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Cassini Spacecraft Uncertainty Analysis Data and Methodology Review and Update Volume 1: Updated Parameter Uncertainty Models for the Consequence Analysis

Timothy A. Wheeler, Gregory D. Wyss, and Frederick T. Harper

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

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Cassini Spacecraft Uncertainty Analysis Data and Methodology Review and Update

Volume 1:

Updated Parameter Uncertainty Models for the Consequence Analysis

Timothy A. Wheeler
Risk & Reliability Analysis Department

Gregory D. Wyss
Risk, Reliability & Modeling Department

Frederick T. Harper
High Consequence Assessment & Technology Department

Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185

Abstract

Uncertainty distributions for specific parameters of the Cassini General Purpose Heat Source Radioisotope Thermoelectric Generator (GPHS-RTG) Final Safety Analysis Report consequence risk analysis were revised and updated. The revisions and updates were done for all consequence parameters for which relevant information exists from the joint project on Probabilistic Accident Consequence Uncertainty Analysis by the United States Nuclear Regulatory Commission and the Commission of European Communities.

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1 Introduction

In support of Lockheed Martin's work to produce the Final Safety Analysis Report (FSAR) for the Cassini GPHS-RTG (Lockheed Martin, 1997), Sandia National Laboratories (SNL) provided input for the quantification of uncertainty associated with several consequence parameters and provided technical assistance in the development of the uncertainty analysis methods. The implementation of the uncertainty analysis is documented in Section 3 of the Volume III Attachment, Set 1 of the Cassini FSAR.

In the Cassini FSAR nine of the consequence parameters were quantified using preliminary information from the joint study of the United States Nuclear Regulatory Commission and the Commission of European Communities (USNRC/CEC) on probabilistic accident consequence uncertainty analysis. The Joint Consequence Uncertainty Project has assembled many of the top experts in the U.S. and Europe to provide uncertainty distributions on many of the parameters required to perform a comprehensive uncertainty study on radiological consequence calculations for terrestrial nuclear power plants. Many of the parameters are relevant to the plutonia dispersal scenarios analyzed in the Cassini GPHS-RTG safety analysis. Experts in the fields of atmospheric dispersion and deposition, ingestion pathways, external dosimetry, internal dosimetry, early health effects, and late health effects have already provided input to the project. Because this was the first major effort to assemble defensible uncertainty distributions in the field of radiological consequences, most of the input provided is unique. The joint study has since been finalized, and this report represents an update, to the state of the art, of the parameter uncertainty models for the eight Cassini FSAR consequence parameters quantified with preliminary data from the USNRC/CEC. Additionally, two more parameters relevant to the Cassini FSAR consequence analysis have been evaluated for uncertainty. The parameters for which uncertainty was reviewed are summarized in Table 1, and the parameter uncertainty models included here represent the current state of knowledge for the uncertainty of these parameters as established in the USNRC/CEC joint study.

For all of the USNRC/CEC elicitations, each expert developed estimates for 5th, 50th, and 95th percentiles of an uncertainty range for the parameter. The elicited values from all of the experts were then aggregated to yield a single uncertainty range. The development of each uncertainty distribution is discussed in Section 2 of this report. The rationale, reasoning, and calculations employed by each expert in developing their estimates are documented in the various USNRC/CEC documents for the joint study (see References). For each Cassini FSAR parameter, the underlying USNRC/CEC data and the recommended uncertainty range and distribution are summarized in Table 2.

Three issues regarding the uncertainty analysis method employed in the Cassini FSAR were raised during the review of that document. These issues, discussed in Section 3, were:

- The appropriateness of maximum entropy distributions for parameter uncertainty.
- Log sampling versus linear sampling of parameter distributions.
- Parameter correlation issues.

Table 1. Cassini FSAR Consequence Parameters Reviewed for Updated State of Knowledge on Uncertainty

Parameter	FSAR Uncertainty Analysis Document	USNRC/CEC Document
Breathing Rate	3.2.4.1	USNRC/CEC, 1998 Appendix E, Question 1
Dry Deposition Velocity Multiplier	3.2.4.2	Cook, 1994 Table E.1.6, p. 170
Health Effects – Total Cancer Risk	3.2.4.3	USNRC/CEC, 1997a Appendix E, Question 11 Data for ^{239}Pu *
Health Effects – Specific Organs: Lung, Bone, Liver	3.2.4.4	USNRC/CEC, 1997a Appendix E, Question 11 Data for ^{239}Pu
Cloud Passage Inhalation Dose Sheltering Factor	3.2.4.10	USNRC/CEC, 1997b Appendix E, Question 11
Fraction of Residents Outside	3.2.4.12	USNRC/CEC, 1997b Appendix E, Question 13
Rural Initial Resuspension Factor	3.2.4.5.3	USNRC/CEC, 1997c Appendix G, Question 5
Urban Initial Resuspension Factor	3.2.4.5.2	USNRC/CEC, 1995 Appendix E
Inhalation Dose Conversion Factor Multiplier	3.2.4.11	USNRC/CEC, 1998 Appendix E, Question 17
Vertical and Horizontal Diffusion Coefficients	N/A	USNRC/CEC, 1995 Appendix E, F, and Cook, 1994, Sec. 4.4, 6, and Appendix E
Fall Velocity	N/A	N/A

* The expert panel provided cancer risk distribution estimates for an exposed population given the inhalation of a specified activity of ^{239}Pu particles in oxide form. The release of plutonium from a potential accident for the Cassini mission would involve ^{238}Pu particles in oxide form. Although the plutonium isotope considered in the USNRC/CEC joint study is not the same as the isotope relevant to the Cassini mission, it is deemed reasonable to apply the expert panel distributions to the Cassini safety analysis for the following reasons:

1. The plutonium in both cases is in oxide form (low solubility in the body) and the metabolic behavior should be similar;
2. The two plutonium isotopes are both alpha particle emitters (high linear energy transfer to tissue), and neither have immediate radioactive decay daughters with largely different radiation emissions;
3. Although the conversion of dose (activity received converted to committed dose) is different for ^{238}Pu and ^{239}Pu , typical inhalation committed dose conversion factor estimates for the two isotopes indicate values within about 20% of each other (Shleien 1992);
4. The expert panel participants cited studies with both ^{238}Pu and ^{239}Pu to obtain cancer induction data for development of their distributions.

It is therefore believed that the differences between ^{238}Pu and ^{239}Pu for cancer fatality risk fall well within the uncertainty ranges provided by the expert panel for ^{239}Pu , and that the cancer risk distributions for ^{239}Pu can be used for ^{238}Pu .

Table 2 Summary of State of Knowledge for Parameter Uncertainty¹

Parameter	Units	Uncertainty Percentiles					Recommended Distribution
		0	5	50	95	100	
Breathing Rate-Adult	L/min	5.5	8.3	13.3	23.5	35.3	
	m ³ /yr	2.9E+03	4.4E+03	7.0E+03	1.2E+04	1.9E+04	Cumulative Linear
Deposition Velocity Multiplier	-	0.02	0.03	1.00	37.0	55.4	Continuous Log
Health Effects ²³⁹ Pu Total Cancers	LCF/10 ⁸ person-K Bq	79	118	1.8E+05	1.9E+06	2.8E+06	
	LCF/person-Rem	9.4E-08	1.4E-07	2.2E-04	2.2E-03	3.4E-03	Continuous Log
Health Effects Specific Organs - ²³⁹ Pu	LCF/10 ⁸ person-K Bq	7.1	10.6	1.5E+05	1.6E+06	2.5E+06	
	LCF/person-Rem	2.2E-09	3.3E-09	4.8E-05	5.1E-04	7.7E-04	Continuous Log
Liver	LCF/10 ⁸ person-K Bq	7.00	10.5	1.2E+04	6.6E+04	9.6E+04	
	LCF/person-Rem	3.3E-09	5.0E-09	5.6E-06	3.0E-05	4.6E-05	Continuous Log
Bone	LCF/10 ⁸ person-K Bq	7.0	10.5	7.0E+03	7.7E+04	1.2E+05	
	LCF/person-Rem	7.4E-10	1.1E-09	7.4E-07	8.1E-06	1.2E-05	Continuous Log
Cloud Passage Inhalation Dose Shielding Factor	-	-	3.2E-02	0.35	1.0	-	
Doors/Windows Open	-	-	9.0E-03	0.125	0.73	-	
Doors/Windows Closed	-	-	-	-	-	-	
Combined INHSF	-	9.0E-03	0.020	0.24	0.88	1.0	Continuous Log
Fraction of Residents Outside	-	0.07	0.11	0.19	0.33	0.50	Cumulative Linear
	-	0.04	0.06	0.10	0.17	0.26	Cumulative Linear
Rural Resuspension Factor	K _{ave} m ⁻¹	-	1.3E-09	7.6E-08	1.8E-05	-	-
Pasture	K _{ave} m ⁻¹	-	1.6E-09	7.6E-08	1.8E-05	-	-
Combined	K _{ave} m ⁻¹	-	1.5E-09	7.6E-08	1.8E-05	-	-

¹ Shaded portions represent units compatible with those of the Cassini FSAR

Parameter	Units	Uncertainty Percentiles					Recommended Distribution
		0	5	50	95	100	
Initial Resuspension Factor	m	1.1E-08	1.7E-08	2.6E-06	6.2E-04	9.3E-04	Continuous Log
Urban Resuspension Factor	K _u , m	-	3.0E-08	1.5E-06	3.6E-04	-	-
Mechanical Driven Average							
Initial Resuspension Factor	m	2.6E-08	4.0E-08	2.1E-06	4.9E-04	7.4E-04	Continuous Log
Dose Conversion Factor Multiplier	-	0.07	0.10	1.00	20.00	30.00	Cumulative Lognormal
Vertical and Horizontal Diffusion Coefficients	m						
Stability Category A/B							
X = 0.5 km	σ_y	38	58	188	581	872	Empirical (See Section 2.10)
	σ_z	5	7	168	1,720	2,580	Empirical (See Section 2.10)
X = 1 km	σ_y	67	101	342	1,140	1,710	Empirical (See Section 2.10)
	σ_z	7	10	282	3,420	5,130	Empirical (See Section 2.10)
X = 3 km	σ_y	165	247	890	3,360	5,040	Empirical (See Section 2.10)
	σ_z	7	110	282	3,420	5,130	Empirical (See Section 2.10)
X = 10 km	σ_y	434	651	2,550	11,000	16,500	Empirical (See Section 2.10)
	σ_z	20	30	1,500	36,700	55,050	Empirical (See Section 2.10)
Stability Category C							
X = 0.5 km	σ_y	28	41	91	194	291	Empirical (See Section 2.10)
	σ_z	4	7	39	153	230	Empirical (See Section 2.10)
X = 1 km	σ_y	49	73	165	378	567	Empirical (See Section 2.10)
	σ_z	7	10	71	305	458	Empirical (See Section 2.10)
X = 3 km	σ_y	121	181	423	1,100	1,650	Empirical (See Section 2.10)

Parameter	Units	Uncertainty Percentiles					Recommended Distribution
		0	5	50	95	100	
Stability Category D	σ_z	13	20	185	921	1,382	Empirical (See Section 2.10)
	X = 10 km.						
	σ_y	325	487	1,200	3,530	5,295	Empirical (See Section 2.10)
	σ_z	28	42	533	3,130	4,695	Empirical (See Section 2.10)
	X = 30 km.						
Stability Category D	σ_y	800	1,200	3,090	10,300	15,450	Empirical (See Section 2.10)
	σ_z	54	80	1,420	9,690	14,535	Empirical (See Section 2.10)
	X = 0.5 km						
	σ_y	18	27	68	163	245	Empirical (See Section 2.10)
	σ_z	3	4	31	211	317	Empirical (See Section 2.10)
Stability Category E/F/G	X = 1 km						
	σ_y	31	47	129	331	497	Empirical (See Section 2.10)
	σ_z	4	6	46	368	552	Empirical (See Section 2.10)
	X = 3 km.						
	σ_y	73	110	353	1,010	1,515	Empirical (See Section 2.10)
Stability Category E/F/G	σ_z	6	9	86	899	1,349	Empirical (See Section 2.10)
	X = 10 km.						
	σ_y	188	282	1,060	3,480	5,220	Empirical (See Section 2.10)
	σ_z	10	15	172	2,380	3,570	Empirical (See Section 2.10)
	X = 30 km.						
	σ_y	443	665	2,930	10,800	16,200	Empirical (See Section 2.10)
Stability Category E/F/G	σ_z	14	22	318	5,850	8,790	Empirical (See Section 2.10)
	X = 0.5 km						
	σ_y	10	15	50	132	198	Empirical (See Section 2.10)
	σ_z	13	20	15	353	530	Empirical (See Section 2.10)

Parameter	Units	Uncertainty Percentiles					Recommended	
		0	5	50	95	100	Distribution	
X = 1 km	σ_y	17	26	190	253	380	Empirical	
	σ_z	17	2.5	20	457	686	(See Section 2.10)	
X = 3 km.	σ_y	41	62	233	709	1064	Empirical	
	σ_z	2.3	3.5	31	693	1,040	(See Section 2.10)	
X = 10 km.	σ_y	105	158	607	2,200	3,300	Empirical	
	σ_z	3.3	5.0	49	1,090	1,635	(See Section 2.10)	
X = 30 km.	σ_y	247	370	1,760	6,210	9,315	Empirical	
	σ_z	4.5	6.8	75	1,640	2,460	(See Section 2.10)	
Fall Velocity							See Section 2.10	

2 Updated Cassini Consequence Uncertainty Parameters

Updated uncertainty ranges for those parameters from the Cassini FSAR consequence analysis that were quantified with preliminary information from the USNRC/CEC joint study are developed in the following sections.

2.1 *Quantification of Distribution Endpoints*

The experts who participated were not asked to develop estimates of the uncertainty range end points. There is debate in the arena of decision sciences as to the validity of bounds elicited from expert panels. Thus, it was necessary to provide the 0th and 100th percentiles for parameters where a physical rationale was not available to select these values. A systematic mathematical approach was used as follows.

To obtain the 0th percentile:

- Divide the 50th percentile value by the 5th percentile value to get (A).
- Multiply (A) by 3/2 to get (B).
- Divide the 50th percentile value by (B) to get the 0th percentile value.

To obtain the 100th percentile:

- Divide the 95th percentile value by the 50th percentile to get (A).
- Multiply (A) by 3/2 to get (B).
- Multiply the 50th percentile value by (B) to get the 100th percentile value.

2.2 *Breathing Rate*

There is much information and much agreement on the breathing rates of individuals during specific activities. Breathing rates while sleeping were given in Kohlhasse, 1996, ranging from 2400 - 4700 m³/yr. for females and 3200 - 6800 m³/yr. for males. Breathing rates for light exercise can range from 7400 - 15800 m³/yr. for females and 11600 - 23700 m³/yr. for males.

Estimation of the average ventilation rate is more problematic. The uncertainty in ventilation rates was assessed by the Internal Dosimetry Panel of the Joint USNRC/CEC Consequence Uncertainty Study (USNRC/CEC, 1998). The Internal Dosimetry Panel consisted of the following members:

M. Bailey, U.K.
Keith Eckerman, U.S.
A. James, U.S.
R. Leggett, U.S.
I. Likhtarev, Ukraine
H. J. Metivier, France
D. Nosske, Germany
N. Priest, U.K.
D. M. Taylor, U.K.

The largest contributor to uncertainty discussed by most of the joint USNRC/CEC experts was the uncertainty in determining the normal daily ventilation rate. Although each expert was free to derive breathing rate estimates by whatever rationale and basis each thought best, two sources were frequently cited by several members of the panel. The first of these sources is ICRP-66 (ICRP, 1994), which makes assumptions on the amount of time spent sleeping, sitting, engaged in light exercise, engaged in heavy exercise, engaged in sedentary work, and engaged in heavy work in order to calculate an average ventilation rate. The second source is Layton (Layton, 1993), who proposed an approach based on oxygen requirements fixed by well-established age and gender specific energy expenditure rates. The "time budget" assumptions used in ICRP-66 have been the most common method used for the past few decades. This method uses the specific information on ventilation rates during activities and relies on estimates of the mix of activities in which the average person participates. It is the estimate of how the "average" or "reference" individual spends time that contributes most of the uncertainty. The breathing rate uncertainty results aggregated across all of the experts was:

Percentile	5 th	50 th	95 th
Average Adult Breathing Rate (m ³ /yr.)	4360	6900	12,400

2.3 Particle Deposition Velocity Uncertainty Multiplier

The deposition velocity uncertainty multiplier for the SPARRC model of the Cassini FSAR (Appendix I of Lockheed Martin, 1997) was developed from information generated by the USNRC/CEC Consequence Uncertainty Deposition Panel. The results of the joint study deposition velocity elicitation are documented in Cook, 1994, which supercedes the actual USNRC/CEC document relevant to this parameter (USNRC/CEC, 1995). The work documented in Cook, 1994 represents a revision in the method by which the elicitations of the expert panel members were aggregated. The publication date of Cook, 1994 precedes the publication of the USNRC/CEC document. This is an artifact of the process by which the USNRC/CEC documentation was reviewed prior to publication. The deposition panel (USNRC/CEC, 1995) consisted of the following members:

John Brockmann, U.S.
Sheldon Friedlander, U.S.
John Garland, U.K.
Jozef Pacyna, Norway
Joern Roed, Denmark
Richard Scorer, U.K.
George Sehmel, U.S.
Sean Twomey, U.S.

Dry deposition velocities based on deposition panel information are summarized for urban, meadow, and forest conditions as shown in Table 3. Wind speeds of 2 and 5 meters per second and particle sizes of 0.1, 0.3, 1, 3 and 10 μm were included in this sample of the potential

Table 3. USNRC/CEC Updated Deposition Velocities for Aerosols

Wind Speed	Particle Size (μm)	Percentile	Surface Type		
			Urban (cm/sec)	Meadow (cm/sec)	Forest (cm/sec)
2 m/s	0.1	5	0.001	0.001	0.003
		50	0.850	0.054	0.148
		95	2.958	0.928	5.984
	0.3	5	0.001	0.001	0.002
		50	0.055	0.040	0.111
		95	1.965	0.578	5.344
	1	5	0.002	0.002	0.008
		50	0.093	0.072	0.233
		95	3.294	1.271	6.116
	3	5	0.009	0.021	0.052
		50	0.290	0.277	0.828
		95	11.266	6.037	39.923
	10	5	0.104	0.103	0.356
		50	0.970	1.041	2.396
		95	48.447	22.071	409.000
5 m/s	0.1	5	0.003	0.002	0.006
		50	0.147	0.077	0.193
		95	3.159	1.681	17.100
	0.3	5	0.002	0.002	0.004
		50	0.093	0.059	0.127
		95	2.136	0.984	16.935
	1	5	0.006	0.005	0.008
		50	0.193	0.113	0.356
		95	3.749	2.600	17.635
	3	5	0.023	0.042	0.075
		50	0.606	0.554	1.491
		95	17.128	8.165	148.400
	10	5	0.111	0.113	0.422
		50	1.526	1.889	4.741
		95	106.300	34.967	1568.000

distributions. The algorithm by which these data were converted into deposition velocity multipliers is shown in Table 4. As shown in Table 4, data were normalized to the median value for each terrain type, wind speed, and particle size. These particle size-dependent average ratios were then averaged over each particle size for the two wind speeds evaluated and then averaged over both wind speeds. The standard deviation in the 0.95 quantile (95th percentile) for this case was still quite large, as shown in Table 4. However, if the 10 μm particle size was deleted from these averages the standard deviation dropped substantially. For particles with a density of 9.8 g/cm^3 , the gravitational settling velocity should be dominant for particles 10 μm or larger. Thus, the distribution parameters for the 5th and 95th percentiles were estimated using the averages

Table 4 Single Deposition Velocity Multiplier Calculation

Wind speed = 2 m/s

Particle Size (µm)	Percentile	Urban (cm/sec)	Ratio Percentile to Median	Meadow (cm/sec)	Ratio Percentile to Median	Forest (cm/sec)	Ratio Percentile to Median	Average Over Land Type	Standard Deviation
0.1	5	0.001	0.002	0.001	0.022	0.003	0.023	0.016	0.012
	50	0.850	1.000	0.054	1.000	0.148	1.000	1.000	0.000
	95	2.958	3.478	0.928	17.228	5.984	40.395	20.367	18.658
0.3	5	0.001	0.021	0.001	0.028	0.002	0.021	0.023	0.004
	50	0.055	1.000	0.040	1.000	0.111	1.000	1.000	0.000
	95	1.965	35.643	0.578	14.274	5.344	48.050	32.656	17.085
1	5	0.002	0.025	0.002	0.031	0.008	0.036	0.031	0.005
	50	0.093	1.000	0.072	1.000	0.233	1.000	1.000	0.000
	95	3.294	35.396	1.271	17.618	6.116	26.242	26.419	8.890
3	5	0.009	0.032	0.021	0.075	0.052	0.063	0.057	0.022
	50	0.290	1.000	0.277	1.000	0.828	1.000	1.000	0.000
	95	11.266	38.838	6.037	21.826	39.923	48.225	36.296	13.382
10	5	0.104	0.108	0.103	0.099	0.356	0.149	0.118	0.027
	50	0.970	1.000	1.041	1.000	2.396	1.000	1.000	0.000
	95	48.447	49.947	22.071	21.204	409.000	170.704	80.618	79.329

Overall Average by Particle size for 2 m/s

5	0.04892733	0.04175657
50	1	0
95	39.2712542	23.8995364

Wind speed = 5 m/s

Particle Size (µm)	Percentile	Urban (cm/sec)	Ratio Percentile to Median	Meadow (cm/sec)	Ratio Percentile to Median	Forest (cm/sec)	Ratio Percentile to Median	Average Over Land Type	Standard Deviation
0.1	5	0.003	0.017	0.002	0.030	0.006	0.032	0.026	0.008
	50	0.147	1.000	0.077	1.000	0.193	1.000	1.000	0.000
	95	3.159	21.560	1.681	21.720	17.100	88.697	43.992	38.716
0.3	5	0.002	0.025	0.002	0.038	0.004	0.028	0.030	0.007
	50	0.093	1.000	0.059	1.000	0.127	1.000	1.000	0.000
	95	2.136	22.954	0.984	16.612	16.935	133.614	57.727	65.796
1	5	0.006	0.029	0.005	0.048	0.008	0.023	0.034	0.013
	50	0.193	1.000	0.113	1.000	0.356	1.000	1.000	0.000
	95	3.749	19.397	2.600	23.042	17.635	49.467	30.635	16.410
3	5	0.023	0.038	0.042	0.076	0.075	0.050	0.055	0.019
	50	0.606	1.000	0.554	1.000	1.491	1.000	1.000	0.000
	95	17.128	28.262	8.165	14.746	148.400	99.560	47.523	45.569
10	5	0.111	0.073	0.113	0.060	0.422	0.089	0.074	0.015
	50	1.526	1.000	1.889	1.000	4.741	1.000	1.000	0.000
	95	106.300	69.679	34.967	18.516	1568.000	330.745	139.647	167.461

Overall Average by Particle size for 5 m/s

5	0.04368874	0.0200536
50	1	0
95	63.9047723	43.4359564

Averaging over both wind speeds

5	0.04630803	0.03100473
50	1	0
95	51.5880132	35.5097891

Neglecting large particle size(i.e. >=10) and averaging over both wind speeds

5	0.03386977	0.01449959
50	1	0
95	36.951888	12.1754504

Direct average of all data points rather than horizontal/vertical average(d<10)

5	0.034	0.0175114
50	1	0
95	36.951888	30.4010532

without the 10 μm particle size data. This uncertainty modeling approach assumes that the SPARRC model is a good estimator of the median deposition velocity. This approach simplified the deposition rate uncertainty into a single parameter used to multiply the SPARRC generated deposition velocity for particle diameters less than 10 μm . The 0th and 100th percentiles were estimated as described previously in Section 2. This approach adjusts the deposition velocity of all particles below 10 μm in a given observation by the same multiplication factor.

2.4 Health Effects Estimators for Total Cancer Risk

The information on dose-response relationships and dose rate effects for humans are limited and subject to many uncertainties. The most often cited source of risk estimation is the study of Japanese A-bomb survivors. The components contributing to the uncertainty in the health effects factor can be attributed to the following sources:

- Statistical uncertainty,
- Dosimetric uncertainty,
- Population transfer uncertainty,
- Projection uncertainty,
- Uncertainty in Dose and Dose Rate Effectiveness Factor (DDREF),
- Uncertainty in Relative Biological Effectiveness (RBE).

In the above, the uncertainty of population transfer is the uncertainty introduced by applying the risks from A-bomb survivors (or any other population) to the relevant population at risk. The uncertainty in the dose rates and the population transfer are usually considered to be the dominant contributors.

Dosimetric uncertainty is related to the estimates of health effects of A-bomb survivors which include possible errors or bias in the dose estimation, uncertainty in shielding characterization and uncertainty in neutron RBE. This uncertainty is not associated with the uncertainty in the dose conversion factors, which might involve factors such as the chemical form of the radioisotope or the transport across the organ surfaces.

The Joint USNRC/CEC accident consequence uncertainty analysis elicited an expert panel for estimates on the latent cancer health effects from radiation exposure (USNRC/CEC, 1997a). Members of the panel were:

Maria Blettner, Germany
Lothar Kreienbrock, Germany
Monty W. Charles, UK
Richard Wakeford, UK
Ethel S. Gilbert, USA
Jerome S. Pushin, USA
Warren Keith Sinclair, USA
Robert L. Ullrich, USA

Micheal Vaeth, Denmark

The expert panel was elicited on the following joint issue of dosimetry and late effects: *“The number of radiation-induced cancer deaths up to 40 years following exposure in a population of a hundred million persons (5×10^7 male, 5×10^7 female) each of whom inhales 10 K Bq of the radionuclides specified.”* The experts were asked to develop health effect estimates for, among other radionuclides, ^{239}Pu . The USNRC/CEC requested elicitations in terms of Fatalities/10 K Bq for a population of 100,000,000 persons. These elicitations were converted to Fatalities/person-rem for consistency with the Cassini FSAR. Conversion factors were taken from Shleien, 1992. The aggregate data for ^{239}Pu from this elicitation is:

Percentiles	5 th	50 th	95 th
Fatalities/rem	1.4×10^{-7}	2.2×10^{-4}	2.2×10^{-3}

2.5 Health Effects – Specific Organs

In this analysis, the specific organs considered for the calculation of health effects due to internal exposure to alpha emitters are those recommended by the BEIR IV committee, i.e., lung, liver and bone surface (NAS, 1990). The BEIR committee considers as highly uncertain the projection of the cancer mortality risk for other tissues.

The Joint USNRC/CEC accident consequence uncertainty analysis elicited the same expert panel that was elicited for total cancer health effects discussed in Section 4 for health effects specific to three organs, lungs, bone surface, and liver (USNRC/CEC, 1997a). The expert panel was elicited on the joint issue of dosimetry and late effects for specific organs as for total cancers: *“The number of radiation-induced cancer deaths up to 40 years following exposure in a population of a hundred million persons (5×10^7 male, 5×10^7 female) each of whom inhales 10 K Bq of the radionuclides specified.”* As before, the experts were asked to develop health effect estimates for, among other radionuclides, ^{239}Pu . The USNRC/CEC requested elicitations in terms of Fatalities/10 K Bq for a population of 100,000,000 persons. These elicitations were converted to Fatalities/person-rem for consistency with the Cassini FSAR. Conversion factors were taken from Shleien, 1992, for lung, and from USDOE, 1988 for liver and bone surface. Shleien, 1992 has no dose conversion factors for bone surface or liver.

The aggregate data for ^{239}Pu from this elicitation is:

Percentile	5 th	50 th	95 th
Lungs	3.3×10^{-9}	4.8×10^{-5}	5.1×10^{-4}
Liver	5.0×10^{-9}	5.6×10^{-6}	3.0×10^{-5}
Bone	1.1×10^{-9}	7.4×10^{-7}	8.1×10^{-6}

2.6 Cloud Passage Inhalation Dose Sheltering Factor (INHSF) for Plutonium

The Joint USNRC/CEC accident consequence uncertainty analysis elicited an expert panel for estimates on the cloud passage Inhalation Dose Sheltering Factor (INHSF) (USNRC/CEC, 1997b). The members of the panel were as follows:

M. Balonov, Russia
A. Bouville, U.S.
J. Brown, U.K.
M. Crick, Austria
E. Gallego, Spain
P. Jacob, Germany
O. Kralberg, Sweden
I. Likhtarev, Ukraine
K. Miller, U.S.
J. Roed, Denmark

The expert panel was elicited on the following question: *What is the ratio of the Time Integrated Air Concentration (TIAC) indoors to that outdoors, given an outdoor value of 1 Bq s m⁻³ for Pu-240 (particulate, representative of $\approx 10 \mu\text{m}$), Cs-137 (particulate, representative of $\approx 1 \mu\text{m}$), and I-131 (gaseous, forms I₂ and CH₃I) for two situations: (i) doors or windows normally open for ventilation and (ii) all doors and windows closed?* The aggregated uncertainty estimates for both parameters (doors open and doors closed) for ²⁴⁰Pu are presented in Table 5.

The distributions for the open and closed window cases presented above were averaged, weighting the open and the closed cases equally. The 0th and 100th percentile values represent the smallest and the largest values of the two distributions. The distribution used for the inhalation-sheltering factor, INHSF, based on the above information is:

Percentiles	0 th	5 th	50 th	95 th	100 th
INHSF	9x10 ⁻³	2x10 ⁻²	0.24	0.88	1.0

2.7 Fraction of Residents Outside

Questions concerning the behavior of populations were asked of the deposited material and related doses panel (DEPMAT panel) as part of the Joint USNRC/CEC Consequence Uncertainty Study (USNRC/CEC, 1997b) and are relevant to this parameter.

The Joint USNRC/CEC accident consequence uncertainty analysis elicited an expert panel for estimates on the amount of time that an "average" member of the population would be expected to spend indoors in various types of structures (USNRC/CEC, 1997b). Thus, this elicitation was evaluated for its applicability to an estimate of the uncertainty of the fraction of time that an "average" individual would spend outside.

Table 5 TIAC Indoors/Outdoors Ratio

Percentiles	5 th	50th	95th
Doors Or Windows Normally Open for Ventilation:			
	0.03	0.35	1.03
All Doors and Windows Closed:			
	0.0090	0.12	0.73

The expert panel was elicited on the following question: *“What is the long-term annual-average fraction of time that an “average” member of the population in your country spends indoors in various types of housing and in cars or buses?”* The types of structures considered are:

- Low shielding , e.g., wooden framed houses,
- Medium shielding, e.g., single brick family house,
- High shielding, e.g., multi-story office block,
- Basement of single family house,
- Basement of multi-story office block,
- Inside typical car,
- Inside typical bus.

The individual experts developed uncertainty ranges for the fraction of time spent in each structure type for eight different population groups:

- Outside workers in urban environments,
- Outside workers in rural environments,
- Inside workers in urban environments,
- Inside workers in rural environments,
- Non-active persons in urban environments,
- Non-active persons in rural environments,
- School children in urban environments, and
- School children in rural environments.

Each expert was also elicited for point estimates on the percent of the population in that expert’s country that fit into each population category. The population estimates and the uncertainty estimates for time spent indoors by each population group in each type of structure were then aggregated across all of the population groups to yield a single uncertainty range for the fraction of time spent by an “average” person inside for each structure type. The results for each expert were then aggregated together to yield a final uncertainty range of the time spent indoors by an “average” person in the seven different structure types.

It is assumed here that the seven structure types defined above represent the entire spectrum of indoor environments in which one might spend time. However, the issue of correlation between

the seven different random variables defined in this elicitation was not discussed or documented in USNRC/CEC, 1997b. Thus, it is statistically meaningless to derive an uncertainty range for the total fraction of time that an "average" person is expected to spend indoors from the seven uncertainty ranges. In fact, when the seven distributions were sampled as independent random variables, a large fraction of the observations resulted in non-physical results wherein an average person was found to be indoors more than 100 percent of the time. Such results were also observed even when a large negative correlation was artificially introduced between the two random variables with the greatest medians.

Consequently, one cannot develop an uncertainty range on the total fraction of time spent outdoors by an "average" person directly from the aggregated uncertainty ranges in USNRC/CEC, 1997b. However, in the process of developing uncertainty ranges for the time spent in each structure type for each of the eight population groups, each expert developed point estimates for the fraction of time spent in each structure type. These point estimate values can be meaningfully combined to yield a point estimate for the total fraction of time spent indoors (and hence the total fraction of time spent outdoors) for an "average" member of the population. The result of such a combination of point estimates equally weighted across all of the experts is:

Fraction of time spent outdoors by an "average" member of the population = 0.19

To establish an uncertainty range on this estimate, the uncertainty ranges for all of the elicitations regarding this parameter in the joint USNRC/CEC study were evaluated to determine a representative range factor (the ratio of the 95th to the 5th percentile) that could be applied to this estimate as the 50th percentile of an uncertainty range. Seven experts were elicited for this parameter, and each expert developed 56 distributions (eight population groups and seven different structure types). The median range factor for all 392 uncertainty ranges was 3.0. Thus, treating the point estimate as the 50th percentile of an uncertainty range, it is reasonable to establish a range factor of 3 for the parameter's uncertainty range. This yields 5th and 95th percentiles of 0.11 and 0.33 respectively.

Since it is more likely that the launch at Kennedy Space Center (KSC) would be nearer midnight than 7 am, a nighttime multiplier of 0.5 is applied to the local residents for cloud passage to account for the reduced number of individual outdoors in the middle of the night. The aggregated uncertainty ranges for the worldwide population and the KSC area are:

Percentile	5 th	50 th	95 th
Worldwide	0.11	0.19	0.33
KSC	0.06	0.10	0.17

2.8 Urban (KRES0) and Rural (KRURAL) Resuspension Factors

Resuspension can be an important process, particularly soon after a deposit under dry, windy conditions in open areas. Humid, vegetated environments such as Florida should tend to suppress resuspension. There has been a long-standing recognition that resuspension is also the pathway of principal importance for long-term exposures subsequent to a plutonium release and dispersal

accident. Resuspension is influenced by many variables and thus measurements have exhibited variations extending over several orders of magnitude.

2.8.1 Exploration of Uncertainty in Resuspension Factors

Three sources of information were used to obtain the uncertainty in resuspension factors to provide the basis for the resuspension factor distributions. The three sources are as follows:

- a) The information provided on alternate resuspension factors in the SPARRC methods documents, as described in Appendix I of the Cassini FSAR (Lockheed Martin, 1997).
- b) The uncertainty information from a panel of U.S. and European experts participating in a Joint USNRC/CEC Consequence Uncertainty Study ((USNRC/CEC, 1995). In this study, a library of general distributions was gathered for many phenomenological areas to assist the consequence community in specific uncertainty studies. Although not all parameters can be assessed generically, valuable information is available from this study for many parameters such as resuspension, deposition velocity, health effects, dosimetry, etc. The areas of concern were southeastern U.S., northeastern U.S., and northern Europe (since it is believed that resuspension is somewhat less in these areas than in arid conditions, due to wetter, more heavily vegetated conditions). The resuspension information from this study was deemed applicable to the uncertainty analysis for the Cassini SAR.
- c) Information obtained from experimental data processed to obtain insights for the current Cassini mission.

Generally, the information from the above sources comes in the form of an average resuspension factor for certain time periods (one year, or one half year). The distributions for the average resuspension factor for the first year are not in the form that can be used by SPARRC in an uncertainty analysis (the average resuspension factor is not a SPARRC input parameter). In order to perform the uncertainty analysis, it was necessary to process the distributions for the short term average resuspension factor to obtain distributions on one or more of the input parameters for the SPARRC resuspension models. The average resuspension factor for the first year, calculated using the SPARRC resuspension model, was forced to match the average resuspension factor for the first year obtained from the above sources by varying the initial resuspension value in the SPARRC models. This was done several times to obtain the 5th, 50th, and 95th percentile values for the initial resuspension value for both rural and urban resuspension models in SPARRC. The SPARRC models were then allowed to extrapolate the uncertainty behavior beyond the first year.

2.8.1.1 Range of Resuspension Factors from SPARRC Documentation

The range of the average resuspension factor for 180 days is from 4×10^{-5} to 2×10^{-8} . An uncertainty of two or more orders of magnitude is implied when the models for rural resuspension values are evaluated (see Appendix I, Figure I.4-1, Lockheed Martin, 1997). The average resuspension factor (m^{-1}) for 180 days ranges from a high of about 4×10^{-5} in Anspaugh's

model (Anspaugh, 1975) to a low of about 2×10^{-8} in the INSRP model (INSRP, 1993). The INSRP model was selected in this study because there are several factors in the KSC/CCAS region that should tend to suppress resuspension including high humidity, high annual rainfall rate, and dense vegetation. The average resuspension factor was calculated by integrating the model over 180 days and then dividing by 180.

2.8.1.2 Range of Resuspension Factors in Joint USNRC/CEC Consequence Uncertainty Study

The experts that took part in this process were as follows (USNRC/CEC, 1997c):

J. Garland, U.K.
 R. Kirchmann, Belgium
 M. Frissel, Netherlands
 G. Prohl, Germany
 G. Shaw, U.K.
 W. Whicker, U.S.

Two questions requesting integrated resuspension factors were as follows:

- 1) *What is the resuspension factor over the entire growing period of a typical surface crop which results from resuspension of a fresh deposit to soil by wind driven processes?*
- 2) *What is the resuspension factor for pasture grass which results from resuspension of a fresh deposit to soil by wind driven processes? (For grass, the integration time for the calculation of the resuspension factor should be taken as 6 months.)*

In the Joint Consequence Uncertainty Study, the resuspension factor was defined as the air concentration at a height of 1 meter above the ground deposit in units of m^{-1} . Soil type, weather conditions, particle size, time dependence of uncertainty distributions are examples of phenomena that are included in the uncertainty distributions. Typically it is assumed that the resuspension factor is averaged over the entire growing period of the vegetation, which was assumed to be 6 months for pasture grass. No value is provided for the surface crops. Only wind-driven processes are considered. The aggregated results from the USNRC/CEC study (USNRC/CEC, 1997) are presented below:

Percentile	5 th	50 th	95 th
Surface Crop	1.3×10^{-9}	7.6×10^{-8}	1.8×10^{-5}
Pasture Grass	1.6×10^{-9}	7.6×10^{-8}	1.8×10^{-5}

The measure of uncertainty reported in the documentation is the range factor, which is defined as the 95th percentile value divided by the 5th percentile value. There were extremely large range factors for the resuspension factors and the 50th percentile value was close to the 5th percentile value. This is an indication that the experts cannot discount the possibility of very high resuspension values.

2.8.1.3 Experimental Data Processed for Cassini Uncertainty Approach

Resuspension data found in the literature are summarized in this section. Some of the data were taken for wind-driven processes. Other data are for mechanically driven processes and are presented for comparison.

The summary distributions are derived from hundreds of literature sources and were obtained by using a stepwise processing method as described below.

1. Begin with a set of measured or estimated resuspension factors or ranges of resuspension factors. It is assumed that these data are "consistent", that is, that they were obtained using the same set of assumptions. The "consistency" can be checked qualitatively. In this case the measure of "consistency" is the degree of overlap among the values and/or ranges of values.
2. Perform a unit-weighted sum over the data in the set. This will provide a distribution of values for the resuspension factor, for that set. The distribution is a more quantitative measure of the consistency of the data set. It will often resemble a Gaussian distribution, indicating good overlap with few if any outliers.
3. Obtain an integrated distribution for the data set. If the distribution is nearly Gaussian, then the integrated distribution will resemble the familiar S-shaped curve.
4. Use the integrated distribution for the data set to estimate the 5th, 50th, and 90th percentiles.

A summary of resuspension factor (RF) data is provided in Table 6. In this section, the percentile values refer to the percentile of data points observed and are not equivalent to the subjective percentile distributions discussed earlier.

2.8.2 Rural Resuspension Parameter Distributions

The model used for resuspension in rural environments in SPARRC is the INSRP model (INSRP, 1993):

$$K(t) = at^{-1} + b \quad (1)$$

Where:

- $K(t)$ $\equiv$ the instantaneous rural resuspension factor,
- a $\equiv$ the initial value of the resuspension factor,
- b $\equiv$ the long term value of the resuspension factor, and
- t $\equiv$ the time in days.

Table 6. Summary of Wind and Mechanically Driven Resuspension Literature RF Values

Percentiles	5 th	50 th	95 th	Reference	Comment
<i>Wind driven resuspension summary</i>					
	6.9x10 ⁻¹⁰	1.0x10 ⁻⁷	8.4x10 ⁻⁶	Randerson, 1984	1)
	7.2x10 ⁻¹⁰	9.2x10 ⁻⁸	8.0x10 ⁻⁶	Mishima, 1993	2)
	9.7x10 ⁻⁸	8.9x10 ⁻⁶	8.1x10 ⁻⁴	USNRC, 1975	3)
	1.3x10 ⁻¹¹	1.1x10 ⁻⁹	1.2x10 ⁻⁵	USNRC, 1975	4)
	2.6x10 ⁻⁹	1.6x10 ⁻⁸	9.6x10 ⁻⁸	Garland, 1994	5)
	2.7x10 ⁻¹⁰	5.0x10 ⁻⁹	3.1x10 ⁻⁸	Garland, 1994	6)
	2.6x10 ⁻⁹	1.6x10 ⁻⁸	9.8x10 ⁻⁸	Garland, 1994	7)
	2.6x10 ⁻¹⁰	2.8x10 ⁻⁹	3.1x10 ⁻⁸	Garland, 1994	8)
<i>Mechanically driven resuspension summary</i>					
	5.1x10 ⁻⁹	7.5x10 ⁻⁶	6.7x10 ⁻³	Randerson, 1984	9)
	6.8x10 ⁻⁹	7.1x10 ⁻⁶	5.0x10 ⁻³	Mishima, 1993	10)
	4.0x10 ⁻⁵	6.3x10 ⁻⁴	8.9x10 ⁻³	USNRC, 1975	11)
	8.0x10 ⁻⁶	4.5x10 ⁻⁴	3.9 x10 ⁻³	USNRC, 1975	12)
1)	21 entries	-	measured at various sites including Nevada Test Site, Rocky Flats, Palmares, etc.		
2)	20 entries	-	field conditions and particle size not recorded		
3)	13 entries	-	applicable for arid/desert climate		
4)	10 entries	-	Semi-arid/grassland conditions		
5)	20 entries-	European sites from July 1986 to June 1987 following Chernobyl accident			
6)	20 entries-	European sites from July 1987 to June 1988 following Chernobyl accident			
7)	7 entries-	U.K. stations from July 1986 to June 1987			
8)	7 entries-	U.K. stations from July 1987 to June 1988			
9)	49 entries-	Various conditions including interiors such as an unventilated room and outside due to vehicular traffic			
10)	50 entries-	field conditions are not well documented			
11)	6 entries-	urban/suburban conditions - time-dependent behavior not given			
12)	8 entries-	interior conditions			

The input distributions reflecting uncertainty in the resuspension factor (K) are based on information from the joint USNRC/CEC consequence uncertainty study (USNRC/CEC, 1997c). Information on the resuspension factor from both the USNRC/CEC uncertainty study is in the form of an average resuspension factor. To obtain the average resuspension Equation (1) is integrated and divided by the appropriate time interval:

$$K_{avg} = \frac{\left(a \int_{t_1}^{t_2} \frac{dt}{t} + b \int_{t_1}^{t_2} dt \right)}{(t_2 - t_1)} \quad (2)$$

where:

K_{avg} $\equiv$ the average resuspension factor

a $\equiv$ the initial value of resuspension factor (m^{-1})

b $\equiv$ the long term value of resuspension factor (m^{-1})

t_1 $\equiv$ the initial time, and

t_2 $\equiv$ the final time.

After integration, this becomes:

$$K_{avg} = \frac{[a(\ln(t_2) - \ln(t_1)) + b(t_2 - t_1)]}{(t_2 - t_1)} \quad (3)$$

The long term resuspension factor, b , is taken to be a constant and known quantity, and is set equal to $1 \times 10^{-9} m^{-1}$. In order to obtain the distributions necessary to perform the uncertainty analysis using SPARRC, the information on the average resuspension factor must be processed to obtain uncertainty information for the quantity a . Information is available for the 5th, 50th, and 95th percentiles for the average resuspension factor from USNRC/CEC, 1997c. In order to obtain the uncertainty range for a , it is necessary to solve for a at each percentile value from USNRC/CEC.

Eq. (3) is solved for a where:

$t_1 = 1$ day, the initial time (a value of $t_1 = 0$ would result in an infinite value for the instantaneous resuspension factor, $K(t)$, in Eq. (1)),

$t_2 = 183$ days, the length of the growing season, and

K_{avg} is quantified at the 5th, 50th, and 95th percentiles from USNRC/CEC as:

Percentile	5 th	50 th	95 th
Surface Crop	1.3×10^{-9}	7.6×10^{-8}	1.8×10^{-5}
Pasture Grass	1.6×10^{-9}	7.6×10^{-8}	1.6×10^{-5}

These two terms are averaged at each percentile to yield an uncertainty range for the average wind driven resuspension factor:

Percentile	5 th	50 th	95 th
Average resuspension factor (m^{-1})	1.5×10^{-9}	7.6×10^{-8}	1.6×10^{-5}

These values, when assumed to be an average for the first year, are applied to Eq. (3) for K_{ave} and the resulting uncertainty range for a , the initial resuspension factor, is:

Percentile	5 th	50 th	95 th
Initial resuspension factor (m^{-1})	1.7×10^{-8}	2.6×10^{-6}	6.2×10^{-4}

2.8.3 Urban Resuspension Parameter Distributions

The model used for resuspension in urban environments in SPARRC is the WASH-1400 model (USNRC, 1997):

$$K(t) = ae^{-bt} + c \quad (4)$$

Where:

- $K(t) \equiv$ the instantaneous urban resuspension factor,
- $a \equiv$ the initial value of the resuspension factor,
- $b \equiv$ the decay rate constant (yr^{-1}), assumed to be 0.6769 in Lockheed Martin 1997,
- $c \equiv$ the long term value of the resuspension factor, and
- $t \equiv$ time in years.

The input distributions reflecting uncertainty in the resuspension factor (K) are based on information from the joint USNRC/CEC consequence uncertainty study (USNRC/CEC, 1997c). The information available from the USNRC/CEC uncertainty study is in the form of an average resuspension factor. To obtain the average resuspension the above expression is integrated and divided by the appropriate time interval.

$$K_{avg} = \frac{\left(\int_{t_1}^{t_2} [a \exp(-bt) + c] dt \right)}{(t_2 - t_1)} \quad (5)$$

Where:

After integration, this becomes

$$K_{avg} = \frac{\left(\frac{a \exp(-bt_1)}{b} - \frac{a \exp(-bt_2)}{b} + ct_2 - ct_1 \right)}{(t_2 - t_1)} \quad (6)$$

In order to obtain the uncertainty ranges necessary to perform the uncertainty analysis using SPARRC, information on the average resuspension factor must be applied to Eq. (6) to obtain uncertainty information for the quantity a , b , and c . Information is available for the 5th, 50th, and 95th percentiles for the average resuspension factor. In order to obtain the joint distribution for a , b , and c , it would be necessary to solve for a , b , and c at each percentile value. This is an under-constrained problem and assumptions regarding the behavior of the three variables are necessary. Because most of the information available is short-term information (i.e., average resuspension factors for a year or less), the uncertainty in the resuspension factor is represented by the uncertainty in a , the initial value of the resuspension factor. The rate of decrease in the WASH-1400 model is assumed here to be reasonable, thus, $b = 0.6769 \text{ (yr}^{-1}\text{)}$ (USNRC, 1977). The long-term value of resuspension factor, c , is taken to be a constant and known quantity, and is set equal to $1 \times 10^{-9} \text{ m}^{-1}$.

The high values of the resuspension factors in Table 6 ($>1 \times 10^{-3}$) in various mechanically driven resuspension distributions come from two sources: measurements of resuspension in unventilated and ventilated rooms, and short term measurements of resuspension due to vehicular and pedestrian traffic on asphalt (Mishima, 1993 and Sehmel, 1984). The indoor measurements result in higher resuspension values than for outdoors due to the reduced dispersion of the particulate. The indoor measurements are not directly applicable to the Cassini safety analysis.

The time dependence of the resuspension factor has been a somewhat controversial issue. However, it appears the higher resuspension values tend to decrease faster than lower resuspension values. The following two examples support this:

- 1) The relatively high resuspension factors measured on the asphalt experiments were reduced by an order of magnitude in four days (Sehmel, 1984).
- 2) Mihaila and Cuculeanu assessed the time dependence using a four parameter function of the resuspension factor for five sites on the Romanian territory following deposition from the Chernobyl accident (Mihaila, 1994). A comparison was made to actual data for five years following the accident. The sites with the higher resuspension factors had higher short-term removal rates, which resulted in a faster decline in the resuspension factor. This behavior was verified using the measured data.

For the reasons outlined above, the higher resuspension factors observed in the literature and summarized in Table 6 are not considered representative of an average urban resuspension factor. Due to the large effort to assess the wind driven resuspension factor expended over the years, and the uncertainty information available from the USNRC/CEC uncertainty project (USNRC/CEC, 1997c), a high degree of confidence is placed on the wind driven uncertainty ranges in USNRC/CEC distributions provided above. The wind driven resuspension distributions from USNRC/CEC, 1997c will therefore serve as a starting point for the mechanically driven (urban) uncertainty ranges.

It is generally agreed that the mechanically driven resuspension factor is higher than the wind driven resuspension factor. The higher measured values of mechanically driven resuspension factors are two orders of magnitude higher than the upper values of the wind driven resuspension

(Table 6). However, these may not be entirely relevant for the reasons described above. Garland observed a factor of 20 difference between a car park at Harwell (mechanically driven resuspension) and a field one kilometer away (wind driven resuspension) (Garland, 1994).

The average resuspension factors obtained for the wind driven case (Section 3.8.2) are multiplied here by a factor of 20 to obtain the average resuspension factor for the mechanically driven case. It is recognized that the factor of 20 comes from one source, but the resultant distribution appears consistent with the published data obtained when modified to account for the localized and transient nature of the measurements.

The following distribution is used for the average mechanically driven resuspension factor.

Percentile	5 th	50 th	95 th
Average resuspension factor (m^{-1})	3.0×10^{-8}	1.5×10^{-6}	3.6×10^{-4}

These values, when assumed to be an average for the first year, were applied to Eq. (6) and result in the following percentiles for α , the initial resuspension factor.

Percentile	5 th	50 th	95 th
Initial resuspension factor (m^{-1})	4.0×10^{-8}	2.1×10^{-6}	4.9×10^{-4}

2.9 Inhalation Dose Conversion Multiplier

The dose conversion factors (DCFs) relevant to radioisotope dispersal accidents are factors used to multiply the concentration of a particular radionuclide in air (inhalation) or in food or water (ingestion) to obtain the dose to various organs. Transport models consisting of many different input parameters are used to estimate the dose conversion factors. There is uncertainty in each of the input parameters of the model used to simulate each block represented in the figures.

The uncertainty in many of the parameters used to quantify dose conversion factors in the models was asked of the Internal Dosimetry Panel of the Joint USNRC/CEC Consequence Uncertainty Study (USNRC/CEC, 1998).

The dominant uncertainty for plutonium is the solubility of Pu in the lungs and the extent of absorption into the blood. Other uncertainties are associated with the systemic distribution of the absorbed material and the extent of Pu burial in bone volume and the time of intake after release, which may change the "solubility" of particles due to fragmentation. The ratio of the 95% value to the 5% value (the range factor - a measure of uncertainty) for the various dose conversion factors derived from the elicitation for Pu varied from 183 to 34,125 among the different parameters. It was decided to address the many uncertainties in the components used to calculate the dose conversion factors by applying multiplication factors to the nominal DCF values to assess the uncertainty from dosimetry estimation.

The uncertainty range for the multipliers used for the SPARRC nominal inhalation DCF values for each particle size are as follows:

Percentiles	0 th	5 th	50 th	95 th	100 th
DCF Multiplier	0.07	0.10	1.00	20.00	30.00

Comparison of the SPARRC ICRP-30 based DCF model for lung, liver, bone surface and bone marrow with those presented in the more recent ICRP-71 (ICRP, 1995) show factors of 0.1, 1.6, 1.7, and 0.1 for the CDFs for 1 AMAD particles in an adult for solubility type M and 0.4, 2.3, 1.4, and 0.5 in a one year old. The solubility class can change the DCF value by a factor of 2.7 within the ICRP-30 model for liver and bone surface. Similar factors in the nominal estimates are found in comparison with Federal Regulatory Guidance Report 11 (Ekerman, 1988) and ICRP-56 (ICRP, 1989) values. Thus, considering the uncertainty that occurs on a nominal basis, the parameter distribution is deemed to be reasonable.

2.10 Vertical and Horizontal Diffusion Rates (σ_z , σ_y)

It was the responsibility of the probability elicitation team for the USNRC/CEC joint study to develop elicitation variables that were physically measurable parameters. However, code input parameters are not always physically measurable. In the case of dispersion, the important code input parameters are mathematical constructs that define the spread of the plume in the Gaussian model. The horizontal spread (σ_y) and vertical spread (σ_z) are modeled using the power law:

$$\sigma_y = a_y x^{b_y}, \quad \sigma_z = a_z x^{b_z}.$$

The code input parameters which define the spread of the plume are the $a_y, b_y; a_z, b_z$ terms of the power law. These terms are assigned values in dispersion codes depending on the atmospheric stability class. Because these terms are not physically measurable parameters, it was necessary to elicit distribution of physically measurable parameters from which one could derive distributions on the $a_y, b_y; a_z$ and b_z . From there, distributions for σ_y and σ_z can be generated.

It was impossible for the Dispersion and Deposition expert panels convened for the joint USNRC/CEC uncertainty project to provide information over the complete variable space needed to perform a comprehensive consequence uncertainty study. It was therefore necessary to design a case structure that would cover the variable space so that the project could interpolate and extrapolate to all areas necessary to perform consequence uncertainty studies.

The initial iteration of the case structure design for dispersion resulted in a very large number of cases: 700. It would be impossible to expect the experts to provide distributions for this number of cases. Hence, after several iterations, a condensed version of the case structure evolved and was tested in a dry run elicitation. The resulting case structure was deemed adequate for the

elicitation of information sufficient to allow valid interpolation and extrapolation over the entire variable space.

The case structure for the vertical and horizontal diffusion rates (σ_z , σ_y) is described in Section 3.2.2 and Appendix D of the USNRC/CEC joint consequence analysis report on uncertainty for dispersion and deposition (USNRC/CEC, 1995). The variables were elicited for four meteorological conditions for various downwind distances. The four conditions are Pasquill stability categories A, C, D, and E. The downwind distances used in the elicitation were 0.5 km, 1 km, 3 km, 10 km, and 30 km, with the exception of category A, for which it was recognized that the effect of the mixing layer came into play at 30 km (Kraan, 1998). This elicited information was then processed after the publication of the joint study report (USNRC/CEC, 1995). The result of this processing is that empirical distributions have been generated for the vertical and horizontal diffusion rates (σ_z , σ_y) for the stability categories and downwind distances discussed above.

The information elicited for long term dispersion was then processed for the purpose of developing uncertainty distributions for the long term dispersion parameters, including the vertical and horizontal diffusion rates (σ_z , σ_y). The processing of the elicited information occurred after the publication of NUREG/CR-6244, and was performed by Dr. Louis Goossens and Mr. Bernd Kraan, Msc., of Delft University, The Netherlands. Summary results of the processing for the diffusion rates, (σ_z , σ_y), are shown in Table 2 but repeated here in Table 7. Detailed statistical results for the distributions are recorded in Appendix A of this document.

The 38 parameters generated from the USNRC/CEC's treatment of the vertical and horizontal diffusion rates could present a logistical challenge in some modeling cases. Thus, an algorithm for collapsing these 38 distributions down to two distributions is shown in Appendix B.

2.11 Fall Velocity

The uncertainty in fall velocity calculated in the SATRAP model (Lockheed Martin, 1997) can be attributed to two different types of uncertainty: 1) the uncertainty due to the variation of the parameters used by the model to calculate the fall velocity and 2) the uncertainty due to phenomena not considered in the model. The contributors to the two types of uncertainty that will be considered in this analysis are listed below:

- 1) Contributors to the uncertainty due to the variation of the parameters used by the model to calculate the fall velocity.

Table 7 Vertical and Horizontal Diffusion Rate (σ_z , σ_y) Distributions

Stability Category	Downwind Distance	Units	Uncertainty Percentiles					Recommended Distribution		
			M	0	5	50	95		100	
A/B	X = 0.5 km	σ_y		38	58	188	581	872	Empirical (See Section 2.10)	
		σ_z		5	7	168	1,720	2,580	Empirical (See Section 2.10)	
	X = 1 km	σ_y		67	101	342	1,140	1,710	Empirical (See Section 2.10)	
		σ_z		7	10	282	3,420	5,130	Empirical (See Section 2.10)	
	X = 3 km	σ_y		165	247	890	3,360	5,040	Empirical (See Section 2.10)	
		σ_z		7	10	282	3,420	5,130	Empirical (See Section 2.10)	
	X = 10 km	σ_y		434	651	2,550	11,000	16,500	Empirical (See Section 2.10)	
		σ_z		20	30	1,500	36,700	55,050	Empirical (See Section 2.10)	
	C	X = 0.5 km	σ_y		28	41	91	194	291	Empirical (See Section 2.10)
			σ_z		4	7	39	153	230	Empirical (See Section 2.10)
X = 1 km		σ_y		49	73	165	378	567	Empirical (See Section 2.10)	
		σ_z		7	10	71	305	458	Empirical (See Section 2.10)	
X = 3 km		σ_y		121	181	423	1,100	1,650	Empirical (See Section 2.10)	
		σ_z		13	20	185	921	1,382	Empirical (See Section 2.10)	
X = 10 km		σ_y		325	487	1,200	3,530	5,295	Empirical (See Section 2.10)	

Stability Category	Downwind Distance	Units	Uncertainty Percentiles						Recommended Distribution
			M	0	5	50	95	100	
D	X = 30 km.	σ_z		28	42	533	3,130	4,695	Empirical (See Section 2.10)
		σ_y		800	1,200	3,090	10,300	15,450	Empirical (See Section 2.10)
		σ_z		54	80	1,420	9,690	14,535	Empirical (See Section 2.10)
	X = 0.5 km	σ_y		18	27	68	163	245	Empirical (See Section 2.10)
		σ_z		3	4	31	211	317	Empirical (See Section 2.10)
		σ_y		31	47	129	331	497	Empirical (See Section 2.10)
	X = 1 km	σ_z		4	6	46	368	552	Empirical (See Section 2.10)
		σ_y		73	110	353	1,010	1,515	Empirical (See Section 2.10)
		σ_z		6	9	86	899	1,349	Empirical (See Section 2.10)
	X = 3 km.	σ_y		188	282	1,060	3,480	5,220	Empirical (See Section 2.10)
		σ_z		10	15	172	2,380	3,570	Empirical (See Section 2.10)
		σ_y		443	665	2,930	10,800	16,200	Empirical (See Section 2.10)
E/F/G	X = 30 km.	σ_z		14	22	318	5,860	8,790	Empirical (See Section 2.10)
		σ_y		10	15	50	132	198	Empirical (See Section 2.10)
		σ_z		13	20	15	353	530	Empirical (See Section 2.10)
	X = 0.5 km	σ_y		17	26	90	253	380	Empirical (See Section 2.10)
		σ_z		17	25	20	457	686	Empirical (See Section 2.10)
		σ_y		17	25	20	457	686	Empirical (See Section 2.10)

Stability Category	Downwind Distance	Units	Uncertainty Percentiles					Recommended Distribution
			M	0	5	50	95	100
E (Continued)	X = 3 km.	σ_y		41	62	233	709	1064
								Empirical (See Section 2.10)
		σ_z		23	35	131	693	1,040
								Empirical (See Section 2.10)
	X = 10 km.	σ_y		105	158	667	2200	3300
								Empirical (See Section 2.10)
		σ_z		33	50	49	11090	1,635
								Empirical (See Section 2.10)
	X = 30 km.	σ_y		2467	3700	1760	6210	9315
								Empirical (See Section 2.10)
		σ_z		45	68	75	1640	2,460
								Empirical (See Section 2.10)

The variables in the Cassini fall velocity model that can potentially contribute to uncertainty are listed below.

- a) d – diameter of particle -- assumed spherical (cm)
- b) ρ_p – density of the particle (g/cm^3)
- c) ρ_a – density of the air (g/cm^3)
- d) η – viscosity of air (g/cm-s)

2) Contributors to the uncertainty due to phenomena not considered in the model

- a) During convective conditions, the localized fall velocity can be affected by the fluctuations in the turbulent vertical velocity. There are large-scale vertical motions driven by the updrafts of warmer air from the surface and the downdrafts of cooler air from the temperature inversion. Vertical motions from other phenomena can also occur during the night. The impact on these phenomena on the fall velocity in very localized regions can be significant. This uncertainty will not be considered further because the Gaussian dispersion model in SATRAP uses the fall velocity to track large-scale plume behavior rather than localized movements of the contaminant.

2.11.1 Approach to Assess the Impact of Variation of the Parameters in the Cassini Fall Velocity Model on the Uncertainty in Fall Velocity

The model that is used to calculate the fall velocity V is summarized by the following equations (Lockheed Martin, 1997):

$$C_d \text{Re}^2 = \frac{4}{3} \left(\frac{d^3 \rho_p \rho_a g}{\eta^2} \right) \quad (7)$$

If $C_d \text{Re}^2 \leq 140$:

$$\text{Re} = \frac{C_d \text{Re}^2}{24} - (2.3363\text{E} - 4)(C_d \text{Re}^2)^2 + (2.0154\text{E} - 6)(C_d \text{Re}^2)^3 - (6.9105\text{E} - 9)(C_d \text{Re}^2)^4 \quad (8)$$

If $C_d \text{Re}^2 > 140$:

$$\begin{aligned} \log_{10}(\text{Re}) = & -1.29536 + 0.986 \log_{10}(C_d \text{Re}^2) - (4.6677\text{E} - 2)(\log_{10}(C_d \text{Re}^2))^2 \\ & + (1.1235\text{E} - 3)(\log_{10}(C_d \text{Re}^2))^3 \end{aligned} \quad (9)$$

and

$$V = \frac{\text{Re} \eta}{\rho_a d} \quad (10)$$

where:

V = Fall velocity (cm/s)
 C_d = Drag coefficient
 Re = Reynold's number
 d = Diameter of particle (cm)
 ρ_p = Density of particle (g/cm³)
 ρ_a = Density of air (g/cm³)
 g = Acceleration of gravity (cm/s²)
 η = Viscosity of air (g/cm-s)

The phenomena that contribute to the uncertainty in the parameters in the above equations are:

Diameter of particle

- a) variance within bin group
- b) impact of deviation from sphericity on aerodynamic behavior

Density of particle

- a) Variance within bin group

Density of air

- a) Variance due to altitude differences
- b) Variance due to diurnal cycles
- c) Natural seasonal variance

Viscosity of air

- a) Variance due to altitude differences
- b) Variance due to relative humidity differences
- c) Variance due to diurnal cycles
- d) Natural seasonal variance

The approach used to assess the sensitivity of the fall velocity to variance in the diameter, the shape and the density of the particle compares the fall velocities of the adjacent bin groups. This gives an indication of the magnitude of uncertainty that can result from binning. The calculations of the fall velocities use the representative Activity Median Aerodynamic Diameters (AMADs) of the bin groups and unit density. It is assumed that the impact of uncertainty in diameter, shape, and density on the AMAD of the particle is accounted for in the source term section.

The approach used to assess the sensitivity of the fall velocity to variance in the density and viscosity of air compares the fall velocities generated using ranges of density and viscosity expected for different temperatures and altitudes.

As can be seen in Table 8, the temperature in Orlando, Florida varies between 50 °F and 90 °F (the launch is assumed to be in Florida).

The below expressions were used to calculate the appropriate density and viscosity for the different temperature ranges. (Powers, 1993)

$$\rho_a = \frac{28.91P}{82.06T} \quad (11)$$

where:

ρ_a = density of air (g/cm³)

Table 8. Monthly Average Temperatures (Minimum and Maximum) for Orlando – 1961 – 1990 Data

Month	Min Temp(F)*	Max Temp(F)*	Avg. Temp(F)*
January	47.3	70.2	58.7
February	50.6	73.5	62.0
March	55.8	78.7	67.3
April	59.2	82.9	71.1
May	65.9	87.9	76.9
June	71.6	91.0	81.3
July	73.1	91.6	82.4
August	73.7	91.7	82.7
September	72.5	90.1	81.3
October	65.4	84.8	75.1
November	58.5	79.0	68.8
December	51.7	72.9	62.3
Annual	62.1	82.9	72.5

* Weather information from the internet at <http://www.florida-weather.com/index.shtml>.

P = pressure in atmospheres

T = temperature in degrees Kelvin

$$\mu_a = 2.3013e - 6T^{0.768} \quad (12)$$

where:

μ_a = viscosity of air in Poise

T = Temperature in degrees Kelvin.

The range of altitude important to the study was obtained from Gregory, 1998 and is approximately 0.5 km to 6 km. The top of the plumes for different lofting energies and different meteorological conditions were obtained using the plume rise model in the ERAD code.

(Boughton, 1992) The following expressions were used to calculate the density and viscosity at different altitudes. (Lockheed Martin, 1997)

$$\rho_a(z) = (1E - 3)(10^{\varepsilon}) \quad (13)$$

where

$$\varepsilon = (8.700081E - 2) - (3.5836E - 2)z - (1.5724E - 3)z^2 + (3.0103E - 5)z^3 - (1.78E - 7)z^4 \quad (14)$$

where z is the altitude in km and finally

$$\eta(z) = (1.7931E - 4) - (3.3368E - 6)z \quad (15)$$

2.11.2 Results of Calculations to Assess the Impact of Variation of the Parameters in the Cassini Fall Velocity Model on the Uncertainty in Fall Velocity

The results of the study described above are summarized in the Tables 9 through 14.

Table 9. Impact of Particle Size Differences within Particle Size Bins

AMAD (microns) for adjacent particle size bins (bin n/bin n+1)	Fall velocity for adjacent bins (cm/s) (bin n/bin n+1) - [factor]
0.14/0.5	5.9E-3/7.5E-2 - [12.8]
1.07/2.3	0.344/1.59 - [4.6]
4.95/10.67	7.14/27.6 - [3.9]
23.01/49.52	82.3/199.0 - [2.4]
49.52/106.7	199.0/412.3 - [2.1]

As can be seen in Table 9, there is an order of magnitude difference between fall velocities between the adjacent bins for smaller particles (bins 1 and 2) and a factor of 2 for the larger bins (bins 8 and 9). In Table 10, the impact of changes in density of air and viscosity of air on fall velocities is shown.

Table 10. Impact of Air Temperature on the Density and Viscosity of Air

Temperature (°F)	50	70	90
Density of air - ρ_a (g/cm ³)	1.244E-3	1.197E-3	1.154E-3
Viscosity of air (Poise or g/cm-s)	1.76E-4	1.81E-4	1.86E-4

As can be seen from the Table 11, the maximum deviation from the central fall velocity value due to variance in the temperature is about 3 % at the smaller particle sizes and less than 1 % at the larger.

Table 11. Impact of Air Temperature on Fall Velocities

Size (microns)	Fall velocity at 50 °F (cm/s)	Fall velocity at 70 °F (cm/s)	Fall velocity at 90 °F (cm/s)
1	0.31	0.30	0.29
10	25.2	24.8	24.4
100	387.0	389.9	392.56

Table 12. Impact of Altitude on the Density and Viscosity of Air

Altitude (km)	0	.5	6
Density of air - ρ_a (g/cm ³)	1.222E-3	1.171E-3	6.63E-4
Viscosity of air (Poise or g/cm-s)	1.79E-4	1.78E-4	1.59E-4

The above changes in density of air and viscosity of air result in the following differences in fall velocities:

Table 13 Impact of Altitude on Fall Velocities

Size (microns)	Fall velocity at 0 km (cm/s)	Fall velocity at .5 km (cm/s)	Fall velocity at 5 km (cm/s)
1	0.304	0.307	0.342
10	24.9	25.2	29.4
100	387.9	395.0	502.0

As can be seen from the tables above, the deviation from a central fall velocity value due to variance in the altitude is about 5 % at the smaller particle sizes and about 10 - 15 % at the larger particle sizes.

2.11.3 Conclusions

Table 14 summarizes the impact of the different phenomena investigated above on the fall velocity.

Table 14 Maximum Impact Factor on Fall Velocity of Selected Contributors to Uncertainty

Contributor	Maximum Impact Factor* for 1 μ m particles	Maximum Impact Factor for 10 μ m particles	Maximum Impact Factor for 100 μ m particles
Variability of diameter within bins	4.6	3.9	2.1
Temperature (impacts air density and viscosity)	1.07	1.03	1.01
Altitude (impacts air density and viscosity)	1.13	1.18	1.29

* Impact Factor is defined by the fall velocity using one set of assumptions divided by the fall velocity using another set of assumptions. (The impact factor is always greater than one.)

As can be seen from the above table, the AMAD variance within bins is a larger contributor to the uncertainty in fall velocity than the variance in temperature and altitude.

3 Statistical Issues

3.1 Correlation of Variables

The statistical distributions that have been developed for the Cassini mission FSAR are derived from an up-to-date and comprehensive set of radiological uncertainty data. In the joint USNRC/CEC consequence uncertainty study, subject matter experts from around the world were assembled and asked to give their best estimates of the uncertainty for very specific questions. For the most part, these questions were restricted to observable phenomena. However, some of the parameters required as input to the SPARRC model do not correspond exactly to the elicitations of the study. Therefore, it falls to analysts to interpret the data from that study and transform its results into uncertainty distributions for the parameters required by the model. This is not always a straightforward task. In particular, there are instances where a single distribution was elicited from the experts for a physically observable phenomenon, but the model requirements imposed by SPARRC break the observable phenomenon into a series of some models, of which few are directly observable. Thus, it falls to the analyst to subdivide the distribution provided by the experts into portions that are useful in the SPARRC analysis. This process can be particularly difficult because the observable parameters tend to be highly uncertain -- so much so that the uncertainty derived from the combination of unobservable parameters and submodels can be much greater than the uncertainty in the actual observable phenomenon that the submodels are designed to represent.

One particular example concerns the dose conversion factor and the health effects factor. The USNRC/CEC study elicited from the experts a distribution representing the number of latent cancer fatalities that would be expected to occur per Curie of inhaled radiological material. The SPARRC software breaks down the computation of latent cancer fatalities into two portions: one that converts the radiological inhalation to a dose equivalent, and a second that converts dose equivalent into latent cancer fatalities. It is extremely difficult for an analyst to determine how much of the uncertainty in the USNRC/CEC distribution is attributable to each of these two separate submodels. Furthermore, if one considers separately the uncertainties in the dose conversion factor and a health effects factor, those uncertainties are indeed each large by themselves, and each is dominated by a different factor. The person-to-person variance in biological characteristics, such as the rates of diffusion through permeable membranes, are important in the dose conversion factor, while the health effects factor is dominated by epidemiological questions such as estimating the dose received by individual persons as a result of the atomic bomb blasts in Japan during World War II. The uncertainties in each of these factors are large, and the reasons for those uncertainties are very different.

It has been suggested that one can account for the fact that the uncertainty that arises from the combination of the two submodels is much greater than the uncertainty in the actual physically observable phenomenon by including an inverse correlation between the dose conversion factor in the health effects factor during statistical sampling in the LHS software. This would enable one to reduce the degree of uncertainty in the overall results to a more realistic level without requiring modifications to the SPARRC software. It may be possible to find a negative correlation that will produce the desired reduction in the overall uncertainty of the results.

However, since there is no physical basis for this negative correlation, and since the uncertainties in these factors are dominated by very different factors, such a negative correlation would be extremely difficult to defend in a scientific peer review.

However, there may be other ways of accomplishing this goal through modifications to the SPARRC software. One could, for example, remove the two submodels and replace them with a single overall (observable) model that simply estimates latent cancer fatalities directly from radiological inhalation. This process, known as "joint dosimetry health effects," produces the most accurate and least uncertain estimates of health effects for this class of problems, and is endorsed by subject matter experts such as Dr. Frederick Harper of Sandia National Laboratories. Such a model could make use of the USNRC/CEC distributions directly. This does, however, have the disadvantage that it does not allow the analyst to examine dose equivalents, and may make it impossible to perform *de minimis* calculations. An alternative to this approach would be to retain the dose model and the associated dose conversion factor uncertainties for the computation of dose equivalents, but bypass the dose equivalent model in favor of the observable model to compute latent cancer fatalities. This would preserve the integrity of the USNRC/CEC data for the latent cancer fatalities (and, thus, eliminate the excessive uncertainties for these results) while retaining the capability to compute dose equivalents for use in *de minimis* calculations. Such an approach shows the greatest promise for obtaining reasonable uncertainty results while maintaining the integrity and defensibility of the USNRC/CEC and other reference data.

3.2 Maximum Entropy Distributions

The literature on the maximum entropy formalism is now vast [(Levine, 1978), (Jumarie, 1990), Cook, 1986, (Unwin, 1989)]. In this report, the maximum entropy formalism is simply regarded as a consistent mathematical procedure for the derivation of a probability distribution function for an uncertain variable, X , from a set of quantitative constraints on the form of that distribution. For example, these quantitative constraints can take the form of a known mean or median, a known minimum or maximum, known percentiles of the distribution, or a known variance. Qualitatively, the maximum entropy formalism seeks to produce a distribution that retains the maximum degree of randomness, consistent with the quantitative constraints.

It is technically erroneous to refer to a single distribution type as a "maximum entropy distribution" because the maximum entropy formalism will derive a different distribution form for each combination of types of constraints. For example, if the constraints consist simply of a known minimum and known maximum value for the distribution, the maximum entropy formalism demands the use of a uniform distribution with the known minimum and known maximum values as the end points. If the constraints consist of a known minimum, a known maximum, and a known mean value for the distribution, the maximum entropy formalism demands the use of a distribution whose density function is a truncated exponential. In our case, the distributions created by the elicitation of experts consisted of known minimum and maximum values with known intermediate quantiles (5th percentile, median, and 95th percentile). In this situation, the maximum entropy formalism demands the use of a distribution that is piecewise uniform. That is, a uniform distribution is used between each of the known quantiles, and each such uniform distribution is normalized such that the known quantiles value constraints are

maintained. This produces a cumulative distribution function that appears as a series of straight lines connecting the known quantiles values, as shown in Figure 1. This process has been standard procedure in the application of expert judgment elicitation to probabilistic risk assessment studies for more than a decade.

Let us now step back and take a philosophical look at the distribution information that is provided by the experts. The original USNRC/CEC study requested that each expert provide a median value, a 5th percentile value, and a 95th percentile value for each parameter in question. Mathematical algorithms were used to infer reasonable minimum and maximum values for those distributions (Section 2.1). The actual meaning of this data, philosophically, is to place five points on a cumulative distribution function, as shown in Figure 2. Technically, any monotonically increasing function that passes through those five points is a candidate distribution function because it satisfies the constraints imposed by the experts. In reality, the expert has only stated that the cumulative distribution falls somewhere within the four rectangles shown in Figure 3. This must be true because it is impossible for a function to be monotonically increasing and yet fall outside of those rectangles. A reasonable and simple way to meet these constraints is to simply connect these points using straight lines on the cumulative distribution function. Mathematically, it can be shown that this simple technique to actually satisfies a maximum entropy formalism. Thus, it does not introduce a greater degree of randomness than was specified by the original experts -- it merely preserves their specifications without introducing additional structure to the distribution that is not attributable to the experts. It is true that the standard deviation of such a distribution will be greater than that of, say, a normal distribution with the same median, 5th and 95th percentile values because the normal distribution is more strongly peaked near the median. Note, however, that the range of the distribution (from minimum to maximum value) is not affected by this formalism because this piecewise uniform distribution simply preserves the minimum and maximum values specified by the experts. Thus, it is unlikely that simply changing the distribution form from a piecewise uniform distribution that satisfies the maximum entropy formalism to some sort of a prescribed normal or log normal distribution will have any significant effect on the 90 percent confidence interval for the final risk result.

In order to test this hypothesis, we constructed normal and log normal distributions for all of the parameters and variables in the original Cassini uncertainty analysis (Lockheed Martin, 1997). In order to do this, we constructed seven candidate normal and log normal distributions for each such variable or parameter. Each candidate distribution preserved different characteristics of the original piecewise uniform distributions (note that the piecewise uniform distributions were specified by five parameters, while a normal or log normal distribution is limited to two). Thus, one candidate distribution preserved a mean value along with the ratio of the 5th to the 95th percentile, while another candidate distribution preserved the 5th and 95th percentile's explicitly without regard to the mean or median, and still another candidate distribution used the 0.001 and 0.999 quantiles of a log normal distribution to preserve the minimum and maximum values of the original distribution. Cumulative distribution functions were plotted for each of the seven candidate distributions plus the original piecewise uniform distribution, and the candidate distribution most closely matching the original piecewise uniform distribution was selected for use in this study.

Figure 1 Example Cumulative distribution Function Based on Quantile Values Specified through Expert Judgement Elicitation.

Figure 2 Representative Data Points Obtained by Expert Judgement Elicitation.

Figure 3 Bounds within Which the Cumulative Distribution Specified by Expert Judgement Elicitation Must Lie.

The new normal and log normal distributions were then sampled using the LHS software (Wyss, 1998), and that sampled data was used to rerun Case 1.1z from the Cassini FSAR analysis to determine whether these revised distribution forms would have any effect on the integrated risk result. We found very little change in the integrated risk result between the original FSAR results and those derived for this hypothetical analysis.(Deane, 1998) For this reason, we believe that it is not profitable to change from the standard, accepted practice of using piecewise uniform distributions to represent data from experts that has already been collected in this form.

3.3 *Logarithmic Sampling*

In the world of engineering, it is not uncommon for numerical values for a phenomenon to vary by several orders of magnitude. In some cases, one can neglect values found outside of a relatively narrow range. In many others, however, it is important to consider the entire range of the data when drawing conclusions. In these cases, the analyst typically displays the data using a logarithmic scale in order to prevent loss of resolution for the lower magnitude data which might obscure important information. A logarithmic graph places the same amount of importance on each order of magnitude, while a linear graph places the same amount of importance on each linear unit. Thus, for data that varies between 10^{-4} and 1.0, a linear graph would squeeze all of the points between 10^{-4} and 0.1 into the same amount of space accorded to the points between 0.9 and 1.0. This could easily mask important information that is contained within the former range. A logarithmic plot of the same data would place all of the points between 0.1 and 1.0 in the same amount of space accorded to the points between 10^{-4} and 10^{-3} , thus increasing the prominence of the lower valued points. The selection of logarithmic versus linear scales for plotting data is largely due to established practice, trial-and-error, and intuition born of experience based on the particular data at hand.

Mathematically, when constructing logarithmic display, one is actually computing the logarithm of each data point and plotting this transformed data point on a linear scale. Logarithmic

displays make this step implicit by providing reference points and scales that have already been transformed into logarithm space. This is a great convenience for the engineer, but it does tend to obscure the fact that one is actually performing a mathematical transformation on the original data and plotting in linear space when one makes use of such a tool.

A phenomenon similar to the data display problem described above exists in the world of expert judgment elicitation. Some of the model parameters for which experts are requested to provide information fall neatly within a narrow range, while others vary over several orders of magnitude. The latter situation provides interesting problems when one seeks to sample the resulting distributions. Recall from Section 3.2 (Figure 3) that the experts merely provided individual reference points on the cumulative distribution function which act as constraints on the distribution to be sampled. Technically, any monotonically increasing function that passes through those five points satisfies the constraints imposed by the experts. This is equivalent to saying that the cumulative distribution function need only stay within the four rectangles shown in Figure 3. Let us now consider two different ways of satisfying these conditions within the constraints imposed by the maximum entropy formalism.

Recall how plotting data on a logarithmic scale actually involved a data transformation that is frequently ignored: computing the logarithm of each data point prior to plotting, and that doing so effectively increased the prominence of the lower valued points in order to prevent the masking of important information within that range. It makes sense to ask, then, whether or not making a similar transformation to a statistical distribution, which spans several orders of magnitude, would also make sense for the same reasons. To accomplish this, one constructs a piecewise uniform distribution between the *logarithms* of the quantiles points specified by the experts. This piecewise uniform distribution is sampled, and the inverse transformation is performed (exponentiation) on each of the resultant data points. This piecewise uniform distribution satisfies the maximum entropy formalism, but does so in a different way than the piecewise uniform distribution among the quantiles described in the previous section. In doing so, it effectively increases the importance of the data points that are closer to the distribution minimum.

To illustrate this point, let us consider two distributions produced by experts. Consider first a simple distribution with the following constraints: a minimum value of 0.2, a maximum value of 0.7, and a median value of 0.5. One distribution that satisfies the maximum entropy formalism for this set of constraints consists of an appropriately normalized uniform distribution with bounds of 0.2 and 0.5, and a second appropriately normalized uniform distribution with bounds of 0.5 and 0.7. A second distribution that satisfies the maximum entropy formalism for the set of constraints consists of appropriately normalized uniform distribution between the bounds of the *logarithm* of 0.2 and the *logarithm* of 0.5, and a second appropriately normalized uniform distribution between the bounds of the *logarithm* of 0.5 and the *logarithm* of 0.7. One could sample this distribution and compute the exponential of each randomly selected data point to obtain sampled points for a distribution that satisfies the same constraints as the first distribution. This effectively creates piecewise *loguniform* distributions between 0.2 and 0.5, and 0.5 and 0.7 for the second distribution. The two graphs shown in Figure 4 represent the cumulative distribution functions for these two distributions, plotted on both linear and logarithmic scales.

Figure 4 Comparison of Liner and Logarithmic Sampling for a Narrow Distribution Function.

Note that in this case, the data does not span several orders of magnitude, and there is relatively little difference between the two resultant distributions.

Consider now a second simple distribution with the following constraints: a minimum value of 10^{-7} , a maximum value of 10^{-2} , and the median value of 10^{-5} . Again, we can specify two different distributions that satisfy the maximum entropy formalism: one composed of appropriately normalized piecewise uniform distributions between the specified points, and a second composed of appropriately normalized piecewise loguniform distributions between the specified points. The cumulative distribution functions for these two distributions, plotted on both linear and logarithmic scales, are shown in Figure 5. Note that both of these distribution functions satisfy the constraints posed by the experts. However, their density functions are dramatically different. At the low end of the distribution, we note that the piecewise uniform distribution selects approximately 90 percent of its samples between 10^{-6} and 10^{-5} , and only 10 percent of its samples between 10^{-7} and 10^{-6} . The piecewise loguniform distribution, however, selects half of its samples in each of these two ranges. This effectively increases the importance of the low end of the distribution. Similarly, for the upper end of the distribution, the piecewise uniform distributions selects approximately 90 percent of its samples between 10^{-3} and 10^{-2} , approximately nine percent between 10^{-4} and 10^{-3} , and the remaining one percent between 10^{-5} and 10^{-4} , while the piecewise loguniform distribution selects approximately one-third of its samples from each of these three ranges. Thus, the piecewise uniform distribution, when used with distributions that vary by several orders of magnitude, places many more samples close to the distribution maximum than does the corresponding piecewise loguniform distribution. In fact, uniform-sampling places more samples near the top of each specified quantile range than does the piecewise loguniform distribution. If one were to view the probability density function of such a distribution on a logarithmic scale, the density would exhibit a sharp peak just to the left of each of the specified quantile values above the minimum, then a dramatic step decrease to a very low value immediately to the right of the quantiles. This is in contrast to the piecewise loguniform distribution, which would show a step change in the probability density between two flat ("uniform") density functions. If it was the intent of the expert to produce a piecewise loguniform distribution (whether he realized it or not), then the effect of sampling it using a piecewise uniform distribution type is to produce an unnatural bias in the samples that favors the upper end of the distribution at the expense of the lower end. This effect becomes even more pronounced when relatively few quantiles are used, or the distance between the quantile values is relatively large (say, the median to the 95th percentile).

The next question for the risk analyst is, "How do I determine whether the distribution quantiles that I obtained from my expert should be sampled using piecewise uniform or piecewise loguniform distributions?" One simple, if naive, answer would be to ask the expert directly. However, many experts are insufficiently trained in statistical principles to understand the issues involved in this question. For this reason, we have developed guidelines to help analysts make this selection. First, it is useful to plot the distribution provided by the experts using both piecewise uniform and piecewise loguniform distributions on both linear and logarithmic axes. These graphical representations can then be presented to the experts, who can directly select which of the distributions most closely approximates their intent. Second, it is useful to ask the expert whether, during the construction of their

distribution, they were thinking more in terms of an "order of magnitude" (which may indicate that piecewise loguniform distribution to be appropriate) or in terms of actual values. A related question can be asked with respect to the actual values of the distribution: divide the range between two consecutive specified quantiles (use the two most widely spaced values) in half based on both linear interpolation and logarithmic interpolation (logarithmic interpolation is accomplished by taking the square root of the ratio of the end points, multiplied by the lower endpoint value). Then have the expert decide which of these two values forms the most appropriate point of division wherein half of the samples drawn for that interval will be on each side. The value selected is an indicator of the expert's thinking and provides guidance as to which distribution type is most appropriate.

There may be occasions, however, when it is either impossible to ask the expert these questions or the expert is unwilling or unable to provide appropriate answers. In this case, the analyst must make the decision himself. Some guidelines that can be used to help make this determination follow.

- Examine the symmetry of the distribution about the median in both linear and logarithmic space. If the distribution is significantly more symmetric in one than the other, then it may be appropriate to select the corresponding distribution type for the analysis.
- Examine the range of the distribution. If the overall range of the distribution covers more than, say, two orders of magnitude, then it may be appropriate to select the piecewise loguniform distribution type for the analysis.
- Examine the consecutive quantiles provided by the experts. If the values corresponding with any two consecutive quantiles vary by more than, say, a factor of five, then it may be appropriate to select the piecewise loguniform distribution type.

Note that these are guidelines, not hard and fast rules. Each distribution must be examined individually -- in consultation with the experts that produce it, if possible -- in order to ensure that the actual sampled data is an accurate reflection of the experts' intent. And, while it is important to consider which distribution type is most appropriate, the analyst should be aware that, in the limit of a large number of quantiles in a distribution, the differences between a piecewise uniform in a piecewise loguniform distribution become small and vanish. Note also that, in Figure 4, the distance between the piecewise uniform and piecewise loguniform distributions is not large even though this distribution is composed of only three quantiles. Therefore, while this issue can have a major impact on distributions that vary over several orders of magnitude, it will have a relatively minor impact on these more compact distributions. It is likely that these differences will be insignificant compared to the uncertainties that were noted by the experts during the development of the distribution points themselves. Thus, since the selection of distribution type makes relatively little difference in the limits of compact distributions and closely spaced quantiles, but a great deal of difference in the other limit, the analyst may wish to err on the side of selecting piecewise loguniform distributions slightly more often than might be indicated by these guidelines.

Figure 5 Comparison of Linear and Logarithmic Sampling for a Wide Distribution Function.

4 Summary

Uncertainty distributions for eight Cassini FSAR risk parameters have been developed. The distributions reflect the current state of knowledge regarding the uncertainty associated with each parameter's value, and the quantification of the distributions is based on the expert elicitation process conducted for the joint study of the United States Nuclear Regulatory Commission and the Commission of European Communities (USNRC/CEC) on probabilistic accident consequence uncertainty analysis.

The expert judgment elicitations resulted in an estimate of the range of uncertainty for each parameter as defined by 5th, 50th, and 95th percentiles. A probability distribution was established for each parameter by calculating the distribution endpoints using mathematical algorithms applied to the 5th and 95th percentiles (Section 2.1), and then selecting either a continuous linear or continuous log maximum entropy sampling of the range now defined by the 0th, 5th, 50th, 95th, and 100th percentiles. The criteria for selecting the appropriate sampling method is established in Section 3, in which issues regarding the appropriateness of maximum entropy distributions for parameter uncertainty, log sampling versus linear sampling of parameter distributions, and parameter correlation issues are discussed.

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Appendix A Vertical and Horizontal Diffusion Rates (σ_z , σ_y)

Detailed statistics and distributions for the vertical and horizontal diffusion rates for the joint USNER/CEC study are listed in this appendix. The following pages are a copy of the output file SANDIA, generated by the computer model FORMULA, which was developed by Delft University, The Netherlands, to process the elicited information on dispersion from the USNRC/CEC joint study expert panel on dispersion (USNRC/CEC, 1995). The output file SANDIA was generated and sent to Sandia National Laboratories by Mr. Bernd, Msc., Kraan, Delft University, The Netherlands (Kraan, 1998).

The 38 diffusion coefficient distributions defined and summarized in Table 2 are documented in detail here. The naming scheme for the diffusion coefficients is of the following manner:

The horizontal diffusion rate (σ_y) for stability class A, at a down wind distance of 0.5 km, is labeled here as **a_sy_05km**, the vertical diffusion rate (σ_z) is labeled **a_sz_05km**, and so on for the other stability classes and down wind distances.

There are five sections to the output file:

1. Summary Report	p. A-2
2. Formula Distributions	p. A-13
3. Random Variable Descriptions	p. A-29
4. Formula & User Defined Functions	p. A-32
5. Simulation Data & Results	p. A-33
5.1. Dependency structure	p. A-33
5.2. Sampling results & data	p. A-34
5.3. Correlation matrix	p. A-36
5.4. Output percentiles	p. A-47

Sections 1, 2, 5.3, and 5.4 of the output file are of the most interest here. Section 1 presents a statistical summary of the distribution for each of the 38 diffusion coefficients. Section 2 presents a more detailed summary of the actual distribution for each diffusion coefficient, Section 5.3 presents the correlation coefficient for each pair of diffusion coefficients, and Section 5.4 presents a listing of each quantile of the distribution for each diffusion coefficient.

The statistical correlation between any pair of the 38 parameters is defined by the correlation coefficients in Section 5.3 of the output file. These coefficients are used in conjunction with any LHS or Monte Carlo sampling of these distributions. For example, suppose the distributions for both **c_sy_05km** and **c_sz_05km** (page A-42) are to be sampled in a LHS uncertainty analysis. The correlation matrix in Section 5.3 shows that a correlation coefficient of 0.13 between these two variables should be implemented in the LHS input.

Report: SANDIA

***** CONTENTS *****

1. Summary Report
2. Formula Distributions
3. Random Variable Descriptions
4. Formula & User Defined Functions
5. Simulation Data & Results
 - 5.1. Dependency structure
 - 5.2. Sampling results & data
 - 5.3. Correlation matrix
 - 5.4. Output percentiles

Report : SANDIA Part: 1

***** 1. Summary Report *****

The results below have been generated using data from the following files:

```
Random variable file      : SANDIA.RAN
Formula file             : SANDIA.FML
Dependency structure file: SANDIA.220
```

```
Number of Samples used = 10000, of 10000 samples total
Random_seed = 1
Bivariate distribution type : Minimum Information Distribution
```

```

Main quantiles of the distribution: a_sy_05km
5%-quantile: 5.77 E+01
50%-quantile: 1.88 E+02
95%-quantile: 5.81 E+02

```

```
Location estimates of the distribution: a_sy_05km
Mean      : 2.35 E+02
Median    : 1.88 E+02
```

Estimates of spread of the distribution:a_sy_05km
Standard deviation: 1.66 E+02
Error factor : 3.09 E+00

Main quantiles of the distribution: a_sy_1km

5%-quantile: 1.01 E+02

50%-quantile: 3.42 E+02

95%-quantile: 1.14 E+03

Location estimates of the distribution: a_sy_1km

Mean : 4.44 E+02

Median : 3.42 E+02

Estimates of spread of the distribution:a_sy_1km

Standard deviation: 3.36 E+02

Error factor : 3.33 E+00

Main quantiles of the distribution: a_sy_3km

5%-quantile: 2.47 E+02

50%-quantile: 8.90 E+02

95%-quantile: 3.36 E+03

Location estimates of the distribution: a_sy_3km

Mean : 1.23 E+03

Median : 8.90 E+02

Estimates of spread of the distribution:a_sy_3km

Standard deviation: 1.02 E+03

Error factor : 3.77 E+00

Main quantiles of the distribution: a_sy_10km

5%-quantile: 6.51 E+02

50%-quantile: 2.55 E+03

95%-quantile: 1.10 E+04

Location estimates of the distribution: a_sy_10km

Mean : 3.77 E+03

Median : 2.55 E+03

Estimates of spread of the distribution:a_sy_10km

Standard deviation: 3.48 E+03

Error factor : 4.29 E+00

Main quantiles of the distribution: a_sz_05km

5%-quantile: 7.15 E+00

50%-quantile: 1.68 E+02

95%-quantile: 1.72 E+03

Location estimates of the distribution: a_sz_05km

Mean : 4.35 E+02

Median : 1.68 E+02

Estimates of spread of the distribution:a_sz_05km

Standard deviation: 8.71 E+02

Error factor : 1.02 E+01

Main quantiles of the distribution: a_sz_1km
 5%-quantile: 1.04 E+01
 50%-quantile: 2.82 E+02
 95%-quantile: 3.42 E+03

Location estimates of the distribution: a_sz_1km
 Mean : 8.40 E+02
 Median : 2.82 E+02

Estimates of spread of the distribution:a_sz_1km
 Standard deviation: 1.87 E+03
 Error factor : 1.21 E+01

Main quantiles of the distribution: a_sz_3km
 5%-quantile: 1.70 E+01
 50%-quantile: 6.22 E+02
 95%-quantile: 1.06 E+04

Location estimates of the distribution: a_sz_3km
 Mean : 2.45 E+03
 Median : 6.22 E+02

Estimates of spread of the distribution:a_sz_3km
 Standard deviation: 6.34 E+03
 Error factor : 1.70 E+01

Main quantiles of the distribution: a_sz_10km
 5%-quantile: 3.05 E+01
 50%-quantile: 1.50 E+03
 95%-quantile: 3.67 E+04

Location estimates of the distribution: a_sz_10km
 Mean : 8.21 E+03
 Median : 1.50 E+03

Estimates of spread of the distribution:a_sz_10km
 Standard deviation: 2.45 E+04
 Error factor : 2.45 E+01

Main quantiles of the distribution: c_sy_05km
 5%-quantile: 4.13 E+01
 50%-quantile: 9.05 E+01
 95%-quantile: 1.94 E+02

Location estimates of the distribution: c_sy_05km
 Mean : 1.03 E+02
 Median : 9.05 E+01

Estimates of spread of the distribution:c_sy_05km
 Standard deviation: 4.68 E+01
 Error factor : 2.14 E+00

Main quantiles of the distribution: c_sy_1km

5%-quantile: 7.33 E+01

50%-quantile: 1.65 E+02

95%-quantile: 3.78 E+02

Location estimates of the distribution: c_sy_1km

Mean : 1.92 E+02

Median : 1.65 E+02

Estimates of spread of the distribution: c_sy_1km

Standard deviation: 9.48 E+01

Error factor : 2.30 E+00

Main quantiles of the distribution: c_sy_3km

5%-quantile: 1.81 E+02

50%-quantile: 4.23 E+02

95%-quantile: 1.10 E+03

Location estimates of the distribution: c_sy_3km

Mean : 5.16 E+02

Median : 4.23 E+02

Estimates of spread of the distribution: c_sy_3km

Standard deviation: 2.89 E+02

Error factor : 2.60 E+00

Main quantiles of the distribution: c_sy_10km

5%-quantile: 4.87 E+02

50%-quantile: 1.20 E+03

95%-quantile: 3.53 E+03

Location estimates of the distribution: c_sy_10km

Mean : 1.53 E+03

Median : 1.20 E+03

Estimates of spread of the distribution: c_sy_10km

Standard deviation: 9.71 E+02

Error factor : 2.96 E+00

Main quantiles of the distribution: c_sy_30km

5%-quantile: 1.20 E+03

50%-quantile: 3.09 E+03

95%-quantile: 1.03 E+04

Location estimates of the distribution: c_sy_30km

Mean : 4.17 E+03

Median : 3.09 E+03

Estimates of spread of the distribution: c_sy_30km

Standard deviation: 2.92 E+03

Error factor : 3.33 E+00

Main quantiles of the distribution: c_sz_05km
 5%-quantile: 6.52 E+00
 50%-quantile: 3.90 E+01
 95%-quantile: 1.53 E+02

Location estimates of the distribution: c_sz_05km
 Mean : 5.66 E+01
 Median : 3.90 E+01

Estimates of spread of the distribution:c_sz_05km
 Standard deviation: 5.12 E+01
 Error factor : 3.91 E+00

Main quantiles of the distribution: c_sz_1km
 5%-quantile: 1.01 E+01
 50%-quantile: 7.13 E+01
 95%-quantile: 3.05 E+02

Location estimates of the distribution: c_sz_1km
 Mean : 1.08 E+02
 Median : 7.13 E+01

Estimates of spread of the distribution:c_sz_1km
 Standard deviation: 1.05 E+02
 Error factor : 4.28 E+00

Main quantiles of the distribution: c_sz_3km
 5%-quantile: 2.02 E+01
 50%-quantile: 1.85 E+02
 95%-quantile: 9.21 E+02

Location estimates of the distribution: c_sz_3km
 Mean : 3.01 E+02
 Median : 1.85 E+02

Estimates of spread of the distribution:c_sz_3km
 Standard deviation: 3.27 E+02
 Error factor : 4.98 E+00

Main quantiles of the distribution: c_sz_10km
 5%-quantile: 4.21 E+01
 50%-quantile: 5.33 E+02
 95%-quantile: 3.13 E+03

Location estimates of the distribution: c_sz_10km
 Mean : 9.40 E+02
 Median : 5.33 E+02

Estimates of spread of the distribution:c_sz_10km
 Standard deviation: 1.14 E+03
 Error factor : 5.87 E+00

Main quantiles of the distribution: c_sz_30km

5%-quantile: 8.03 E+01

50%-quantile: 1.42 E+03

95%-quantile: 9.69 E+03

Location estimates of the distribution: c_sz_30km

Mean : 2.69 E+03

Median : 1.42 E+03

Estimates of spread of the distribution: c_sz_30km

Standard deviation: 3.57 E+03

Error factor : 6.81 E+00

Main quantiles of the distribution: d_sy_05km

5%-quantile: 2.71 E+01

50%-quantile: 6.84 E+01

95%-quantile: 1.63 E+02

Location estimates of the distribution: d_sy_05km

Mean : 7.78 E+01

Median : 6.84 E+01

Estimates of spread of the distribution: d_sy_05km

Standard deviation: 4.29 E+01

Error factor : 2.38 E+00

Main quantiles of the distribution: d_sy_1km

5%-quantile: 4.66 E+01

50%-quantile: 1.29 E+02

95%-quantile: 3.31 E+02

Location estimates of the distribution: d_sy_1km

Mean : 1.50 E+02

Median : 1.29 E+02

Estimates of spread of the distribution: d_sy_1km

Standard deviation: 9.13 E+01

Error factor : 2.57 E+00

Main quantiles of the distribution: d_sy_3km

5%-quantile: 1.10 E+02

50%-quantile: 3.53 E+02

95%-quantile: 1.01 E+03

Location estimates of the distribution: d_sy_3km

Mean : 4.30 E+02

Median : 3.53 E+02

Estimates of spread of the distribution: d_sy_3km

Standard deviation: 3.01 E+02

Error factor : 2.87 E+00

Main quantiles of the distribution: d_sy_10km
 5%-quantile: 2.82 E+02
 50%-quantile: 1.06 E+03
 95%-quantile: 3.48 E+03

Location estimates of the distribution: d_sy_10km
 Mean : 1.37 E+03
 Median : 1.06 E+03

Estimates of spread of the distribution:d_sy_10km
 Standard deviation: 1.11 E+03
 Error factor : 3.27 E+00

Main quantiles of the distribution: d_sy_30km
 5%-quantile: 6.65 E+02
 50%-quantile: 2.93 E+03
 95%-quantile: 1.08 E+04

Location estimates of the distribution: d_sy_30km
 Mean : 3.98 E+03
 Median : 2.93 E+03

Estimates of spread of the distribution:d_sy_30km
 Standard deviation: 3.63 E+03
 Error factor : 3.69 E+00

Main quantiles of the distribution: d_sz_05km
 5%-quantile: 4.30 E+00
 50%-quantile: 3.10 E+01
 95%-quantile: 2.11 E+02

Location estimates of the distribution: d_sz_05km
 Mean : 5.85 E+01
 Median : 3.10 E+01

Estimates of spread of the distribution:d_sz_05km
 Standard deviation: 8.30 E+01
 Error factor : 6.80 E+00

Main quantiles of the distribution: d_sz_1km
 5%-quantile: 5.82 E+00
 50%-quantile: 4.55 E+01
 95%-quantile: 3.68 E+02

Location estimates of the distribution: d_sz_1km
 Mean : 9.62 E+01
 Median : 4.55 E+01

Estimates of spread of the distribution:d_sz_1km
 Standard deviation: 1.49 E+02
 Error factor : 8.10 E+00

Main quantiles of the distribution: d_sz_3km

5%-quantile: 9.08 E+00
50%-quantile: 8.64 E+01
95%-quantile: 8.99 E+02

Location estimates of the distribution: d_sz_3km

Mean : 2.16 E+02
Median : 8.64 E+01

Estimates of spread of the distribution: d_sz_3km

Standard deviation: 3.79 E+02
Error factor : 1.04 E+01

Main quantiles of the distribution: d_sz_10km

5%-quantile: 1.48 E+01
50%-quantile: 1.72 E+02
95%-quantile: 2.38 E+03

Location estimates of the distribution: d_sz_10km

Mean : 5.37 E+02
Median : 1.72 E+02

Estimates of spread of the distribution: d_sz_10km

Standard deviation: 1.06 E+03
Error factor : 1.38 E+01

Main quantiles of the distribution: d_sz_30km

5%-quantile: 2.17 E+01
50%-quantile: 3.18 E+02
95%-quantile: 5.86 E+03

Location estimates of the distribution: d_sz_30km

Mean : 1.26 E+03
Median : 3.18 E+02

Estimates of spread of the distribution: d_sz_30km

Standard deviation: 2.73 E+03
Error factor : 1.85 E+01

Main quantiles of the distribution: e_sy_05km

5%-quantile: 1.52 E+01
50%-quantile: 4.96 E+01
95%-quantile: 1.32 E+02

Location estimates of the distribution: e_sy_05km

Mean : 5.97 E+01
Median : 4.96 E+01

Estimates of spread of the distribution: e_sy_05km

Standard deviation: 3.66 E+01
Error factor : 2.67 E+00

Main quantiles of the distribution: e_sy_1km

5%-quantile: 2.61 E+01
50%-quantile: 9.00 E+01
95%-quantile: 2.53 E+02

Location estimates of the distribution: e_sy_1km

Mean : 1.11 E+02
Median : 9.00 E+01

Estimates of spread of the distribution: e_sy_1km

Standard deviation: 7.12 E+01
Error factor : 2.81 E+00

Main quantiles of the distribution: e_sy_3km

5%-quantile: 6.16 E+01
50%-quantile: 2.33 E+02
95%-quantile: 7.09 E+02

Location estimates of the distribution: e_sy_3km

Mean : 2.97 E+02
Median : 2.33 E+02

Estimates of spread of the distribution: e_sy_3km

Standard deviation: 2.05 E+02
Error factor : 3.04 E+00

Main quantiles of the distribution: e_sy_10km

5%-quantile: 1.58 E+02
50%-quantile: 6.67 E+02
95%-quantile: 2.20 E+03

Location estimates of the distribution: e_sy_10km

Mean : 8.76 E+02
Median : 6.67 E+02

Estimates of spread of the distribution: e_sy_10km

Standard deviation: 6.50 E+02
Error factor : 3.30 E+00

Main quantiles of the distribution: e_sy_30km

5%-quantile: 3.70 E+02
50%-quantile: 1.76 E+03
95%-quantile: 6.21 E+03

Location estimates of the distribution: e_sy_30km

Mean : 2.36 E+03
Median : 1.76 E+03

Estimates of spread of the distribution: e_sy_30km

Standard deviation: 1.87 E+03
Error factor : 3.53 E+00

Main quantiles of the distribution: e_sz_05km

5%-quantile: 1.97 E+00

50%-quantile: 1.46 E+01

95%-quantile: 3.53 E+02

Location estimates of the distribution: e_sz_05km

Mean : 7.71 E+01

Median : 1.46 E+01

Estimates of spread of the distribution: e_sz_05km

Standard deviation: 1.39 E+02

Error factor : 2.41 E+01

Main quantiles of the distribution: e_sz_1km

5%-quantile: 2.48 E+00

50%-quantile: 1.96 E+01

95%-quantile: 4.57 E+02

Location estimates of the distribution: e_sz_1km

Mean : 9.95 E+01

Median : 1.96 E+01

Estimates of spread of the distribution: e_sz_1km

Standard deviation: 1.87 E+02

Error factor : 2.33 E+01

Main quantiles of the distribution: e_sz_3km

5%-quantile: 3.52 E+00

50%-quantile: 3.05 E+01

95%-quantile: 6.93 E+02

Location estimates of the distribution: e_sz_3km

Mean : 1.51 E+02

Median : 3.05 E+01

Estimates of spread of the distribution: e_sz_3km

Standard deviation: 3.05 E+02

Error factor : 2.27 E+01

Main quantiles of the distribution: e_sz_10km

5%-quantile: 4.98 E+00

50%-quantile: 4.94 E+01

95%-quantile: 1.09 E+03

Location estimates of the distribution: e_sz_10km

Mean : 2.40 E+02

Median : 4.94 E+01

Estimates of spread of the distribution: e_sz_10km

Standard deviation: 5.32 E+02

Error factor : 2.21 E+01

Main quantiles of the distribution: e_sz_30km

5%-quantile: 6.75 E+00

50%-quantile: 7.50 E+01

95%-quantile: 1.64 E+03

Location estimates of the distribution: e_sz_30km

Mean : 3.73 E+02

Median : 7.50 E+01

Estimates of spread of the distribution: e_sz_30km

Standard deviation: 8.96 E+02

Error factor : 2.19 E+01

Uncertainty Distribution of: a_sy_3km
Quantile Value

5% :	2.47 E+02
10% :	3.47 E+02
15% :	4.21 E+02
20% :	4.90 E+02
25% :	5.59 E+02
30% :	6.25 E+02
35% :	6.93 E+02
40% :	7.57 E+02
45% :	8.20 E+02
50% :	8.90 E+02
55% :	9.75 E+02
60% :	1.07 E+03
65% :	1.19 E+03
70% :	1.34 E+03
75% :	1.54 E+03
80% :	1.81 E+03
85% :	2.12 E+03
90% :	2.59 E+03
95% :	3.36 E+03

Uncertainty Distribution of: a_sy_10km
Quantile Value

5% :	6.51 E+02
10% :	9.25 E+02
15% :	1.11 E+03
20% :	1.30 E+03
25% :	1.51 E+03
30% :	1.72 E+03
35% :	1.92 E+03
40% :	2.11 E+03
45% :	2.30 E+03
50% :	2.55 E+03
55% :	2.83 E+03
60% :	3.15 E+03
65% :	3.58 E+03
70% :	4.12 E+03
75% :	4.79 E+03
80% :	5.73 E+03
85% :	6.76 E+03
90% :	8.39 E+03
95% :	1.10 E+04

Uncertainty Distribution of: a_sz_05km

Quantile	Value
5% :	7.15 E+00
10% :	2.05 E+01
15% :	3.52 E+01
20% :	4.95 E+01
25% :	6.40 E+01
30% :	8.22 E+01
35% :	9.97 E+01
40% :	1.19 E+02
45% :	1.41 E+02
50% :	1.68 E+02
55% :	2.00 E+02
60% :	2.39 E+02
65% :	2.86 E+02
70% :	3.45 E+02
75% :	4.28 E+02
80% :	5.36 E+02
85% :	7.20 E+02
90% :	1.04 E+03
95% :	1.72 E+03

Uncertainty Distribution of: a_sz_1km

Quantile	Value
5% :	1.04 E+01
10% :	3.04 E+01
15% :	5.30 E+01
20% :	7.67 E+01
25% :	1.01 E+02
30% :	1.31 E+02
35% :	1.60 E+02
40% :	1.92 E+02
45% :	2.32 E+02
50% :	2.82 E+02
55% :	3.37 E+02
60% :	4.08 E+02
65% :	4.89 E+02
70% :	6.03 E+02
75% :	7.67 E+02
80% :	9.79 E+02
85% :	1.34 E+03
90% :	2.00 E+03
95% :	3.42 E+03

Uncertainty Distribution of: a_sz_3km

Quantile	Value
5% :	1.70 E+01
10% :	5.65 E+01
15% :	1.02 E+02
20% :	1.50 E+02
25% :	2.07 E+02
30% :	2.67 E+02
35% :	3.34 E+02
40% :	4.14 E+02

45% :	5.15 E+02
50% :	6.22 E+02
55% :	7.67 E+02
60% :	9.40 E+02
65% :	1.17 E+03
70% :	1.47 E+03
75% :	1.96 E+03
80% :	2.58 E+03
85% :	3.68 E+03
90% :	5.76 E+03
95% :	1.06 E+04

Uncertainty Distribution of: a_sz_10km

Quantile	Value
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5% :	3.05 E+01
10% :	1.07 E+02
15% :	2.04 E+02
20% :	3.15 E+02
25% :	4.47 E+02
30% :	5.86 E+02
35% :	7.49 E+02
40% :	9.57 E+02
45% :	1.22 E+03
50% :	1.50 E+03
55% :	1.88 E+03
60% :	2.38 E+03
65% :	3.09 E+03
70% :	3.98 E+03
75% :	5.41 E+03
80% :	7.50 E+03
85% :	1.12 E+04
90% :	1.82 E+04
95% :	3.67 E+04

Uncertainty Distribution of: c_sy_05km

Quantile	Value
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5% :	4.13 E+01
10% :	5.30 E+01
15% :	5.98 E+01
20% :	6.41 E+01
25% :	6.82 E+01
30% :	7.21 E+01
35% :	7.61 E+01
40% :	8.02 E+01
45% :	8.51 E+01
50% :	9.05 E+01
55% :	9.71 E+01
60% :	1.05 E+02
65% :	1.14 E+02
70% :	1.23 E+02
75% :	1.32 E+02
80% :	1.43 E+02
85% :	1.54 E+02
90% :	1.70 E+02
95% :	1.94 E+02

Uncertainty Distribution of: c_sy_1km

Quantile	Value
5% :	7.33 E+01
10% :	9.41 E+01
15% :	1.05 E+02
20% :	1.13 E+02
25% :	1.21 E+02
30% :	1.28 E+02
35% :	1.36 E+02
40% :	1.44 E+02
45% :	1.53 E+02
50% :	1.65 E+02
55% :	1.78 E+02
60% :	1.94 E+02
65% :	2.12 E+02
70% :	2.30 E+02
75% :	2.50 E+02
80% :	2.72 E+02
85% :	2.96 E+02
90% :	3.29 E+02
95% :	3.78 E+02

Uncertainty Distribution of: c_sy_3km

Quantile	Value
5% :	1.81 E+02
10% :	2.32 E+02
15% :	2.59 E+02
20% :	2.80 E+02
25% :	3.00 E+02
30% :	3.18 E+02
35% :	3.41 E+02
40% :	3.63 E+02
45% :	3.89 E+02
50% :	4.23 E+02
55% :	4.66 E+02
60% :	5.15 E+02
65% :	5.67 E+02
70% :	6.22 E+02
75% :	6.86 E+02
80% :	7.54 E+02
85% :	8.32 E+02
90% :	9.31 E+02
95% :	1.10 E+03

Uncertainty Distribution of: c_sy_10km

Quantile	Value
5% :	4.87 E+02
10% :	6.19 E+02
15% :	6.87 E+02
20% :	7.49 E+02
25% :	8.09 E+02
30% :	8.64 E+02
35% :	9.31 E+02

40% :	9.99 E+02
45% :	1.09 E+03
50% :	1.20 E+03
55% :	1.33 E+03
60% :	1.50 E+03
65% :	1.67 E+03
70% :	1.86 E+03
75% :	2.08 E+03
80% :	2.31 E+03
85% :	2.56 E+03
90% :	2.92 E+03
95% :	3.53 E+03

Uncertainty Distribution of: c_sy_30km

Quantile	Value
----------	-------

5% :	1.20 E+03
10% :	1.51 E+03
15% :	1.68 E+03
20% :	1.84 E+03
25% :	1.99 E+03
30% :	2.16 E+03
35% :	2.34 E+03
40% :	2.53 E+03
45% :	2.77 E+03
50% :	3.09 E+03
55% :	3.49 E+03
60% :	3.99 E+03
65% :	4.48 E+03
70% :	5.05 E+03
75% :	5.73 E+03
80% :	6.41 E+03
85% :	7.19 E+03
90% :	8.28 E+03
95% :	1.03 E+04

Uncertainty Distribution of: c_sz_05km

Quantile	Value
----------	-------

5% :	6.52 E+00
10% :	9.60 E+00
15% :	1.28 E+01
20% :	1.59 E+01
25% :	1.90 E+01
30% :	2.28 E+01
35% :	2.59 E+01
40% :	3.01 E+01
45% :	3.40 E+01
50% :	3.90 E+01
55% :	4.63 E+01
60% :	5.53 E+01
65% :	6.30 E+01
70% :	7.08 E+01
75% :	7.96 E+01
80% :	9.03 E+01
85% :	1.07 E+02
90% :	1.23 E+02

95% : 1.53 E+02

Uncertainty Distribution of: c_sz_1km

Quantile	Value
5% :	1.01 E+01
10% :	1.52 E+01
15% :	2.04 E+01
20% :	2.56 E+01
25% :	3.14 E+01
30% :	3.84 E+01
35% :	4.53 E+01
40% :	5.26 E+01
45% :	6.19 E+01
50% :	7.13 E+01
55% :	8.43 E+01
60% :	1.03 E+02
65% :	1.19 E+02
70% :	1.35 E+02
75% :	1.52 E+02
80% :	1.73 E+02
85% :	2.05 E+02
90% :	2.39 E+02
95% :	3.05 E+02

Uncertainty Distribution of: c_sz_3km

Quantile	Value
5% :	2.02 E+01
10% :	3.08 E+01
15% :	4.36 E+01
20% :	5.45 E+01
25% :	6.88 E+01
30% :	8.63 E+01
35% :	1.08 E+02
40% :	1.31 E+02
45% :	1.58 E+02
50% :	1.85 E+02
55% :	2.21 E+02
60% :	2.76 E+02
65% :	3.26 E+02
70% :	3.74 E+02
75% :	4.25 E+02
80% :	4.88 E+02
85% :	5.76 E+02
90% :	6.81 E+02
95% :	9.21 E+02

Uncertainty Distribution of: c_sz_10km

Quantile	Value
5% :	4.21 E+01
10% :	6.67 E+01
15% :	9.79 E+01
20% :	1.26 E+02
25% :	1.64 E+02
30% :	2.10 E+02

35% :	2.73 E+02
40% :	3.59 E+02
45% :	4.40 E+02
50% :	5.33 E+02
55% :	6.50 E+02
60% :	8.16 E+02
65% :	9.87 E+02
70% :	1.15 E+03
75% :	1.31 E+03
80% :	1.52 E+03
85% :	1.82 E+03
90% :	2.15 E+03
95% :	3.13 E+03

Uncertainty Distribution of: c_sz_30km

Quantile	Value
----------	-------

5% :	8.03 E+01
10% :	1.35 E+02
15% :	2.05 E+02
20% :	2.72 E+02
25% :	3.59 E+02
30% :	4.73 E+02
35% :	6.38 E+02
40% :	8.86 E+02
45% :	1.13 E+03
50% :	1.42 E+03
55% :	1.74 E+03
60% :	2.19 E+03
65% :	2.71 E+03
70% :	3.18 E+03
75% :	3.64 E+03
80% :	4.28 E+03
85% :	5.14 E+03
90% :	6.29 E+03
95% :	9.69 E+03

Uncertainty Distribution of: d_sy_05km

Quantile	Value
----------	-------

5% :	2.71 E+01
10% :	3.38 E+01
15% :	3.88 E+01
20% :	4.30 E+01
25% :	4.76 E+01
30% :	5.23 E+01
35% :	5.66 E+01
40% :	6.04 E+01
45% :	6.45 E+01
50% :	6.84 E+01
55% :	7.31 E+01
60% :	7.82 E+01
65% :	8.39 E+01
70% :	9.06 E+01
75% :	9.73 E+01
80% :	1.05 E+02
85% :	1.16 E+02

90% :	1.34 E+02
95% :	1.63 E+02

Uncertainty Distribution of: d_sy_1km

Quantile	Value
----------	-------

5% :	4.66 E+01
10% :	5.99 E+01
15% :	6.92 E+01
20% :	7.78 E+01
25% :	8.64 E+01
30% :	9.60 E+01
35% :	1.05 E+02
40% :	1.13 E+02
45% :	1.21 E+02
50% :	1.29 E+02
55% :	1.39 E+02
60% :	1.50 E+02
65% :	1.62 E+02
70% :	1.76 E+02
75% :	1.89 E+02
80% :	2.07 E+02
85% :	2.29 E+02
90% :	2.66 E+02
95% :	3.31 E+02

Uncertainty Distribution of: d_sy_3km

Quantile	Value
----------	-------

5% :	1.10 E+02
10% :	1.48 E+02
15% :	1.73 E+02
20% :	1.98 E+02
25% :	2.23 E+02
30% :	2.51 E+02
35% :	2.78 E+02
40% :	3.01 E+02
45% :	3.25 E+02
50% :	3.53 E+02
55% :	3.84 E+02
60% :	4.21 E+02
65% :	4.61 E+02
70% :	5.02 E+02
75% :	5.47 E+02
80% :	6.04 E+02
85% :	6.80 E+02
90% :	7.97 E+02
95% :	1.01 E+03

Uncertainty Distribution of: d_sy_10km

Quantile	Value
----------	-------

5% :	2.82 E+02
10% :	3.97 E+02
15% :	4.75 E+02
20% :	5.49 E+02
25% :	6.26 E+02

30% :	7.21 E+02
35% :	8.09 E+02
40% :	8.86 E+02
45% :	9.67 E+02
50% :	1.06 E+03
55% :	1.17 E+03
60% :	1.30 E+03
65% :	1.44 E+03
70% :	1.59 E+03
75% :	1.76 E+03
80% :	1.97 E+03
85% :	2.25 E+03
90% :	2.65 E+03
95% :	3.48 E+03

Uncertainty Distribution of: d_sy_30km
Quantile Value

5% :	6.65 E+02
10% :	9.69 E+02
15% :	1.19 E+03
20% :	1.39 E+03
25% :	1.60 E+03
30% :	1.88 E+03
35% :	2.14 E+03
40% :	2.37 E+03
45% :	2.61 E+03
50% :	2.93 E+03
55% :	3.24 E+03
60% :	3.66 E+03
65% :	4.09 E+03
70% :	4.53 E+03
75% :	5.11 E+03
80% :	5.79 E+03
85% :	6.71 E+03
90% :	7.94 E+03
95% :	1.08 E+04

Uncertainty Distribution of: d_sz_05km
Quantile Value

5% :	4.30 E+00
10% :	6.85 E+00
15% :	9.67 E+00
20% :	1.24 E+01
25% :	1.47 E+01
30% :	1.71 E+01
35% :	1.99 E+01
40% :	2.29 E+01
45% :	2.63 E+01
50% :	3.10 E+01
55% :	3.64 E+01
60% :	4.24 E+01
65% :	4.85 E+01
70% :	5.55 E+01
75% :	6.59 E+01
80% :	7.93 E+01

85% :	1.03 E+02
90% :	1.40 E+02
95% :	2.11 E+02

Uncertainty Distribution of: d_sz_1km

Quantile	Value
----------	-------

5% :	5.82 E+00
10% :	9.32 E+00
15% :	1.33 E+01
20% :	1.73 E+01
25% :	2.07 E+01
30% :	2.44 E+01
35% :	2.85 E+01
40% :	3.33 E+01
45% :	3.91 E+01
50% :	4.55 E+01
55% :	5.47 E+01
60% :	6.43 E+01
65% :	7.37 E+01
70% :	8.68 E+01
75% :	1.05 E+02
80% :	1.31 E+02
85% :	1.71 E+02
90% :	2.31 E+02
95% :	3.68 E+02

Uncertainty Distribution of: d_sz_3km

Quantile	Value
----------	-------

5% :	9.08 E+00
10% :	1.52 E+01
15% :	2.17 E+01
20% :	2.91 E+01
25% :	3.53 E+01
30% :	4.23 E+01
35% :	5.03 E+01
40% :	6.02 E+01
45% :	7.24 E+01
50% :	8.64 E+01
55% :	1.02 E+02
60% :	1.23 E+02
65% :	1.47 E+02
70% :	1.74 E+02
75% :	2.23 E+02
80% :	2.89 E+02
85% :	3.81 E+02
90% :	5.34 E+02
95% :	8.99 E+02

Uncertainty Distribution of: d_sz_10km

Quantile	Value
----------	-------

5% :	1.48 E+01
10% :	2.56 E+01
15% :	3.76 E+01
20% :	5.08 E+01

25% :	6.24 E+01
30% :	7.84 E+01
35% :	9.44 E+01
40% :	1.14 E+02
45% :	1.41 E+02
50% :	1.72 E+02
55% :	2.05 E+02
60% :	2.50 E+02
65% :	3.10 E+02
70% :	3.87 E+02
75% :	5.07 E+02
80% :	6.92 E+02
85% :	9.40 E+02
90% :	1.37 E+03
95% :	2.38 E+03

Uncertainty Distribution of: d_sz_30km

Quantile	Value
----------	-------

5% :	2.17 E+01
10% :	4.12 E+01
15% :	6.15 E+01
20% :	8.49 E+01
25% :	1.06 E+02
30% :	1.35 E+02
35% :	1.66 E+02
40% :	2.03 E+02
45% :	2.55 E+02
50% :	3.18 E+02
55% :	3.95 E+02
60% :	4.90 E+02
65% :	6.22 E+02
70% :	8.09 E+02
75% :	1.08 E+03
80% :	1.53 E+03
85% :	2.19 E+03
90% :	3.24 E+03
95% :	5.86 E+03

Uncertainty Distribution of: e_sy_05km

Quantile	Value
----------	-------

5% :	1.52 E+01
10% :	2.00 E+01
15% :	2.42 E+01
20% :	2.78 E+01
25% :	3.13 E+01
30% :	3.47 E+01
35% :	3.79 E+01
40% :	4.14 E+01
45% :	4.56 E+01
50% :	4.96 E+01
55% :	5.48 E+01
60% :	6.08 E+01
65% :	6.71 E+01
70% :	7.42 E+01
75% :	8.26 E+01

80% :	9.16 E+01
85% :	1.01 E+02
90% :	1.15 E+02
95% :	1.32 E+02

Uncertainty Distribution of: e_sy_1km

Quantile	Value
5% :	2.61 E+01
10% :	3.49 E+01
15% :	4.30 E+01
20% :	4.97 E+01
25% :	5.58 E+01
30% :	6.18 E+01
35% :	6.75 E+01
40% :	7.46 E+01
45% :	8.22 E+01
50% :	9.00 E+01
55% :	9.96 E+01
60% :	1.11 E+02
65% :	1.24 E+02
70% :	1.38 E+02
75% :	1.54 E+02
80% :	1.72 E+02
85% :	1.91 E+02
90% :	2.19 E+02
95% :	2.53 E+02

Uncertainty Distribution of: e_sy_3km

Quantile	Value
5% :	6.16 E+01
10% :	8.50 E+01
15% :	1.06 E+02
20% :	1.23 E+02
25% :	1.39 E+02
30% :	1.54 E+02
35% :	1.71 E+02
40% :	1.89 E+02
45% :	2.11 E+02
50% :	2.33 E+02
55% :	2.61 E+02
60% :	2.91 E+02
65% :	3.29 E+02
70% :	3.71 E+02
75% :	4.18 E+02
80% :	4.70 E+02
85% :	5.27 E+02
90% :	6.08 E+02
95% :	7.09 E+02

Uncertainty Distribution of: e_sy_10km

Quantile	Value
5% :	1.58 E+02
10% :	2.25 E+02
15% :	2.81 E+02

20% :	3.30 E+02
25% :	3.75 E+02
30% :	4.19 E+02
35% :	4.70 E+02
40% :	5.25 E+02
45% :	5.94 E+02
50% :	6.67 E+02
55% :	7.56 E+02
60% :	8.48 E+02
65% :	9.66 E+02
70% :	1.09 E+03
75% :	1.24 E+03
80% :	1.42 E+03
85% :	1.61 E+03
90% :	1.86 E+03
95% :	2.20 E+03

Uncertainty Distribution of: e_sy_30km
Quantile Value

5% :	3.70 E+02
10% :	5.38 E+02
15% :	6.74 E+02
20% :	7.97 E+02
25% :	9.18 E+02
30% :	1.04 E+03
35% :	1.17 E+03
40% :	1.35 E+03
45% :	1.55 E+03
50% :	1.76 E+03
55% :	2.01 E+03
60% :	2.26 E+03
65% :	2.58 E+03
70% :	2.95 E+03
75% :	3.37 E+03
80% :	3.89 E+03
85% :	4.47 E+03
90% :	5.19 E+03
95% :	6.21 E+03

Uncertainty Distribution of: e_sz_05km
Quantile Value

5% :	1.97 E+00
10% :	3.01 E+00
15% :	3.85 E+00
20% :	4.65 E+00
25% :	5.85 E+00
30% :	6.90 E+00
35% :	8.02 E+00
40% :	9.57 E+00
45% :	1.17 E+01
50% :	1.46 E+01
55% :	1.95 E+01
60% :	3.09 E+01
65% :	4.69 E+01
70% :	6.62 E+01

75% :	9.07 E+01
80% :	1.21 E+02
85% :	1.63 E+02
90% :	2.31 E+02
95% :	3.53 E+02

Uncertainty Distribution of: e_sz_1km

Quantile	Value
5% :	2.48 E+00
10% :	3.84 E+00
15% :	4.98 E+00
20% :	6.04 E+00
25% :	7.55 E+00
30% :	9.10 E+00
35% :	1.06 E+01
40% :	1.26 E+01
45% :	1.55 E+01
50% :	1.96 E+01
55% :	2.52 E+01
60% :	3.87 E+01
65% :	5.68 E+01
70% :	8.10 E+01
75% :	1.11 E+02
80% :	1.51 E+02
85% :	2.03 E+02
90% :	2.92 E+02
95% :	4.57 E+02

Uncertainty Distribution of: e_sz_3km

Quantile	Value
5% :	3.52 E+00
10% :	5.60 E+00
15% :	7.28 E+00
20% :	9.13 E+00
25% :	1.16 E+01
30% :	1.41 E+01
35% :	1.63 E+01
40% :	1.95 E+01
45% :	2.44 E+01
50% :	3.05 E+01
55% :	3.85 E+01
60% :	5.43 E+01
65% :	7.92 E+01
70% :	1.12 E+02
75% :	1.56 E+02
80% :	2.16 E+02
85% :	2.95 E+02
90% :	4.30 E+02
95% :	6.93 E+02

Uncertainty Distribution of: e_sz_10km

Quantile	Value
5% :	4.98 E+00
10% :	8.34 E+00
15% :	1.10 E+01
20% :	1.42 E+01
25% :	1.81 E+01
30% :	2.21 E+01
35% :	2.60 E+01
40% :	3.10 E+01
45% :	3.93 E+01
50% :	4.94 E+01
55% :	6.16 E+01
60% :	7.90 E+01
65% :	1.15 E+02
70% :	1.64 E+02
75% :	2.25 E+02
80% :	3.20 E+02
85% :	4.42 E+02
90% :	6.67 E+02
95% :	1.09 E+03

Uncertainty Distribution of: e_sz_30km

Quantile	Value
5% :	6.75 E+00
10% :	1.20 E+01
15% :	1.61 E+01
20% :	2.10 E+01
25% :	2.72 E+01
30% :	3.30 E+01
35% :	3.97 E+01
40% :	4.77 E+01
45% :	5.98 E+01
50% :	7.50 E+01
55% :	9.51 E+01
60% :	1.22 E+02
65% :	1.65 E+02
70% :	2.36 E+02
75% :	3.21 E+02
80% :	4.55 E+02
85% :	6.37 E+02
90% :	9.93 E+02
95% :	1.64 E+03

Random_variable : C_BY
Distribution type : DISTRIBUTION FILE: BY_C.DIS

Description :

number: 7
AAAAAAAAAAAAAA

Random_variable : C_AZ
Distribution type : DISTRIBUTION FILE: AZ_C.DIS

Description :

number: 8
AAAAAAAAAAAAAA

Random_variable : C_BZ
Distribution type : DISTRIBUTION FILE: BZ_C.DIS
Description :

number: 9
AAAAAAAAAAAAAA

Random_variable : D_AY
Distribution type : DISTRIBUTION FILE: AY_D.DIS

Description :

number: 10
AAAAAAAAAAAAAA

Random_variable : D_BY
Distribution type : DISTRIBUTION FILE: BY_D.DIS

Description :

number: 11
AAAAAAAAAAAAAA

Random_variable : D_AZ
Distribution type : DISTRIBUTION FILE: AZ_D.DIS

Description :

number: 12
AAAAAAAAAAAAAA

Random_variable : D_BZ
Distribution type : DISTRIBUTION FILE: BZ_D.DIS

Description :

number: 13
AAAAAAAAAAAAA
Random_variable : E_AZ
Distribution type : DISTRIBUTION FILE: AZ_E.DIS

Description :

number: 14
AAAAAAAAAAAAA
Random_variable : E_BZ
Distribution type : DISTRIBUTION FILE: BZ_E.DIS

Description :

number: 15
AAAAAAAAAAAAA
Random_variable : E_BY
Distribution type : DISTRIBUTION FILE: BY_E.DIS

Description :

number: 16
AAAAAAAAAAAAA
Random_variable : E_AY
Distribution type : DISTRIBUTION FILE: AY_E.DIS

Description :

```

iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii
iii
Report : SANDIA
Part: 4
iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii
iii

```

***** 4. Formula & User Defined Functions *****

File: SANDIA

```

a_sy_05km: a_ay*500^a_by
a_sy_1km: a_ay*1000^a_by
a_sy_3km: a_ay*3000^a_by
a_sy_10km: a_ay*10000^a_by
a_sz_05km: a_az*500^a_bz
a_sz_1km: a_az*1000^a_bz
a_sz_3km: a_az*3000^a_bz
a_sz_10km: a_az*10000^a_bz
c_sy_05km: c_ay*500^c_by
c_sy_1km: c_ay*1000^c_by
c_sy_3km: c_ay*3000^c_by
c_sy_10km: c_ay*10000^c_by
c_sy_30km: c_ay*30000^c_by
c_sz_05km: c_az*500^c_bz
c_sz_1km: c_az*1000^c_bz
c_sz_3km: c_az*3000^c_bz
c_sz_10km: c_az*10000^c_bz
c_sz_30km: c_az*30000^c_bz
d_sy_05km: d_ay*500^d_by
d_sy_1km: d_ay*1000^d_by
d_sy_3km: d_ay*3000^d_by
d_sy_10km: d_ay*10000^d_by
d_sy_30km: d_ay*30000^d_by
d_sz_05km: d_az*500^d_bz
d_sz_1km: d_az*1000^d_bz
d_sz_3km: d_az*3000^d_bz
d_sz_10km: d_az*10000^d_bz
d_sz_30km: d_az*30000^d_bz
e_sy_05km: e_ay*500^e_by
e_sy_1km: e_ay*1000^e_by
e_sy_3km: e_ay*3000^e_by
e_sy_10km: e_ay*10000^e_by
e_sy_30km: e_ay*30000^e_by
e_sz_05km: e_az*500^e_bz
e_sz_1km: e_az*1000^e_bz
e_sz_3km: e_az*3000^e_bz
e_sz_10km: e_az*10000^e_bz
e_sz_30km: e_az*30000^e_bz

```



```

D_BY
3
AA(-0.14) D_AY
AA(-0.25) D_BZ
3
AA(-0.25) D_AZ

```

***** Dependency tree with main root : E_AZ *****

```

E_AZ
3
AA(-0.23) E_AY
AA(-0.45) E_BZ
3
AA( 0.25) E_BY

```

***** 5.2. Sampling results & data *****

```

Model type           : SANDIA
Random_seed = 1
Bivariate distribution: Minimum Information Distribution

```

```

OUTPUT OPTIONS:      Rank Correlation Matrix
Number of samples used = 10000, Total number of samples produced = 10000
Quantile option      : 100 percentiles generated

```

Random Variable	3	Mean	3	Variance	3	5% Perc	3	Median	3	95%
Perc										
AAAA										
1. a_ay	3	*	3	*	3	*	3	*	3	*
2. a_by	3	*	3	*	3	*	3	*	3	*
3. a_az	3	*	3	*	3	*	3	*	3	*
4. a_bz	3	*	3	*	3	*	3	*	3	*
5. c_ay	3	*	3	*	3	*	3	*	3	*
6. c_by	3	*	3	*	3	*	3	*	3	*
7. c_az	3	*	3	*	3	*	3	*	3	*
8. c_bz	3	*	3	*	3	*	3	*	3	*
9. d_ay	3	*	3	*	3	*	3	*	3	*
10. d_by	3	*	3	*	3	*	3	*	3	*
11. d_az	3	*	3	*	3	*	3	*	3	*
12. d_bz	3	*	3	*	3	*	3	*	3	*
13. e_az	3	*	3	*	3	*	3	*	3	*
14. e_bz	3	*	3	*	3	*	3	*	3	*
15. e_by	3	*	3	*	3	*	3	*	3	*
16. e_ay	3	*	3	*	3	*	3	*	3	*
AAAA										
17. a_sy_05km	3	2.35 E+02	3	2.77 E+04	3	5.77 E+01	3	1.88 E+02	3	5.81 E+02
18. a_sy_1km	3	4.44 E+02	3	1.13 E+05	3	1.01 E+02	3	3.42 E+02	3	1.14 E+03

19. a_sy_3km	³	1.23 E+03	³	1.05 E+06	³	2.47 E+02	³	8.90 E+02	³	3.36 E+03
20. a_sy_10km	³	3.77 E+03	³	1.21 E+07	³	6.51 E+02	³	2.55 E+03	³	1.10 E+04
21. a_sz_05km	³	4.35 E+02	³	7.59 E+05	³	7.15 E+00	³	1.68 E+02	³	1.72 E+03
22. a_sz_1km	³	8.40 E+02	³	3.49 E+06	³	1.04 E+01	³	2.82 E+02	³	3.42 E+03
23. a_sz_3km	³	2.45 E+03	³	4.02 E+07	³	1.70 E+01	³	6.22 E+02	³	1.06 E+04
24. a_sz_10km	³	8.21 E+03	³	5.99 E+08	³	3.05 E+01	³	1.50 E+03	³	3.67 E+04
25. c_sy_05km	³	1.03 E+02	³	2.19 E+03	³	4.13 E+01	³	9.05 E+01	³	1.94 E+02
26. c_sy_1km	³	1.92 E+02	³	9.00 E+03	³	7.33 E+01	³	1.65 E+02	³	3.78 E+02
27. c_sy_3km	³	5.16 E+02	³	8.34 E+04	³	1.81 E+02	³	4.23 E+02	³	1.10 E+03
28. c_sy_10km	³	1.53 E+03	³	9.43 E+05	³	4.87 E+02	³	1.20 E+03	³	3.53 E+03
29. c_sy_30km	³	4.17 E+03	³	8.53 E+06	³	1.20 E+03	³	3.09 E+03	³	1.03 E+04
30. c_sz_05km	³	5.66 E+01	³	2.62 E+03	³	6.52 E+00	³	3.90 E+01	³	1.53 E+02
31. c_sz_1km	³	1.08 E+02	³	1.10 E+04	³	1.01 E+01	³	7.13 E+01	³	3.05 E+02
32. c_sz_3km	³	3.01 E+02	³	1.07 E+05	³	2.02 E+01	³	1.85 E+02	³	9.21 E+02
33. c_sz_10km	³	9.40 E+02	³	1.30 E+06	³	4.21 E+01	³	5.33 E+02	³	3.13 E+03
34. c_sz_30km	³	2.69 E+03	³	1.27 E+07	³	8.03 E+01	³	1.42 E+03	³	9.69 E+03
35. d_sy_05km	³	7.78 E+01	³	1.84 E+03	³	2.71 E+01	³	6.84 E+01	³	1.63 E+02
36. d_sy_1km	³	1.50 E+02	³	8.33 E+03	³	4.66 E+01	³	1.29 E+02	³	3.31 E+02
37. d_sy_3km	³	4.30 E+02	³	9.05 E+04	³	1.10 E+02	³	3.53 E+02	³	1.01 E+03
38. d_sy_10km	³	1.37 E+03	³	1.23 E+06	³	2.82 E+02	³	1.06 E+03	³	3.48 E+03
39. d_sy_30km	³	3.98 E+03	³	1.32 E+07	³	6.65 E+02	³	2.93 E+03	³	1.08 E+04
40. d_sz_05km	³	5.85 E+01	³	6.88 E+03	³	4.30 E+00	³	3.10 E+01	³	2.11 E+02
41. d_sz_1km	³	9.62 E+01	³	2.22 E+04	³	5.82 E+00	³	4.55 E+01	³	3.68 E+02
42. d_sz_3km	³	2.16 E+02	³	1.44 E+05	³	9.08 E+00	³	8.64 E+01	³	8.99 E+02
43. d_sz_10km	³	5.37 E+02	³	1.13 E+06	³	1.48 E+01	³	1.72 E+02	³	2.38 E+03
44. d_sz_30km	³	1.26 E+03	³	7.44 E+06	³	2.17 E+01	³	3.18 E+02	³	5.86 E+03
45. e_sy_05km	³	5.97 E+01	³	1.34 E+03	³	1.52 E+01	³	4.96 E+01	³	1.32 E+02
46. e_sy_1km	³	1.11 E+02	³	5.07 E+03	³	2.61 E+01	³	9.00 E+01	³	2.53 E+02

```

47. e_sy_3km    3  2.97 E+02 3  4.19 E+04 3  6.16 E+01 3  2.33 E+02 3  7.09
E+02
48. e_sy_10km   3  8.76 E+02 3  4.23 E+05 3  1.58 E+02 3  6.67 E+02 3  2.20
E+03
49. e_sy_30km   3  2.36 E+03 3  3.48 E+06 3  3.70 E+02 3  1.76 E+03 3  6.21
E+03
50. e_sz_05km   3  7.71 E+01 3  1.92 E+04 3  1.97 E+00 3  1.46 E+01 3  3.53
E+02
51. e_sz_1km    3  9.95 E+01 3  3.49 E+04 3  2.48 E+00 3  1.96 E+01 3  4.57
E+02
52. e_sz_3km    3  1.51 E+02 3  9.30 E+04 3  3.52 E+00 3  3.05 E+01 3  6.93
E+02
53. e_sz_10km   3  2.40 E+02 3  2.83 E+05 3  4.98 E+00 3  4.94 E+01 3  1.09
E+03
54. e_sz_30km   3  3.73 E+02 3  8.03 E+05 3  6.75 E+00 3  7.50 E+01 3  1.64
E+03

```

***** 5.3. Correlation matrix *****

Rank Correlation Matrix

```

.....
Random Variable 3  1 3  2 3  3 3  4 3  5 3  6 3  7 3  8 3  9 3
10
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAA
1. a_ay          3  1.003 -0.273  0.013  0.053  0.033 -0.003 -0.013 -0.013 -0.013
0.00
2. a_by          3 -0.273  1.003  0.023 -0.153 -0.023  0.003 -0.013 -0.013  0.003
0.00
3. a_az          3  0.013  0.023  1.003 -0.253 -0.003  0.003 -0.013  0.003 -0.003 -
0.01
4. a_bz          3  0.053 -0.153 -0.253  1.003  0.013  0.013  0.013  0.003 -0.023
0.01
5. c_ay          3  0.033 -0.023 -0.003  0.013  1.003  0.073  0.013  0.023 -0.033 -
0.00
6. c_by          3 -0.003  0.003  0.003  0.013  0.073  1.003 -0.043  0.193 -0.013
0.02
7. c_az          3 -0.013 -0.013 -0.013  0.013  0.013 -0.043  1.003 -0.153  0.003 -
0.01
8. c_bz          3 -0.013 -0.013  0.003  0.003  0.023  0.193 -0.153  1.003 -0.023
0.01
9. d_ay          3 -0.013  0.003 -0.003 -0.023 -0.033 -0.013  0.003 -0.023  1.003 -
0.13
10. d_by         3  0.003  0.003 -0.013  0.013 -0.003  0.023 -0.013  0.013 -0.133
1.00
11. d_az         3 -0.013 -0.013 -0.023  0.013 -0.013 -0.013 -0.013  0.003 -0.003
0.06
12. d_bz         3  0.003 -0.013 -0.013 -0.013  0.003  0.003  0.013 -0.013  0.033 -
0.24
13. e_az         3  0.003 -0.003 -0.023 -0.013 -0.003 -0.003 -0.023  0.013 -0.003
0.00
14. e_bz         3  0.003  0.003  0.013 -0.013  0.013  0.013  0.013  0.003  0.003
0.01
15. e_by         3 -0.003 -0.013  0.013  0.003  0.013 -0.003 -0.013 -0.013  0.003 -
0.01
16. e_ay         3  0.003 -0.013  0.013 -0.003 -0.023 -0.013  0.003 -0.003  0.003
0.01

```

AA
 AAAA

17. a_sy_05km ³ 0.62³ 0.55³ 0.02³ -0.08³ 0.01³ -0.00³ -0.02³ -0.02³ -0.00³
 0.01
 18. a_sy_1km ³ 0.56³ 0.62³ 0.02³ -0.09³ 0.01³ -0.00³ -0.02³ -0.02³ -0.00³
 0.01
 19. a_sy_3km ³ 0.46³ 0.70³ 0.02³ -0.10³ 0.01³ -0.00³ -0.02³ -0.02³ -0.00³
 0.01
 20. a_sy_10km ³ 0.38³ 0.77³ 0.02³ -0.11³ 0.00³ -0.00³ -0.02³ -0.02³ -0.00³
 0.01
 21. a_sz_05km ³ 0.04³ -0.11³ 0.51³ 0.64³ 0.01³ 0.01³ 0.00³ -0.00³ -0.02³ -
 0.00
 22. a_sz_1km ³ 0.05³ -0.12³ 0.46³ 0.68³ 0.01³ 0.01³ 0.00³ -0.00³ -0.02³ -
 0.00
 23. a_sz_3km ³ 0.05³ -0.12³ 0.39³ 0.74³ 0.01³ 0.01³ 0.00³ -0.00³ -0.02³ -
 0.00
 24. a_sz_10km ³ 0.05³ -0.13³ 0.33³ 0.78³ 0.01³ 0.01³ 0.01³ -0.00³ -0.02³ -
 0.00
 25. c_sy_05km ³ 0.01³ -0.01³ 0.00³ 0.01³ 0.55³ 0.84³ -0.03³ 0.16³ -0.03³
 0.01
 26. c_sy_1km ³ 0.01³ -0.01³ 0.00³ 0.01³ 0.52³ 0.86³ -0.03³ 0.17³ -0.02³
 0.01
 27. c_sy_3km ³ 0.01³ -0.01³ 0.00³ 0.01³ 0.48³ 0.88³ -0.03³ 0.17³ -0.02³
 0.02
 28. c_sy_10km ³ 0.01³ -0.01³ 0.00³ 0.01³ 0.44³ 0.91³ -0.03³ 0.18³ -0.02³
 0.02
 29. c_sy_30km ³ 0.01³ -0.01³ 0.00³ 0.01³ 0.41³ 0.92³ -0.03³ 0.18³ -0.02³
 0.02
 30. c_sz_05km ³ -0.02³ -0.02³ 0.00³ 0.01³ 0.02³ 0.15³ 0.41³ 0.80³ -0.02³
 0.01
 31. c_sz_1km ³ -0.02³ -0.02³ 0.00³ 0.01³ 0.02³ 0.15³ 0.37³ 0.83³ -0.02³
 0.01
 32. c_sz_3km ³ -0.02³ -0.02³ 0.00³ 0.01³ 0.02³ 0.16³ 0.31³ 0.86³ -0.02³
 0.01
 33. c_sz_10km ³ -0.02³ -0.02³ 0.00³ 0.01³ 0.02³ 0.16³ 0.27³ 0.89³ -0.02³
 0.01
 34. c_sz_30km ³ -0.02³ -0.02³ 0.00³ 0.01³ 0.02³ 0.17³ 0.23³ 0.90³ -0.02³
 0.01
 35. d_sy_05km ³ 0.00³ 0.00³ -0.01³ 0.00³ -0.02³ 0.01³ -0.01³ 0.00³ 0.32³
 0.88
 36. d_sy_1km ³ 0.00³ 0.00³ -0.01³ 0.00³ -0.02³ 0.01³ -0.01³ 0.00³ 0.28³
 0.90
 37. d_sy_3km ³ 0.00³ 0.00³ -0.01³ 0.00³ -0.01³ 0.02³ -0.01³ 0.01³ 0.23³
 0.92
 38. d_sy_10km ³ 0.00³ 0.00³ -0.01³ 0.00³ -0.01³ 0.02³ -0.01³ 0.01³ 0.18³
 0.94
 39. d_sy_30km ³ 0.00³ 0.00³ -0.01³ 0.00³ -0.01³ 0.02³ -0.01³ 0.01³ 0.15³
 0.95
 40. d_sz_05km ³ -0.01³ -0.01³ -0.02³ 0.00³ -0.00³ -0.01³ 0.00³ -0.01³ 0.02³ -
 0.16
 41. d_sz_1km ³ -0.01³ -0.01³ -0.02³ 0.00³ -0.00³ -0.01³ 0.00³ -0.01³ 0.03³ -
 0.17
 42. d_sz_3km ³ -0.01³ -0.01³ -0.02³ -0.00³ -0.00³ -0.01³ 0.01³ -0.01³ 0.03³ -
 0.19
 43. d_sz_10km ³ -0.01³ -0.01³ -0.02³ -0.00³ -0.00³ -0.00³ 0.01³ -0.01³ 0.03³ -
 0.20

44. d_sz_30km ³ -0.00³ -0.01³ -0.01³ -0.00³ -0.00³ -0.00³ 0.01³ -0.01³ 0.03³ -
 0.21
 45. e_sy_05km ³ 0.00³ -0.01³ 0.02³ -0.00³ -0.01³ -0.01³ -0.00³ -0.01³ 0.00³ -
 0.00
 46. e_sy_1km ³ 0.00³ -0.01³ 0.02³ -0.00³ -0.01³ -0.01³ -0.00³ -0.01³ 0.00³ -
 0.00
 47. e_sy_3km ³ 0.00³ -0.01³ 0.02³ -0.00³ -0.00³ -0.01³ -0.00³ -0.01³ 0.00³ -
 0.01
 48. e_sy_10km ³ 0.00³ -0.01³ 0.02³ 0.00³ -0.00³ -0.01³ -0.00³ -0.01³ 0.00³ -
 0.01
 49. e_sy_30km ³ 0.00³ -0.01³ 0.02³ 0.00³ -0.00³ -0.01³ -0.01³ -0.01³ 0.00³ -
 0.01
 50. e_sz_05km ³ -0.00³ -0.00³ -0.02³ -0.01³ 0.00³ 0.00³ -0.02³ 0.01³ -0.00³
 0.01
 51. e_sz_1km ³ -0.00³ -0.00³ -0.02³ -0.01³ 0.00³ 0.01³ -0.02³ 0.01³ 0.00³
 0.01
 52. e_sz_3km ³ -0.00³ -0.00³ -0.02³ -0.01³ 0.00³ 0.01³ -0.02³ 0.01³ 0.00³
 0.01
 53. e_sz_10km ³ -0.00³ -0.00³ -0.02³ -0.01³ 0.00³ 0.01³ -0.01³ 0.01³ 0.00³
 0.01
 54. e_sz_30km ³ -0.00³ -0.00³ -0.01³ -0.01³ 0.00³ 0.01³ -0.01³ 0.01³ 0.00³
 0.01

Random Variable ³ 11 ³ 12 ³ 13 ³ 14 ³ 15 ³ 16 ³ 17 ³ 18 ³ 19 ³
 20
 AA
 AAAAA
 1. a_ay ³ -0.01³ 0.00³ 0.00³ 0.00³ -0.00³ 0.00³ 0.62³ 0.56³ 0.46³
 0.38
 2. a_by ³ -0.01³ -0.01³ -0.00³ 0.00³ -0.01³ -0.01³ 0.55³ 0.62³ 0.70³
 0.77
 3. a_az ³ -0.02³ -0.01³ -0.02³ 0.01³ 0.01³ 0.01³ 0.02³ 0.02³ 0.02³
 0.02
 4. a_bz ³ 0.01³ -0.01³ -0.01³ -0.01³ 0.00³ -0.00³ -0.08³ -0.09³ -0.10³ -
 0.11
 5. c_ay ³ -0.01³ 0.00³ -0.00³ 0.01³ 0.01³ -0.02³ 0.01³ 0.01³ 0.01³
 0.00
 6. c_by ³ -0.01³ 0.00³ -0.00³ 0.01³ -0.00³ -0.01³ -0.00³ -0.00³ -0.00³ -
 0.00
 7. c_az ³ -0.01³ 0.01³ -0.02³ 0.01³ -0.01³ 0.00³ -0.02³ -0.02³ -0.02³ -
 0.02
 8. c_bz ³ 0.00³ -0.01³ 0.01³ 0.00³ -0.01³ -0.00³ -0.02³ -0.02³ -0.02³ -
 0.02
 9. d_ay ³ -0.00³ 0.03³ -0.00³ 0.00³ 0.00³ 0.00³ -0.00³ -0.00³ -0.00³ -
 0.00
 10. d_by ³ 0.06³ -0.24³ 0.00³ 0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.01
 11. d_az ³ 1.00³ -0.24³ -0.01³ 0.02³ -0.01³ -0.00³ -0.01³ -0.01³ -0.01³ -
 0.01
 12. d_bz ³ -0.24³ 1.00³ 0.01³ -0.01³ 0.01³ -0.02³ -0.00³ -0.00³ -0.00³ -
 0.00
 13. e_az ³ -0.01³ 0.01³ 1.00³ -0.44³ -0.10³ -0.23³ -0.01³ -0.01³ -0.01³ -
 0.01
 14. e_bz ³ 0.02³ -0.01³ -0.44³ 1.00³ 0.25³ 0.09³ 0.00³ 0.00³ 0.00³
 0.00
 15. e_by ³ -0.01³ 0.01³ -0.10³ 0.25³ 1.00³ 0.01³ -0.01³ -0.01³ -0.01³ -
 0.01

16. e_ay ³ -0.00³ -0.02³ -0.23³ 0.09³ 0.01³ 1.00³ -0.00³ -0.00³ -0.00³ -
0.00
~~AA~~
~~AAAA~~
17. a_sy_05km ³ -0.01³ -0.00³ -0.01³ 0.00³ -0.01³ -0.00³ 1.00³ 1.00³ 0.98³
0.95
18. a_sy_1km ³ -0.01³ -0.00³ -0.01³ 0.00³ -0.01³ -0.00³ 1.00³ 1.00³ 0.99³
0.97
19. a_sy_3km ³ -0.01³ -0.00³ -0.01³ 0.00³ -0.01³ -0.00³ 0.98³ 0.99³ 1.00³
0.99
20. a_sy_10km ³ -0.01³ -0.00³ -0.01³ 0.00³ -0.01³ -0.00³ 0.95³ 0.97³ 0.99³
1.00
21. a_sz_05km ³ -0.00³ -0.01³ -0.02³ 0.01³ 0.01³ 0.01³ -0.05³ -0.06³ -0.07³ -
0.08
22. a_sz_1km ³ -0.00³ -0.01³ -0.02³ 0.01³ 0.01³ 0.01³ -0.06³ -0.07³ -0.08³ -
0.09
23. a_sz_3km ³ -0.00³ -0.01³ -0.02³ 0.01³ 0.01³ 0.01³ -0.06³ -0.07³ -0.08³ -
0.09
24. a_sz_10km ³ 0.00³ -0.02³ -0.02³ 0.01³ 0.01³ 0.01³ -0.06³ -0.07³ -0.09³ -
0.09
25. c_sy_05km ³ -0.01³ 0.00³ 0.00³ 0.01³ 0.00³ -0.02³ -0.00³ -0.00³ -0.00³ -
0.00
26. c_sy_1km ³ -0.01³ 0.00³ 0.00³ 0.01³ 0.00³ -0.02³ -0.00³ -0.00³ -0.00³ -
0.00
27. c_sy_3km ³ -0.01³ 0.00³ 0.00³ 0.01³ 0.00³ -0.02³ -0.00³ -0.00³ -0.00³ -
0.00
28. c_sy_10km ³ -0.01³ 0.00³ 0.00³ 0.01³ 0.00³ -0.02³ -0.00³ -0.00³ -0.00³ -
0.00
29. c_sy_30km ³ -0.01³ 0.00³ 0.00³ 0.01³ 0.00³ -0.02³ -0.00³ -0.00³ -0.00³ -
0.00
30. c_sz_05km ³ 0.00³ -0.01³ -0.00³ 0.01³ -0.01³ -0.01³ -0.03³ -0.03³ -0.03³ -
0.03
31. c_sz_1km ³ 0.00³ -0.01³ -0.00³ 0.01³ -0.01³ -0.01³ -0.03³ -0.03³ -0.03³ -
0.03
32. c_sz_3km ³ 0.00³ -0.01³ -0.00³ 0.01³ -0.01³ -0.01³ -0.03³ -0.03³ -0.03³ -
0.03
33. c_sz_10km ³ 0.00³ -0.01³ -0.00³ 0.01³ -0.01³ -0.01³ -0.03³ -0.03³ -0.03³ -
0.03
34. c_sz_30km ³ 0.00³ -0.01³ 0.00³ 0.01³ -0.01³ -0.01³ -0.03³ -0.03³ -0.03³ -
0.03
35. d_sy_05km ³ 0.05³ -0.21³ 0.00³ 0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³
0.01
36. d_sy_1km ³ 0.05³ -0.22³ 0.00³ 0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³
0.01
37. d_sy_3km ³ 0.06³ -0.22³ 0.00³ 0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³
0.01
38. d_sy_10km ³ 0.06³ -0.23³ 0.00³ 0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³
0.01
39. d_sy_30km ³ 0.06³ -0.23³ 0.00³ 0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³
0.01
40. d_sz_05km ³ 0.49³ 0.68³ 0.00³ 0.00³ -0.00³ -0.02³ -0.01³ -0.01³ -0.01³ -
0.01
41. d_sz_1km ³ 0.43³ 0.73³ 0.00³ 0.00³ -0.00³ -0.02³ -0.01³ -0.01³ -0.01³ -
0.01
42. d_sz_3km ³ 0.36³ 0.78³ 0.00³ -0.00³ 0.00³ -0.02³ -0.01³ -0.01³ -0.01³ -
0.01

43. d_sz_10km ³ 0.29³ 0.82³ 0.00³ -0.00³ 0.00³ -0.02³ -0.01³ -0.01³ -0.01³ -
 0.01
 44. d_sz_30km ³ 0.24³ 0.85³ 0.00³ -0.00³ 0.00³ -0.02³ -0.01³ -0.01³ -0.01³ -
 0.01
 45. e_sy_05km ³ -0.01³ -0.01³ -0.24³ 0.23³ 0.63³ 0.76³ -0.01³ -0.01³ -0.01³ -
 0.01
 46. e_sy_1km ³ -0.01³ -0.01³ -0.23³ 0.23³ 0.67³ 0.73³ -0.01³ -0.01³ -0.01³ -
 0.01
 47. e_sy_3km ³ -0.01³ -0.01³ -0.23³ 0.24³ 0.72³ 0.67³ -0.01³ -0.01³ -0.01³ -
 0.01
 48. e_sy_10km ³ -0.01³ -0.01³ -0.22³ 0.25³ 0.77³ 0.62³ -0.01³ -0.01³ -0.01³ -
 0.01
 49. e_sy_30km ³ -0.01³ -0.00³ -0.21³ 0.25³ 0.81³ 0.57³ -0.01³ -0.01³ -0.01³ -
 0.01
 50. e_sz_05km ³ -0.01³ 0.00³ 0.91³ -0.07³ -0.01³ -0.21³ -0.01³ -0.01³ -0.01³ -
 0.01
 51. e_sz_1km ³ -0.01³ 0.00³ 0.89³ -0.04³ -0.00³ -0.21³ -0.01³ -0.01³ -0.01³ -
 0.01
 52. e_sz_3km ³ -0.00³ 0.00³ 0.86³ 0.02³ 0.01³ -0.20³ -0.01³ -0.01³ -0.01³ -
 0.01
 53. e_sz_10km ³ -0.00³ -0.00³ 0.82³ 0.09³ 0.03³ -0.19³ -0.01³ -0.01³ -0.01³ -
 0.01
 54. e_sz_30km ³ -0.00³ -0.00³ 0.78³ 0.15³ 0.04³ -0.18³ -0.01³ -0.01³ -0.01³ -
 0.00

Random Variable ³ 21 ³ 22 ³ 23 ³ 24 ³ 25 ³ 26 ³ 27 ³ 28 ³ 29 ³
 30
 AA
 AAAA
 1. a_ay ³ 0.04³ 0.05³ 0.05³ 0.05³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
 0.02
 2. a_by ³ -0.11³ -0.12³ -0.12³ -0.13³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.02
 3. a_az ³ 0.51³ 0.46³ 0.39³ 0.33³ 0.00³ 0.00³ 0.00³ 0.00³ 0.00³
 0.00
 4. a_bz ³ 0.64³ 0.68³ 0.74³ 0.78³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.01
 5. c_ay ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.55³ 0.52³ 0.48³ 0.44³ 0.41³
 0.02
 6. c_by ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.84³ 0.86³ 0.88³ 0.91³ 0.92³
 0.15
 7. c_az ³ 0.00³ 0.00³ 0.00³ 0.01³ -0.03³ -0.03³ -0.03³ -0.03³ -0.03³
 0.41
 8. c_bz ³ -0.00³ -0.00³ -0.00³ -0.00³ 0.16³ 0.17³ 0.17³ 0.18³ 0.18³
 0.80
 9. d_ay ³ -0.02³ -0.02³ -0.02³ -0.02³ -0.03³ -0.02³ -0.02³ -0.02³ -0.02³ -
 0.02
 10. d_by ³ -0.00³ -0.00³ -0.00³ -0.00³ 0.01³ 0.01³ 0.02³ 0.02³ 0.02³
 0.01
 11. d_az ³ -0.00³ -0.00³ -0.00³ 0.00³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 12. d_bz ³ -0.01³ -0.01³ -0.01³ -0.02³ 0.00³ 0.00³ 0.00³ 0.00³ 0.00³ -
 0.01
 13. e_az ³ -0.02³ -0.02³ -0.02³ -0.02³ 0.00³ 0.00³ 0.00³ 0.00³ 0.00³ -
 0.00
 14. e_bz ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.01

15. e_by ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.00³ 0.00³ 0.00³ 0.00³ 0.00³ -
 0.01
 16. e_ay ³ 0.01³ 0.01³ 0.01³ 0.01³ -0.02³ -0.02³ -0.02³ -0.02³ -0.02³ -
 0.01
 AA
 AAAAA
 17. a_sy_05km ³ -0.05³ -0.06³ -0.06³ -0.06³ -0.00³ -0.00³ -0.00³ -0.00³ -0.00³ -
 0.03
 18. a_sy_1km ³ -0.06³ -0.07³ -0.07³ -0.07³ -0.00³ -0.00³ -0.00³ -0.00³ -0.00³ -
 0.03
 19. a_sy_3km ³ -0.07³ -0.08³ -0.08³ -0.09³ -0.00³ -0.00³ -0.00³ -0.00³ -0.00³ -
 0.03
 20. a_sy_10km ³ -0.08³ -0.09³ -0.09³ -0.09³ -0.00³ -0.00³ -0.00³ -0.00³ -0.00³ -
 0.03
 21. a_sz_05km ³ 1.00³ 1.00³ 0.99³ 0.97³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.00
 22. a_sz_1km ³ 1.00³ 1.00³ 1.00³ 0.99³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.00
 23. a_sz_3km ³ 0.99³ 1.00³ 1.00³ 1.00³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.00
 24. a_sz_10km ³ 0.97³ 0.99³ 1.00³ 1.00³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.00
 25. c_sy_05km ³ 0.01³ 0.01³ 0.01³ 0.01³ 1.00³ 1.00³ 0.99³ 0.99³ 0.98³
 0.13
 26. c_sy_1km ³ 0.01³ 0.01³ 0.01³ 0.01³ 1.00³ 1.00³ 1.00³ 0.99³ 0.99³
 0.13
 27. c_sy_3km ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.99³ 1.00³ 1.00³ 1.00³ 1.00³
 0.14
 28. c_sy_10km ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.99³ 0.99³ 1.00³ 1.00³ 1.00³
 0.14
 29. c_sy_30km ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.98³ 0.99³ 1.00³ 1.00³ 1.00³
 0.14
 30. c_sz_05km ³ 0.00³ 0.00³ 0.00³ 0.00³ 0.13³ 0.13³ 0.14³ 0.14³ 0.14³
 1.00
 31. c_sz_1km ³ 0.00³ 0.00³ 0.00³ 0.00³ 0.13³ 0.14³ 0.14³ 0.14³ 0.14³
 1.00
 32. c_sz_3km ³ 0.00³ 0.00³ 0.00³ 0.00³ 0.14³ 0.14³ 0.15³ 0.15³ 0.15³
 0.99
 33. c_sz_10km ³ 0.00³ 0.00³ 0.00³ 0.00³ 0.14³ 0.15³ 0.15³ 0.15³ 0.15³
 0.98
 34. c_sz_30km ³ 0.00³ 0.00³ 0.00³ 0.00³ 0.15³ 0.15³ 0.15³ 0.16³ 0.16³
 0.98
 35. d_sy_05km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.00³ 0.00³ 0.00³ 0.01³ 0.01³
 0.01
 36. d_sy_1km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.00³ 0.00³ 0.01³ 0.01³ 0.01³
 0.01
 37. d_sy_3km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.00³ 0.01³ 0.01³ 0.01³ 0.01³
 0.01
 38. d_sy_10km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.01
 39. d_sy_30km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.01
 40. d_sz_05km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.00
 41. d_sz_1km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.00


```

14. e_bz      ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
0.00
15. e_by      ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
0.00
16. e_ay      ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.02
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAA
17. a_sy_05km ³ -0.03³ -0.03³ -0.03³ -0.03³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
18. a_sy_1km  ³ -0.03³ -0.03³ -0.03³ -0.03³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
19. a_sy_3km  ³ -0.03³ -0.03³ -0.03³ -0.03³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
20. a_sy_10km ³ -0.03³ -0.03³ -0.03³ -0.03³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
21. a_sz_05km ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
0.01
22. a_sz_1km  ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
0.01
23. a_sz_3km  ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
0.01
24. a_sz_10km ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
0.01
25. c_sy_05km ³ 0.13³ 0.14³ 0.14³ 0.15³ 0.00³ 0.00³ 0.00³ 0.01³ 0.01³ -
0.01
26. c_sy_1km  ³ 0.14³ 0.14³ 0.15³ 0.15³ 0.00³ 0.00³ 0.01³ 0.01³ 0.01³ -
0.01
27. c_sy_3km  ³ 0.14³ 0.15³ 0.15³ 0.15³ 0.00³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
28. c_sy_10km ³ 0.14³ 0.15³ 0.15³ 0.16³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
29. c_sy_30km ³ 0.14³ 0.15³ 0.15³ 0.16³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
30. c_sz_05km ³ 1.00³ 0.99³ 0.98³ 0.98³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.00
31. c_sz_1km  ³ 1.00³ 1.00³ 0.99³ 0.99³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
32. c_sz_3km  ³ 1.00³ 1.00³ 1.00³ 0.99³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
33. c_sz_10km ³ 0.99³ 1.00³ 1.00³ 1.00³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
34. c_sz_30km ³ 0.99³ 0.99³ 1.00³ 1.00³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
0.01
35. d_sy_05km ³ 0.01³ 0.01³ 0.01³ 0.01³ 1.00³ 1.00³ 0.99³ 0.99³ 0.98³ -
0.14
36. d_sy_1km  ³ 0.01³ 0.01³ 0.01³ 0.01³ 1.00³ 1.00³ 1.00³ 0.99³ 0.99³ -
0.14
37. d_sy_3km  ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.99³ 1.00³ 1.00³ 1.00³ 1.00³ -
0.15
38. d_sy_10km ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.99³ 0.99³ 1.00³ 1.00³ 1.00³ -
0.15
39. d_sy_30km ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.98³ 0.99³ 1.00³ 1.00³ 1.00³ -
0.15
40. d_sz_05km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.14³ -0.14³ -0.15³ -0.15³ -0.15³
1.00

```

41. d_sz_1km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.15³ -0.15³ -0.16³ -0.16³ -0.16³
 1.00
 42. d_sz_3km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.16³ -0.17³ -0.17³ -0.18³ -0.18³
 0.99
 43. d_sz_10km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.17³ -0.18³ -0.18³ -0.19³ -0.19³
 0.97
 44. d_sz_30km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.18³ -0.18³ -0.19³ -0.19³ -0.20³
 0.96
 45. e_sy_05km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.00³ -0.00³ -0.00³ -0.00³ -0.00³ -
 0.01
 46. e_sy_1km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.00³ -0.00³ -0.00³ -0.00³ -0.00³ -
 0.01
 47. e_sy_3km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.00³ -0.00³ -0.00³ -0.00³ -0.00³ -
 0.01
 48. e_sy_10km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.00³ -0.00³ -0.00³ -0.01³ -0.01³ -
 0.01
 49. e_sy_30km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.01
 50. e_sz_05km ³ 0.00³ 0.00³ 0.00³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.00
 51. e_sz_1km ³ 0.00³ 0.00³ 0.00³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.00
 52. e_sz_3km ³ 0.00³ 0.00³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.00
 53. e_sz_10km ³ 0.00³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.00
 54. e_sz_30km ³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³
 0.00

Random Variable ³ 41 ³ 42 ³ 43 ³ 44 ³ 45 ³ 46 ³ 47 ³ 48 ³ 49 ³
 50
 AA
 AAAAA
 1. a_ay ³ -0.01³ -0.01³ -0.01³ -0.00³ 0.00³ 0.00³ 0.00³ 0.00³ 0.00³ -
 0.00
 2. a_by ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.00
 3. a_az ³ -0.02³ -0.02³ -0.02³ -0.01³ 0.02³ 0.02³ 0.02³ 0.02³ 0.02³ -
 0.02
 4. a_bz ³ 0.00³ -0.00³ -0.00³ -0.00³ -0.00³ -0.00³ -0.00³ 0.00³ 0.00³ -
 0.01
 5. c_ay ³ -0.00³ -0.00³ -0.00³ -0.00³ -0.01³ -0.01³ -0.00³ -0.00³ -0.00³
 0.00
 6. c_by ³ -0.01³ -0.01³ -0.00³ -0.00³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 7. c_az ³ 0.00³ 0.01³ 0.01³ 0.01³ -0.00³ -0.00³ -0.00³ -0.00³ -0.01³ -
 0.02
 8. c_bz ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.01
 9. d_ay ³ 0.03³ 0.03³ 0.03³ 0.03³ 0.00³ 0.00³ 0.00³ 0.00³ 0.00³ -
 0.00
 10. d_by ³ -0.17³ -0.19³ -0.20³ -0.21³ -0.00³ -0.00³ -0.01³ -0.01³ -0.01³
 0.01
 11. d_az ³ 0.43³ 0.36³ 0.29³ 0.24³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.01
 12. d_bz ³ 0.73³ 0.78³ 0.82³ 0.85³ -0.01³ -0.01³ -0.01³ -0.01³ -0.00³
 0.00

13. e_az ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.24³ -0.23³ -0.23³ -0.22³ -0.21³
 0.91
 14. e_bz ³ 0.00³ -0.00³ -0.00³ -0.00³ 0.23³ 0.23³ 0.24³ 0.25³ 0.25³ -
 0.07
 15. e_by ³ -0.00³ 0.00³ 0.00³ 0.00³ 0.63³ 0.67³ 0.72³ 0.77³ 0.81³ -
 0.01
 16. e_ay ³ -0.02³ -0.02³ -0.02³ -0.02³ 0.76³ 0.73³ 0.67³ 0.62³ 0.57³ -
 0.21
 AA
 AAAA
 17. a_sy_05km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.01
 18. a_sy_1km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.01
 19. a_sy_3km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.01
 20. a_sy_10km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -
 0.01
 21. a_sz_05km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
 0.02
 22. a_sz_1km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
 0.02
 23. a_sz_3km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
 0.02
 24. a_sz_10km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.01³ 0.01³ 0.01³ 0.01³ 0.01³ -
 0.02
 25. c_sy_05km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.01
 26. c_sy_1km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.01
 27. c_sy_3km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.01
 28. c_sy_10km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.01
 29. c_sy_30km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.01
 30. c_sz_05km ³ -0.00³ -0.00³ -0.00³ -0.00³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 31. c_sz_1km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 32. c_sz_3km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 33. c_sz_10km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 34. c_sz_30km ³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.01
 35. d_sy_05km ³ -0.15³ -0.16³ -0.17³ -0.18³ -0.00³ -0.00³ -0.00³ -0.00³ -0.01³
 0.01
 36. d_sy_1km ³ -0.15³ -0.17³ -0.18³ -0.18³ -0.00³ -0.00³ -0.00³ -0.00³ -0.01³
 0.01
 37. d_sy_3km ³ -0.16³ -0.17³ -0.18³ -0.19³ -0.00³ -0.00³ -0.00³ -0.00³ -0.01³
 0.01
 38. d_sy_10km ³ -0.16³ -0.18³ -0.19³ -0.19³ -0.00³ -0.00³ -0.00³ -0.01³ -0.01³
 0.01
 39. d_sy_30km ³ -0.16³ -0.18³ -0.19³ -0.20³ -0.00³ -0.00³ -0.00³ -0.01³ -0.01³
 0.01

40. d_sz_05km ³ 1.00³ 0.99³ 0.97³ 0.96³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 41. d_sz_1km ³ 1.00³ 1.00³ 0.99³ 0.97³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 42. d_sz_3km ³ 1.00³ 1.00³ 1.00³ 0.99³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 43. d_sz_10km ³ 0.99³ 1.00³ 1.00³ 1.00³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 44. d_sz_30km ³ 0.97³ 0.99³ 1.00³ 1.00³ -0.01³ -0.01³ -0.01³ -0.01³ -0.01³
 0.00
 45. e_sy_05km ³ -0.01³ -0.01³ -0.01³ -0.01³ 1.00³ 1.00³ 0.99³ 0.98³ 0.96³ -
 0.16
 46. e_sy_1km ³ -0.01³ -0.01³ -0.01³ -0.01³ 1.00³ 1.00³ 1.00³ 0.99³ 0.98³ -
 0.16
 47. e_sy_3km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.99³ 1.00³ 1.00³ 1.00³ 0.99³ -
 0.14
 48. e_sy_10km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.98³ 0.99³ 1.00³ 1.00³ 1.00³ -
 0.13
 49. e_sy_30km ³ -0.01³ -0.01³ -0.01³ -0.01³ 0.96³ 0.98³ 0.99³ 1.00³ 1.00³ -
 0.12
 50. e_sz_05km ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.16³ -0.16³ -0.14³ -0.13³ -0.12³
 1.00
 51. e_sz_1km ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.15³ -0.15³ -0.14³ -0.12³ -0.12³
 1.00
 52. e_sz_3km ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.14³ -0.13³ -0.12³ -0.11³ -0.10³
 0.99
 53. e_sz_10km ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.12³ -0.12³ -0.10³ -0.09³ -0.08³
 0.98
 54. e_sz_30km ³ 0.00³ 0.00³ 0.00³ 0.00³ -0.11³ -0.10³ -0.09³ -0.07³ -0.06³
 0.96

Random Variable ³ 51 ³ 52 ³ 53 ³ 54
 AA
 1. a_ay ³ -0.00³ -0.00³ -0.00³ -0.00
 2. a_by ³ -0.00³ -0.00³ -0.00³ -0.00
 3. a_az ³ -0.02³ -0.02³ -0.02³ -0.01
 4. a_bz ³ -0.01³ -0.01³ -0.01³ -0.01
 5. c_ay ³ 0.00³ 0.00³ 0.00³ 0.00
 6. c_by ³ 0.01³ 0.01³ 0.01³ 0.01
 7. c_az ³ -0.02³ -0.02³ -0.01³ -0.01
 8. c_bz ³ 0.01³ 0.01³ 0.01³ 0.01
 9. d_ay ³ 0.00³ 0.00³ 0.00³ 0.00
 10. d_by ³ 0.01³ 0.01³ 0.01³ 0.01
 11. d_az ³ -0.01³ -0.00³ -0.00³ -0.00
 12. d_bz ³ 0.00³ 0.00³ -0.00³ -0.00
 13. e_az ³ 0.89³ 0.86³ 0.82³ 0.78
 14. e_bz ³ -0.04³ 0.02³ 0.09³ 0.15
 15. e_by ³ -0.00³ 0.01³ 0.03³ 0.04
 16. e_ay ³ -0.21³ -0.20³ -0.19³ -0.18
 AA
 17. a_sy_05km ³ -0.01³ -0.01³ -0.01³ -0.01
 18. a_sy_1km ³ -0.01³ -0.01³ -0.01³ -0.01
 19. a_sy_3km ³ -0.01³ -0.01³ -0.01³ -0.01
 20. a_sy_10km ³ -0.01³ -0.01³ -0.01³ -0.00
 21. a_sz_05km ³ -0.02³ -0.02³ -0.02³ -0.02
 22. a_sz_1km ³ -0.02³ -0.02³ -0.02³ -0.02
 23. a_sz_3km ³ -0.02³ -0.02³ -0.02³ -0.02

```

24. a_sz_10km ³ -0.02³ -0.02³ -0.02³ -0.02
25. c_sy_05km ³ 0.01³ 0.01³ 0.01³ 0.01
26. c_sy_1km ³ 0.01³ 0.01³ 0.01³ 0.01
27. c_sy_3km ³ 0.01³ 0.01³ 0.01³ 0.01
28. c_sy_10km ³ 0.01³ 0.01³ 0.01³ 0.01
29. c_sy_30km ³ 0.01³ 0.01³ 0.01³ 0.01
30. c_sz_05km ³ 0.00³ 0.00³ 0.00³ 0.00
31. c_sz_1km ³ 0.00³ 0.00³ 0.00³ 0.01
32. c_sz_3km ³ 0.00³ 0.00³ 0.01³ 0.01
33. c_sz_10km ³ 0.00³ 0.01³ 0.01³ 0.01
34. c_sz_30km ³ 0.01³ 0.01³ 0.01³ 0.01
35. d_sy_05km ³ 0.01³ 0.01³ 0.01³ 0.01
36. d_sy_1km ³ 0.01³ 0.01³ 0.01³ 0.01
37. d_sy_3km ³ 0.01³ 0.01³ 0.01³ 0.01
38. d_sy_10km ³ 0.01³ 0.01³ 0.01³ 0.01
39. d_sy_30km ³ 0.01³ 0.01³ 0.01³ 0.01
40. d_sz_05km ³ 0.00³ 0.00³ 0.00³ 0.00
41. d_sz_1km ³ 0.00³ 0.00³ 0.00³ 0.00
42. d_sz_3km ³ 0.00³ 0.00³ 0.00³ 0.00
43. d_sz_10km ³ 0.00³ 0.00³ 0.00³ 0.00
44. d_sz_30km ³ 0.00³ 0.00³ 0.00³ 0.00
45. e_sy_05km ³ -0.15³ -0.14³ -0.12³ -0.11
46. e_sy_1km ³ -0.15³ -0.13³ -0.12³ -0.10
47. e_sy_3km ³ -0.14³ -0.12³ -0.10³ -0.09
48. e_sy_10km ³ -0.12³ -0.11³ -0.09³ -0.07
49. e_sy_30km ³ -0.12³ -0.10³ -0.08³ -0.06
50. e_sz_05km ³ 1.00³ 0.99³ 0.98³ 0.96
51. e_sz_1km ³ 1.00³ 1.00³ 0.99³ 0.97
52. e_sz_3km ³ 1.00³ 1.00³ 1.00³ 0.99
53. e_sz_10km ³ 0.99³ 1.00³ 1.00³ 1.00
54. e_sz_30km ³ 0.97³ 0.99³ 1.00³ 1.00

```

***** 5.4. Output percentiles *****

***** Output Distribution Variable : a_sy_05km *****

MINIMUM SAMPLE VALUE: 3.002 E+01
MAXIMUM SAMPLE VALUE: 1.219 E+03

perc. 0.01: 3.830 E+01	perc. 0.34: 1.442 E+02	perc. 0.67: 2.486 E+02
perc. 0.02: 4.357 E+01	perc. 0.35: 1.469 E+02	perc. 0.68: 2.528 E+02
perc. 0.03: 4.882 E+01	perc. 0.36: 1.500 E+02	perc. 0.69: 2.580 E+02
perc. 0.04: 5.304 E+01	perc. 0.37: 1.527 E+02	perc. 0.70: 2.632 E+02
perc. 0.05: 5.773 E+01	perc. 0.38: 1.551 E+02	perc. 0.71: 2.679 E+02
perc. 0.06: 6.183 E+01	perc. 0.39: 1.575 E+02	perc. 0.72: 2.736 E+02
perc. 0.07: 6.629 E+01	perc. 0.40: 1.601 E+02	perc. 0.73: 2.799 E+02
perc. 0.08: 7.093 E+01	perc. 0.41: 1.626 E+02	perc. 0.74: 2.875 E+02

perc. 0.09: 7.553 E+01 E+02	perc. 0.42: 1.656 E+02	perc. 0.75: 2.943
perc. 0.10: 7.964 E+01 E+02	perc. 0.43: 1.684 E+02	perc. 0.76: 3.019
perc. 0.11: 8.343 E+01 E+02	perc. 0.44: 1.705 E+02	perc. 0.77: 3.087
perc. 0.12: 8.713 E+01 E+02	perc. 0.45: 1.731 E+02	perc. 0.78: 3.167
perc. 0.13: 9.112 E+01 E+02	perc. 0.46: 1.758 E+02	perc. 0.79: 3.237
perc. 0.14: 9.457 E+01 E+02	perc. 0.47: 1.792 E+02	perc. 0.80: 3.318
perc. 0.15: 9.799 E+01 E+02	perc. 0.48: 1.824 E+02	perc. 0.81: 3.390
perc. 0.16: 1.010 E+02 E+02	perc. 0.49: 1.853 E+02	perc. 0.82: 3.498
perc. 0.17: 1.035 E+02 E+02	perc. 0.50: 1.883 E+02	perc. 0.83: 3.593
perc. 0.18: 1.057 E+02 E+02	perc. 0.51: 1.915 E+02	perc. 0.84: 3.716
perc. 0.19: 1.080 E+02 E+02	perc. 0.52: 1.946 E+02	perc. 0.85: 3.831
perc. 0.20: 1.105 E+02 E+02	perc. 0.53: 1.972 E+02	perc. 0.86: 3.950
perc. 0.21: 1.133 E+02 E+02	perc. 0.54: 2.002 E+02	perc. 0.87: 4.092
perc. 0.22: 1.154 E+02 E+02	perc. 0.55: 2.034 E+02	perc. 0.88: 4.228
perc. 0.23: 1.176 E+02 E+02	perc. 0.56: 2.064 E+02	perc. 0.89: 4.376
perc. 0.24: 1.200 E+02 E+02	perc. 0.57: 2.099 E+02	perc. 0.90: 4.544
perc. 0.25: 1.224 E+02 E+02	perc. 0.58: 2.128 E+02	perc. 0.91: 4.734
perc. 0.26: 1.250 E+02 E+02	perc. 0.59: 2.163 E+02	perc. 0.92: 4.918
perc. 0.27: 1.276 E+02 E+02	perc. 0.60: 2.196 E+02	perc. 0.93: 5.184
perc. 0.28: 1.301 E+02 E+02	perc. 0.61: 2.224 E+02	perc. 0.94: 5.475
perc. 0.29: 1.323 E+02 E+02	perc. 0.62: 2.271 E+02	perc. 0.95: 5.808
perc. 0.30: 1.348 E+02 E+02	perc. 0.63: 2.308 E+02	perc. 0.96: 6.228
perc. 0.31: 1.372 E+02 E+02	perc. 0.64: 2.345 E+02	perc. 0.97: 6.723
perc. 0.32: 1.394 E+02 E+02	perc. 0.65: 2.389 E+02	perc. 0.98: 7.357
perc. 0.33: 1.419 E+02 E+02	perc. 0.66: 2.435 E+02	perc. 0.99: 8.403

***** Output Distribution Variable : a_sy_1km *****

MINIMUM SAMPLE VALUE: 5.095 E+01
MAXIMUM SAMPLE VALUE: 2.504 E+03

perc. 0.01: 6.598 E+01 E+02	perc. 0.34: 2.643 E+02	perc. 0.67: 4.590
perc. 0.02: 7.530 E+01 E+02	perc. 0.35: 2.683 E+02	perc. 0.68: 4.676
perc. 0.03: 8.410 E+01 E+02	perc. 0.36: 2.736 E+02	perc. 0.69: 4.794
perc. 0.04: 9.276 E+01 E+02	perc. 0.37: 2.780 E+02	perc. 0.70: 4.887
perc. 0.05: 1.013 E+02 E+02	perc. 0.38: 2.825 E+02	perc. 0.71: 5.028
perc. 0.06: 1.094 E+02 E+02	perc. 0.39: 2.881 E+02	perc. 0.72: 5.155
perc. 0.07: 1.177 E+02 E+02	perc. 0.40: 2.929 E+02	perc. 0.73: 5.278
perc. 0.08: 1.257 E+02 E+02	perc. 0.41: 2.971 E+02	perc. 0.74: 5.432
perc. 0.09: 1.340 E+02 E+02	perc. 0.42: 3.026 E+02	perc. 0.75: 5.581
perc. 0.10: 1.415 E+02 E+02	perc. 0.43: 3.074 E+02	perc. 0.76: 5.728
perc. 0.11: 1.485 E+02 E+02	perc. 0.44: 3.126 E+02	perc. 0.77: 5.874
perc. 0.12: 1.546 E+02 E+02	perc. 0.45: 3.173 E+02	perc. 0.78: 6.034
perc. 0.13: 1.609 E+02 E+02	perc. 0.46: 3.228 E+02	perc. 0.79: 6.207
perc. 0.14: 1.673 E+02 E+02	perc. 0.47: 3.286 E+02	perc. 0.80: 6.385
perc. 0.15: 1.729 E+02 E+02	perc. 0.48: 3.336 E+02	perc. 0.81: 6.532
perc. 0.16: 1.780 E+02 E+02	perc. 0.49: 3.387 E+02	perc. 0.82: 6.725
perc. 0.17: 1.826 E+02 E+02	perc. 0.50: 3.422 E+02	perc. 0.83: 6.945
perc. 0.18: 1.871 E+02 E+02	perc. 0.51: 3.482 E+02	perc. 0.84: 7.157
perc. 0.19: 1.926 E+02 E+02	perc. 0.52: 3.542 E+02	perc. 0.85: 7.439
perc. 0.20: 1.981 E+02 E+02	perc. 0.53: 3.594 E+02	perc. 0.86: 7.704
perc. 0.21: 2.032 E+02 E+02	perc. 0.54: 3.649 E+02	perc. 0.87: 7.938
perc. 0.22: 2.078 E+02 E+02	perc. 0.55: 3.709 E+02	perc. 0.88: 8.223
perc. 0.23: 2.124 E+02 E+02	perc. 0.56: 3.770 E+02	perc. 0.89: 8.512
perc. 0.24: 2.167 E+02 E+02	perc. 0.57: 3.822 E+02	perc. 0.90: 8.914
perc. 0.25: 2.221 E+02 E+02	perc. 0.58: 3.889 E+02	perc. 0.91: 9.280

perc. 0.26: 2.267 E+02 E+02	perc. 0.59: 3.960 E+02	perc. 0.92: 9.714
perc. 0.27: 2.314 E+02 E+03	perc. 0.60: 4.027 E+02	perc. 0.93: 1.027
perc. 0.28: 2.358 E+02 E+03	perc. 0.61: 4.096 E+02	perc. 0.94: 1.078
perc. 0.29: 2.404 E+02 E+03	perc. 0.62: 4.177 E+02	perc. 0.95: 1.139
perc. 0.30: 2.451 E+02 E+03	perc. 0.63: 4.253 E+02	perc. 0.96: 1.224
perc. 0.31: 2.490 E+02 E+03	perc. 0.64: 4.338 E+02	perc. 0.97: 1.331
perc. 0.32: 2.544 E+02 E+03	perc. 0.65: 4.427 E+02	perc. 0.98: 1.467
perc. 0.33: 2.592 E+02 E+03	perc. 0.66: 4.516 E+02	perc. 0.99: 1.685

***** Output Distribution Variable : a_sy_3km *****

MINIMUM SAMPLE VALUE: 1.175 E+02

MAXIMUM SAMPLE VALUE: 7.840 E+03

perc. 0.01: 1.569 E+02 E+03	perc. 0.34: 6.797 E+02	perc. 0.67: 1.250
perc. 0.02: 1.788 E+02 E+03	perc. 0.35: 6.926 E+02	perc. 0.68: 1.277
perc. 0.03: 2.020 E+02 E+03	perc. 0.36: 7.055 E+02	perc. 0.69: 1.312
perc. 0.04: 2.233 E+02 E+03	perc. 0.37: 7.184 E+02	perc. 0.70: 1.340
perc. 0.05: 2.474 E+02 E+03	perc. 0.38: 7.306 E+02	perc. 0.71: 1.371
perc. 0.06: 2.677 E+02 E+03	perc. 0.39: 7.446 E+02	perc. 0.72: 1.412
perc. 0.07: 2.899 E+02 E+03	perc. 0.40: 7.566 E+02	perc. 0.73: 1.457
perc. 0.08: 3.095 E+02 E+03	perc. 0.41: 7.678 E+02	perc. 0.74: 1.500
perc. 0.09: 3.300 E+02 E+03	perc. 0.42: 7.801 E+02	perc. 0.75: 1.543
perc. 0.10: 3.474 E+02 E+03	perc. 0.43: 7.940 E+02	perc. 0.76: 1.594
perc. 0.11: 3.661 E+02 E+03	perc. 0.44: 8.059 E+02	perc. 0.77: 1.644
perc. 0.12: 3.808 E+02 E+03	perc. 0.45: 8.195 E+02	perc. 0.78: 1.697
perc. 0.13: 3.954 E+02 E+03	perc. 0.46: 8.327 E+02	perc. 0.79: 1.756
perc. 0.14: 4.093 E+02 E+03	perc. 0.47: 8.475 E+02	perc. 0.80: 1.811
perc. 0.15: 4.205 E+02 E+03	perc. 0.48: 8.588 E+02	perc. 0.81: 1.863
perc. 0.16: 4.312 E+02 E+03	perc. 0.49: 8.737 E+02	perc. 0.82: 1.921
perc. 0.17: 4.448 E+02 E+03	perc. 0.50: 8.898 E+02	perc. 0.83: 1.984

perc. 0.18: 4.603 E+02	perc. 0.51: 9.047 E+02	perc. 0.84: 2.046
E+03		
perc. 0.19: 4.758 E+02	perc. 0.52: 9.221 E+02	perc. 0.85: 2.117
E+03		
perc. 0.20: 4.904 E+02	perc. 0.53: 9.399 E+02	perc. 0.86: 2.206
E+03		
perc. 0.21: 5.021 E+02	perc. 0.54: 9.545 E+02	perc. 0.87: 2.299
E+03		
perc. 0.22: 5.164 E+02	perc. 0.55: 9.747 E+02	perc. 0.88: 2.374
E+03		
perc. 0.23: 5.316 E+02	perc. 0.56: 9.956 E+02	perc. 0.89: 2.467
E+03		
perc. 0.24: 5.437 E+02	perc. 0.57: 1.013 E+03	perc. 0.90: 2.588
E+03		
perc. 0.25: 5.592 E+02	perc. 0.58: 1.029 E+03	perc. 0.91: 2.727
E+03		
perc. 0.26: 5.721 E+02	perc. 0.59: 1.048 E+03	perc. 0.92: 2.860
E+03		
perc. 0.27: 5.853 E+02	perc. 0.60: 1.068 E+03	perc. 0.93: 2.995
E+03		
perc. 0.28: 6.006 E+02	perc. 0.61: 1.087 E+03	perc. 0.94: 3.175
E+03		
perc. 0.29: 6.118 E+02	perc. 0.62: 1.110 E+03	perc. 0.95: 3.357
E+03		
perc. 0.30: 6.245 E+02	perc. 0.63: 1.133 E+03	perc. 0.96: 3.583
E+03		
perc. 0.31: 6.386 E+02	perc. 0.64: 1.156 E+03	perc. 0.97: 3.910
E+03		
perc. 0.32: 6.520 E+02	perc. 0.65: 1.186 E+03	perc. 0.98: 4.347
E+03		
perc. 0.33: 6.657 E+02	perc. 0.66: 1.215 E+03	perc. 0.99: 5.135
E+03		

***** Output Distribution Variable : a_sy_10km *****

MINIMUM SAMPLE VALUE: 2.936 E+02

MAXIMUM SAMPLE VALUE: 2.739 E+04

perc. 0.01: 4.024 E+02	perc. 0.34: 1.879 E+03	perc. 0.67: 3.773
E+03		
perc. 0.02: 4.601 E+02	perc. 0.35: 1.918 E+03	perc. 0.68: 3.869
E+03		
perc. 0.03: 5.201 E+02	perc. 0.36: 1.961 E+03	perc. 0.69: 3.991
E+03		
perc. 0.04: 5.824 E+02	perc. 0.37: 1.997 E+03	perc. 0.70: 4.125
E+03		
perc. 0.05: 6.515 E+02	perc. 0.38: 2.036 E+03	perc. 0.71: 4.232
E+03		
perc. 0.06: 7.097 E+02	perc. 0.39: 2.077 E+03	perc. 0.72: 4.354
E+03		
perc. 0.07: 7.722 E+02	perc. 0.40: 2.111 E+03	perc. 0.73: 4.483
E+03		
perc. 0.08: 8.247 E+02	perc. 0.41: 2.146 E+03	perc. 0.74: 4.631
E+03		
perc. 0.09: 8.760 E+02	perc. 0.42: 2.177 E+03	perc. 0.75: 4.788
E+03		

perc. 0.10: 9.250 E+02 E+03	perc. 0.43: 2.219 E+03	perc. 0.76: 4.962
perc. 0.11: 9.661 E+02 E+03	perc. 0.44: 2.259 E+03	perc. 0.77: 5.125
perc. 0.12: 1.006 E+03 E+03	perc. 0.45: 2.296 E+03	perc. 0.78: 5.331
perc. 0.13: 1.045 E+03 E+03	perc. 0.46: 2.342 E+03	perc. 0.79: 5.533
perc. 0.14: 1.077 E+03 E+03	perc. 0.47: 2.397 E+03	perc. 0.80: 5.726
perc. 0.15: 1.109 E+03 E+03	perc. 0.48: 2.449 E+03	perc. 0.81: 5.901
perc. 0.16: 1.147 E+03 E+03	perc. 0.49: 2.504 E+03	perc. 0.82: 6.107
perc. 0.17: 1.181 E+03 E+03	perc. 0.50: 2.554 E+03	perc. 0.83: 6.320
perc. 0.18: 1.221 E+03 E+03	perc. 0.51: 2.609 E+03	perc. 0.84: 6.498
perc. 0.19: 1.260 E+03 E+03	perc. 0.52: 2.656 E+03	perc. 0.85: 6.763
perc. 0.20: 1.304 E+03 E+03	perc. 0.53: 2.716 E+03	perc. 0.86: 7.028
perc. 0.21: 1.341 E+03 E+03	perc. 0.54: 2.763 E+03	perc. 0.87: 7.335
perc. 0.22: 1.380 E+03 E+03	perc. 0.55: 2.826 E+03	perc. 0.88: 7.672
perc. 0.23: 1.425 E+03 E+03	perc. 0.56: 2.891 E+03	perc. 0.89: 7.975
perc. 0.24: 1.462 E+03 E+03	perc. 0.57: 2.955 E+03	perc. 0.90: 8.394
perc. 0.25: 1.507 E+03 E+03	perc. 0.58: 3.022 E+03	perc. 0.91: 8.893
perc. 0.26: 1.550 E+03 E+03	perc. 0.59: 3.087 E+03	perc. 0.92: 9.353
perc. 0.27: 1.588 E+03 E+03	perc. 0.60: 3.149 E+03	perc. 0.93: 9.801
perc. 0.28: 1.630 E+03 E+04	perc. 0.61: 3.235 E+03	perc. 0.94: 1.034
perc. 0.29: 1.675 E+03 E+04	perc. 0.62: 3.330 E+03	perc. 0.95: 1.096
perc. 0.30: 1.718 E+03 E+04	perc. 0.63: 3.404 E+03	perc. 0.96: 1.175
perc. 0.31: 1.754 E+03 E+04	perc. 0.64: 3.497 E+03	perc. 0.97: 1.290
perc. 0.32: 1.801 E+03 E+04	perc. 0.65: 3.582 E+03	perc. 0.98: 1.433
perc. 0.33: 1.843 E+03 E+04	perc. 0.66: 3.683 E+03	perc. 0.99: 1.735

***** Output Distribution Variable : a_sz_05km *****

MINIMUM SAMPLE VALUE: 8.772 E-03

MAXIMUM SAMPLE VALUE: 1.273 E+04

perc. 0.01: 7.104 E-01 E+02	perc. 0.34: 9.549 E+01	perc. 0.67: 3.075
perc. 0.02: 1.679 E+00 E+02	perc. 0.35: 9.966 E+01	perc. 0.68: 3.201
perc. 0.03: 3.199 E+00 E+02	perc. 0.36: 1.036 E+02	perc. 0.69: 3.324
perc. 0.04: 5.173 E+00 E+02	perc. 0.37: 1.075 E+02	perc. 0.70: 3.455
perc. 0.05: 7.147 E+00 E+02	perc. 0.38: 1.115 E+02	perc. 0.71: 3.589
perc. 0.06: 9.846 E+00 E+02	perc. 0.39: 1.155 E+02	perc. 0.72: 3.760
perc. 0.07: 1.242 E+01 E+02	perc. 0.40: 1.189 E+02	perc. 0.73: 3.934
perc. 0.08: 1.478 E+01 E+02	perc. 0.41: 1.232 E+02	perc. 0.74: 4.091
perc. 0.09: 1.789 E+01 E+02	perc. 0.42: 1.279 E+02	perc. 0.75: 4.280
perc. 0.10: 2.052 E+01 E+02	perc. 0.43: 1.325 E+02	perc. 0.76: 4.490
perc. 0.11: 2.383 E+01 E+02	perc. 0.44: 1.365 E+02	perc. 0.77: 4.718
perc. 0.12: 2.638 E+01 E+02	perc. 0.45: 1.411 E+02	perc. 0.78: 4.916
perc. 0.13: 2.948 E+01 E+02	perc. 0.46: 1.462 E+02	perc. 0.79: 5.133
perc. 0.14: 3.259 E+01 E+02	perc. 0.47: 1.509 E+02	perc. 0.80: 5.356
perc. 0.15: 3.519 E+01 E+02	perc. 0.48: 1.575 E+02	perc. 0.81: 5.636
perc. 0.16: 3.874 E+01 E+02	perc. 0.49: 1.631 E+02	perc. 0.82: 5.919
perc. 0.17: 4.105 E+01 E+02	perc. 0.50: 1.685 E+02	perc. 0.83: 6.298
perc. 0.18: 4.371 E+01 E+02	perc. 0.51: 1.750 E+02	perc. 0.84: 6.737
perc. 0.19: 4.666 E+01 E+02	perc. 0.52: 1.815 E+02	perc. 0.85: 7.200
perc. 0.20: 4.950 E+01 E+02	perc. 0.53: 1.878 E+02	perc. 0.86: 7.707
perc. 0.21: 5.249 E+01 E+02	perc. 0.54: 1.939 E+02	perc. 0.87: 8.201
perc. 0.22: 5.523 E+01 E+02	perc. 0.55: 2.001 E+02	perc. 0.88: 8.860
perc. 0.23: 5.817 E+01 E+02	perc. 0.56: 2.067 E+02	perc. 0.89: 9.534
perc. 0.24: 6.151 E+01 E+03	perc. 0.57: 2.158 E+02	perc. 0.90: 1.040
perc. 0.25: 6.398 E+01 E+03	perc. 0.58: 2.256 E+02	perc. 0.91: 1.123

perc. 0.26: 6.757 E+01 E+03	perc. 0.59: 2.323 E+02	perc. 0.92: 1.227
perc. 0.27: 7.172 E+01 E+03	perc. 0.60: 2.394 E+02	perc. 0.93: 1.350
perc. 0.28: 7.544 E+01 E+03	perc. 0.61: 2.480 E+02	perc. 0.94: 1.507
perc. 0.29: 7.884 E+01 E+03	perc. 0.62: 2.585 E+02	perc. 0.95: 1.715
perc. 0.30: 8.216 E+01 E+03	perc. 0.63: 2.670 E+02	perc. 0.96: 1.962
perc. 0.31: 8.551 E+01 E+03	perc. 0.64: 2.767 E+02	perc. 0.97: 2.312
perc. 0.32: 8.880 E+01 E+03	perc. 0.65: 2.859 E+02	perc. 0.98: 2.951
perc. 0.33: 9.178 E+01 E+03	perc. 0.66: 2.963 E+02	perc. 0.99: 4.348

***** Output Distribution Variable : a_sz_1km *****

MINIMUM SAMPLE VALUE: 8.943 E-03
MAXIMUM SAMPLE VALUE: 2.852 E+04

perc. 0.01: 1.128 E+00 E+02	perc. 0.34: 1.544 E+02	perc. 0.67: 5.297
perc. 0.02: 2.549 E+00 E+02	perc. 0.35: 1.598 E+02	perc. 0.68: 5.507
perc. 0.03: 4.789 E+00 E+02	perc. 0.36: 1.657 E+02	perc. 0.69: 5.738
perc. 0.04: 7.054 E+00 E+02	perc. 0.37: 1.724 E+02	perc. 0.70: 6.026
perc. 0.05: 1.037 E+01 E+02	perc. 0.38: 1.791 E+02	perc. 0.71: 6.304
perc. 0.06: 1.387 E+01 E+02	perc. 0.39: 1.858 E+02	perc. 0.72: 6.566
perc. 0.07: 1.728 E+01 E+02	perc. 0.40: 1.916 E+02	perc. 0.73: 6.972
perc. 0.08: 2.125 E+01 E+02	perc. 0.41: 1.999 E+02	perc. 0.74: 7.366
perc. 0.09: 2.577 E+01 E+02	perc. 0.42: 2.071 E+02	perc. 0.75: 7.672
perc. 0.10: 3.040 E+01 E+02	perc. 0.43: 2.163 E+02	perc. 0.76: 8.099
perc. 0.11: 3.468 E+01 E+02	perc. 0.44: 2.248 E+02	perc. 0.77: 8.464
perc. 0.12: 3.950 E+01 E+02	perc. 0.45: 2.319 E+02	perc. 0.78: 8.871
perc. 0.13: 4.396 E+01 E+02	perc. 0.46: 2.415 E+02	perc. 0.79: 9.326
perc. 0.14: 4.851 E+01 E+02	perc. 0.47: 2.520 E+02	perc. 0.80: 9.793
perc. 0.15: 5.303 E+01 E+03	perc. 0.48: 2.614 E+02	perc. 0.81: 1.036
perc. 0.16: 5.787 E+01 E+03	perc. 0.49: 2.702 E+02	perc. 0.82: 1.103
perc. 0.17: 6.313 E+01 E+03	perc. 0.50: 2.824 E+02	perc. 0.83: 1.176

perc. 0.18: 6.744 E+01 E+03	perc. 0.51: 2.932 E+02	perc. 0.84: 1.249
perc. 0.19: 7.163 E+01 E+03	perc. 0.52: 3.036 E+02	perc. 0.85: 1.340
perc. 0.20: 7.668 E+01 E+03	perc. 0.53: 3.128 E+02	perc. 0.86: 1.439
perc. 0.21: 8.026 E+01 E+03	perc. 0.54: 3.235 E+02	perc. 0.87: 1.575
perc. 0.22: 8.544 E+01 E+03	perc. 0.55: 3.369 E+02	perc. 0.88: 1.695
perc. 0.23: 9.052 E+01 E+03	perc. 0.56: 3.497 E+02	perc. 0.89: 1.844
perc. 0.24: 9.577 E+01 E+03	perc. 0.57: 3.645 E+02	perc. 0.90: 2.004
perc. 0.25: 1.015 E+02 E+03	perc. 0.58: 3.811 E+02	perc. 0.91: 2.204
perc. 0.26: 1.068 E+02 E+03	perc. 0.59: 3.942 E+02	perc. 0.92: 2.387
perc. 0.27: 1.132 E+02 E+03	perc. 0.60: 4.078 E+02	perc. 0.93: 2.658
perc. 0.28: 1.198 E+02 E+03	perc. 0.61: 4.236 E+02	perc. 0.94: 2.978
perc. 0.29: 1.253 E+02 E+03	perc. 0.62: 4.373 E+02	perc. 0.95: 3.419
perc. 0.30: 1.307 E+02 E+03	perc. 0.63: 4.535 E+02	perc. 0.96: 4.049
perc. 0.31: 1.354 E+02 E+03	perc. 0.64: 4.728 E+02	perc. 0.97: 4.721
perc. 0.32: 1.415 E+02 E+03	perc. 0.65: 4.885 E+02	perc. 0.98: 6.124
perc. 0.33: 1.476 E+02 E+03	perc. 0.66: 5.108 E+02	perc. 0.99: 9.218

***** Output Distribution Variable : a_sz_3km *****

MINIMUM SAMPLE VALUE: 9.221 E-03
MAXIMUM SAMPLE VALUE: 1.024 E+05

perc. 0.01: 1.904 E+00 E+03	perc. 0.34: 3.192 E+02	perc. 0.67: 1.281
perc. 0.02: 4.668 E+00 E+03	perc. 0.35: 3.339 E+02	perc. 0.68: 1.337
perc. 0.03: 8.025 E+00 E+03	perc. 0.36: 3.494 E+02	perc. 0.69: 1.400
perc. 0.04: 1.193 E+01 E+03	perc. 0.37: 3.639 E+02	perc. 0.70: 1.468
perc. 0.05: 1.702 E+01 E+03	perc. 0.38: 3.792 E+02	perc. 0.71: 1.555
perc. 0.06: 2.388 E+01 E+03	perc. 0.39: 3.970 E+02	perc. 0.72: 1.633
perc. 0.07: 3.033 E+01 E+03	perc. 0.40: 4.142 E+02	perc. 0.73: 1.738
perc. 0.08: 3.858 E+01 E+03	perc. 0.41: 4.348 E+02	perc. 0.74: 1.825
perc. 0.09: 4.723 E+01 E+03	perc. 0.42: 4.544 E+02	perc. 0.75: 1.963

perc. 0.10: 5.652 E+01 E+03	perc. 0.43: 4.732 E+02	perc. 0.76: 2.046
perc. 0.11: 6.323 E+01 E+03	perc. 0.44: 4.936 E+02	perc. 0.77: 2.184
perc. 0.12: 7.146 E+01 E+03	perc. 0.45: 5.146 E+02	perc. 0.78: 2.301
perc. 0.13: 8.150 E+01 E+03	perc. 0.46: 5.364 E+02	perc. 0.79: 2.437
perc. 0.14: 9.130 E+01 E+03	perc. 0.47: 5.584 E+02	perc. 0.80: 2.583
perc. 0.15: 1.016 E+02 E+03	perc. 0.48: 5.803 E+02	perc. 0.81: 2.759
perc. 0.16: 1.105 E+02 E+03	perc. 0.49: 6.011 E+02	perc. 0.82: 2.910
perc. 0.17: 1.223 E+02 E+03	perc. 0.50: 6.221 E+02	perc. 0.83: 3.145
perc. 0.18: 1.302 E+02 E+03	perc. 0.51: 6.496 E+02	perc. 0.84: 3.420
perc. 0.19: 1.407 E+02 E+03	perc. 0.52: 6.777 E+02	perc. 0.85: 3.678
perc. 0.20: 1.499 E+02 E+03	perc. 0.53: 7.071 E+02	perc. 0.86: 4.000
perc. 0.21: 1.608 E+02 E+03	perc. 0.54: 7.355 E+02	perc. 0.87: 4.377
perc. 0.22: 1.707 E+02 E+03	perc. 0.55: 7.671 E+02	perc. 0.88: 4.777
perc. 0.23: 1.827 E+02 E+03	perc. 0.56: 7.976 E+02	perc. 0.89: 5.207
perc. 0.24: 1.943 E+02 E+03	perc. 0.57: 8.292 E+02	perc. 0.90: 5.756
perc. 0.25: 2.074 E+02 E+03	perc. 0.58: 8.647 E+02	perc. 0.91: 6.384
perc. 0.26: 2.214 E+02 E+03	perc. 0.59: 8.960 E+02	perc. 0.92: 7.153
perc. 0.27: 2.335 E+02 E+03	perc. 0.60: 9.397 E+02	perc. 0.93: 7.827
perc. 0.28: 2.445 E+02 E+03	perc. 0.61: 9.817 E+02	perc. 0.94: 8.741
perc. 0.29: 2.557 E+02 E+04	perc. 0.62: 1.024 E+03	perc. 0.95: 1.057
perc. 0.30: 2.673 E+02 E+04	perc. 0.63: 1.071 E+03	perc. 0.96: 1.269
perc. 0.31: 2.796 E+02 E+04	perc. 0.64: 1.120 E+03	perc. 0.97: 1.493
perc. 0.32: 2.918 E+02 E+04	perc. 0.65: 1.171 E+03	perc. 0.98: 1.997
perc. 0.33: 3.060 E+02 E+04	perc. 0.66: 1.230 E+03	perc. 0.99: 3.131

***** Output Distribution Variable : a_sz_10km *****

MINIMUM SAMPLE VALUE: 9.536 E-03

MAXIMUM SAMPLE VALUE: 4.160 E+05

perc. 0.01: 3.069 E+00 E+03	perc. 0.34: 7.146 E+02	perc. 0.67: 3.399
perc. 0.02: 8.128 E+00 E+03	perc. 0.35: 7.490 E+02	perc. 0.68: 3.602
perc. 0.03: 1.364 E+01 E+03	perc. 0.36: 7.887 E+02	perc. 0.69: 3.778
perc. 0.04: 2.075 E+01 E+03	perc. 0.37: 8.260 E+02	perc. 0.70: 3.980
perc. 0.05: 3.055 E+01 E+03	perc. 0.38: 8.744 E+02	perc. 0.71: 4.227
perc. 0.06: 4.381 E+01 E+03	perc. 0.39: 9.123 E+02	perc. 0.72: 4.499
perc. 0.07: 5.541 E+01 E+03	perc. 0.40: 9.572 E+02	perc. 0.73: 4.788
perc. 0.08: 7.326 E+01 E+03	perc. 0.41: 1.008 E+03	perc. 0.74: 5.081
perc. 0.09: 8.961 E+01 E+03	perc. 0.42: 1.060 E+03	perc. 0.75: 5.414
perc. 0.10: 1.065 E+02 E+03	perc. 0.43: 1.111 E+03	perc. 0.76: 5.728
perc. 0.11: 1.222 E+02 E+03	perc. 0.44: 1.164 E+03	perc. 0.77: 6.145
perc. 0.12: 1.441 E+02 E+03	perc. 0.45: 1.219 E+03	perc. 0.78: 6.578
perc. 0.13: 1.635 E+02 E+03	perc. 0.46: 1.267 E+03	perc. 0.79: 6.984
perc. 0.14: 1.833 E+02 E+03	perc. 0.47: 1.314 E+03	perc. 0.80: 7.499
perc. 0.15: 2.043 E+02 E+03	perc. 0.48: 1.375 E+03	perc. 0.81: 8.073
perc. 0.16: 2.278 E+02 E+03	perc. 0.49: 1.431 E+03	perc. 0.82: 8.725
perc. 0.17: 2.515 E+02 E+03	perc. 0.50: 1.497 E+03	perc. 0.83: 9.425
perc. 0.18: 2.723 E+02 E+04	perc. 0.51: 1.566 E+03	perc. 0.84: 1.018
perc. 0.19: 2.934 E+02 E+04	perc. 0.52: 1.625 E+03	perc. 0.85: 1.122
perc. 0.20: 3.147 E+02 E+04	perc. 0.53: 1.702 E+03	perc. 0.86: 1.243
perc. 0.21: 3.396 E+02 E+04	perc. 0.54: 1.773 E+03	perc. 0.87: 1.363
perc. 0.22: 3.648 E+02 E+04	perc. 0.55: 1.880 E+03	perc. 0.88: 1.499
perc. 0.23: 3.909 E+02 E+04	perc. 0.56: 1.958 E+03	perc. 0.89: 1.674
perc. 0.24: 4.219 E+02 E+04	perc. 0.57: 2.051 E+03	perc. 0.90: 1.823
perc. 0.25: 4.472 E+02 E+04	perc. 0.58: 2.164 E+03	perc. 0.91: 2.030
perc. 0.26: 4.757 E+02 E+04	perc. 0.59: 2.257 E+03	perc. 0.92: 2.326

perc. 0.27: 5.009 E+02 E+04	perc. 0.60: 2.379 E+03	perc. 0.93: 2.640
perc. 0.28: 5.284 E+02 E+04	perc. 0.61: 2.508 E+03	perc. 0.94: 3.003
perc. 0.29: 5.585 E+02 E+04	perc. 0.62: 2.642 E+03	perc. 0.95: 3.675
perc. 0.30: 5.860 E+02 E+04	perc. 0.63: 2.790 E+03	perc. 0.96: 4.380
perc. 0.31: 6.168 E+02 E+04	perc. 0.64: 2.925 E+03	perc. 0.97: 5.486
perc. 0.32: 6.508 E+02 E+04	perc. 0.65: 3.093 E+03	perc. 0.98: 7.557
perc. 0.33: 6.799 E+02 E+05	perc. 0.66: 3.242 E+03	perc. 0.99: 1.190

***** Output Distribution Variable : c_sy_05km *****

MINIMUM SAMPLE VALUE: 2.485 E+01
MAXIMUM SAMPLE VALUE: 2.811 E+02

perc. 0.01: 2.980 E+01 E+02	perc. 0.34: 7.521 E+01	perc. 0.67: 1.174
perc. 0.02: 3.284 E+01 E+02	perc. 0.35: 7.612 E+01	perc. 0.68: 1.191
perc. 0.03: 3.583 E+01 E+02	perc. 0.36: 7.696 E+01	perc. 0.69: 1.212
perc. 0.04: 3.878 E+01 E+02	perc. 0.37: 7.779 E+01	perc. 0.70: 1.229
perc. 0.05: 4.134 E+01 E+02	perc. 0.38: 7.854 E+01	perc. 0.71: 1.247
perc. 0.06: 4.374 E+01 E+02	perc. 0.39: 7.940 E+01	perc. 0.72: 1.264
perc. 0.07: 4.635 E+01 E+02	perc. 0.40: 8.021 E+01	perc. 0.73: 1.282
perc. 0.08: 4.913 E+01 E+02	perc. 0.41: 8.105 E+01	perc. 0.74: 1.303
perc. 0.09: 5.103 E+01 E+02	perc. 0.42: 8.205 E+01	perc. 0.75: 1.322
perc. 0.10: 5.301 E+01 E+02	perc. 0.43: 8.293 E+01	perc. 0.76: 1.343
perc. 0.11: 5.488 E+01 E+02	perc. 0.44: 8.402 E+01	perc. 0.77: 1.362
perc. 0.12: 5.631 E+01 E+02	perc. 0.45: 8.508 E+01	perc. 0.78: 1.386
perc. 0.13: 5.769 E+01 E+02	perc. 0.46: 8.610 E+01	perc. 0.79: 1.405
perc. 0.14: 5.867 E+01 E+02	perc. 0.47: 8.700 E+01	perc. 0.80: 1.430
perc. 0.15: 5.978 E+01 E+02	perc. 0.48: 8.829 E+01	perc. 0.81: 1.453
perc. 0.16: 6.076 E+01 E+02	perc. 0.49: 8.942 E+01	perc. 0.82: 1.473
perc. 0.17: 6.158 E+01 E+02	perc. 0.50: 9.051 E+01	perc. 0.83: 1.498
perc. 0.18: 6.251 E+01 E+02	perc. 0.51: 9.183 E+01	perc. 0.84: 1.520

perc. 0.19: 6.327 E+01 E+02	perc. 0.52: 9.311 E+01	perc. 0.85: 1.543
perc. 0.20: 6.411 E+01 E+02	perc. 0.53: 9.453 E+01	perc. 0.86: 1.569
perc. 0.21: 6.489 E+01 E+02	perc. 0.54: 9.584 E+01	perc. 0.87: 1.601
perc. 0.22: 6.570 E+01 E+02	perc. 0.55: 9.708 E+01	perc. 0.88: 1.631
perc. 0.23: 6.656 E+01 E+02	perc. 0.56: 9.865 E+01	perc. 0.89: 1.662
perc. 0.24: 6.719 E+01 E+02	perc. 0.57: 1.002 E+02	perc. 0.90: 1.700
perc. 0.25: 6.820 E+01 E+02	perc. 0.58: 1.019 E+02	perc. 0.91: 1.740
perc. 0.26: 6.902 E+01 E+02	perc. 0.59: 1.033 E+02	perc. 0.92: 1.780
perc. 0.27: 6.971 E+01 E+02	perc. 0.60: 1.050 E+02	perc. 0.93: 1.827
perc. 0.28: 7.047 E+01 E+02 --	perc. 0.61: 1.067 E+02	perc. 0.94: 1.880
perc. 0.29: 7.136 E+01 E+02	perc. 0.62: 1.085 E+02	perc. 0.95: 1.935
perc. 0.30: 7.210 E+01 E+02	perc. 0.63: 1.103 E+02	perc. 0.96: 2.004
perc. 0.31: 7.286 E+01 E+02	perc. 0.64: 1.120 E+02	perc. 0.97: 2.069
perc. 0.32: 7.353 E+01 E+02	perc. 0.65: 1.139 E+02	perc. 0.98: 2.188
perc. 0.33: 7.442 E+01 E+02	perc. 0.66: 1.156 E+02	perc. 0.99: 2.363

***** Output Distribution Variable : c_sy_1km *****

MINIMUM SAMPLE VALUE: 4.300 E+01
MAXIMUM SAMPLE VALUE: 5.628 E+02

perc. 0.01: 5.205 E+01 E+02	perc. 0.34: 1.342 E+02	perc. 0.67: 2.194
perc. 0.02: 5.768 E+01 E+02	perc. 0.35: 1.357 E+02	perc. 0.68: 2.227
perc. 0.03: 6.334 E+01 E+02	perc. 0.36: 1.373 E+02	perc. 0.69: 2.264
perc. 0.04: 6.844 E+01 E+02	perc. 0.37: 1.392 E+02	perc. 0.70: 2.299
perc. 0.05: 7.332 E+01 E+02	perc. 0.38: 1.406 E+02	perc. 0.71: 2.341
perc. 0.06: 7.775 E+01 E+02	perc. 0.39: 1.421 E+02	perc. 0.72: 2.378
perc. 0.07: 8.205 E+01 E+02	perc. 0.40: 1.437 E+02	perc. 0.73: 2.420
perc. 0.08: 8.733 E+01 E+02	perc. 0.41: 1.451 E+02	perc. 0.74: 2.459
perc. 0.09: 9.088 E+01 E+02	perc. 0.42: 1.470 E+02	perc. 0.75: 2.497
perc. 0.10: 9.410 E+01 E+02	perc. 0.43: 1.492 E+02	perc. 0.76: 2.534

perc. 0.11: 9.709 E+01 E+02	perc. 0.44: 1.508 E+02	perc. 0.77: 2.583
perc. 0.12: 9.980 E+01 E+02	perc. 0.45: 1.529 E+02	perc. 0.78: 2.627
perc. 0.13: 1.017 E+02 E+02	perc. 0.46: 1.549 E+02	perc. 0.79: 2.672
perc. 0.14: 1.036 E+02 E+02	perc. 0.47: 1.573 E+02	perc. 0.80: 2.720
perc. 0.15: 1.055 E+02 E+02	perc. 0.48: 1.600 E+02	perc. 0.81: 2.765
perc. 0.16: 1.074 E+02 E+02	perc. 0.49: 1.622 E+02	perc. 0.82: 2.809
perc. 0.17: 1.089 E+02 E+02	perc. 0.50: 1.646 E+02	perc. 0.83: 2.859
perc. 0.18: 1.104 E+02 E+02	perc. 0.51: 1.672 E+02	perc. 0.84: 2.904
perc. 0.19: 1.118 E+02 E+02	perc. 0.52: 1.696 E+02	perc. 0.85: 2.961
perc. 0.20: 1.133 E+02 E+02	perc. 0.53: 1.721 E+02	perc. 0.86: 3.012
perc. 0.21: 1.150 E+02 E+02	perc. 0.54: 1.752 E+02	perc. 0.87: 3.071
perc. 0.22: 1.165 E+02 E+02	perc. 0.55: 1.782 E+02	perc. 0.88: 3.133
perc. 0.23: 1.178 E+02 E+02	perc. 0.56: 1.812 E+02	perc. 0.89: 3.193
perc. 0.24: 1.194 E+02 E+02	perc. 0.57: 1.841 E+02	perc. 0.90: 3.286
perc. 0.25: 1.209 E+02 E+02	perc. 0.58: 1.873 E+02	perc. 0.91: 3.361
perc. 0.26: 1.223 E+02 E+02	perc. 0.59: 1.903 E+02	perc. 0.92: 3.442
perc. 0.27: 1.238 E+02 E+02	perc. 0.60: 1.937 E+02	perc. 0.93: 3.543
perc. 0.28: 1.253 E+02 E+02	perc. 0.61: 1.972 E+02	perc. 0.94: 3.659
perc. 0.29: 1.270 E+02 E+02	perc. 0.62: 2.010 E+02	perc. 0.95: 3.784
perc. 0.30: 1.282 E+02 E+02	perc. 0.63: 2.040 E+02	perc. 0.96: 3.936
perc. 0.31: 1.298 E+02 E+02	perc. 0.64: 2.081 E+02	perc. 0.97: 4.085
perc. 0.32: 1.309 E+02 E+02	perc. 0.65: 2.118 E+02	perc. 0.98: 4.323
perc. 0.33: 1.327 E+02 E+02	perc. 0.66: 2.156 E+02	perc. 0.99: 4.684

***** Output Distribution Variable : c_sy_3km *****

MINIMUM SAMPLE VALUE: 1.025 E+02

MAXIMUM SAMPLE VALUE: 1.691 E+03

perc. 0.01: 1.257 E+02	perc. 0.34: 3.360 E+02	perc. 0.67: 5.902
E+02		
perc. 0.02: 1.415 E+02	perc. 0.35: 3.409 E+02	perc. 0.68: 5.996
E+02		
perc. 0.03: 1.559 E+02	perc. 0.36: 3.453 E+02	perc. 0.69: 6.105
E+02		
perc. 0.04: 1.700 E+02	perc. 0.37: 3.492 E+02	perc. 0.70: 6.223
E+02		
perc. 0.05: 1.809 E+02	perc. 0.38: 3.540 E+02	perc. 0.71: 6.352
E+02		
perc. 0.06: 1.932 E+02	perc. 0.39: 3.582 E+02	perc. 0.72: 6.491
E+02		
perc. 0.07: 2.047 E+02	perc. 0.40: 3.629 E+02	perc. 0.73: 6.598
E+02		
perc. 0.08: 2.159 E+02	perc. 0.41: 3.669 E+02	perc. 0.74: 6.726
E+02		
perc. 0.09: 2.248 E+02	perc. 0.42: 3.726 E+02	perc. 0.75: 6.861
E+02		
perc. 0.10: 2.323 E+02	perc. 0.43: 3.783 E+02	perc. 0.76: 6.994
E+02		
perc. 0.11: 2.388 E+02	perc. 0.44: 3.831 E+02	perc. 0.77: 7.131
E+02		
perc. 0.12: 2.441 E+02	perc. 0.45: 3.890 E+02	perc. 0.78: 7.266
E+02		
perc. 0.13: 2.491 E+02	perc. 0.46: 3.959 E+02	perc. 0.79: 7.408
E+02		
perc. 0.14: 2.547 E+02	perc. 0.47: 4.022 E+02	perc. 0.80: 7.542
E+02		
perc. 0.15: 2.588 E+02	perc. 0.48: 4.093 E+02	perc. 0.81: 7.664
E+02		
perc. 0.16: 2.626 E+02	perc. 0.49: 4.159 E+02	perc. 0.82: 7.818
E+02		
perc. 0.17: 2.667 E+02	perc. 0.50: 4.229 E+02	perc. 0.83: 7.972
E+02		
perc. 0.18: 2.709 E+02	perc. 0.51: 4.298 E+02	perc. 0.84: 8.118
E+02		
perc. 0.19: 2.754 E+02	perc. 0.52: 4.394 E+02	perc. 0.85: 8.323
E+02		
perc. 0.20: 2.797 E+02	perc. 0.53: 4.472 E+02	perc. 0.86: 8.463
E+02		
perc. 0.21: 2.832 E+02	perc. 0.54: 4.568 E+02	perc. 0.87: 8.639
E+02		
perc. 0.22: 2.876 E+02	perc. 0.55: 4.658 E+02	perc. 0.88: 8.812
E+02		
perc. 0.23: 2.923 E+02	perc. 0.56: 4.745 E+02	perc. 0.89: 9.044
E+02		
perc. 0.24: 2.961 E+02	perc. 0.57: 4.834 E+02	perc. 0.90: 9.307
E+02		
perc. 0.25: 2.999 E+02	perc. 0.58: 4.954 E+02	perc. 0.91: 9.545
E+02		

perc. 0.26: 3.040 E+02	perc. 0.59: 5.055 E+02	perc. 0.92: 9.777 E+02
perc. 0.27: 3.073 E+02	perc. 0.60: 5.153 E+02	perc. 0.93: 1.015 E+03
perc. 0.28: 3.112 E+02	perc. 0.61: 5.246 E+02	perc. 0.94: 1.055 E+03
perc. 0.29: 3.150 E+02	perc. 0.62: 5.346 E+02	perc. 0.95: 1.098 E+03
perc. 0.30: 3.184 E+02	perc. 0.63: 5.439 E+02	perc. 0.96: 1.151 E+03
perc. 0.31: 3.230 E+02	perc. 0.64: 5.563 E+02	perc. 0.97: 1.207 E+03
perc. 0.32: 3.270 E+02	perc. 0.65: 5.670 E+02	perc. 0.98: 1.276 E+03
perc. 0.33: 3.308 E+02	perc. 0.66: 5.787 E+02	perc. 0.99: 1.391 E+03

***** Output Distribution Variable : c_sy_10km *****

MINIMUM SAMPLE VALUE: 2.657 E+02

MAXIMUM SAMPLE VALUE: 5.647 E+03

perc. 0.01: 3.311 E+02	perc. 0.34: 9.167 E+02	perc. 0.67: 1.742 E+03
perc. 0.02: 3.774 E+02	perc. 0.35: 9.308 E+02	perc. 0.68: 1.780 E+03
perc. 0.03: 4.169 E+02	perc. 0.36: 9.456 E+02	perc. 0.69: 1.817 E+03
perc. 0.04: 4.559 E+02	perc. 0.37: 9.602 E+02	perc. 0.70: 1.856 E+03
perc. 0.05: 4.871 E+02	perc. 0.38: 9.726 E+02	perc. 0.71: 1.900 E+03
perc. 0.06: 5.211 E+02	perc. 0.39: 9.864 E+02	perc. 0.72: 1.943 E+03
perc. 0.07: 5.533 E+02	perc. 0.40: 9.989 E+02	perc. 0.73: 1.990 E+03
perc. 0.08: 5.803 E+02	perc. 0.41: 1.015 E+03	perc. 0.74: 2.033 E+03
perc. 0.09: 6.019 E+02	perc. 0.42: 1.034 E+03	perc. 0.75: 2.079 E+03
perc. 0.10: 6.192 E+02	perc. 0.43: 1.052 E+03	perc. 0.76: 2.124 E+03
perc. 0.11: 6.363 E+02	perc. 0.44: 1.068 E+03	perc. 0.77: 2.180 E+03
perc. 0.12: 6.479 E+02	perc. 0.45: 1.086 E+03	perc. 0.78: 2.223 E+03
perc. 0.13: 6.662 E+02	perc. 0.46: 1.106 E+03	perc. 0.79: 2.267 E+03
perc. 0.14: 6.787 E+02	perc. 0.47: 1.127 E+03	perc. 0.80: 2.306 E+03
perc. 0.15: 6.867 E+02	perc. 0.48: 1.152 E+03	perc. 0.81: 2.351 E+03
perc. 0.16: 6.998 E+02	perc. 0.49: 1.172 E+03	perc. 0.82: 2.404 E+03
perc. 0.17: 7.116 E+02	perc. 0.50: 1.195 E+03	perc. 0.83: 2.456 E+03

perc. 0.18: 7.234 E+02	perc. 0.51: 1.224 E+03	perc. 0.84: 2.514
E+03		
perc. 0.19: 7.384 E+02	perc. 0.52: 1.251 E+03	perc. 0.85: 2.564
E+03		
perc. 0.20: 7.489 E+02	perc. 0.53: 1.276 E+03	perc. 0.86: 2.627
E+03		
perc. 0.21: 7.604 E+02	perc. 0.54: 1.304 E+03	perc. 0.87: 2.680
E+03		
perc. 0.22: 7.723 E+02	perc. 0.55: 1.334 E+03	perc. 0.88: 2.750
E+03		
perc. 0.23: 7.823 E+02	perc. 0.56: 1.362 E+03	perc. 0.89: 2.826
E+03		
perc. 0.24: 7.970 E+02	perc. 0.57: 1.395 E+03	perc. 0.90: 2.916
E+03		
perc. 0.25: 8.088 E+02	perc. 0.58: 1.432 E+03	perc. 0.91: 3.003
E+03		
perc. 0.26: 8.189 E+02	perc. 0.59: 1.470 E+03	perc. 0.92: 3.089
E+03		
perc. 0.27: 8.304 E+02	perc. 0.60: 1.503 E+03	perc. 0.93: 3.221
E+03		
perc. 0.28: 8.421 E+02	perc. 0.61: 1.533 E+03	perc. 0.94: 3.367
E+03		
perc. 0.29: 8.547 E+02	perc. 0.62: 1.566 E+03	perc. 0.95: 3.534
E+03		
perc. 0.30: 8.644 E+02	perc. 0.63: 1.598 E+03	perc. 0.96: 3.738
E+03		
perc. 0.31: 8.796 E+02	perc. 0.64: 1.642 E+03	perc. 0.97: 3.931
E+03		
perc. 0.32: 8.932 E+02	perc. 0.65: 1.672 E+03	perc. 0.98: 4.206
E+03		
perc. 0.33: 9.039 E+02	perc. 0.66: 1.707 E+03	perc. 0.99: 4.582
E+03		

***** Output Distribution Variable : c_sy_30km *****

MINIMUM SAMPLE VALUE: 6.337 E+02
 MAXIMUM SAMPLE VALUE: 1.697 E+04

perc. 0.01: 8.008 E+02	perc. 0.34: 2.296 E+03	perc. 0.67: 4.704
E+03		
perc. 0.02: 9.228 E+02	perc. 0.35: 2.342 E+03	perc. 0.68: 4.826
E+03		
perc. 0.03: 1.024 E+03	perc. 0.36: 2.373 E+03	perc. 0.69: 4.914
E+03		
perc. 0.04: 1.124 E+03	perc. 0.37: 2.412 E+03	perc. 0.70: 5.047
E+03		
perc. 0.05: 1.198 E+03	perc. 0.38: 2.444 E+03	perc. 0.71: 5.165
E+03		
perc. 0.06: 1.280 E+03	perc. 0.39: 2.486 E+03	perc. 0.72: 5.305
E+03		
perc. 0.07: 1.360 E+03	perc. 0.40: 2.532 E+03	perc. 0.73: 5.439
E+03		
perc. 0.08: 1.422 E+03	perc. 0.41: 2.572 E+03	perc. 0.74: 5.569
E+03		
perc. 0.09: 1.473 E+03	perc. 0.42: 2.627 E+03	perc. 0.75: 5.731
E+03		

perc. 0.10: 1.512 E+03 E+03	perc. 0.43: 2.674 E+03	perc. 0.76: 5.870
perc. 0.11: 1.546 E+03 E+03	perc. 0.44: 2.723 E+03	perc. 0.77: 6.009
perc. 0.12: 1.586 E+03 E+03	perc. 0.45: 2.773 E+03	perc. 0.78: 6.174
perc. 0.13: 1.621 E+03 E+03	perc. 0.46: 2.825 E+03	perc. 0.79: 6.279
perc. 0.14: 1.651 E+03 E+03	perc. 0.47: 2.894 E+03	perc. 0.80: 6.412
perc. 0.15: 1.683 E+03 E+03	perc. 0.48: 2.958 E+03	perc. 0.81: 6.544
perc. 0.16: 1.712 E+03 E+03	perc. 0.49: 3.021 E+03	perc. 0.82: 6.690
perc. 0.17: 1.745 E+03 E+03	perc. 0.50: 3.091 E+03	perc. 0.83: 6.875
perc. 0.18: 1.775 E+03 E+03	perc. 0.51: 3.170 E+03	perc. 0.84: 7.046
perc. 0.19: 1.810 E+03 E+03	perc. 0.52: 3.257 E+03	perc. 0.85: 7.190
perc. 0.20: 1.839 E+03 E+03	perc. 0.53: 3.330 E+03	perc. 0.86: 7.372
perc. 0.21: 1.869 E+03 E+03	perc. 0.54: 3.406 E+03	perc. 0.87: 7.558
perc. 0.22: 1.900 E+03 E+03	perc. 0.55: 3.488 E+03	perc. 0.88: 7.761
perc. 0.23: 1.925 E+03 E+03	perc. 0.56: 3.582 E+03	perc. 0.89: 8.001
perc. 0.24: 1.958 E+03 E+03	perc. 0.57: 3.679 E+03	perc. 0.90: 8.284
perc. 0.25: 1.991 E+03 E+03	perc. 0.58: 3.766 E+03	perc. 0.91: 8.547
perc. 0.26: 2.021 E+03 E+03	perc. 0.59: 3.892 E+03	perc. 0.92: 8.844
perc. 0.27: 2.052 E+03 E+03	perc. 0.60: 3.988 E+03	perc. 0.93: 9.218
perc. 0.28: 2.080 E+03 E+03	perc. 0.61: 4.085 E+03	perc. 0.94: 9.716
perc. 0.29: 2.120 E+03 E+04	perc. 0.62: 4.173 E+03	perc. 0.95: 1.029
perc. 0.30: 2.156 E+03 E+04	perc. 0.63: 4.279 E+03	perc. 0.96: 1.091
perc. 0.31: 2.195 E+03 E+04	perc. 0.64: 4.381 E+03	perc. 0.97: 1.164
perc. 0.32: 2.225 E+03 E+04	perc. 0.65: 4.483 E+03	perc. 0.98: 1.249
perc. 0.33: 2.258 E+03 E+04	perc. 0.66: 4.583 E+03	perc. 0.99: 1.369

***** Output Distribution Variable : c_sz_05km *****

MINIMUM SAMPLE VALUE: 2.155 E-01

MAXIMUM SAMPLE VALUE: 3.722 E+02

perc. 0.01: 2.910 E+00 E+01	perc. 0.34: 2.532 E+01	perc. 0.67: 6.580
perc. 0.02: 4.257 E+00 E+01	perc. 0.35: 2.595 E+01	perc. 0.68: 6.729
perc. 0.03: 5.009 E+00 E+01	perc. 0.36: 2.684 E+01	perc. 0.69: 6.886
perc. 0.04: 5.785 E+00 E+01	perc. 0.37: 2.769 E+01	perc. 0.70: 7.077
perc. 0.05: 6.515 E+00 E+01	perc. 0.38: 2.845 E+01	perc. 0.71: 7.235
perc. 0.06: 7.127 E+00 E+01	perc. 0.39: 2.930 E+01	perc. 0.72: 7.432
perc. 0.07: 7.710 E+00 E+01	perc. 0.40: 3.009 E+01	perc. 0.73: 7.595
perc. 0.08: 8.353 E+00 E+01	perc. 0.41: 3.092 E+01	perc. 0.74: 7.762
perc. 0.09: 8.997 E+00 E+01	perc. 0.42: 3.167 E+01	perc. 0.75: 7.963
perc. 0.10: 9.595 E+00 E+01	perc. 0.43: 3.230 E+01	perc. 0.76: 8.148
perc. 0.11: 1.019 E+01 E+01	perc. 0.44: 3.320 E+01	perc. 0.77: 8.333
perc. 0.12: 1.084 E+01 E+01	perc. 0.45: 3.402 E+01	perc. 0.78: 8.547
perc. 0.13: 1.147 E+01 E+01	perc. 0.46: 3.509 E+01	perc. 0.79: 8.794
perc. 0.14: 1.205 E+01 E+01	perc. 0.47: 3.609 E+01	perc. 0.80: 9.029
perc. 0.15: 1.281 E+01 E+01	perc. 0.48: 3.715 E+01	perc. 0.81: 9.310
perc. 0.16: 1.340 E+01 E+01	perc. 0.49: 3.801 E+01	perc. 0.82: 9.662
perc. 0.17: 1.410 E+01 E+02	perc. 0.50: 3.904 E+01	perc. 0.83: 1.003
perc. 0.18: 1.467 E+01 E+02	perc. 0.51: 4.026 E+01	perc. 0.84: 1.033
perc. 0.19: 1.531 E+01 E+02	perc. 0.52: 4.154 E+01	perc. 0.85: 1.071
perc. 0.20: 1.592 E+01 E+02	perc. 0.53: 4.270 E+01	perc. 0.86: 1.103
perc. 0.21: 1.641 E+01 E+02	perc. 0.54: 4.457 E+01	perc. 0.87: 1.129
perc. 0.22: 1.703 E+01 E+02	perc. 0.55: 4.629 E+01	perc. 0.88: 1.166
perc. 0.23: 1.758 E+01 E+02	perc. 0.56: 4.791 E+01	perc. 0.89: 1.198
perc. 0.24: 1.836 E+01 E+02	perc. 0.57: 4.982 E+01	perc. 0.90: 1.234
perc. 0.25: 1.903 E+01 E+02	perc. 0.58: 5.179 E+01	perc. 0.91: 1.276

perc. 0.26: 1.981 E+01 E+02	perc. 0.59: 5.360 E+01	perc. 0.92: 1.326
perc. 0.27: 2.070 E+01 E+02	perc. 0.60: 5.526 E+01	perc. 0.93: 1.381
perc. 0.28: 2.145 E+01 E+02	perc. 0.61: 5.675 E+01	perc. 0.94: 1.449
perc. 0.29: 2.212 E+01 E+02	perc. 0.62: 5.863 E+01	perc. 0.95: 1.528
perc. 0.30: 2.279 E+01 E+02	perc. 0.63: 6.005 E+01	perc. 0.96: 1.636
perc. 0.31: 2.352 E+01 E+02	perc. 0.64: 6.151 E+01	perc. 0.97: 1.805
perc. 0.32: 2.410 E+01 E+02	perc. 0.65: 6.298 E+01	perc. 0.98: 2.082
perc. 0.33: 2.472 E+01 E+02	perc. 0.66: 6.437 E+01	perc. 0.99: 2.497

***** Output Distribution Variable : c_sz_1km *****

MINIMUM SAMPLE VALUE: 2.911 E-01
MAXIMUM SAMPLE VALUE: 7.805 E+02

perc. 0.01: 4.347 E+00 E+02	perc. 0.34: 4.415 E+01	perc. 0.67: 1.250
perc. 0.02: 6.506 E+00 E+02	perc. 0.35: 4.534 E+01	perc. 0.68: 1.278
perc. 0.03: 7.651 E+00 E+02	perc. 0.36: 4.662 E+01	perc. 0.69: 1.310
perc. 0.04: 8.792 E+00 E+02	perc. 0.37: 4.799 E+01	perc. 0.70: 1.347
perc. 0.05: 1.009 E+01 E+02	perc. 0.38: 4.959 E+01	perc. 0.71: 1.376
perc. 0.06: 1.119 E+01 E+02	perc. 0.39: 5.103 E+01	perc. 0.72: 1.413
perc. 0.07: 1.204 E+01 E+02	perc. 0.40: 5.258 E+01	perc. 0.73: 1.451
perc. 0.08: 1.299 E+01 E+02	perc. 0.41: 5.465 E+01	perc. 0.74: 1.485
perc. 0.09: 1.418 E+01 E+02	perc. 0.42: 5.665 E+01	perc. 0.75: 1.525
perc. 0.10: 1.521 E+01 E+02	perc. 0.43: 5.839 E+01	perc. 0.76: 1.557
perc. 0.11: 1.629 E+01 E+02	perc. 0.44: 6.017 E+01	perc. 0.77: 1.599
perc. 0.12: 1.734 E+01 E+02	perc. 0.45: 6.185 E+01	perc. 0.78: 1.642
perc. 0.13: 1.842 E+01 E+02	perc. 0.46: 6.342 E+01	perc. 0.79: 1.686
perc. 0.14: 1.953 E+01 E+02	perc. 0.47: 6.521 E+01	perc. 0.80: 1.725
perc. 0.15: 2.045 E+01 E+02	perc. 0.48: 6.735 E+01	perc. 0.81: 1.774
perc. 0.16: 2.138 E+01 E+02	perc. 0.49: 6.913 E+01	perc. 0.82: 1.846
perc. 0.17: 2.253 E+01 E+02	perc. 0.50: 7.132 E+01	perc. 0.83: 1.912

perc. 0.18: 2.352 E+01	perc. 0.51: 7.323 E+01	perc. 0.84: 1.977 E+02
perc. 0.19: 2.461 E+01	perc. 0.52: 7.546 E+01	perc. 0.85: 2.049 E+02
perc. 0.20: 2.558 E+01	perc. 0.53: 7.808 E+01	perc. 0.86: 2.116 E+02
perc. 0.21: 2.666 E+01	perc. 0.54: 8.088 E+01	perc. 0.87: 2.182 E+02
perc. 0.22: 2.778 E+01	perc. 0.55: 8.427 E+01	perc. 0.88: 2.247 E+02
perc. 0.23: 2.891 E+01	perc. 0.56: 8.780 E+01	perc. 0.89: 2.310 E+02
perc. 0.24: 3.007 E+01	perc. 0.57: 9.163 E+01	perc. 0.90: 2.390 E+02
perc. 0.25: 3.135 E+01	perc. 0.58: 9.587 E+01	perc. 0.91: 2.479 E+02
perc. 0.26: 3.290 E+01	perc. 0.59: 9.947 E+01	perc. 0.92: 2.586 E+02
perc. 0.27: 3.419 E+01	perc. 0.60: 1.027 E+02	perc. 0.93: 2.718 E+02
perc. 0.28: 3.569 E+01	perc. 0.61: 1.061 E+02	perc. 0.94: 2.860 E+02
perc. 0.29: 3.692 E+01	perc. 0.62: 1.096 E+02	perc. 0.95: 3.049 E+02
perc. 0.30: 3.843 E+01	perc. 0.63: 1.129 E+02	perc. 0.96: 3.296 E+02
perc. 0.31: 3.983 E+01	perc. 0.64: 1.160 E+02	perc. 0.97: 3.697 E+02
perc. 0.32: 4.111 E+01	perc. 0.65: 1.191 E+02	perc. 0.98: 4.243 E+02
perc. 0.33: 4.275 E+01	perc. 0.66: 1.222 E+02	perc. 0.99: 5.127 E+02

***** Output Distribution Variable : c_sz_3km *****

MINIMUM SAMPLE VALUE: 4.690 E-01

MAXIMUM SAMPLE VALUE: 2.524 E+03

perc. 0.01: 7.936 E+00	perc. 0.34: 1.031 E+02	perc. 0.67: 3.458 E+02
perc. 0.02: 1.216 E+01	perc. 0.35: 1.078 E+02	perc. 0.68: 3.542 E+02
perc. 0.03: 1.496 E+01	perc. 0.36: 1.122 E+02	perc. 0.69: 3.635 E+02
perc. 0.04: 1.722 E+01	perc. 0.37: 1.170 E+02	perc. 0.70: 3.740 E+02
perc. 0.05: 2.019 E+01	perc. 0.38: 1.216 E+02	perc. 0.71: 3.840 E+02
perc. 0.06: 2.236 E+01	perc. 0.39: 1.260 E+02	perc. 0.72: 3.948 E+02
perc. 0.07: 2.402 E+01	perc. 0.40: 1.314 E+02	perc. 0.73: 4.033 E+02
perc. 0.08: 2.603 E+01	perc. 0.41: 1.361 E+02	perc. 0.74: 4.144 E+02
perc. 0.09: 2.835 E+01	perc. 0.42: 1.420 E+02	perc. 0.75: 4.253 E+02

perc. 0.10: 3.081 E+01 E+02	perc. 0.43: 1.475 E+02	perc. 0.76: 4.361
perc. 0.11: 3.363 E+01 E+02	perc. 0.44: 1.531 E+02	perc. 0.77: 4.467
perc. 0.12: 3.649 E+01 E+02	perc. 0.45: 1.584 E+02	perc. 0.78: 4.590
perc. 0.13: 3.908 E+01 E+02	perc. 0.46: 1.632 E+02	perc. 0.79: 4.721
perc. 0.14: 4.164 E+01 E+02	perc. 0.47: 1.678 E+02	perc. 0.80: 4.885
perc. 0.15: 4.357 E+01 E+02	perc. 0.48: 1.736 E+02	perc. 0.81: 5.052
perc. 0.16: 4.559 E+01 E+02	perc. 0.49: 1.790 E+02	perc. 0.82: 5.212
perc. 0.17: 4.773 E+01 E+02	perc. 0.50: 1.848 E+02	perc. 0.83: 5.395
perc. 0.18: 4.980 E+01 E+02	perc. 0.51: 1.920 E+02	perc. 0.84: 5.571
perc. 0.19: 5.217 E+01 E+02	perc. 0.52: 1.979 E+02	perc. 0.85: 5.760
perc. 0.20: 5.451 E+01 E+02	perc. 0.53: 2.047 E+02	perc. 0.86: 5.938
perc. 0.21: 5.688 E+01 E+02	perc. 0.54: 2.128 E+02	perc. 0.87: 6.148
perc. 0.22: 5.981 E+01 E+02	perc. 0.55: 2.212 E+02	perc. 0.88: 6.355
perc. 0.23: 6.278 E+01 E+02	perc. 0.56: 2.318 E+02	perc. 0.89: 6.583
perc. 0.24: 6.570 E+01 E+02	perc. 0.57: 2.429 E+02	perc. 0.90: 6.808
perc. 0.25: 6.879 E+01 E+02	perc. 0.58: 2.539 E+02	perc. 0.91: 7.105
perc. 0.26: 7.253 E+01 E+02	perc. 0.59: 2.660 E+02	perc. 0.92: 7.462
perc. 0.27: 7.578 E+01 E+02	perc. 0.60: 2.765 E+02	perc. 0.93: 7.931
perc. 0.28: 7.890 E+01 E+02	perc. 0.61: 2.873 E+02	perc. 0.94: 8.533
perc. 0.29: 8.248 E+01 E+02	perc. 0.62: 2.958 E+02	perc. 0.95: 9.210
perc. 0.30: 8.626 E+01 E+03	perc. 0.63: 3.073 E+02	perc. 0.96: 1.023
perc. 0.31: 9.076 E+01 E+03	perc. 0.64: 3.174 E+02	perc. 0.97: 1.155
perc. 0.32: 9.502 E+01 E+03	perc. 0.65: 3.259 E+02	perc. 0.98: 1.319
perc. 0.33: 9.884 E+01 E+03	perc. 0.66: 3.355 E+02	perc. 0.99: 1.635

***** Output Distribution Variable : c_sz_10km *****

MINIMUM SAMPLE VALUE: 7.909 E-01
MAXIMUM SAMPLE VALUE: 9.136 E+03

perc. 0.01: 1.518 E+01	perc. 0.34: 2.579 E+02	perc. 0.67: 1.050
E+03		
perc. 0.02: 2.436 E+01	perc. 0.35: 2.729 E+02	perc. 0.68: 1.082
E+03		
perc. 0.03: 3.027 E+01	perc. 0.36: 2.884 E+02	perc. 0.69: 1.108
E+03		
perc. 0.04: 3.517 E+01	perc. 0.37: 3.065 E+02	perc. 0.70: 1.148
E+03		
perc. 0.05: 4.211 E+01	perc. 0.38: 3.261 E+02	perc. 0.71: 1.178
E+03		
perc. 0.06: 4.730 E+01	perc. 0.39: 3.436 E+02	perc. 0.72: 1.208
E+03		
perc. 0.07: 5.145 E+01	perc. 0.40: 3.586 E+02	perc. 0.73: 1.242
E+03		
perc. 0.08: 5.657 E+01	perc. 0.41: 3.716 E+02	perc. 0.74: 1.279
E+03		
perc. 0.09: 6.083 E+01	perc. 0.42: 3.884 E+02	perc. 0.75: 1.308
E+03		
perc. 0.10: 6.671 E+01	perc. 0.43: 4.027 E+02	perc. 0.76: 1.344
E+03		
perc. 0.11: 7.442 E+01	perc. 0.44: 4.240 E+02	perc. 0.77: 1.383
E+03		
perc. 0.12: 8.070 E+01	perc. 0.45: 4.404 E+02	perc. 0.78: 1.421
E+03		
perc. 0.13: 8.695 E+01	perc. 0.46: 4.608 E+02	perc. 0.79: 1.472
E+03		
perc. 0.14: 9.267 E+01	perc. 0.47: 4.796 E+02	perc. 0.80: 1.517
E+03		
perc. 0.15: 9.793 E+01	perc. 0.48: 4.960 E+02	perc. 0.81: 1.569
E+03		
perc. 0.16: 1.035 E+02	perc. 0.49: 5.146 E+02	perc. 0.82: 1.626
E+03		
perc. 0.17: 1.091 E+02	perc. 0.50: 5.331 E+02	perc. 0.83: 1.690
E+03		
perc. 0.18: 1.143 E+02	perc. 0.51: 5.527 E+02	perc. 0.84: 1.753
E+03		
perc. 0.19: 1.200 E+02	perc. 0.52: 5.771 E+02	perc. 0.85: 1.815
E+03		
perc. 0.20: 1.259 E+02	perc. 0.53: 5.988 E+02	perc. 0.86: 1.869
E+03		
perc. 0.21: 1.335 E+02	perc. 0.54: 6.233 E+02	perc. 0.87: 1.939
E+03		
perc. 0.22: 1.400 E+02	perc. 0.55: 6.497 E+02	perc. 0.88: 2.002
E+03		
perc. 0.23: 1.468 E+02	perc. 0.56: 6.792 E+02	perc. 0.89: 2.067
E+03		
perc. 0.24: 1.542 E+02	perc. 0.57: 7.101 E+02	perc. 0.90: 2.154
E+03		
perc. 0.25: 1.636 E+02	perc. 0.58: 7.456 E+02	perc. 0.91: 2.261
E+03		

perc. 0.26: 1.716 E+02	perc. 0.59: 7.803 E+02	perc. 0.92: 2.405
E+03		
perc. 0.27: 1.794 E+02	perc. 0.60: 8.157 E+02	perc. 0.93: 2.585
E+03		
perc. 0.28: 1.890 E+02	perc. 0.61: 8.535 E+02	perc. 0.94: 2.814
E+03		
perc. 0.29: 1.980 E+02	perc. 0.62: 8.845 E+02	perc. 0.95: 3.127
E+03		
perc. 0.30: 2.102 E+02	perc. 0.63: 9.136 E+02	perc. 0.96: 3.560
E+03		
perc. 0.31: 2.213 E+02	perc. 0.64: 9.518 E+02	perc. 0.97: 4.029
E+03		
perc. 0.32: 2.326 E+02	perc. 0.65: 9.869 E+02	perc. 0.98: 4.643
E+03		
perc. 0.33: 2.458 E+02	perc. 0.66: 1.020 E+03	perc. 0.99: 5.766
E+03		

***** Output Distribution Variable : c_sz_30km *****

MINIMUM SAMPLE VALUE: 1.274 E+00
 MAXIMUM SAMPLE VALUE: 2.955 E+04

perc. 0.01: 2.816 E+01	perc. 0.34: 5.993 E+02	perc. 0.67: 2.894
E+03		
perc. 0.02: 4.515 E+01	perc. 0.35: 6.382 E+02	perc. 0.68: 2.985
E+03		
perc. 0.03: 5.739 E+01	perc. 0.36: 6.848 E+02	perc. 0.69: 3.081
E+03		
perc. 0.04: 6.845 E+01	perc. 0.37: 7.343 E+02	perc. 0.70: 3.181
E+03		
perc. 0.05: 8.027 E+01	perc. 0.38: 7.855 E+02	perc. 0.71: 3.264
E+03		
perc. 0.06: 9.227 E+01	perc. 0.39: 8.347 E+02	perc. 0.72: 3.361
E+03		
perc. 0.07: 1.036 E+02	perc. 0.40: 8.864 E+02	perc. 0.73: 3.442
E+03		
perc. 0.08: 1.124 E+02	perc. 0.41: 9.216 E+02	perc. 0.74: 3.548
E+03		
perc. 0.09: 1.226 E+02	perc. 0.42: 9.704 E+02	perc. 0.75: 3.641
E+03		
perc. 0.10: 1.348 E+02	perc. 0.43: 1.024 E+03	perc. 0.76: 3.749
E+03		
perc. 0.11: 1.508 E+02	perc. 0.44: 1.076 E+03	perc. 0.77: 3.889
E+03		
perc. 0.12: 1.664 E+02	perc. 0.45: 1.128 E+03	perc. 0.78: 4.005
E+03		
perc. 0.13: 1.789 E+02	perc. 0.46: 1.187 E+03	perc. 0.79: 4.149
E+03		
perc. 0.14: 1.926 E+02	perc. 0.47: 1.250 E+03	perc. 0.80: 4.281
E+03		
perc. 0.15: 2.051 E+02	perc. 0.48: 1.305 E+03	perc. 0.81: 4.431
E+03		
perc. 0.16: 2.178 E+02	perc. 0.49: 1.357 E+03	perc. 0.82: 4.583
E+03		
perc. 0.17: 2.300 E+02	perc. 0.50: 1.422 E+03	perc. 0.83: 4.753
E+03		

perc. 0.18: 2.434 E+02	perc. 0.51: 1.476 E+03	perc. 0.84: 4.966
E+03		
perc. 0.19: 2.558 E+02	perc. 0.52: 1.535 E+03	perc. 0.85: 5.136
E+03		
perc. 0.20: 2.721 E+02	perc. 0.53: 1.603 E+03	perc. 0.86: 5.306
E+03		
perc. 0.21: 2.861 E+02	perc. 0.54: 1.680 E+03	perc. 0.87: 5.527
E+03		
perc. 0.22: 3.033 E+02	perc. 0.55: 1.744 E+03	perc. 0.88: 5.748
E+03		
perc. 0.23: 3.187 E+02	perc. 0.56: 1.824 E+03	perc. 0.89: 5.957
E+03		
perc. 0.24: 3.384 E+02	perc. 0.57: 1.907 E+03	perc. 0.90: 6.285
E+03		
perc. 0.25: 3.590 E+02	perc. 0.58: 2.000 E+03	perc. 0.91: 6.597
E+03		
perc. 0.26: 3.789 E+02	perc. 0.59: 2.093 E+03	perc. 0.92: 7.033
E+03		
perc. 0.27: 4.005 E+02	perc. 0.60: 2.195 E+03	perc. 0.93: 7.602
E+03		
perc. 0.28: 4.196 E+02	perc. 0.61: 2.285 E+03	perc. 0.94: 8.493
E+03		
perc. 0.29: 4.456 E+02	perc. 0.62: 2.399 E+03	perc. 0.95: 9.692
E+03		
perc. 0.30: 4.734 E+02	perc. 0.63: 2.497 E+03	perc. 0.96: 1.119
E+04		
perc. 0.31: 4.994 E+02	perc. 0.64: 2.601 E+03	perc. 0.97: 1.268
E+04		
perc. 0.32: 5.316 E+02	perc. 0.65: 2.714 E+03	perc. 0.98: 1.474
E+04		
perc. 0.33: 5.640 E+02	perc. 0.66: 2.797 E+03	perc. 0.99: 1.834
E+04		

***** Output Distribution Variable : d_sy_05km *****

MINIMUM SAMPLE VALUE: 1.059 E+01

MAXIMUM SAMPLE VALUE: 3.522 E+02

perc. 0.01: 1.609 E+01	perc. 0.34: 5.568 E+01	perc. 0.67: 8.642
E+01		
perc. 0.02: 1.975 E+01	perc. 0.35: 5.663 E+01	perc. 0.68: 8.783
E+01		
perc. 0.03: 2.323 E+01	perc. 0.36: 5.737 E+01	perc. 0.69: 8.916
E+01		
perc. 0.04: 2.549 E+01	perc. 0.37: 5.815 E+01	perc. 0.70: 9.055
E+01		
perc. 0.05: 2.710 E+01	perc. 0.38: 5.887 E+01	perc. 0.71: 9.190
E+01		
perc. 0.06: 2.845 E+01	perc. 0.39: 5.971 E+01	perc. 0.72: 9.332
E+01		
perc. 0.07: 3.014 E+01	perc. 0.40: 6.045 E+01	perc. 0.73: 9.463
E+01		
perc. 0.08: 3.163 E+01	perc. 0.41: 6.122 E+01	perc. 0.74: 9.587
E+01		
perc. 0.09: 3.287 E+01	perc. 0.42: 6.218 E+01	perc. 0.75: 9.730
E+01		

perc. 0.10: 3.385 E+01 E+01	perc. 0.43: 6.293 E+01	perc. 0.76: 9.866
perc. 0.11: 3.479 E+01 E+02	perc. 0.44: 6.362 E+01	perc. 0.77: 1.002
perc. 0.12: 3.601 E+01 E+02	perc. 0.45: 6.448 E+01	perc. 0.78: 1.014
perc. 0.13: 3.697 E+01 E+02	perc. 0.46: 6.519 E+01	perc. 0.79: 1.033
perc. 0.14: 3.785 E+01 E+02	perc. 0.47: 6.594 E+01	perc. 0.80: 1.050
perc. 0.15: 3.884 E+01 E+02	perc. 0.48: 6.677 E+01	perc. 0.81: 1.070
perc. 0.16: 3.967 E+01 E+02	perc. 0.49: 6.762 E+01	perc. 0.82: 1.094
perc. 0.17: 4.048 E+01 E+02	perc. 0.50: 6.838 E+01	perc. 0.83: 1.112
perc. 0.18: 4.130 E+01 E+02	perc. 0.51: 6.927 E+01	perc. 0.84: 1.135
perc. 0.19: 4.221 E+01 E+02	perc. 0.52: 7.023 E+01	perc. 0.85: 1.158
perc. 0.20: 4.305 E+01 E+02	perc. 0.53: 7.127 E+01	perc. 0.86: 1.184
perc. 0.21: 4.386 E+01 E+02	perc. 0.54: 7.217 E+01	perc. 0.87: 1.212
perc. 0.22: 4.486 E+01 E+02	perc. 0.55: 7.313 E+01	perc. 0.88: 1.257
perc. 0.23: 4.575 E+01 E+02	perc. 0.56: 7.416 E+01	perc. 0.89: 1.290
perc. 0.24: 4.671 E+01 E+02	perc. 0.57: 7.527 E+01	perc. 0.90: 1.337
perc. 0.25: 4.764 E+01 E+02	perc. 0.58: 7.629 E+01	perc. 0.91: 1.385
perc. 0.26: 4.861 E+01 E+02	perc. 0.59: 7.716 E+01	perc. 0.92: 1.443
perc. 0.27: 4.955 E+01 E+02	perc. 0.60: 7.816 E+01	perc. 0.93: 1.491
perc. 0.28: 5.054 E+01 E+02	perc. 0.61: 7.925 E+01	perc. 0.94: 1.551
perc. 0.29: 5.139 E+01 E+02	perc. 0.62: 8.043 E+01	perc. 0.95: 1.626
perc. 0.30: 5.228 E+01 E+02	perc. 0.63: 8.146 E+01	perc. 0.96: 1.706
perc. 0.31: 5.316 E+01 E+02	perc. 0.64: 8.269 E+01	perc. 0.97: 1.811
perc. 0.32: 5.398 E+01 E+02	perc. 0.65: 8.388 E+01	perc. 0.98: 1.937
perc. 0.33: 5.486 E+01 E+02	perc. 0.66: 8.516 E+01	perc. 0.99: 2.210

***** Output Distribution Variable : d_sy_1km *****

MINIMUM SAMPLE VALUE: 1.687 E+01
MAXIMUM SAMPLE VALUE: 7.589 E+02

perc. 0.01: 2.608 E+01 E+02	perc. 0.34: 1.032 E+02	perc. 0.67: 1.673
perc. 0.02: 3.281 E+01 E+02	perc. 0.35: 1.049 E+02	perc. 0.68: 1.702
perc. 0.03: 3.878 E+01 E+02	perc. 0.36: 1.063 E+02	perc. 0.69: 1.732
perc. 0.04: 4.250 E+01 E+02	perc. 0.37: 1.080 E+02	perc. 0.70: 1.764
perc. 0.05: 4.661 E+01 E+02	perc. 0.38: 1.095 E+02	perc. 0.71: 1.790
perc. 0.06: 4.911 E+01 E+02	perc. 0.39: 1.112 E+02	perc. 0.72: 1.818
perc. 0.07: 5.255 E+01 E+02	perc. 0.40: 1.126 E+02	perc. 0.73: 1.840
perc. 0.08: 5.556 E+01 E+02	perc. 0.41: 1.141 E+02	perc. 0.74: 1.867
perc. 0.09: 5.767 E+01 E+02	perc. 0.42: 1.154 E+02	perc. 0.75: 1.895
perc. 0.10: 5.986 E+01 E+02	perc. 0.43: 1.173 E+02	perc. 0.76: 1.924
perc. 0.11: 6.198 E+01 E+02	perc. 0.44: 1.192 E+02	perc. 0.77: 1.956
perc. 0.12: 6.405 E+01 E+02	perc. 0.45: 1.208 E+02	perc. 0.78: 1.988
perc. 0.13: 6.582 E+01 E+02	perc. 0.46: 1.224 E+02	perc. 0.79: 2.020
perc. 0.14: 6.732 E+01 E+02	perc. 0.47: 1.240 E+02	perc. 0.80: 2.068
perc. 0.15: 6.922 E+01 E+02	perc. 0.48: 1.256 E+02	perc. 0.81: 2.109
perc. 0.16: 7.090 E+01 E+02	perc. 0.49: 1.272 E+02	perc. 0.82: 2.154
perc. 0.17: 7.252 E+01 E+02	perc. 0.50: 1.288 E+02	perc. 0.83: 2.200
perc. 0.18: 7.404 E+01 E+02	perc. 0.51: 1.309 E+02	perc. 0.84: 2.244
perc. 0.19: 7.595 E+01 E+02	perc. 0.52: 1.326 E+02	perc. 0.85: 2.293
perc. 0.20: 7.785 E+01 E+02	perc. 0.53: 1.347 E+02	perc. 0.86: 2.350
perc. 0.21: 7.959 E+01 E+02	perc. 0.54: 1.367 E+02	perc. 0.87: 2.415
perc. 0.22: 8.136 E+01 E+02	perc. 0.55: 1.388 E+02	perc. 0.88: 2.489
perc. 0.23: 8.308 E+01 E+02	perc. 0.56: 1.410 E+02	perc. 0.89: 2.574
perc. 0.24: 8.466 E+01 E+02	perc. 0.57: 1.432 E+02	perc. 0.90: 2.664
perc. 0.25: 8.637 E+01 E+02	perc. 0.58: 1.455 E+02	perc. 0.91: 2.757

perc. 0.26: 8.857 E+01 E+02	perc. 0.59: 1.481 E+02	perc. 0.92: 2.871
perc. 0.27: 9.067 E+01 E+02	perc. 0.60: 1.501 E+02	perc. 0.93: 3.010
perc. 0.28: 9.270 E+01 E+02	perc. 0.61: 1.520 E+02	perc. 0.94: 3.122
perc. 0.29: 9.449 E+01 E+02	perc. 0.62: 1.542 E+02	perc. 0.95: 3.309
perc. 0.30: 9.605 E+01 E+02	perc. 0.63: 1.568 E+02	perc. 0.96: 3.483
perc. 0.31: 9.783 E+01 E+02	perc. 0.64: 1.595 E+02	perc. 0.97: 3.732
perc. 0.32: 9.973 E+01 E+02	perc. 0.65: 1.624 E+02	perc. 0.98: 4.024
perc. 0.33: 1.014 E+02 E+02	perc. 0.66: 1.646 E+02	perc. 0.99: 4.614

***** Output Distribution Variable : d_sy_3km *****

MINIMUM SAMPLE VALUE: 3.529 E+01
MAXIMUM SAMPLE VALUE: 2.562 E+03

perc. 0.01: 5.655 E+01 E+02	perc. 0.34: 2.737 E+02	perc. 0.67: 4.778
perc. 0.02: 7.207 E+01 E+02	perc. 0.35: 2.781 E+02	perc. 0.68: 4.852
perc. 0.03: 8.747 E+01 E+02	perc. 0.36: 2.827 E+02	perc. 0.69: 4.937
perc. 0.04: 9.779 E+01 E+02	perc. 0.37: 2.874 E+02	perc. 0.70: 5.022
perc. 0.05: 1.101 E+02 E+02	perc. 0.38: 2.917 E+02	perc. 0.71: 5.110
perc. 0.06: 1.173 E+02 E+02	perc. 0.39: 2.968 E+02	perc. 0.72: 5.212
perc. 0.07: 1.270 E+02 E+02	perc. 0.40: 3.014 E+02	perc. 0.73: 5.292
perc. 0.08: 1.343 E+02 E+02	perc. 0.41: 3.058 E+02	perc. 0.74: 5.377
perc. 0.09: 1.406 E+02 E+02	perc. 0.42: 3.099 E+02	perc. 0.75: 5.467
perc. 0.10: 1.483 E+02 E+02	perc. 0.43: 3.144 E+02	perc. 0.76: 5.576
perc. 0.11: 1.536 E+02 E+02	perc. 0.44: 3.204 E+02	perc. 0.77: 5.692
perc. 0.12: 1.586 E+02 E+02	perc. 0.45: 3.253 E+02	perc. 0.78: 5.813
perc. 0.13: 1.639 E+02 E+02	perc. 0.46: 3.316 E+02	perc. 0.79: 5.925
perc. 0.14: 1.681 E+02 E+02	perc. 0.47: 3.376 E+02	perc. 0.80: 6.035
perc. 0.15: 1.733 E+02 E+02	perc. 0.48: 3.427 E+02	perc. 0.81: 6.191
perc. 0.16: 1.782 E+02 E+02	perc. 0.49: 3.471 E+02	perc. 0.82: 6.332
perc. 0.17: 1.829 E+02 E+02	perc. 0.50: 3.532 E+02	perc. 0.83: 6.469

perc. 0.18: 1.875 E+02 E+02	perc. 0.51: 3.596 E+02	perc. 0.84: 6.621
perc. 0.19: 1.925 E+02 E+02	perc. 0.52: 3.645 E+02	perc. 0.85: 6.798
perc. 0.20: 1.978 E+02 E+02	perc. 0.53: 3.707 E+02	perc. 0.86: 7.000
perc. 0.21: 2.037 E+02 E+02	perc. 0.54: 3.759 E+02	perc. 0.87: 7.223
perc. 0.22: 2.078 E+02 E+02	perc. 0.55: 3.841 E+02	perc. 0.88: 7.445
perc. 0.23: 2.122 E+02 E+02	perc. 0.56: 3.903 E+02	perc. 0.89: 7.705
perc. 0.24: 2.171 E+02 E+02	perc. 0.57: 3.979 E+02	perc. 0.90: 7.974
perc. 0.25: 2.234 E+02 E+02	perc. 0.58: 4.061 E+02	perc. 0.91: 8.212
perc. 0.26: 2.289 E+02 E+02	perc. 0.59: 4.135 E+02	perc. 0.92: 8.615
perc. 0.27: 2.350 E+02 E+02	perc. 0.60: 4.209 E+02	perc. 0.93: 9.088
perc. 0.28: 2.407 E+02 E+02	perc. 0.61: 4.291 E+02	perc. 0.94: 9.642
perc. 0.29: 2.460 E+02 E+03	perc. 0.62: 4.363 E+02	perc. 0.95: 1.015
perc. 0.30: 2.511 E+02 E+03	perc. 0.63: 4.439 E+02	perc. 0.96: 1.103
perc. 0.31: 2.576 E+02 E+03	perc. 0.64: 4.527 E+02	perc. 0.97: 1.194
perc. 0.32: 2.635 E+02 E+03	perc. 0.65: 4.610 E+02	perc. 0.98: 1.292
perc. 0.33: 2.685 E+02 E+03	perc. 0.66: 4.687 E+02	perc. 0.99: 1.500

***** Output Distribution Variable : d_sy_10km *****

MINIMUM SAMPLE VALUE: 7.922 E+01

MAXIMUM SAMPLE VALUE: 9.722 E+03

perc. 0.01: 1.295 E+02 E+03	perc. 0.34: 7.898 E+02	perc. 0.67: 1.497
perc. 0.02: 1.728 E+02 E+03	perc. 0.35: 8.087 E+02	perc. 0.68: 1.526
perc. 0.03: 2.120 E+02 E+03	perc. 0.36: 8.259 E+02	perc. 0.69: 1.557
perc. 0.04: 2.447 E+02 E+03	perc. 0.37: 8.433 E+02	perc. 0.70: 1.587
perc. 0.05: 2.820 E+02 E+03	perc. 0.38: 8.569 E+02	perc. 0.71: 1.614
perc. 0.06: 3.034 E+02 E+03	perc. 0.39: 8.702 E+02	perc. 0.72: 1.644
perc. 0.07: 3.306 E+02 E+03	perc. 0.40: 8.865 E+02	perc. 0.73: 1.681
perc. 0.08: 3.544 E+02 E+03	perc. 0.41: 9.004 E+02	perc. 0.74: 1.727
perc. 0.09: 3.740 E+02 E+03	perc. 0.42: 9.145 E+02	perc. 0.75: 1.760

perc. 0.10: 3.971 E+02 E+03	perc. 0.43: 9.273 E+02	perc. 0.76: 1.801
perc. 0.11: 4.153 E+02 E+03	perc. 0.44: 9.454 E+02	perc. 0.77: 1.837
perc. 0.12: 4.300 E+02 E+03	perc. 0.45: 9.673 E+02	perc. 0.78: 1.881
perc. 0.13: 4.449 E+02 E+03	perc. 0.46: 9.894 E+02	perc. 0.79: 1.924
perc. 0.14: 4.589 E+02 E+03	perc. 0.47: 1.010 E+03	perc. 0.80: 1.969
perc. 0.15: 4.751 E+02 E+03	perc. 0.48: 1.029 E+03	perc. 0.81: 2.011
perc. 0.16: 4.894 E+02 E+03	perc. 0.49: 1.048 E+03	perc. 0.82: 2.062
perc. 0.17: 5.035 E+02 E+03	perc. 0.50: 1.065 E+03	perc. 0.83: 2.121
perc. 0.18: 5.176 E+02 E+03	perc. 0.51: 1.086 E+03	perc. 0.84: 2.184
perc. 0.19: 5.327 E+02 E+03	perc. 0.52: 1.107 E+03	perc. 0.85: 2.254
perc. 0.20: 5.487 E+02 E+03	perc. 0.53: 1.126 E+03	perc. 0.86: 2.323
perc. 0.21: 5.669 E+02 E+03	perc. 0.54: 1.146 E+03	perc. 0.87: 2.385
perc. 0.22: 5.801 E+02 E+03	perc. 0.55: 1.173 E+03	perc. 0.88: 2.488
perc. 0.23: 5.932 E+02 E+03	perc. 0.56: 1.197 E+03	perc. 0.89: 2.560
perc. 0.24: 6.088 E+02 E+03	perc. 0.57: 1.221 E+03	perc. 0.90: 2.650
perc. 0.25: 6.265 E+02 E+03	perc. 0.58: 1.247 E+03	perc. 0.91: 2.763
perc. 0.26: 6.437 E+02 E+03	perc. 0.59: 1.277 E+03	perc. 0.92: 2.863
perc. 0.27: 6.624 E+02 E+03	perc. 0.60: 1.304 E+03	perc. 0.93: 3.064
perc. 0.28: 6.833 E+02 E+03	perc. 0.61: 1.333 E+03	perc. 0.94: 3.275
perc. 0.29: 7.018 E+02 E+03	perc. 0.62: 1.363 E+03	perc. 0.95: 3.484
perc. 0.30: 7.207 E+02 E+03	perc. 0.63: 1.392 E+03	perc. 0.96: 3.841
perc. 0.31: 7.403 E+02 E+03	perc. 0.64: 1.419 E+03	perc. 0.97: 4.182
perc. 0.32: 7.566 E+02 E+03	perc. 0.65: 1.444 E+03	perc. 0.98: 4.767
perc. 0.33: 7.727 E+02 E+03	perc. 0.66: 1.470 E+03	perc. 0.99: 5.558

***** Output Distribution Variable : d_sy_30km *****

MINIMUM SAMPLE VALUE: 1.657 E+02

MAXIMUM SAMPLE VALUE: 3.283 E+04

perc. 0.01: 2.782 E+02	perc. 0.34: 2.075 E+03	perc. 0.67: 4.246 E+03
perc. 0.02: 3.786 E+02	perc. 0.35: 2.141 E+03	perc. 0.68: 4.327 E+03
perc. 0.03: 4.760 E+02	perc. 0.36: 2.198 E+03	perc. 0.69: 4.434 E+03
perc. 0.04: 5.685 E+02	perc. 0.37: 2.242 E+03	perc. 0.70: 4.532 E+03
perc. 0.05: 6.651 E+02	perc. 0.38: 2.286 E+03	perc. 0.71: 4.639 E+03
perc. 0.06: 7.238 E+02	perc. 0.39: 2.325 E+03	perc. 0.72: 4.754 E+03
perc. 0.07: 7.923 E+02	perc. 0.40: 2.365 E+03	perc. 0.73: 4.851 E+03
perc. 0.08: 8.581 E+02	perc. 0.41: 2.407 E+03	perc. 0.74: 4.980 E+03
perc. 0.09: 9.090 E+02	perc. 0.42: 2.460 E+03	perc. 0.75: 5.114 E+03
perc. 0.10: 9.689 E+02	perc. 0.43: 2.509 E+03	perc. 0.76: 5.225 E+03
perc. 0.11: 1.023 E+03	perc. 0.44: 2.563 E+03	perc. 0.77: 5.366 E+03
perc. 0.12: 1.067 E+03	perc. 0.45: 2.615 E+03	perc. 0.78: 5.493 E+03
perc. 0.13: 1.110 E+03	perc. 0.46: 2.676 E+03	perc. 0.79: 5.647 E+03
perc. 0.14: 1.146 E+03	perc. 0.47: 2.742 E+03	perc. 0.80: 5.785 E+03
perc. 0.15: 1.191 E+03	perc. 0.48: 2.807 E+03	perc. 0.81: 5.920 E+03
perc. 0.16: 1.231 E+03	perc. 0.49: 2.865 E+03	perc. 0.82: 6.103 E+03
perc. 0.17: 1.266 E+03	perc. 0.50: 2.930 E+03	perc. 0.83: 6.278 E+03
perc. 0.18: 1.308 E+03	perc. 0.51: 2.979 E+03	perc. 0.84: 6.486 E+03
perc. 0.19: 1.347 E+03	perc. 0.52: 3.058 E+03	perc. 0.85: 6.710 E+03
perc. 0.20: 1.395 E+03	perc. 0.53: 3.117 E+03	perc. 0.86: 6.928 E+03
perc. 0.21: 1.438 E+03	perc. 0.54: 3.184 E+03	perc. 0.87: 7.183 E+03
perc. 0.22: 1.480 E+03	perc. 0.55: 3.244 E+03	perc. 0.88: 7.412 E+03
perc. 0.23: 1.515 E+03	perc. 0.56: 3.313 E+03	perc. 0.89: 7.671 E+03
perc. 0.24: 1.555 E+03	perc. 0.57: 3.393 E+03	perc. 0.90: 7.935 E+03
perc. 0.25: 1.601 E+03	perc. 0.58: 3.489 E+03	perc. 0.91: 8.325 E+03

perc. 0.26: 1.652 E+03	perc. 0.59: 3.573 E+03	perc. 0.92: 8.695 E+03
perc. 0.27: 1.706 E+03	perc. 0.60: 3.663 E+03	perc. 0.93: 9.219 E+03
perc. 0.28: 1.768 E+03	perc. 0.61: 3.754 E+03	perc. 0.94: 1.001 E+04
perc. 0.29: 1.824 E+03	perc. 0.62: 3.843 E+03	perc. 0.95: 1.082 E+04
perc. 0.30: 1.881 E+03	perc. 0.63: 3.925 E+03	perc. 0.96: 1.207 E+04
perc. 0.31: 1.926 E+03	perc. 0.64: 4.007 E+03	perc. 0.97: 1.343 E+04
perc. 0.32: 1.976 E+03	perc. 0.65: 4.089 E+03	perc. 0.98: 1.568 E+04
perc. 0.33: 2.021 E+03	perc. 0.66: 4.155 E+03	perc. 0.99: 1.858 E+04

***** Output Distribution Variable : d_sz_05km *****

MINIMUM SAMPLE VALUE: 4.740 E-02
 MAXIMUM SAMPLE VALUE: 8.742 E+02

perc. 0.01: 1.065 E+00	perc. 0.34: 1.938 E+01	perc. 0.67: 5.106 E+01
perc. 0.02: 2.091 E+00	perc. 0.35: 1.993 E+01	perc. 0.68: 5.250 E+01
perc. 0.03: 2.852 E+00	perc. 0.36: 2.047 E+01	perc. 0.69: 5.383 E+01
perc. 0.04: 3.722 E+00	perc. 0.37: 2.092 E+01	perc. 0.70: 5.545 E+01
perc. 0.05: 4.299 E+00	perc. 0.38: 2.148 E+01	perc. 0.71: 5.716 E+01
perc. 0.06: 4.762 E+00	perc. 0.39: 2.215 E+01	perc. 0.72: 5.918 E+01
perc. 0.07: 5.400 E+00	perc. 0.40: 2.286 E+01	perc. 0.73: 6.142 E+01
perc. 0.08: 5.984 E+00	perc. 0.41: 2.357 E+01	perc. 0.74: 6.371 E+01
perc. 0.09: 6.447 E+00	perc. 0.42: 2.419 E+01	perc. 0.75: 6.588 E+01
perc. 0.10: 6.852 E+00	perc. 0.43: 2.477 E+01	perc. 0.76: 6.803 E+01
perc. 0.11: 7.402 E+00	perc. 0.44: 2.550 E+01	perc. 0.77: 7.072 E+01
perc. 0.12: 7.890 E+00	perc. 0.45: 2.632 E+01	perc. 0.78: 7.331 E+01
perc. 0.13: 8.449 E+00	perc. 0.46: 2.704 E+01	perc. 0.79: 7.591 E+01
perc. 0.14: 9.061 E+00	perc. 0.47: 2.792 E+01	perc. 0.80: 7.934 E+01
perc. 0.15: 9.675 E+00	perc. 0.48: 2.886 E+01	perc. 0.81: 8.324 E+01
perc. 0.16: 1.024 E+01	perc. 0.49: 2.980 E+01	perc. 0.82: 8.697 E+01
perc. 0.17: 1.069 E+01	perc. 0.50: 3.098 E+01	perc. 0.83: 9.134 E+01

perc. 0.18: 1.127 E+01 E+01	perc. 0.51: 3.170 E+01	perc. 0.84: 9.709
perc. 0.19: 1.182 E+01 E+02	perc. 0.52: 3.290 E+01	perc. 0.85: 1.025
perc. 0.20: 1.238 E+01 E+02	perc. 0.53: 3.414 E+01	perc. 0.86: 1.081
perc. 0.21: 1.285 E+01 E+02	perc. 0.54: 3.530 E+01	perc. 0.87: 1.141
perc. 0.22: 1.337 E+01 E+02	perc. 0.55: 3.642 E+01	perc. 0.88: 1.217
perc. 0.23: 1.384 E+01 E+02	perc. 0.56: 3.757 E+01	perc. 0.89: 1.297
perc. 0.24: 1.427 E+01 E+02	perc. 0.57: 3.863 E+01	perc. 0.90: 1.398
perc. 0.25: 1.473 E+01 E+02	perc. 0.58: 4.002 E+01	perc. 0.91: 1.492
perc. 0.26: 1.516 E+01 E+02	perc. 0.59: 4.113 E+01	perc. 0.92: 1.615
perc. 0.27: 1.559 E+01 E+02	perc. 0.60: 4.239 E+01	perc. 0.93: 1.743
perc. 0.28: 1.598 E+01 E+02	perc. 0.61: 4.360 E+01	perc. 0.94: 1.888
perc. 0.29: 1.647 E+01 E+02	perc. 0.62: 4.480 E+01	perc. 0.95: 2.107
perc. 0.30: 1.710 E+01 E+02	perc. 0.63: 4.590 E+01	perc. 0.96: 2.292
perc. 0.31: 1.773 E+01 E+02	perc. 0.64: 4.715 E+01	perc. 0.97: 2.577
perc. 0.32: 1.836 E+01 E+02	perc. 0.65: 4.850 E+01	perc. 0.98: 3.076
perc. 0.33: 1.885 E+01 E+02	perc. 0.66: 4.983 E+01	perc. 0.99: 4.434

***** Output Distribution Variable : d_sz_1km *****

MINIMUM SAMPLE VALUE: 5.559 E-02

MAXIMUM SAMPLE VALUE: 1.623 E+03

perc. 0.01: 1.489 E+00 E+01	perc. 0.34: 2.736 E+01	perc. 0.67: 7.825
perc. 0.02: 2.616 E+00 E+01	perc. 0.35: 2.850 E+01	perc. 0.68: 8.032
perc. 0.03: 4.003 E+00 E+01	perc. 0.36: 2.935 E+01	perc. 0.69: 8.334
perc. 0.04: 4.881 E+00 E+01	perc. 0.37: 3.025 E+01	perc. 0.70: 8.682
perc. 0.05: 5.824 E+00 E+01	perc. 0.38: 3.121 E+01	perc. 0.71: 8.959
perc. 0.06: 6.418 E+00 E+01	perc. 0.39: 3.212 E+01	perc. 0.72: 9.297
perc. 0.07: 7.296 E+00 E+01	perc. 0.40: 3.327 E+01	perc. 0.73: 9.623
perc. 0.08: 8.014 E+00 E+02	perc. 0.41: 3.417 E+01	perc. 0.74: 1.007
perc. 0.09: 8.630 E+00 E+02	perc. 0.42: 3.545 E+01	perc. 0.75: 1.053

perc. 0.10: 9.323 E+00 E+02	perc. 0.43: 3.661 E+01	perc. 0.76: 1.090
perc. 0.11: 1.007 E+01 E+02	perc. 0.44: 3.798 E+01	perc. 0.77: 1.138
perc. 0.12: 1.067 E+01 E+02	perc. 0.45: 3.914 E+01	perc. 0.78: 1.191
perc. 0.13: 1.143 E+01 E+02	perc. 0.46: 4.034 E+01	perc. 0.79: 1.243
perc. 0.14: 1.258 E+01 E+02	perc. 0.47: 4.151 E+01	perc. 0.80: 1.305
perc. 0.15: 1.331 E+01 E+02	perc. 0.48: 4.259 E+01	perc. 0.81: 1.371
perc. 0.16: 1.421 E+01 E+02	perc. 0.49: 4.403 E+01	perc. 0.82: 1.423
perc. 0.17: 1.483 E+01 E+02	perc. 0.50: 4.549 E+01	perc. 0.83: 1.502
perc. 0.18: 1.556 E+01 E+02	perc. 0.51: 4.740 E+01	perc. 0.84: 1.612
perc. 0.19: 1.634 E+01 E+02	perc. 0.52: 4.924 E+01	perc. 0.85: 1.710
perc. 0.20: 1.730 E+01 E+02	perc. 0.53: 5.066 E+01	perc. 0.86: 1.808
perc. 0.21: 1.805 E+01 E+02	perc. 0.54: 5.273 E+01	perc. 0.87: 1.934
perc. 0.22: 1.890 E+01 E+02	perc. 0.55: 5.469 E+01	perc. 0.88: 2.038
perc. 0.23: 1.953 E+01 E+02	perc. 0.56: 5.625 E+01	perc. 0.89: 2.178
perc. 0.24: 2.004 E+01 E+02	perc. 0.57: 5.851 E+01	perc. 0.90: 2.315
perc. 0.25: 2.068 E+01 E+02	perc. 0.58: 6.058 E+01	perc. 0.91: 2.489
perc. 0.26: 2.128 E+01 E+02	perc. 0.59: 6.223 E+01	perc. 0.92: 2.694
perc. 0.27: 2.196 E+01 E+02	perc. 0.60: 6.432 E+01	perc. 0.93: 2.951
perc. 0.28: 2.275 E+01 E+02	perc. 0.61: 6.621 E+01	perc. 0.94: 3.298
perc. 0.29: 2.353 E+01 E+02	perc. 0.62: 6.795 E+01	perc. 0.95: 3.684
perc. 0.30: 2.439 E+01 E+02	perc. 0.63: 7.000 E+01	perc. 0.96: 4.083
perc. 0.31: 2.508 E+01 E+02	perc. 0.64: 7.181 E+01	perc. 0.97: 4.490
perc. 0.32: 2.576 E+01 E+02	perc. 0.65: 7.368 E+01	perc. 0.98: 5.392
perc. 0.33: 2.650 E+01 E+02	perc. 0.66: 7.581 E+01	perc. 0.99: 8.053

***** Output Distribution Variable : d_sz_3km *****

MINIMUM SAMPLE VALUE: 7.157 E-02
MAXIMUM SAMPLE VALUE: 4.329 E+03

perc. 0.01: 2.533 E+00 E+02	perc. 0.34: 4.834 E+01	perc. 0.67: 1.564
perc. 0.02: 4.019 E+00 E+02	perc. 0.35: 5.032 E+01	perc. 0.68: 1.621
perc. 0.03: 5.905 E+00 E+02	perc. 0.36: 5.189 E+01	perc. 0.69: 1.671
perc. 0.04: 7.717 E+00 E+02	perc. 0.37: 5.397 E+01	perc. 0.70: 1.744
perc. 0.05: 9.085 E+00 E+02	perc. 0.38: 5.578 E+01	perc. 0.71: 1.827
perc. 0.06: 1.019 E+01 E+02	perc. 0.39: 5.777 E+01	perc. 0.72: 1.906
perc. 0.07: 1.124 E+01 E+02	perc. 0.40: 6.021 E+01	perc. 0.73: 2.013
perc. 0.08: 1.268 E+01 E+02	perc. 0.41: 6.226 E+01	perc. 0.74: 2.111
perc. 0.09: 1.399 E+01 E+02	perc. 0.42: 6.507 E+01	perc. 0.75: 2.232
perc. 0.10: 1.524 E+01 E+02	perc. 0.43: 6.719 E+01	perc. 0.76: 2.340
perc. 0.11: 1.645 E+01 E+02	perc. 0.44: 6.976 E+01	perc. 0.77: 2.452
perc. 0.12: 1.755 E+01 E+02	perc. 0.45: 7.242 E+01	perc. 0.78: 2.600
perc. 0.13: 1.890 E+01 E+02	perc. 0.46: 7.514 E+01	perc. 0.79: 2.752
perc. 0.14: 2.044 E+01 E+02	perc. 0.47: 7.748 E+01	perc. 0.80: 2.894
perc. 0.15: 2.169 E+01 E+02	perc. 0.48: 7.987 E+01	perc. 0.81: 3.066
perc. 0.16: 2.318 E+01 E+02	perc. 0.49: 8.348 E+01	perc. 0.82: 3.213
perc. 0.17: 2.441 E+01 E+02	perc. 0.50: 8.639 E+01	perc. 0.83: 3.384
perc. 0.18: 2.608 E+01 E+02	perc. 0.51: 8.912 E+01	perc. 0.84: 3.598
perc. 0.19: 2.753 E+01 E+02	perc. 0.52: 9.159 E+01	perc. 0.85: 3.813
perc. 0.20: 2.910 E+01 E+02	perc. 0.53: 9.492 E+01	perc. 0.86: 4.067
perc. 0.21: 3.075 E+01 E+02	perc. 0.54: 9.814 E+01	perc. 0.87: 4.357
perc. 0.22: 3.198 E+01 E+02	perc. 0.55: 1.022 E+02	perc. 0.88: 4.663
perc. 0.23: 3.293 E+01 E+02	perc. 0.56: 1.058 E+02	perc. 0.89: 5.031
perc. 0.24: 3.421 E+01 E+02	perc. 0.57: 1.098 E+02	perc. 0.90: 5.345
perc. 0.25: 3.526 E+01 E+02	perc. 0.58: 1.137 E+02	perc. 0.91: 5.770

perc. 0.26: 3.637 E+01 E+02	perc. 0.59: 1.183 E+02	perc. 0.92: 6.281
perc. 0.27: 3.770 E+01 E+02	perc. 0.60: 1.229 E+02	perc. 0.93: 7.072
perc. 0.28: 3.933 E+01 E+02	perc. 0.61: 1.274 E+02	perc. 0.94: 8.034
perc. 0.29: 4.088 E+01 E+02	perc. 0.62: 1.326 E+02	perc. 0.95: 8.993
perc. 0.30: 4.233 E+01 E+03	perc. 0.63: 1.371 E+02	perc. 0.96: 1.011
perc. 0.31: 4.398 E+01 E+03	perc. 0.64: 1.424 E+02	perc. 0.97: 1.132
perc. 0.32: 4.565 E+01 E+03	perc. 0.65: 1.469 E+02	perc. 0.98: 1.354
perc. 0.33: 4.702 E+01 E+03	perc. 0.66: 1.521 E+02	perc. 0.99: 1.998

***** Output Distribution Variable : d_sz_10km *****

MINIMUM SAMPLE VALUE: 9.441 E-02
MAXIMUM SAMPLE VALUE: 1.268 E+04

perc. 0.01: 3.648 E+00 E+02	perc. 0.34: 9.057 E+01	perc. 0.67: 3.418
perc. 0.02: 6.484 E+00 E+02	perc. 0.35: 9.435 E+01	perc. 0.68: 3.571
perc. 0.03: 8.788 E+00 E+02	perc. 0.36: 9.722 E+01	perc. 0.69: 3.713
perc. 0.04: 1.209 E+01 E+02	perc. 0.37: 1.016 E+02	perc. 0.70: 3.866
perc. 0.05: 1.479 E+01 E+02	perc. 0.38: 1.053 E+02	perc. 0.71: 4.039
perc. 0.06: 1.648 E+01 E+02	perc. 0.39: 1.098 E+02	perc. 0.72: 4.259
perc. 0.07: 1.830 E+01 E+02	perc. 0.40: 1.136 E+02	perc. 0.73: 4.508
perc. 0.08: 2.091 E+01 E+02	perc. 0.41: 1.186 E+02	perc. 0.74: 4.759
perc. 0.09: 2.338 E+01 E+02	perc. 0.42: 1.233 E+02	perc. 0.75: 5.074
perc. 0.10: 2.562 E+01 E+02	perc. 0.43: 1.280 E+02	perc. 0.76: 5.378
perc. 0.11: 2.771 E+01 E+02	perc. 0.44: 1.350 E+02	perc. 0.77: 5.744
perc. 0.12: 2.997 E+01 E+02	perc. 0.45: 1.413 E+02	perc. 0.78: 6.182
perc. 0.13: 3.235 E+01 E+02	perc. 0.46: 1.467 E+02	perc. 0.79: 6.499
perc. 0.14: 3.525 E+01 E+02	perc. 0.47: 1.527 E+02	perc. 0.80: 6.920
perc. 0.15: 3.760 E+01 E+02	perc. 0.48: 1.592 E+02	perc. 0.81: 7.335
perc. 0.16: 3.999 E+01 E+02	perc. 0.49: 1.656 E+02	perc. 0.82: 7.802
perc. 0.17: 4.269 E+01 E+02	perc. 0.50: 1.721 E+02	perc. 0.83: 8.310

perc. 0.18: 4.579 E+01 E+02	perc. 0.51: 1.781 E+02	perc. 0.84: 8.920
perc. 0.19: 4.829 E+01 E+02	perc. 0.52: 1.837 E+02	perc. 0.85: 9.396
perc. 0.20: 5.081 E+01 E+03	perc. 0.53: 1.912 E+02	perc. 0.86: 1.004
perc. 0.21: 5.338 E+01 E+03	perc. 0.54: 1.968 E+02	perc. 0.87: 1.076
perc. 0.22: 5.551 E+01 E+03	perc. 0.55: 2.045 E+02	perc. 0.88: 1.157
perc. 0.23: 5.797 E+01 E+03	perc. 0.56: 2.127 E+02	perc. 0.89: 1.255
perc. 0.24: 6.013 E+01 E+03	perc. 0.57: 2.215 E+02	perc. 0.90: 1.366
perc. 0.25: 6.237 E+01 E+03	perc. 0.58: 2.303 E+02	perc. 0.91: 1.496
perc. 0.26: 6.516 E+01 E+03	perc. 0.59: 2.396 E+02	perc. 0.92: 1.648
perc. 0.27: 6.871 E+01 E+03	perc. 0.60: 2.498 E+02	perc. 0.93: 1.842
perc. 0.28: 7.192 E+01 E+03	perc. 0.61: 2.620 E+02	perc. 0.94: 2.120
perc. 0.29: 7.512 E+01 E+03	perc. 0.62: 2.735 E+02	perc. 0.95: 2.377
perc. 0.30: 7.844 E+01 E+03	perc. 0.63: 2.863 E+02	perc. 0.96: 2.763
perc. 0.31: 8.106 E+01 E+03	perc. 0.64: 2.990 E+02	perc. 0.97: 3.170
perc. 0.32: 8.424 E+01 E+03	perc. 0.65: 3.095 E+02	perc. 0.98: 3.706
perc. 0.33: 8.713 E+01 E+03	perc. 0.66: 3.262 E+02	perc. 0.99: 5.485

***** Output Distribution Variable : d_sz_30km *****

MINIMUM SAMPLE VALUE: 1.216 E-01

MAXIMUM SAMPLE VALUE: 3.382 E+04

perc. 0.01: 5.450 E+00 E+02	perc. 0.34: 1.597 E+02	perc. 0.67: 6.900
perc. 0.02: 9.850 E+00 E+02	perc. 0.35: 1.659 E+02	perc. 0.68: 7.234
perc. 0.03: 1.317 E+01 E+02	perc. 0.36: 1.725 E+02	perc. 0.69: 7.605
perc. 0.04: 1.771 E+01 E+02	perc. 0.37: 1.793 E+02	perc. 0.70: 8.093
perc. 0.05: 2.175 E+01 E+02	perc. 0.38: 1.874 E+02	perc. 0.71: 8.479
perc. 0.06: 2.571 E+01 E+02	perc. 0.39: 1.948 E+02	perc. 0.72: 9.013
perc. 0.07: 2.829 E+01 E+02	perc. 0.40: 2.034 E+02	perc. 0.73: 9.524
perc. 0.08: 3.274 E+01 E+03	perc. 0.41: 2.123 E+02	perc. 0.74: 1.012
perc. 0.09: 3.691 E+01 E+03	perc. 0.42: 2.211 E+02	perc. 0.75: 1.079

perc. 0.10: 4.121 E+01 E+03	perc. 0.43: 2.320 E+02	perc. 0.76: 1.157
perc. 0.11: 4.521 E+01 E+03	perc. 0.44: 2.447 E+02	perc. 0.77: 1.246
perc. 0.12: 4.881 E+01 E+03	perc. 0.45: 2.554 E+02	perc. 0.78: 1.336
perc. 0.13: 5.220 E+01 E+03	perc. 0.46: 2.666 E+02	perc. 0.79: 1.419
perc. 0.14: 5.708 E+01 E+03	perc. 0.47: 2.791 E+02	perc. 0.80: 1.526
perc. 0.15: 6.145 E+01 E+03	perc. 0.48: 2.918 E+02	perc. 0.81: 1.619
perc. 0.16: 6.609 E+01 E+03	perc. 0.49: 3.056 E+02	perc. 0.82: 1.726
perc. 0.17: 7.005 E+01 E+03	perc. 0.50: 3.176 E+02	perc. 0.83: 1.857
perc. 0.18: 7.487 E+01 E+03	perc. 0.51: 3.299 E+02	perc. 0.84: 2.013
perc. 0.19: 8.003 E+01 E+03	perc. 0.52: 3.462 E+02	perc. 0.85: 2.187
perc. 0.20: 8.488 E+01 E+03	perc. 0.53: 3.611 E+02	perc. 0.86: 2.343
perc. 0.21: 8.930 E+01 E+03	perc. 0.54: 3.794 E+02	perc. 0.87: 2.478
perc. 0.22: 9.290 E+01 E+03	perc. 0.55: 3.946 E+02	perc. 0.88: 2.719
perc. 0.23: 9.692 E+01 E+03	perc. 0.56: 4.108 E+02	perc. 0.89: 2.925
perc. 0.24: 1.017 E+02 E+03	perc. 0.57: 4.310 E+02	perc. 0.90: 3.235
perc. 0.25: 1.062 E+02 E+03	perc. 0.58: 4.496 E+02	perc. 0.91: 3.621
perc. 0.26: 1.116 E+02 E+03	perc. 0.59: 4.693 E+02	perc. 0.92: 4.036
perc. 0.27: 1.170 E+02 E+03	perc. 0.60: 4.904 E+02	perc. 0.93: 4.463
perc. 0.28: 1.244 E+02 E+03	perc. 0.61: 5.144 E+02	perc. 0.94: 5.063
perc. 0.29: 1.305 E+02 E+03	perc. 0.62: 5.357 E+02	perc. 0.95: 5.861
perc. 0.30: 1.351 E+02 E+03	perc. 0.63: 5.599 E+02	perc. 0.96: 6.936
perc. 0.31: 1.412 E+02 E+03	perc. 0.64: 5.912 E+02	perc. 0.97: 8.123
perc. 0.32: 1.464 E+02 E+03	perc. 0.65: 6.216 E+02	perc. 0.98: 9.358
perc. 0.33: 1.528 E+02 E+04	perc. 0.66: 6.569 E+02	perc. 0.99: 1.379

***** Output Distribution Variable : e_sy_05km *****

MINIMUM SAMPLE VALUE: 7.449 E+00

MAXIMUM SAMPLE VALUE: 1.785 E+02

perc. 0.01: 1.038 E+01	perc. 0.34: 3.732 E+01	perc. 0.67: 6.982 E+01
perc. 0.02: 1.182 E+01	perc. 0.35: 3.790 E+01	perc. 0.68: 7.152 E+01
perc. 0.03: 1.312 E+01	perc. 0.36: 3.842 E+01	perc. 0.69: 7.286 E+01
perc. 0.04: 1.424 E+01	perc. 0.37: 3.898 E+01	perc. 0.70: 7.425 E+01
perc. 0.05: 1.517 E+01	perc. 0.38: 3.982 E+01	perc. 0.71: 7.578 E+01
perc. 0.06: 1.613 E+01	perc. 0.39: 4.051 E+01	perc. 0.72: 7.767 E+01
perc. 0.07: 1.714 E+01	perc. 0.40: 4.136 E+01	perc. 0.73: 7.926 E+01
perc. 0.08: 1.815 E+01	perc. 0.41: 4.215 E+01	perc. 0.74: 8.103 E+01
perc. 0.09: 1.909 E+01	perc. 0.42: 4.298 E+01	perc. 0.75: 8.264 E+01
perc. 0.10: 2.003 E+01	perc. 0.43: 4.385 E+01	perc. 0.76: 8.408 E+01
perc. 0.11: 2.075 E+01	perc. 0.44: 4.466 E+01	perc. 0.77: 8.574 E+01
perc. 0.12: 2.177 E+01	perc. 0.45: 4.564 E+01	perc. 0.78: 8.768 E+01
perc. 0.13: 2.261 E+01	perc. 0.46: 4.642 E+01	perc. 0.79: 8.964 E+01
perc. 0.14: 2.336 E+01	perc. 0.47: 4.735 E+01	perc. 0.80: 9.158 E+01
perc. 0.15: 2.422 E+01	perc. 0.48: 4.799 E+01	perc. 0.81: 9.305 E+01
perc. 0.16: 2.488 E+01	perc. 0.49: 4.871 E+01	perc. 0.82: 9.498 E+01
perc. 0.17: 2.565 E+01	perc. 0.50: 4.962 E+01	perc. 0.83: 9.669 E+01
perc. 0.18: 2.655 E+01	perc. 0.51: 5.055 E+01	perc. 0.84: 9.856 E+01
perc. 0.19: 2.716 E+01	perc. 0.52: 5.147 E+01	perc. 0.85: 1.013 E+02
perc. 0.20: 2.777 E+01	perc. 0.53: 5.259 E+01	perc. 0.86: 1.037 E+02
perc. 0.21: 2.853 E+01	perc. 0.54: 5.378 E+01	perc. 0.87: 1.063 E+02
perc. 0.22: 2.928 E+01	perc. 0.55: 5.477 E+01	perc. 0.88: 1.093 E+02
perc. 0.23: 2.996 E+01	perc. 0.56: 5.588 E+01	perc. 0.89: 1.122 E+02
perc. 0.24: 3.057 E+01	perc. 0.57: 5.698 E+01	perc. 0.90: 1.148 E+02
perc. 0.25: 3.128 E+01	perc. 0.58: 5.848 E+01	perc. 0.91: 1.182 E+02

perc. 0.26:	3.203 E+01	perc. 0.59:	5.956 E+01	perc. 0.92:	1.211
E+02					
perc. 0.27:	3.260 E+01	perc. 0.60:	6.081 E+01	perc. 0.93:	1.238
E+02					
perc. 0.28:	3.332 E+01	perc. 0.61:	6.182 E+01	perc. 0.94:	1.273
E+02					
perc. 0.29:	3.403 E+01	perc. 0.62:	6.312 E+01	perc. 0.95:	1.324
E+02					
perc. 0.30:	3.472 E+01	perc. 0.63:	6.430 E+01	perc. 0.96:	1.382
E+02					
perc. 0.31:	3.530 E+01	perc. 0.64:	6.560 E+01	perc. 0.97:	1.445
E+02					
perc. 0.32:	3.594 E+01	perc. 0.65:	6.705 E+01	perc. 0.98:	1.521
E+02					
perc. 0.33:	3.656 E+01	perc. 0.66:	6.834 E+01	perc. 0.99:	1.606
E+02					

***** Output Distribution Variable : e_sy_1km *****

MINIMUM SAMPLE VALUE: 1.248 E+01

MAXIMUM SAMPLE VALUE: 3.474 E+02

perc. 0.01:	1.776 E+01	perc. 0.34:	6.645 E+01	perc. 0.67:	1.290
E+02					
perc. 0.02:	2.017 E+01	perc. 0.35:	6.752 E+01	perc. 0.68:	1.327
E+02					
perc. 0.03:	2.235 E+01	perc. 0.36:	6.894 E+01	perc. 0.69:	1.353
E+02					
perc. 0.04:	2.456 E+01	perc. 0.37:	7.039 E+01	perc. 0.70:	1.384
E+02					
perc. 0.05:	2.613 E+01	perc. 0.38:	7.177 E+01	perc. 0.71:	1.417
E+02					
perc. 0.06:	2.788 E+01	perc. 0.39:	7.311 E+01	perc. 0.72:	1.447
E+02					
perc. 0.07:	3.000 E+01	perc. 0.40:	7.463 E+01	perc. 0.73:	1.482
E+02					
perc. 0.08:	3.174 E+01	perc. 0.41:	7.617 E+01	perc. 0.74:	1.513
E+02					
perc. 0.09:	3.340 E+01	perc. 0.42:	7.777 E+01	perc. 0.75:	1.541
E+02					
perc. 0.10:	3.486 E+01	perc. 0.43:	7.924 E+01	perc. 0.76:	1.576
E+02					
perc. 0.11:	3.669 E+01	perc. 0.44:	8.071 E+01	perc. 0.77:	1.613
E+02					
perc. 0.12:	3.858 E+01	perc. 0.45:	8.215 E+01	perc. 0.78:	1.649
E+02					
perc. 0.13:	4.013 E+01	perc. 0.46:	8.381 E+01	perc. 0.79:	1.685
E+02					
perc. 0.14:	4.152 E+01	perc. 0.47:	8.525 E+01	perc. 0.80:	1.719
E+02					
perc. 0.15:	4.303 E+01	perc. 0.48:	8.683 E+01	perc. 0.81:	1.755
E+02					
perc. 0.16:	4.443 E+01	perc. 0.49:	8.847 E+01	perc. 0.82:	1.792
E+02					
perc. 0.17:	4.581 E+01	perc. 0.50:	8.999 E+01	perc. 0.83:	1.825
E+02					

perc. 0.18: 4.710 E+01	perc. 0.51: 9.157 E+01	perc. 0.84: 1.863 E+02
perc. 0.19: 4.852 E+01	perc. 0.52: 9.350 E+01	perc. 0.85: 1.913 E+02
perc. 0.20: 4.974 E+01	perc. 0.53: 9.550 E+01	perc. 0.86: 1.973 E+02
perc. 0.21: 5.095 E+01	perc. 0.54: 9.756 E+01	perc. 0.87: 2.019 E+02
perc. 0.22: 5.239 E+01	perc. 0.55: 9.955 E+01	perc. 0.88: 2.071 E+02
perc. 0.23: 5.347 E+01	perc. 0.56: 1.021 E+02	perc. 0.89: 2.138 E+02
perc. 0.24: 5.459 E+01	perc. 0.57: 1.044 E+02	perc. 0.90: 2.188 E+02
perc. 0.25: 5.585 E+01	perc. 0.58: 1.067 E+02	perc. 0.91: 2.247 E+02
perc. 0.26: 5.707 E+01	perc. 0.59: 1.087 E+02	perc. 0.92: 2.305 E+02
perc. 0.27: 5.850 E+01	perc. 0.60: 1.106 E+02	perc. 0.93: 2.369 E+02
perc. 0.28: 5.963 E+01	perc. 0.61: 1.137 E+02	perc. 0.94: 2.438 E+02
perc. 0.29: 6.067 E+01	perc. 0.62: 1.159 E+02	perc. 0.95: 2.525 E+02
perc. 0.30: 6.179 E+01	perc. 0.63: 1.184 E+02	perc. 0.96: 2.647 E+02
perc. 0.31: 6.314 E+01	perc. 0.64: 1.214 E+02	perc. 0.97: 2.782 E+02
perc. 0.32: 6.406 E+01	perc. 0.65: 1.237 E+02	perc. 0.98: 2.936 E+02
perc. 0.33: 6.535 E+01	perc. 0.66: 1.268 E+02	perc. 0.99: 3.111 E+02

***** Output Distribution Variable : e_sy_3km *****

MINIMUM SAMPLE VALUE: 2.829 E+01

MAXIMUM SAMPLE VALUE: 9.985 E+02

perc. 0.01: 4.154 E+01	perc. 0.34: 1.677 E+02	perc. 0.67: 3.462 E+02
perc. 0.02: 4.746 E+01	perc. 0.35: 1.708 E+02	perc. 0.68: 3.540 E+02
perc. 0.03: 5.193 E+01	perc. 0.36: 1.744 E+02	perc. 0.69: 3.619 E+02
perc. 0.04: 5.760 E+01	perc. 0.37: 1.784 E+02	perc. 0.70: 3.713 E+02
perc. 0.05: 6.165 E+01	perc. 0.38: 1.817 E+02	perc. 0.71: 3.801 E+02
perc. 0.06: 6.658 E+01	perc. 0.39: 1.859 E+02	perc. 0.72: 3.887 E+02
perc. 0.07: 7.213 E+01	perc. 0.40: 1.892 E+02	perc. 0.73: 3.974 E+02
perc. 0.08: 7.621 E+01	perc. 0.41: 1.927 E+02	perc. 0.74: 4.076 E+02
perc. 0.09: 8.082 E+01	perc. 0.42: 1.975 E+02	perc. 0.75: 4.178 E+02

perc. 0.10: 8.505 E+01 E+02	perc. 0.43: 2.015 E+02	perc. 0.76: 4.287
perc. 0.11: 8.988 E+01 E+02	perc. 0.44: 2.061 E+02	perc. 0.77: 4.366
perc. 0.12: 9.365 E+01 E+02	perc. 0.45: 2.108 E+02	perc. 0.78: 4.475
perc. 0.13: 9.788 E+01 E+02	perc. 0.46: 2.145 E+02	perc. 0.79: 4.597
perc. 0.14: 1.025 E+02 E+02	perc. 0.47: 2.189 E+02	perc. 0.80: 4.698
perc. 0.15: 1.061 E+02 E+02	perc. 0.48: 2.240 E+02	perc. 0.81: 4.789
perc. 0.16: 1.098 E+02 E+02	perc. 0.49: 2.292 E+02	perc. 0.82: 4.901
perc. 0.17: 1.138 E+02 E+02	perc. 0.50: 2.335 E+02	perc. 0.83: 5.026
perc. 0.18: 1.168 E+02 E+02	perc. 0.51: 2.390 E+02	perc. 0.84: 5.139
perc. 0.19: 1.202 E+02 E+02	perc. 0.52: 2.448 E+02	perc. 0.85: 5.268
perc. 0.20: 1.232 E+02 E+02	perc. 0.53: 2.495 E+02	perc. 0.86: 5.413
perc. 0.21: 1.264 E+02 E+02	perc. 0.54: 2.556 E+02	perc. 0.87: 5.598
perc. 0.22: 1.300 E+02 E+02	perc. 0.55: 2.610 E+02	perc. 0.88: 5.755
perc. 0.23: 1.327 E+02 E+02	perc. 0.56: 2.666 E+02	perc. 0.89: 5.932
perc. 0.24: 1.361 E+02 E+02	perc. 0.57: 2.720 E+02	perc. 0.90: 6.082
perc. 0.25: 1.392 E+02 E+02	perc. 0.58: 2.788 E+02	perc. 0.91: 6.242
perc. 0.26: 1.425 E+02 E+02	perc. 0.59: 2.848 E+02	perc. 0.92: 6.444
perc. 0.27: 1.455 E+02 E+02	perc. 0.60: 2.914 E+02	perc. 0.93: 6.640
perc. 0.28: 1.483 E+02 E+02	perc. 0.61: 2.983 E+02	perc. 0.94: 6.842
perc. 0.29: 1.510 E+02 E+02	perc. 0.62: 3.062 E+02	perc. 0.95: 7.089
perc. 0.30: 1.541 E+02 E+02	perc. 0.63: 3.139 E+02	perc. 0.96: 7.452
perc. 0.31: 1.579 E+02 E+02	perc. 0.64: 3.217 E+02	perc. 0.97: 7.857
perc. 0.32: 1.610 E+02 E+02	perc. 0.65: 3.287 E+02	perc. 0.98: 8.314
perc. 0.33: 1.642 E+02 E+02	perc. 0.66: 3.373 E+02	perc. 0.99: 8.869

***** Output Distribution Variable : e_sy_10km *****

MINIMUM SAMPLE VALUE: 6.937 E+01
MAXIMUM SAMPLE VALUE: 3.175 E+03

perc. 0.01: 1.047 E+02	perc. 0.34: 4.585 E+02	perc. 0.67: 1.018 E+03
perc. 0.02: 1.208 E+02	perc. 0.35: 4.698 E+02	perc. 0.68: 1.044 E+03
perc. 0.03: 1.332 E+02	perc. 0.36: 4.794 E+02	perc. 0.69: 1.069 E+03
perc. 0.04: 1.460 E+02	perc. 0.37: 4.923 E+02	perc. 0.70: 1.093 E+03
perc. 0.05: 1.576 E+02	perc. 0.38: 5.029 E+02	perc. 0.71: 1.125 E+03
perc. 0.06: 1.722 E+02	perc. 0.39: 5.134 E+02	perc. 0.72: 1.152 E+03
perc. 0.07: 1.865 E+02	perc. 0.40: 5.253 E+02	perc. 0.73: 1.180 E+03
perc. 0.08: 1.979 E+02	perc. 0.41: 5.410 E+02	perc. 0.74: 1.210 E+03
perc. 0.09: 2.112 E+02	perc. 0.42: 5.549 E+02	perc. 0.75: 1.243 E+03
perc. 0.10: 2.250 E+02	perc. 0.43: 5.672 E+02	perc. 0.76: 1.274 E+03
perc. 0.11: 2.370 E+02	perc. 0.44: 5.803 E+02	perc. 0.77: 1.312 E+03
perc. 0.12: 2.468 E+02	perc. 0.45: 5.938 E+02	perc. 0.78: 1.347 E+03
perc. 0.13: 2.570 E+02	perc. 0.46: 6.101 E+02	perc. 0.79: 1.379 E+03
perc. 0.14: 2.700 E+02	perc. 0.47: 6.256 E+02	perc. 0.80: 1.416 E+03
perc. 0.15: 2.815 E+02	perc. 0.48: 6.394 E+02	perc. 0.81: 1.447 E+03
perc. 0.16: 2.922 E+02	perc. 0.49: 6.532 E+02	perc. 0.82: 1.486 E+03
perc. 0.17: 3.016 E+02	perc. 0.50: 6.674 E+02	perc. 0.83: 1.528 E+03
perc. 0.18: 3.102 E+02	perc. 0.51: 6.867 E+02	perc. 0.84: 1.566 E+03
perc. 0.19: 3.193 E+02	perc. 0.52: 7.045 E+02	perc. 0.85: 1.611 E+03
perc. 0.20: 3.299 E+02	perc. 0.53: 7.206 E+02	perc. 0.86: 1.657 E+03
perc. 0.21: 3.388 E+02	perc. 0.54: 7.378 E+02	perc. 0.87: 1.709 E+03
perc. 0.22: 3.469 E+02	perc. 0.55: 7.562 E+02	perc. 0.88: 1.762 E+03
perc. 0.23: 3.560 E+02	perc. 0.56: 7.760 E+02	perc. 0.89: 1.807 E+03
perc. 0.24: 3.652 E+02	perc. 0.57: 7.931 E+02	perc. 0.90: 1.863 E+03
perc. 0.25: 3.750 E+02	perc. 0.58: 8.082 E+02	perc. 0.91: 1.925 E+03

perc. 0.26: 3.835 E+02 E+03	perc. 0.59: 8.252 E+02	perc. 0.92: 1.986
perc. 0.27: 3.913 E+02 E+03	perc. 0.60: 8.482 E+02	perc. 0.93: 2.050
perc. 0.28: 4.000 E+02 E+03	perc. 0.61: 8.707 E+02	perc. 0.94: 2.121
perc. 0.29: 4.102 E+02 E+03	perc. 0.62: 8.941 E+02	perc. 0.95: 2.204
perc. 0.30: 4.191 E+02 E+03	perc. 0.63: 9.157 E+02	perc. 0.96: 2.323
perc. 0.31: 4.288 E+02 E+03	perc. 0.64: 9.342 E+02	perc. 0.97: 2.452
perc. 0.32: 4.402 E+02 E+03	perc. 0.65: 9.659 E+02	perc. 0.98: 2.609
perc. 0.33: 4.496 E+02 E+03	perc. 0.66: 9.921 E+02	perc. 0.99: 2.779

***** Output Distribution Variable : e_sy_30km *****

MINIMUM SAMPLE VALUE: 1.572 E+02
MAXIMUM SAMPLE VALUE: 9.126 E+03

perc. 0.01: 2.406 E+02 E+03	perc. 0.34: 1.150 E+03	perc. 0.67: 2.723
perc. 0.02: 2.772 E+02 E+03	perc. 0.35: 1.174 E+03	perc. 0.68: 2.790
perc. 0.03: 3.118 E+02 E+03	perc. 0.36: 1.206 E+03	perc. 0.69: 2.872
perc. 0.04: 3.427 E+02 E+03	perc. 0.37: 1.243 E+03	perc. 0.70: 2.950
perc. 0.05: 3.696 E+02 E+03	perc. 0.38: 1.275 E+03	perc. 0.71: 3.045
perc. 0.06: 4.065 E+02 E+03	perc. 0.39: 1.316 E+03	perc. 0.72: 3.118
perc. 0.07: 4.399 E+02 E+03	perc. 0.40: 1.347 E+03	perc. 0.73: 3.190
perc. 0.08: 4.755 E+02 E+03	perc. 0.41: 1.384 E+03	perc. 0.74: 3.284
perc. 0.09: 5.086 E+02 E+03	perc. 0.42: 1.424 E+03	perc. 0.75: 3.365
perc. 0.10: 5.378 E+02 E+03	perc. 0.43: 1.465 E+03	perc. 0.76: 3.475
perc. 0.11: 5.717 E+02 E+03	perc. 0.44: 1.504 E+03	perc. 0.77: 3.574
perc. 0.12: 5.985 E+02 E+03	perc. 0.45: 1.547 E+03	perc. 0.78: 3.669
perc. 0.13: 6.221 E+02 E+03	perc. 0.46: 1.585 E+03	perc. 0.79: 3.772
perc. 0.14: 6.482 E+02 E+03	perc. 0.47: 1.623 E+03	perc. 0.80: 3.890
perc. 0.15: 6.744 E+02 E+03	perc. 0.48: 1.668 E+03	perc. 0.81: 3.998
perc. 0.16: 7.031 E+02 E+03	perc. 0.49: 1.713 E+03	perc. 0.82: 4.094
perc. 0.17: 7.240 E+02 E+03	perc. 0.50: 1.757 E+03	perc. 0.83: 4.203

perc. 0.18: 7.507 E+02	perc. 0.51: 1.807 E+03	perc. 0.84: 4.346
E+03		
perc. 0.19: 7.735 E+02	perc. 0.52: 1.857 E+03	perc. 0.85: 4.472
E+03		
perc. 0.20: 7.966 E+02	perc. 0.53: 1.903 E+03	perc. 0.86: 4.610
E+03		
perc. 0.21: 8.211 E+02	perc. 0.54: 1.956 E+03	perc. 0.87: 4.735
E+03		
perc. 0.22: 8.452 E+02	perc. 0.55: 2.010 E+03	perc. 0.88: 4.867
E+03		
perc. 0.23: 8.712 E+02	perc. 0.56: 2.059 E+03	perc. 0.89: 5.015
E+03		
perc. 0.24: 8.963 E+02	perc. 0.57: 2.108 E+03	perc. 0.90: 5.189
E+03		
perc. 0.25: 9.183 E+02	perc. 0.58: 2.163 E+03	perc. 0.91: 5.392
E+03		
perc. 0.26: 9.390 E+02	perc. 0.59: 2.214 E+03	perc. 0.92: 5.574
E+03		
perc. 0.27: 9.653 E+02	perc. 0.60: 2.263 E+03	perc. 0.93: 5.767
E+03		
perc. 0.28: 9.891 E+02	perc. 0.61: 2.320 E+03	perc. 0.94: 5.975
E+03		
perc. 0.29: 1.013 E+03	perc. 0.62: 2.375 E+03	perc. 0.95: 6.209
E+03		
perc. 0.30: 1.040 E+03	perc. 0.63: 2.435 E+03	perc. 0.96: 6.547
E+03		
perc. 0.31: 1.064 E+03	perc. 0.64: 2.504 E+03	perc. 0.97: 6.932
E+03		
perc. 0.32: 1.087 E+03	perc. 0.65: 2.584 E+03	perc. 0.98: 7.409
E+03		
perc. 0.33: 1.118 E+03	perc. 0.66: 2.655 E+03	perc. 0.99: 7.892
E+03		

***** Output Distribution Variable : e_sz_05km *****

MINIMUM SAMPLE VALUE: 9.573 E-02

MAXIMUM SAMPLE VALUE: 1.663 E+03

perc. 0.01: 8.814 E-01	perc. 0.34: 7.800 E+00	perc. 0.67: 5.431
E+01		
perc. 0.02: 1.219 E+00	perc. 0.35: 8.021 E+00	perc. 0.68: 5.820
E+01		
perc. 0.03: 1.498 E+00	perc. 0.36: 8.315 E+00	perc. 0.69: 6.237
E+01		
perc. 0.04: 1.735 E+00	perc. 0.37: 8.548 E+00	perc. 0.70: 6.618
E+01		
perc. 0.05: 1.967 E+00	perc. 0.38: 8.852 E+00	perc. 0.71: 7.080
E+01		
perc. 0.06: 2.186 E+00	perc. 0.39: 9.190 E+00	perc. 0.72: 7.562
E+01		
perc. 0.07: 2.462 E+00	perc. 0.40: 9.573 E+00	perc. 0.73: 8.010
E+01		
perc. 0.08: 2.631 E+00	perc. 0.41: 9.878 E+00	perc. 0.74: 8.529
E+01		
perc. 0.09: 2.821 E+00	perc. 0.42: 1.029 E+01	perc. 0.75: 9.070
E+01		

perc. 0.10: 3.010 E+00 E+01	perc. 0.43: 1.071 E+01	perc. 0.76: 9.553
perc. 0.11: 3.178 E+00 E+02	perc. 0.44: 1.118 E+01	perc. 0.77: 1.010
perc. 0.12: 3.350 E+00 E+02	perc. 0.45: 1.167 E+01	perc. 0.78: 1.074
perc. 0.13: 3.552 E+00 E+02	perc. 0.46: 1.215 E+01	perc. 0.79: 1.137
perc. 0.14: 3.730 E+00 E+02	perc. 0.47: 1.280 E+01	perc. 0.80: 1.208
perc. 0.15: 3.854 E+00 E+02	perc. 0.48: 1.335 E+01	perc. 0.81: 1.274
perc. 0.16: 4.021 E+00 E+02	perc. 0.49: 1.398 E+01	perc. 0.82: 1.351
perc. 0.17: 4.156 E+00 E+02	perc. 0.50: 1.461 E+01	perc. 0.83: 1.430
perc. 0.18: 4.320 E+00 E+02	perc. 0.51: 1.521 E+01	perc. 0.84: 1.519
perc. 0.19: 4.492 E+00 E+02	perc. 0.52: 1.606 E+01	perc. 0.85: 1.628
perc. 0.20: 4.654 E+00 E+02	perc. 0.53: 1.679 E+01	perc. 0.86: 1.743
perc. 0.21: 4.880 E+00 E+02	perc. 0.54: 1.817 E+01	perc. 0.87: 1.863
perc. 0.22: 5.092 E+00 E+02	perc. 0.55: 1.953 E+01	perc. 0.88: 2.010
perc. 0.23: 5.327 E+00 E+02	perc. 0.56: 2.126 E+01	perc. 0.89: 2.145
perc. 0.24: 5.545 E+00 E+02	perc. 0.57: 2.366 E+01	perc. 0.90: 2.308
perc. 0.25: 5.847 E+00 E+02	perc. 0.58: 2.583 E+01	perc. 0.91: 2.475
perc. 0.26: 6.037 E+00 E+02	perc. 0.59: 2.826 E+01	perc. 0.92: 2.627
perc. 0.27: 6.253 E+00 E+02	perc. 0.60: 3.090 E+01	perc. 0.93: 2.869
perc. 0.28: 6.491 E+00 E+02	perc. 0.61: 3.377 E+01	perc. 0.94: 3.171
perc. 0.29: 6.646 E+00 E+02	perc. 0.62: 3.670 E+01	perc. 0.95: 3.525
perc. 0.30: 6.905 E+00 E+02	perc. 0.63: 3.939 E+01	perc. 0.96: 3.918
perc. 0.31: 7.107 E+00 E+02	perc. 0.64: 4.365 E+01	perc. 0.97: 4.438
perc. 0.32: 7.347 E+00 E+02	perc. 0.65: 4.689 E+01	perc. 0.98: 5.131
perc. 0.33: 7.566 E+00 E+02	perc. 0.66: 5.074 E+01	perc. 0.99: 6.535

***** Output Distribution Variable : e_sz_1km *****

MINIMUM SAMPLE VALUE: 1.002 E-01
MAXIMUM SAMPLE VALUE: 2.417 E+03

perc. 0.01: 1.041 E+00	perc. 0.34: 1.027 E+01	perc. 0.67: 6.550
E+01		
perc. 0.02: 1.396 E+00	perc. 0.35: 1.058 E+01	perc. 0.68: 7.015
E+01		
perc. 0.03: 1.820 E+00	perc. 0.36: 1.094 E+01	perc. 0.69: 7.600
E+01		
perc. 0.04: 2.151 E+00	perc. 0.37: 1.127 E+01	perc. 0.70: 8.099
E+01		
perc. 0.05: 2.483 E+00	perc. 0.38: 1.168 E+01	perc. 0.71: 8.687
E+01		
perc. 0.06: 2.774 E+00	perc. 0.39: 1.208 E+01	perc. 0.72: 9.269
E+01		
perc. 0.07: 3.069 E+00	perc. 0.40: 1.257 E+01	perc. 0.73: 9.814
E+01		
perc. 0.08: 3.322 E+00	perc. 0.41: 1.303 E+01	perc. 0.74: 1.058
E+02		
perc. 0.09: 3.581 E+00	perc. 0.42: 1.366 E+01	perc. 0.75: 1.115
E+02		
perc. 0.10: 3.836 E+00	perc. 0.43: 1.417 E+01	perc. 0.76: 1.182
E+02		
perc. 0.11: 4.088 E+00	perc. 0.44: 1.487 E+01	perc. 0.77: 1.259
E+02		
perc. 0.12: 4.300 E+00	perc. 0.45: 1.553 E+01	perc. 0.78: 1.346
E+02		
perc. 0.13: 4.526 E+00	perc. 0.46: 1.620 E+01	perc. 0.79: 1.426
E+02		
perc. 0.14: 4.762 E+00	perc. 0.47: 1.705 E+01	perc. 0.80: 1.509
E+02		
perc. 0.15: 4.976 E+00	perc. 0.48: 1.790 E+01	perc. 0.81: 1.585
E+02		
perc. 0.16: 5.137 E+00	perc. 0.49: 1.873 E+01	perc. 0.82: 1.687
E+02		
perc. 0.17: 5.389 E+00	perc. 0.50: 1.957 E+01	perc. 0.83: 1.809
E+02		
perc. 0.18: 5.569 E+00	perc. 0.51: 2.040 E+01	perc. 0.84: 1.924
E+02		
perc. 0.19: 5.809 E+00	perc. 0.52: 2.146 E+01	perc. 0.85: 2.033
E+02		
perc. 0.20: 6.036 E+00	perc. 0.53: 2.228 E+01	perc. 0.86: 2.187
E+02		
perc. 0.21: 6.336 E+00	perc. 0.54: 2.363 E+01	perc. 0.87: 2.334
E+02		
perc. 0.22: 6.636 E+00	perc. 0.55: 2.525 E+01	perc. 0.88: 2.516
E+02		
perc. 0.23: 6.963 E+00	perc. 0.56: 2.704 E+01	perc. 0.89: 2.710
E+02		
perc. 0.24: 7.327 E+00	perc. 0.57: 2.931 E+01	perc. 0.90: 2.919
E+02		
perc. 0.25: 7.545 E+00	perc. 0.58: 3.228 E+01	perc. 0.91: 3.131
E+02		

perc. 0.26: 7.869 E+00 E+02	perc. 0.59: 3.550 E+01	perc. 0.92: 3.396
perc. 0.27: 8.188 E+00 E+02	perc. 0.60: 3.872 E+01	perc. 0.93: 3.710
perc. 0.28: 8.525 E+00 E+02	perc. 0.61: 4.239 E+01	perc. 0.94: 4.125
perc. 0.29: 8.812 E+00 E+02	perc. 0.62: 4.538 E+01	perc. 0.95: 4.570
perc. 0.30: 9.100 E+00 E+02	perc. 0.63: 4.814 E+01	perc. 0.96: 5.074
perc. 0.31: 9.364 E+00 E+02	perc. 0.64: 5.277 E+01	perc. 0.97: 5.735
perc. 0.32: 9.735 E+00 E+02	perc. 0.65: 5.679 E+01	perc. 0.98: 6.952
perc. 0.33: 9.997 E+00 E+02	perc. 0.66: 6.068 E+01	perc. 0.99: 8.768

***** Output Distribution Variable : e_sz_3km *****

MINIMUM SAMPLE VALUE: 1.078 E-01
MAXIMUM SAMPLE VALUE: 4.370 E+03

perc. 0.01: 1.312 E+00 E+01	perc. 0.34: 1.588 E+01	perc. 0.67: 9.040
perc. 0.02: 1.802 E+00 E+01	perc. 0.35: 1.627 E+01	perc. 0.68: 9.646
perc. 0.03: 2.387 E+00 E+02	perc. 0.36: 1.682 E+01	perc. 0.69: 1.046
perc. 0.04: 3.006 E+00 E+02	perc. 0.37: 1.730 E+01	perc. 0.70: 1.118
perc. 0.05: 3.515 E+00 E+02	perc. 0.38: 1.795 E+01	perc. 0.71: 1.191
perc. 0.06: 3.970 E+00 E+02	perc. 0.39: 1.865 E+01	perc. 0.72: 1.272
perc. 0.07: 4.371 E+00 E+02	perc. 0.40: 1.948 E+01	perc. 0.73: 1.373
perc. 0.08: 4.736 E+00 E+02	perc. 0.41: 2.019 E+01	perc. 0.74: 1.447
perc. 0.09: 5.162 E+00 E+02	perc. 0.42: 2.116 E+01	perc. 0.75: 1.565
perc. 0.10: 5.595 E+00 E+02	perc. 0.43: 2.209 E+01	perc. 0.76: 1.674
perc. 0.11: 5.979 E+00 E+02	perc. 0.44: 2.326 E+01	perc. 0.77: 1.787
perc. 0.12: 6.331 E+00 E+02	perc. 0.45: 2.436 E+01	perc. 0.78: 1.918
perc. 0.13: 6.634 E+00 E+02	perc. 0.46: 2.561 E+01	perc. 0.79: 2.033
perc. 0.14: 6.927 E+00 E+02	perc. 0.47: 2.672 E+01	perc. 0.80: 2.164
perc. 0.15: 7.284 E+00 E+02	perc. 0.48: 2.799 E+01	perc. 0.81: 2.290
perc. 0.16: 7.667 E+00 E+02	perc. 0.49: 2.917 E+01	perc. 0.82: 2.432
perc. 0.17: 7.965 E+00 E+02	perc. 0.50: 3.048 E+01	perc. 0.83: 2.584

perc. 0.18: 8.309 E+00 E+02	perc. 0.51: 3.168 E+01	perc. 0.84: 2.765
perc. 0.19: 8.698 E+00 E+02	perc. 0.52: 3.351 E+01	perc. 0.85: 2.952
perc. 0.20: 9.131 E+00 E+02	perc. 0.53: 3.494 E+01	perc. 0.86: 3.151
perc. 0.21: 9.604 E+00 E+02	perc. 0.54: 3.677 E+01	perc. 0.87: 3.352
perc. 0.22: 1.001 E+01 E+02	perc. 0.55: 3.846 E+01	perc. 0.88: 3.660
perc. 0.23: 1.055 E+01 E+02	perc. 0.56: 4.033 E+01	perc. 0.89: 3.951
perc. 0.24: 1.109 E+01 E+02	perc. 0.57: 4.292 E+01	perc. 0.90: 4.298
perc. 0.25: 1.157 E+01 E+02	perc. 0.58: 4.584 E+01	perc. 0.91: 4.657
perc. 0.26: 1.205 E+01 E+02	perc. 0.59: 4.924 E+01	perc. 0.92: 5.062
perc. 0.27: 1.255 E+01 E+02	perc. 0.60: 5.426 E+01	perc. 0.93: 5.628
perc. 0.28: 1.301 E+01 E+02	perc. 0.61: 5.925 E+01	perc. 0.94: 6.173
perc. 0.29: 1.349 E+01 E+02	perc. 0.62: 6.395 E+01	perc. 0.95: 6.931
perc. 0.30: 1.406 E+01 E+02	perc. 0.63: 6.802 E+01	perc. 0.96: 7.606
perc. 0.31: 1.442 E+01 E+02	perc. 0.64: 7.321 E+01	perc. 0.97: 8.721
perc. 0.32: 1.490 E+01 E+03	perc. 0.65: 7.923 E+01	perc. 0.98: 1.121
perc. 0.33: 1.544 E+01 E+03	perc. 0.66: 8.463 E+01	perc. 0.99: 1.434

***** Output Distribution Variable : e_sz_10km *****

MINIMUM SAMPLE VALUE: 1.167 E-01
MAXIMUM SAMPLE VALUE: 8.366 E+03

perc. 0.01: 1.514 E+00 E+02	perc. 0.34: 2.523 E+01	perc. 0.67: 1.343
perc. 0.02: 2.338 E+00 E+02	perc. 0.35: 2.603 E+01	perc. 0.68: 1.441
perc. 0.03: 3.267 E+00 E+02	perc. 0.36: 2.683 E+01	perc. 0.69: 1.534
perc. 0.04: 4.189 E+00 E+02	perc. 0.37: 2.784 E+01	perc. 0.70: 1.635
perc. 0.05: 4.978 E+00 E+02	perc. 0.38: 2.897 E+01	perc. 0.71: 1.735
perc. 0.06: 5.679 E+00 E+02	perc. 0.39: 2.993 E+01	perc. 0.72: 1.845
perc. 0.07: 6.405 E+00 E+02	perc. 0.40: 3.103 E+01	perc. 0.73: 1.963
perc. 0.08: 7.101 E+00 E+02	perc. 0.41: 3.257 E+01	perc. 0.74: 2.108
perc. 0.09: 7.771 E+00 E+02	perc. 0.42: 3.428 E+01	perc. 0.75: 2.252

perc. 0.10: 8.337 E+00 E+02	perc. 0.43: 3.556 E+01	perc. 0.76: 2.447
perc. 0.11: 8.916 E+00 E+02	perc. 0.44: 3.728 E+01	perc. 0.77: 2.617
perc. 0.12: 9.441 E+00 E+02	perc. 0.45: 3.927 E+01	perc. 0.78: 2.808
perc. 0.13: 1.003 E+01 E+02	perc. 0.46: 4.098 E+01	perc. 0.79: 3.003
perc. 0.14: 1.055 E+01 E+02	perc. 0.47: 4.318 E+01	perc. 0.80: 3.203
perc. 0.15: 1.104 E+01 E+02	perc. 0.48: 4.498 E+01	perc. 0.81: 3.434
perc. 0.16: 1.162 E+01 E+02	perc. 0.49: 4.724 E+01	perc. 0.82: 3.629
perc. 0.17: 1.220 E+01 E+02	perc. 0.50: 4.941 E+01	perc. 0.83: 3.837
perc. 0.18: 1.282 E+01 E+02	perc. 0.51: 5.159 E+01	perc. 0.84: 4.133
perc. 0.19: 1.337 E+01 E+02	perc. 0.52: 5.360 E+01	perc. 0.85: 4.420
perc. 0.20: 1.415 E+01 E+02	perc. 0.53: 5.615 E+01	perc. 0.86: 4.742
perc. 0.21: 1.491 E+01 E+02	perc. 0.54: 5.866 E+01	perc. 0.87: 5.096
perc. 0.22: 1.575 E+01 E+02	perc. 0.55: 6.155 E+01	perc. 0.88: 5.460
perc. 0.23: 1.649 E+01 E+02	perc. 0.56: 6.504 E+01	perc. 0.89: 6.070
perc. 0.24: 1.730 E+01 E+02	perc. 0.57: 6.781 E+01	perc. 0.90: 6.665
perc. 0.25: 1.814 E+01 E+02	perc. 0.58: 7.132 E+01	perc. 0.91: 7.329
perc. 0.26: 1.890 E+01 E+02	perc. 0.59: 7.536 E+01	perc. 0.92: 7.949
perc. 0.27: 1.969 E+01 E+02	perc. 0.60: 7.905 E+01	perc. 0.93: 8.818
perc. 0.28: 2.052 E+01 E+02	perc. 0.61: 8.578 E+01	perc. 0.94: 9.837
perc. 0.29: 2.124 E+01 E+03	perc. 0.62: 9.246 E+01	perc. 0.95: 1.091
perc. 0.30: 2.213 E+01 E+03	perc. 0.63: 9.978 E+01	perc. 0.96: 1.211
perc. 0.31: 2.282 E+01 E+03	perc. 0.64: 1.074 E+02	perc. 0.97: 1.439
perc. 0.32: 2.367 E+01 E+03	perc. 0.65: 1.152 E+02	perc. 0.98: 1.847
perc. 0.33: 2.441 E+01 E+03	perc. 0.66: 1.251 E+02	perc. 0.99: 2.478

***** Output Distribution Variable : e_sz_30km *****

MINIMUM SAMPLE VALUE: 1.255 E-01
MAXIMUM SAMPLE VALUE: 1.513 E+04

perc. 0.01: 1.761 E+00 E+02	perc. 0.34: 3.837 E+01	perc. 0.67: 1.936
perc. 0.02: 2.898 E+00 E+02	perc. 0.35: 3.969 E+01	perc. 0.68: 2.051
perc. 0.03: 4.393 E+00 E+02	perc. 0.36: 4.119 E+01	perc. 0.69: 2.216
perc. 0.04: 5.538 E+00 E+02	perc. 0.37: 4.265 E+01	perc. 0.70: 2.361
perc. 0.05: 6.750 E+00 E+02	perc. 0.38: 4.413 E+01	perc. 0.71: 2.477
perc. 0.06: 7.684 E+00 E+02	perc. 0.39: 4.592 E+01	perc. 0.72: 2.642
perc. 0.07: 8.811 E+00 E+02	perc. 0.40: 4.768 E+01	perc. 0.73: 2.811
perc. 0.08: 1.001 E+01 E+02	perc. 0.41: 5.011 E+01	perc. 0.74: 3.011
perc. 0.09: 1.096 E+01 E+02	perc. 0.42: 5.246 E+01	perc. 0.75: 3.205
perc. 0.10: 1.195 E+01 E+02	perc. 0.43: 5.442 E+01	perc. 0.76: 3.453
perc. 0.11: 1.283 E+01 E+02	perc. 0.44: 5.688 E+01	perc. 0.77: 3.683
perc. 0.12: 1.361 E+01 E+02	perc. 0.45: 5.980 E+01	perc. 0.78: 3.968
perc. 0.13: 1.441 E+01 E+02	perc. 0.46: 6.233 E+01	perc. 0.79: 4.299
perc. 0.14: 1.516 E+01 E+02	perc. 0.47: 6.552 E+01	perc. 0.80: 4.554
perc. 0.15: 1.613 E+01 E+02	perc. 0.48: 6.884 E+01	perc. 0.81: 4.881
perc. 0.16: 1.702 E+01 E+02	perc. 0.49: 7.179 E+01	perc. 0.82: 5.178
perc. 0.17: 1.764 E+01 E+02	perc. 0.50: 7.504 E+01	perc. 0.83: 5.579
perc. 0.18: 1.857 E+01 E+02	perc. 0.51: 7.830 E+01	perc. 0.84: 5.937
perc. 0.19: 1.968 E+01 E+02	perc. 0.52: 8.204 E+01	perc. 0.85: 6.371
perc. 0.20: 2.102 E+01 E+02	perc. 0.53: 8.610 E+01	perc. 0.86: 6.909
perc. 0.21: 2.214 E+01 E+02	perc. 0.54: 9.061 E+01	perc. 0.87: 7.423
perc. 0.22: 2.334 E+01 E+02	perc. 0.55: 9.507 E+01	perc. 0.88: 8.118
perc. 0.23: 2.453 E+01 E+02	perc. 0.56: 9.901 E+01	perc. 0.89: 8.939
perc. 0.24: 2.583 E+01 E+02	perc. 0.57: 1.035 E+02	perc. 0.90: 9.927
perc. 0.25: 2.715 E+01 E+03	perc. 0.58: 1.093 E+02	perc. 0.91: 1.107

perc. 0.26: 2.824 E+01 E+03	perc. 0.59: 1.156 E+02	perc. 0.92: 1.212
perc. 0.27: 2.958 E+01 E+03	perc. 0.60: 1.221 E+02	perc. 0.93: 1.333
perc. 0.28: 3.072 E+01 E+03	perc. 0.61: 1.291 E+02	perc. 0.94: 1.504
perc. 0.29: 3.191 E+01 E+03	perc. 0.62: 1.354 E+02	perc. 0.95: 1.644
perc. 0.30: 3.297 E+01 E+03	perc. 0.63: 1.444 E+02	perc. 0.96: 1.874
perc. 0.31: 3.455 E+01 E+03	perc. 0.64: 1.534 E+02	perc. 0.97: 2.283
perc. 0.32: 3.563 E+01 E+03	perc. 0.65: 1.650 E+02	perc. 0.98: 2.995
perc. 0.33: 3.697 E+01 E+03	perc. 0.66: 1.791 E+02	perc. 0.99: 4.133

Appendix B Simplification of Uncertainty for Lateral and Vertical Diffusion Rates in SATRAP

Table B-1 contains the 38 distributions for vertical and horizontal diffusion rates (σ_z , σ_y) that were provided by the USNRC/CEC study (see Section 2.10). These distributions take the form of distance (m) given at five different quantile levels for various down wind distances and atmospheric stability classes. It should be noted that the USNRC/CEC study also provided a correlation matrix to go with these distributions. An examination of that correlation matrix (found in Appendix A) indicates almost complete correlation between the distributions at various down wind distances for a given stability class for σ_y and σ_z , respectively. However, it shows almost zero correlation between distributions for either the same variable under different stability conditions or for different variables under the same stability conditions. Thus, statistically, these 38 distributions are really representative of only eight different random variables: one each for σ_y and σ_z in each of the four stability classes. Thus, it is recommended that eight standard uniform random variables (one each for σ_y and σ_z in each of the four stability classes) be sampled within LHS or a similar sampling engine. Each of these random variables should then be used to infer sampled values for its respective parameter at all downwind distances according to the distribution quantiles provided in the table. The sampling of 38 independent random variables is statistically inappropriate based on the correlation information provided by the USNRC/CEC study.

Lockheed Martin has processed the original USNRC/CEC study data to generate surrogate distributions in terms of a ratio of the quantile value to the median value for σ_y and σ_z for each stability class. The results of this data reduction are also shown in Table B-1. Based on these results, Lockheed Martin has proposed sampling these 38 distributions based on only two random variables: one for σ_y and one for σ_z . Lockheed Martin has argued that there is relatively low variation between the distributions over the various stability classes for a σ_y and σ_z when the distributions are viewed in terms of this ratio, and that this justifies the use of only two random variables. Obviously, this approach is not supported by the correlation matrix supplied by the USNRC/CEC experts who produced the distributions for σ_y and σ_z . However, the statistical independence of these distributions may not be important to the overall risk uncertainty computed by SPARRC. Removing the statistical independence is likely to cause a slight overstatement of the breadth of the risk uncertainty results. It is recommended that Lockheed Martin examine and document the sensitivity of the risk uncertainty to this loss of statistical independence by comparing the results for at least one example case using two versus eight independent random variables. If, as expected, the breadth of risk uncertainty is dominated by other random variables, then it is reasonable to adopt the use of two random variables as standard practice for future risk uncertainty computations.

Table B-1 Simplification of Uncertainty for Lateral and Vertical Diffusion Rates in SATRAP

Stability Class Sigma Y Uncertainty	Wind Distance (km)	Ratio of SATRAP Nominal Value To USNR/CEC Headline										Quantiles					Ratio of Quantile to				
		Briggs SATRAP Rural		Briggs SATRAP Urban		Briggs SATRAP Sigma Y or Z		USNR/CEC Dist. (m)		USNR/CEC Dist. (m)		USNR/CEC Dist. (m)		USNR/CEC Dist. (m)		USNR/CEC Dist. (m)		USNR/CEC Dist. (m)			
		(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)	(meters)		
A	0.5	107.35	156.14	0.57	0.83	sigma	Y	30	58	188	581	872	0.20	0.31	1.00	3.09	4.64				
	1	209.76	305.11	0.61	0.89	sigma	Y	67	101	342	1,140	1,710	0.20	0.30	1.00	3.33	5.00				
	3	578.86	841.98	0.65	0.95	sigma	Y	165	247	890	3,360	5,040	0.19	0.28	1.00	4.30	5.66				
	10	1,555.63	2,262.74	0.61	0.89	sigma	Y	434	651	2,550	11,000	16,500	0.17	0.26	1.00	4.31	6.47				
C	0.5	53.67	107.35	0.59	1.18	sigma	Y	28	41	91	194	291	0.31	0.45	1.00	2.13	3.20				
	1	104.80	209.76	0.64	1.27	sigma	Y	49	73	165	378	567	0.30	0.44	1.00	2.29	3.44				
	3	289.43	578.86	0.68	1.37	sigma	Y	121	181	423	1,100	1,650	0.29	0.43	1.00	2.60	3.90				
	10	777.82	1,555.63	0.65	1.30	sigma	Y	325	487	1,200	3,530	5,295	0.27	0.41	1.00	2.94	4.41				
D	0.5	39.04	78.07	0.53	1.07	sigma	Y	800	1,200	3,090	10,300	15,450	0.26	0.39	1.00	3.33	5.00				
	1	76.28	152.55	0.59	1.15	sigma	Y	18	27	68	163	245	0.26	0.40	1.00	2.40	3.60				
	3	210.49	420.99	0.60	1.19	sigma	Y	31	47	129	331	497	0.24	0.36	1.00	2.57	3.85				
	10	565.69	1,131.37	0.53	1.07	sigma	Y	73	110	353	1,010	1,515	0.21	0.31	1.00	2.86	4.29				
	30	1,200.00	2,400.00	0.41	0.82	sigma	Y	186	282	1,060	3,480	5,220	0.18	0.27	1.00	3.28	4.92				
E	0.5	29.28	58.57	0.59	1.07	sigma	Y	10	15	50	132	198	0.30	0.40	1.00	2.64	3.96				
	1	57.21	104.88	0.64	1.17	sigma	Y	17	26	90	253	380	0.19	0.29	1.00	2.81	4.22				
	3	157.87	289.43	0.68	1.24	sigma	Y	41	62	233	709	1,064	0.18	0.27	1.00	3.04	4.57				
	10	424.26	777.82	0.64	1.17	sigma	Y	105	158	667	2,200	3,300	0.16	0.24	1.00	3.30	4.95				
	30	900.00	1,800.00	0.16	0.22	sigma	Y	2,467	3,700	5,760	6,210	9,315	0.13	0.18	1.00	3.04	4.57				
		Ave. Ratio		0.58	1.06					Ave. Class A			0.19	0.28	1.00	3.63	5.44				
		Std. Dev.		0.12	0.25					Ave. Std. Dev.			0.01	0.02	1.00	0.54	0.81				
													0.28	0.42	1.00	2.66	3.99				
													0.02	0.03	1.00	0.49	0.73				
													0.21	0.31	1.00	2.96	4.44				
													0.05	0.07	1.00	0.53	0.79				
													0.23	0.35	1.00	2.57	3.86				
													0.11	0.17	1.00	0.87	1.31				
													0.23	0.34	1.00	2.92	4.38				
													0.07	0.10	1.00	0.70	1.06				

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