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ANNUAL PROGRESS REPORT: CONTRACT DE-AT06-79EV10216

✓ "Bomb Radiocarbon Sections Along the Hawaii-Tahiti Shuttle Track" ① 111

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The contract was initiated June 1, 1979. The objective of the research is to use the temporal and spatial distribution of the transient, bomb-produced ^{14}C in the equatorial Pacific Ocean to determine mixing rates in the upper 1000 m of the ocean. To accomplish this goal approximately 400 ^{14}C samples were collected during two legs of the NORPAX shuttle. A majority of these samples were collected during FFGE leg 3.

Surface samples were collected every degree of latitude between 17°S and 20°N along the longitudes of 150°W and 158°W . Depth profiles, to a maximum depth of 2500 m, were collected every 4° of latitude and every 2° near the equator (see fig. 9). The majority of the samples were collected in the upper 500 m of water, as shown in fig. 2.

Two additional ^{14}C counters were put into operation for the ^{14}C measurements of ocean water samples. Together with the two counters used for GEOSECS samples it is possible to determine the ^{14}C activities of 8 marine samples each week. For the second NORPAX year we expect to be able to use the combined capability for NORPAX samples because the GEOSECS program terminates in the mid-1980.

A North-South profile of the surface samples that have been measured so far is shown in fig. 3. There is extensive relative depletion in ^{14}C of the equatorial surface waters. This feature of the surface water ^{14}C distribution, coupled with the depth distribution of ^{14}C and the physical and chemical (nutrient) oceanographic data collected during the NORPAX program should allow us to estimate the rate of upwelling in the equatorial Pacific.

The ^{14}C depth distribution for stations 1, 9 and 16 are presented in fig. 4. Although the excess bomb $^{14}\text{CO}_2$ activities for these stations have

not yet been determined, some qualitative features stand out. The shallower penetration depth of ^{14}C near the equator is dramatically shown. Below about 500 m the ^{14}C depth distribution is similar for all three stations. The close depth interval sampling accomplished on leg 3 results in the appearance of a sub-surface maximum in ^{14}C for both stations 9 and 16. These ^{14}C maxima are associated with salinity maxima suggesting that this feature of the ^{14}C depth distribution results from horizontal (isopycnal) advective transport of a distinct water type in the equatorial region.

FIGURE 1 STATION LOCATIONS

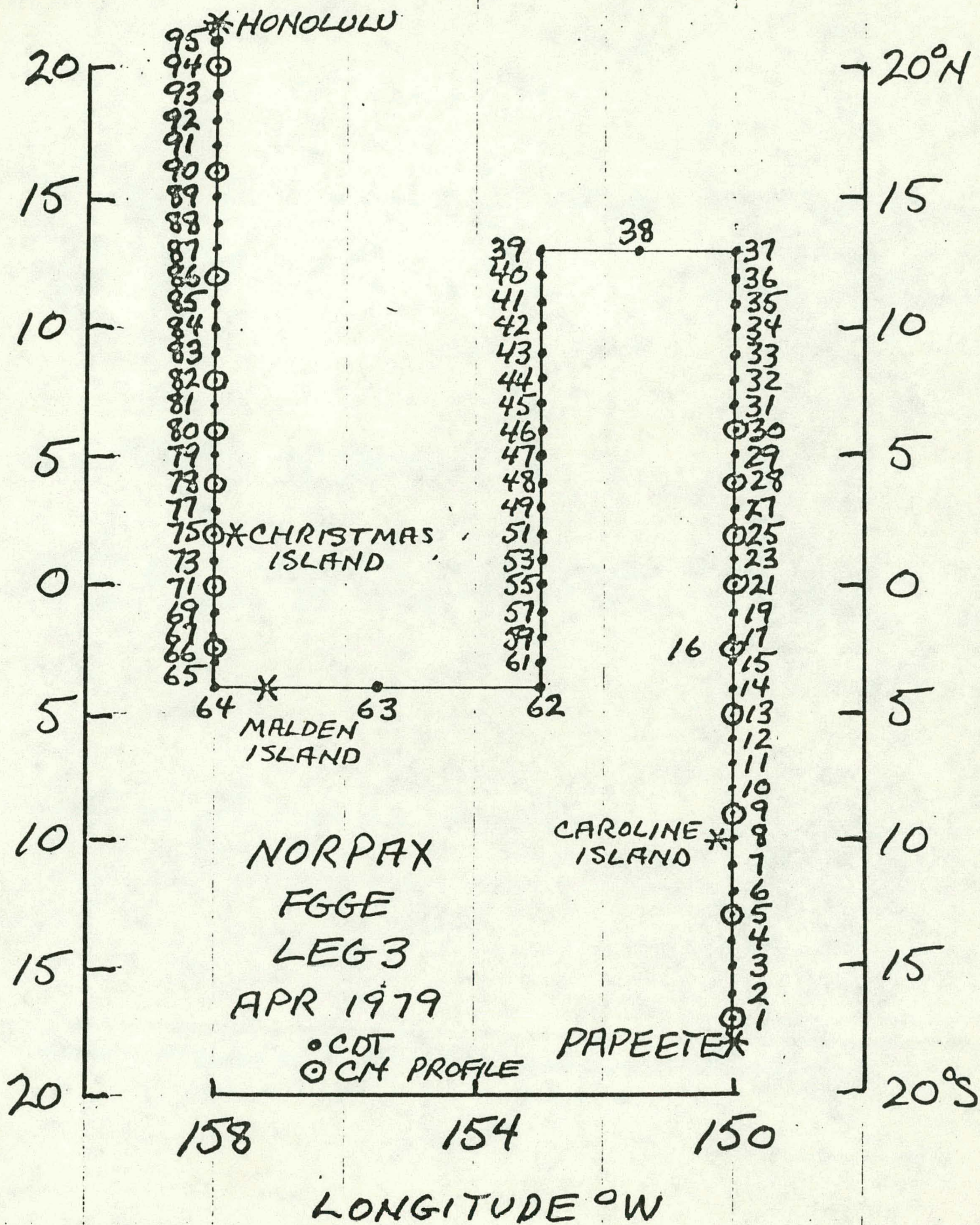


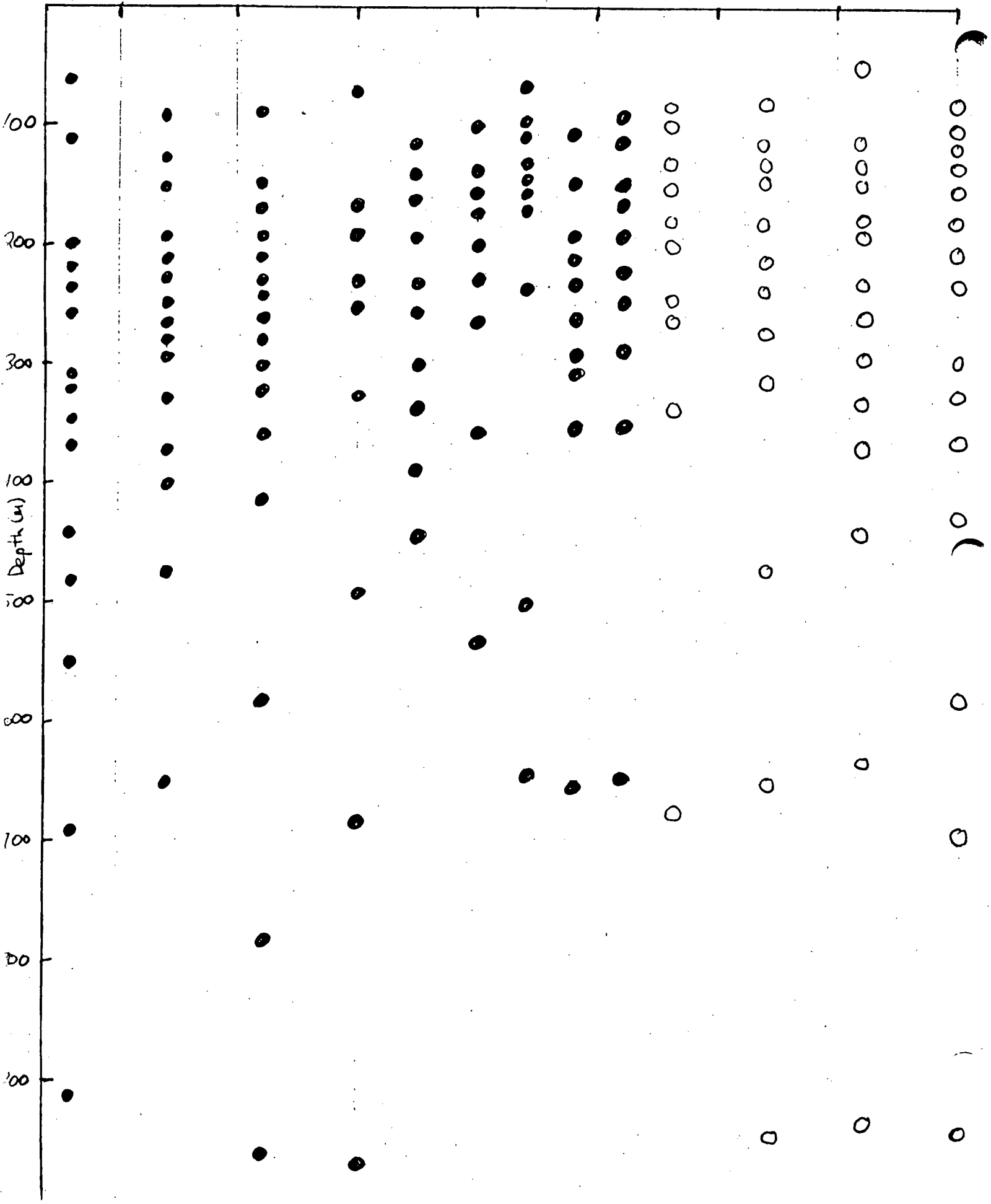
Figure 2

LATITUDE

• 150°W

○ 158°W

S 15° 10 5 0 5 10 15 20°



PACIFIC
SURFACE $\Delta^{14}\text{C}$ VALUES

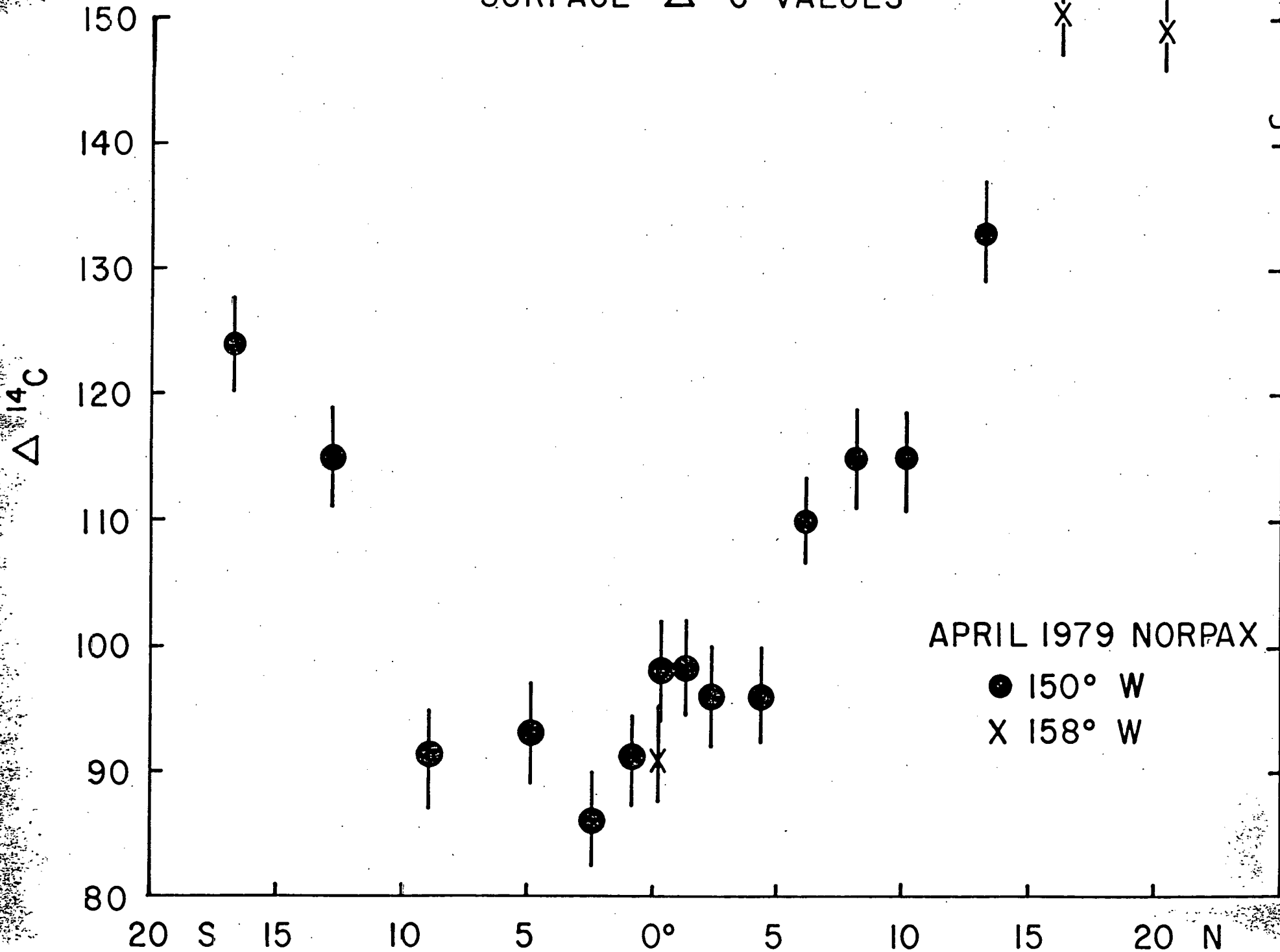


Figure 4

$\Delta^{14}\text{C} \text{ ‰}$

