

May 2000

ARM Facilities Newsletter

ANL/ER/NL-00-05



Tropical Western Pacific CART Site

This month we will visit an ARM CART site with a pleasant climate: the Tropical Western Pacific (TWP) CART site, along the equator in the western Pacific Ocean.

The TWP locale lies between 10 degrees North latitude and 10 degrees South latitude and extends from Indonesia eastward beyond the international date line (Figure 1). This area was selected because it is in and around the Pacific warm pool, the area of warm sea-surface temperatures that determine El Niño/La Niña episodes. The warm pool also adds heat and moisture to the atmosphere and thus fuels cloud formation. Understanding the way tropical clouds and water vapor affect the solar radiation budget is a focus of the ARM Program. The two current island-based

CART sites in the TWP are in Manus Province in Papua New Guinea and on Nauru Island.

The first site implemented was in Manus Province, Papua New Guinea in September of 1996 (Figure 2). This site is located at the Papua New Guinea (PNG) National Weather Service (NWS) station at the Momote airport on Los Negros Island (Figure 3).

Each of the TWP sites is outfitted with a self-contained instrument package called an atmospheric radiation and cloud station (ARCS). The ARCS is an integrated instrument suite that can measure surface radiation, surface



ARM Facilities Newsletter is published by Argonne National Laboratory, a multiprogram laboratory operated by The University of Chicago under contract W-31-109-Eng-38 with the U.S. Department of Energy.

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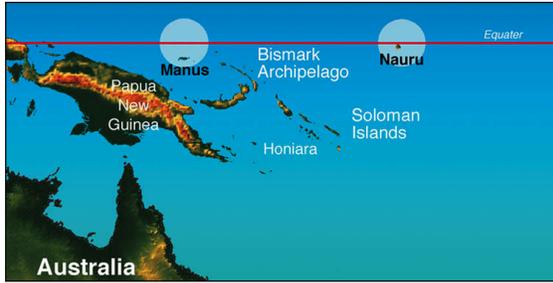


Figure 1. Manus Province (Papua New Guinea) and Nauru Island.

meteorological parameters, cloud properties, and some atmospheric quantities. A data acquisition system is used to collect data, monitor and control the instruments, and process and store the data. All of the collected data are stored on tape and shipped to the United States for processing by the ARM Data Management Facility and inclusion in the ARM Data Archive.

The ARCS is a specially designed, 20-foot seaworthy shipping container (a seatainer) holding a self-contained, portable instrument station. Although it is meant for long-term deployment, the ARCS can be moved from location to location. The seatainer has dual air conditioners with humidity control to

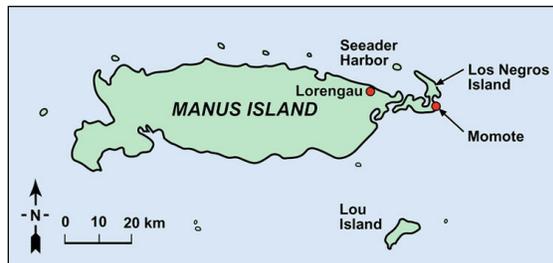


Figure 2. Manus and Los Negros Islands. The ARM TWP CART site is located at Momote airport.

provide an optimal operating environment for the computer equipment housed inside. The design features automated operation requiring minimal on-site support.

The ARCS is connected to the local power supply, but it also has a backup generator to supply electricity to the computers and sensors in the event of a power outage. The 50-kilowatt diesel generator has a 700-gallon fuel tank and is capable of providing backup



Figure 3. The TWP CART site located at Momote airport, Los Negros Island, Manus Province, Papua New Guinea.

power for one month without refueling, an important contribution to portability.

The second TWP site is on the northwest shore of the island of Nauru (Figure 4), approximately 1,200 miles northeast of the Manus CART site. Nauru, the world's smallest republic, is home to more than 10,000 people. The island covers 8.2 square miles and is rich in high-grade phosphates, the main export for the local economy. The ARCS on Nauru Island was installed

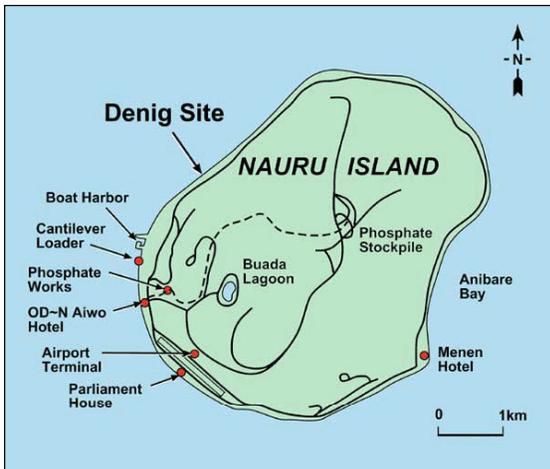


Figure 4. Nauru Island. Note the phosphate stockpile near the center of the island. The CART site is located at the Denigi Site.

in the Denigomodu District in October of 1998 (Figure 5). In addition to the ARCS instruments, Nauru also has an atmospherically emitted radiance interferometer and a hydrogen generator used to fill weather balloons.

The ARCS are tended by local residents. The Manus site is operated by three PNG NWS employees. The Nauru site is monitored by the ARM TWP Program Office and personnel of the Nauru Department of Island Development and Industry.

The November 1998 edition of this newsletter featured the National Oceanic and Atmospheric Administration's TAO buoy array in the Pacific Ocean. This network of ocean buoys measures surface and subsurface ocean temperatures, surface winds, air temperature, and humidity and is deployed throughout the TWP locale, making available

additional streams of data to ARM global climate modeling researchers.

The TWP provides a unique challenge to researchers, because gathering important climate data over such a large, remote area can be logistically complicated. ARM scientists and engineers, especially those at Los Alamos National Laboratory (operators of the TWP CART site), have taken a difficult task to heart and have provided the science community with valuable data on a long-term basis, advancing our understanding of Earth's complicated climate one step farther. The ARM Program goal to improve the accuracy of models on which climate forecasts are based will be reached only through efforts like the ones that make the TWP CART site a reality.



Figure 5. The Nauru CART site, located along the beach in the center portion of the photo (open sandy area).