

U.S. Department of Energy

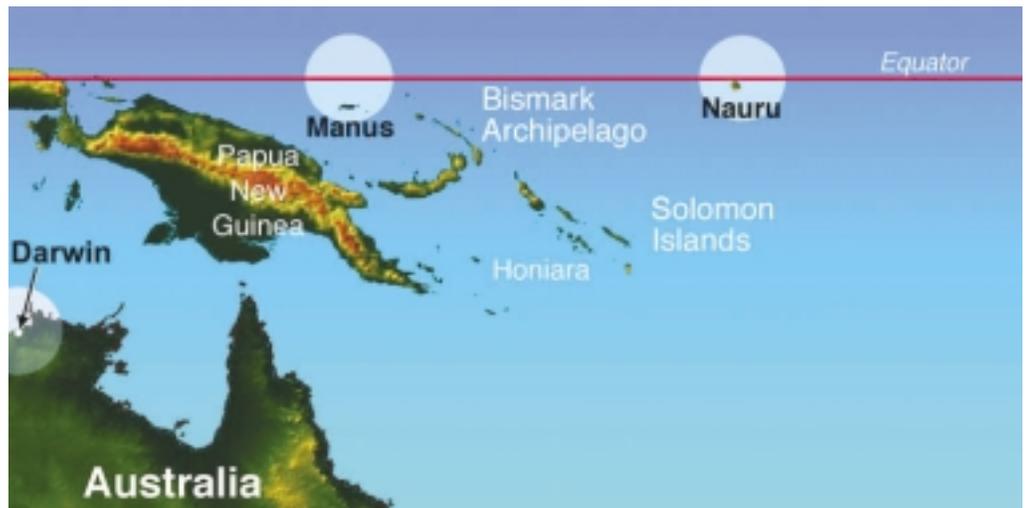
Tropical Western Pacific

The U.S. Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) Program established the Tropical Western Pacific (TWP) field measurement sites to obtain data to better understand phenomena such as the El Niño/Southern Oscillation (ENSO). Information collected at the site will help scientists understand the role of the tropics in modulating or controlling significant aspects of the global climate and improve models that predict global climate change.

Located in the "Warm Pool"

The TWP locale spans an area roughly between 10°N to 10°S of the equator from Indonesia to the dateline. This region of the world plays a large role in the interannual variability observed in the global climate system. The ENSO, for example, has far-reaching implications for weather patterns over much of the Northern Hemisphere. The TWP area consistently has the world's warmest sea surface temperatures and is often called the "warm pool." The warm pool supplies heat and moisture to the atmosphere above it, resulting in the formation of deep convective cloud systems. These systems produce large amounts of rain and the high-altitude cirrus clouds that cover much of the region. These cloud systems affect the amount of solar energy reaching the surface and the amount of heat energy that can escape into space.

Improved understanding of the interaction between clouds, latent heat release, and incoming and outgoing radiation energy will help improve the global climate models used for climate research.



The Tropical Western Pacific locale spans an area roughly between 10°N to 10°S latitude and 120°E to 180°E longitude. Climate research stations are located on Manus Island in Papua New Guinea, on Nauru, and at Darwin, Australia.





Nauru99 Campaign

Data Collected at TWP Sites

Three instrument sites operate in the TWP. The first site was installed at Manus Island in Papua New Guinea in 1996. It is operated in collaboration with the Papua New Guinea National Weather Service. Nauru hosts the second site, which is operated with the cooperation of the Nauru Department of Island Development and Industry. A third site at Darwin, Australia, is operated in partnership with the Australian Bureau of Meteorology.

Each site contains instruments to measure solar and terrestrial radiation, cloud properties, and other meteorological variables. Each site also contains computer systems for data collection and storage, a satellite communications system, and support equipment. Data from the three sites will be used to study the way clouds affect radiative processes and other atmospheric processes.

In 1999, ARM sponsored an international research collaboration conducted on and around the island of Nauru. The NOAA research ship Ron Brown and the Japanese Marine

Science and Technology Center (JAMSTEC) research ship Mirai measured surface and radiation fluxes at sea, for comparison with the land-based site on Nauru and the Tropical Atmosphere Ocean (TAO) buoy array. Research resulting from this intensive, month-long campaign ultimately is being used to understand spatial variability and island effects.

Open ocean measurements are considered critical to ARM objectives in the TWP. To the extent feasible, the ARM Program will investigate measurement facilities for the open ocean in the TWP locale. At a minimum, satellites, aircraft, ships, and collaborations with other programs will provide additional data with which to supplement and extend the island-based data.

For more information contact:

<http://www.arm.gov>
ARM Program Office (509) 375-2745

ARM Program Office
P.O. Box 999, K9-38
Richland, Washington 99352

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