

ARM

CLIMATE RESEARCH FACILITY

FACT SHEET

U.S. Department of Energy Tropical Western Pacific

The Atmospheric Radiation Measurement (ARM) Climate Research Facility established its second research facility, the Tropical Western Pacific (TWP) field measurement site, in 1996. This site consists of three research facilities: Manus (established in 1996), Nauru (1998), and Darwin (2002). The data collected at these sites help scientists better 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 International Date Line. This region of the world plays a large role in the interannual variability observed in the global climate system. Periodic phenomena such as El Niño/La Niña and the 30–60 day Madden-Julian Oscillation not only affect events such as the Indian and Australian monsoons, but also produce much further-reaching effects over much of the Northern Hemisphere and perhaps the entire planet. 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 both the amount of solar energy reaching the Earth’s surface and the total heat energy that can escape into space.

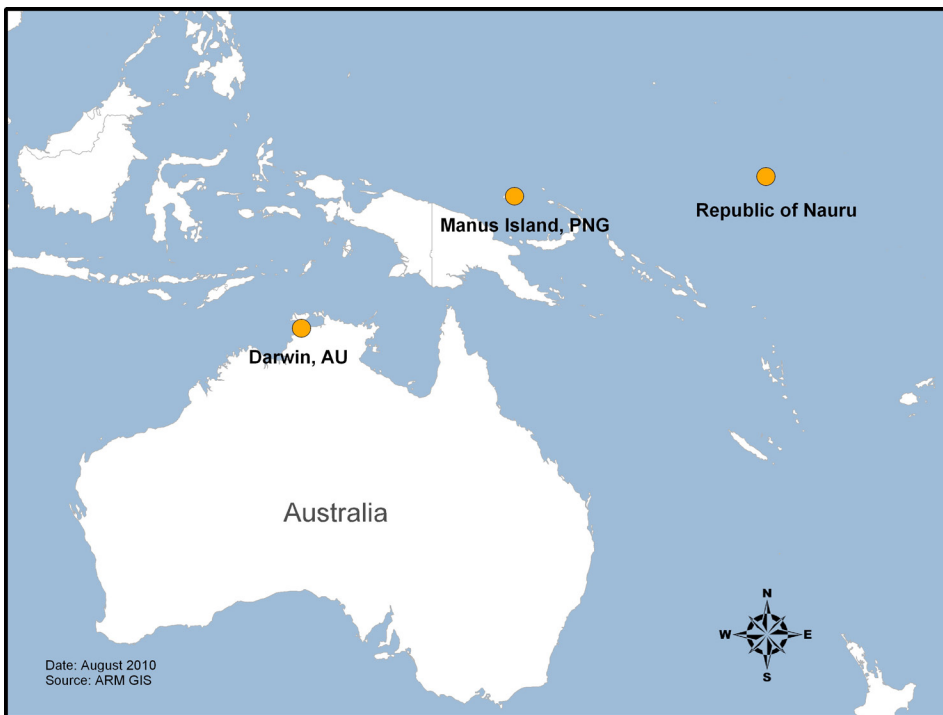
TWP Sites

Manus Island - The Manus facility is located at Momote Airport on Los Negros Island, Papua New Guinea. This location was chosen because it is in the heart of the Pacific warm pool and borders the maritime continent area. It is operated with the support of the PNG National Weather Service (NWS).

Nauru Island - Located in the western South Pacific, approximately 1,200 miles northeast of Papua New Guinea, the Nauru site is situated in the Denigomodu district on Nauru Island. The ARM Facility selected this location because it is on the eastern edge of the Pacific warm pool under La Niña conditions, which affect weather patterns in the Pacific.

Darwin - The facility is situated adjacent to the Australian Bureau of Meteorology’s (BOM) Meteorological Office near Darwin International Airport. Darwin was chosen because it meets the scientific goal of the ARM Climate Research Facility, providing a unique set of climate regimes that are not seen at the other TWP facilities. Annually, Darwin experiences three distinctive climate patterns: (1) a dry continental regime from May to September; (2) a wet, monsoonal season, which sometimes involves cyclones, from December to March; and (3) a transitional period between the other two.





Instrumentation and Data

The Manus, Nauru, and Darwin sites collect continuous data that will help scientists better understand the interactions between clouds and incoming and outgoing energy. Instrumentation at these sites includes radiometers, radars, lidars, surface meteorological instrumentation, total sky imagers, ceilometers, and balloon-borne sounding systems.

Through the American Recovery and Reinvestment Act of 2009, ARM received funds to purchase new instruments and upgrade existing instruments at all its sites, including Manus and Darwin. New capabilities at these sites include:

- New dual-frequency scanning cloud radars that provide three-dimensional information about cloud properties, including reflectivity and precipitation
- A Raman lidar, the first one operating in the Southern hemisphere



Through funding from the Recovery Act, a new present weather sensor (right) joins the existing temperature/relative humidity probe at the 2-meter height on the 10-meter meteorological tower at the ARM site in Darwin, Australia.

- New eddy correlation flux measurement systems and surface energy balance systems.

Other replaced or upgraded instruments include:

- Vaisala ceilometer
- Cimel sunphotometer
- Present weather sensor
- Micropulse lidar
- Millimeter wavelength cloud radar (now called the Ka-band ARM zenith radar, or KAZR).

For more information about Recovery Act activities at TWP, visit <http://www.arm.gov/about/recovery-act>.

User Information

There are a number of ways that researchers can use TWP's facilities and data.

- Access data gathered during normal operations or field campaigns through the ARM Data Archive (<http://www.archive.arm.gov/>)
- Propose and conduct a field campaign (<http://www.arm.gov/campaigns/propose>)
- Make an in-person or virtual visit to the TWP site (<http://www.arm.gov/sites/twp/visit>).

For more information, contact:

<http://www.arm.gov/sites/twp>

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