200 Scientists from around the world gather in Darwin

Tropical Warm Pool International Cloud Experiment

In one of the largest weather experiments ever conducted in the world, scientists have gathered in Darwin over the last four weeks to gather information to improve forecasting and modelling. Given the dire predictions by some scientists of the impact of global warming the experiment takes on even greater significance than most other studies.

Experimental weather station

Planes used for gathering airbourne data

Airborne Analysis

An intense airborne measurement campaign combined with an extensive network of ground-based observations is being conducted for the region near Darwin, during January-February, 2006 to address these weather patterns. The Tropical Warm Pool – International Cloud Experiment (TWP-ICE) is the first field program in the tropics that attempts to describe the evolution of tropical convection, including the large scale heat, moisture, and momentum budgets, while at the same time obtaining detailed observations of cloud properties and the impact of the clouds on the environment.

Concentrating on Cirrus Clouds

The emphasis will be on cirrus for the cloud properties component of the experiment. Cirrus are ubiquitous in the tropics and have a large impact on their environment but the properties of these clouds are poorly understood. A crucial product from this experiment will be a data set suitable to provide the forcing and testing required by cloud resolving models and parameters in Global Climate Models (GCMs).

World wide collaboration

The experiment is a collaboration between the US DOE ARM project, the Bureau of Meteorology, NASA, the European Commission DG RTD-1.2 and several United States, Australian, Canadian and European Universities. This experiment will be undertaken over a four week period in early 2006. January/February corresponds to the wet phase of the Australia monsoon. This season has been selected because, despite Darwin's coastal location, the convection that occurs over and near Darwin at this time is largely of maritime origin with a large fetch over water.

Darwin Experiment delivers new findings

The Darwin experiment is being designed to include the characterization of cirrus and the upper troposphere along with the convective environment. This dual focus is extremely important. A primary reason for ARM's attention to tropical cirrus is to improve the representation of these clouds in climate models.

The experiment to research key weather issues

The dual focus if TWP-ICE will result in a data set that can be used to address a range of important scientific questions related to tropical clouds. Specific goals of the experiment are:

1. Make detailed measurements of the cirrus microphysics and how they relate to storm intensity and proximity (spatial and temporal) to the parent convection.
2. Verification of remotely sensed microphysical measurements.
3. Provide data sets for forcing cloud resolving and single column models that will attempt to simulate the observed characteristics and impacts.
4. Document the evolution of oceanic convective clouds from the early convection phase through to the remnant cirrus with particular emphasis on their microphysics.
5. Measure the dynamical and radiative impacts of the cloud systems.
6. Characterize the environment in which the cloud systems occur.
7. Document the evolution of the convective boundary layer throughout the diurnal cycle and through the lifecycle of convective systems.

Europeans make their contribution

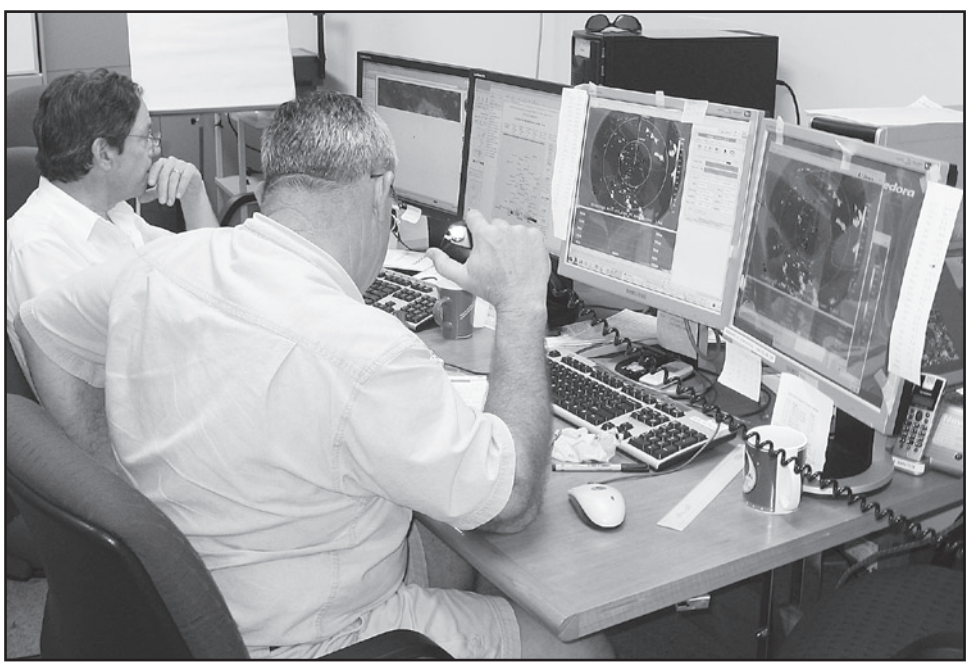
The European participants will also focus on issues such as troposphere/stratosphere exchange, and the water budget of the lower stratosphere while there will be a large chemistry component from NASA focusing on short-lived species generated in the convection. Other groups will also be adding smaller components focused on specific areas of research, such as convectively generated gravity waves, that can use the data gathered by ARM synergistically, but are not core areas of the program.

Darwin provides a critical site

Darwin is a coastal site and it will be important to characterize the oceanic region off the Australia coast. For this purpose, the CSIRO research vessel Southern Surveyor will be stationed in the Timor Sea to the northwest of Darwin. This ship will serve as a launch site for sondes, to complete the ring around Darwin and will also carry surface flux instruments. In addition to flux observations, remote sensing instruments are also being considered for the ship.

Satellites provide important information

Finally, satellites will be important for characterizing the upper boundary of the experiment region. Geostationary observations will provide top of atmosphere fluxes over the entire domain while more specialized satellite products will be collected both as an additional source of information for understanding cloud processes and to test satellite remote sensing retrievals in much the same way that surface-based retrievals will be tested. Of particular interest will be comparisons of in situ aircraft observations of cirrus properties with retrievals from CloudSat and Calypso which are both due to be launched in early 2006.



Scientists analyse data