



During the early part of this decade, NASA, as part of its Earth Science enterprise (formerly known as Mission to Planet Earth (MTPE) program), initiated the Pacific Exploratory Missions (PEM) to understand the impact of human activity on the chemistry of the troposphere (that portion of the atmosphere that lies between the Earth's surface and an altitude of approximately 15 km) over the Pacific ocean. This vast region of the world has traditionally been thought to be relatively free from the impact of human activity. Yet, in the northern hemisphere, the Pacific ocean is bordered by heavily populated continents, many with an increasing industrial potential, and consequently a potential for significantly impacting the quality of the Pacific region, and the global troposphere. The PEM-Tropics expedition conducted in September-October 1996 focused on the south tropical regions of the Pacific ocean.

The two major objectives of PEM-Tropics are:

1. To provide baseline data over the Basin for gases important in controlling the oxidizing power of the atmosphere including ozone, H<sub>2</sub>O, NO, CO, and NMHCs;
2. To understand the factors controlling the concentrations of these gases, and to assess the resulting sensitivity of the oxidizing power of the atmosphere to anthropogenic and natural perturbations.

In addition, PEM-Tropics has three secondary objectives:

1. To survey the concentrations of aerosol precursors and ultra fine aerosol particles over the South Pacific Basin;
2. To improve our understanding of sulfur gas-to-particle formation over the region;
3. To provide detailed latitude-altitude transects of long-lived gases for the evaluation of global tropospheric models.

The field deployment phase of PEM-Tropics was completed in early October, 1996. The NASA DC-8 based at the NASA Ames Research Center and the NASA P-3B aircraft based at the NASA Wallops Flight Facility covered an area extending zonally across the entire Pacific Basin and meridionally from Hawaii to south of New Zealand. Together they provided significant coverage of the Walker circulation cell over the Pacific Basin including the upwelling region over the western equatorial Pacific, the subsiding region offshore of South America, and the connecting atmosphere in between. PEM-Tropics involved the NASA DC-8 and P-3B aircraft operating jointly from bases in Tahiti, and Easter Island, and the P-3B operating from Christmas Island, and Guayaquil, Ecuador, and the DC-8 from Christchurch, NZ, and Nadi, Fiji. See [P3-B flights](#) and [DC-8 flights](#) for detailed flight information. For current data availability, see [P3-B measurements](#) and [DC-8 measurements](#).

## OZONESONDE MEASUREMENTS

The pre-deployment phase of PEM Tropics, consisting of a small ozonesonde network, was initiated to provide a time history of tropospheric ozone in the PEM Tropics study region. Data from the ozondesondes will serve as a basis from which to judge the representativeness of the PEM Tropics airborne measurements. Supporting measurements for the mission include ozonesonde releases from Easter Island, Tahiti, American Samoa, and Lauder, New Zealand. See [OZONESONDE measurements](#).

## TRAJECTORIES

The modeling activities were planned as a part of the "real-time" field activities as well as post-mission analysis. These analyses include various chemical models focusing on specific science issues as well as meteorological models for real time air mass trajectories. See [TRAJECTORIES measurements](#).

Additional items available from the GTE Project Office for analyzing the data include:

- [Video Tapes available](#)
- [Satellite data available](#)
- [List of available documents](#)

More detailed information about PEM Tropics is available from the [GTE Project Home Page](#).