Part II

The 1997–98 El Niño Event

Monitoring El Niño

A range of new instruments to monitor the climate system has been implemented since the major El Niño event of 1982–83. These developments must be tempered by realization that there has also been an overall decline in the number of operational national surface and upper-air meteorological observing stations in many countries around the globe over the period. New or expanded observing systems that have been introduced and from which data are freely available include:

- Satellite instruments for remote sensing;
- An array of fixed buoys across the equatorial Pacific Ocean (the Tropical Atmosphere Ocean (TAO) array);
- A fleet of cooperating volunteer observing ships for deploying expendable bathythermographs (XBT) that measure ocean temperature and salinity at depth; and
- Drifting buoys for measuring sea surface conditions.

The initiatives, strongly supported by the World Climate Research Programme, reflect recognition by scientists that the understanding and prediction of climate variability and climate change will not advance satisfactorily without essential observations, particularly from across and beneath the ocean surface. In addition, because of limits to the observing capability existing at the time, many significant processes associated with the 1982–83 El Niño were not recognized or could only be inferred. Many features were only identified through research well after the event was over. The previous deficiencies significantly reduced the capacity for effectively warning of the existence of an El Niño event and the associated potential for climate extremes. A priority of the World Climate Research Programme, put to the Second World Climate Conference in 1990, has been for more international cooperation and

The Global Climate Observing System — GCOS

The Global Climate Observing System is an initiative that has its origins at the 1990 Second World Climate Conference, held in Geneva, Switzerland. Scientists called for a greater effort to better observe the climate system in support of research, monitoring variability and trends, prediction of future events, and services in support of safety of life and sustainable development. WMO, the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), International Council for Science (ICSU) and United Nations Environment Programme (UNEP) have joined as co-sponsors of the GCOS programme.

A priority of GCOS is to ensure that the data needs are met for seasonal-to-interannual climate prediction and for detection and attribution of long-term climate trends. The detailed scientific plans for GCOS were developed during the 1992–95 period and in 1996 the implementation phase began. The GCOS plans include observational elements relating to atmospheric, oceanic, terrestrial, cryospheric, hydrospheric and ecosystem processes, as well as space-based observations and data systems and management.

Several initiatives are under way to increase critical climate observations from the oceans. In the tropical Pacific Ocean the TAO array is operational. The TAO array has proven so successful that it is being extended to the tropical Atlantic Ocean and there is a plan for a network in the tropical Indian Ocean. New projects to deploy drifting buoys in the Southern Ocean have been initiated and an additional project has been proposed to provide global data assimilation of both space-based and *in situ* observations.

The implementation and operational management of GCOS components are through the dedicated contributions by national governments. The ultimate success of GCOS will require ongoing commitment by all governments to contribute funds and the services of scientific and technical staff.