

# Progress in Predicting Climate

How accurately can scientists forecast seasonal climate anomalies, such as dry or wet summers? What can be done to improve the predictive skill of climate models? These were the questions addressed by the two climate meetings hosted by the International Pacific Research Center at the East-West Center in Honolulu from November 3 to 7, 2003. The “Climate System Observational and Prediction Experiment (COPE) Workshop on Seasonal Prediction” and the “CLIVAR Working Group on Seasonal-to-Interannual Prediction” brought together experts from each part of the climate system: the atmosphere, ocean, land surface, and cryosphere.

“The main objective of the World Climate Research Programme (WCRP) is to answer the question whether climate is predictable,” said Dr. Shukla, Director of the Center for Land-Ocean-Atmosphere Studies. “We really haven’t answered that question yet. The only way that you can see whether climate is predictable is to predict it. This is why the Joint Scientific Committee of the WCRP decided on conducting the ‘Climate System Observational and Prediction Experiment’.”

The first task of COPE is to determine to what extent climate is predictable two weeks to a year in advance and what factors currently limit such predictions.

“No climate model yet exists that includes all the elements that scientists know influence climate,” says Benjamin Kirtman, professor at George Mason University and chairman of the seasonal prediction project of COPE. The aim of the COPE working group is to make a road map for developing prediction models that include all aspects of the climate system. This is a very difficult process, according to Kirtman, since the coupled system behaves quite differently from what might be expected when each system is studied separately.

Another stumbling block is the paucity of quality climate

observations needed to validate and initialize the models. For example, according to Randal Koster of the Goddard Space Flight Center, soil wetness, the climate memory of land, is important to a depth of 30 feet or deeper, but satellites can measure wetness just below the surface. Even straightforward rain gauge stations are far apart in many regions of the world.

Similarly, changes in the cryosphere must affect the atmosphere, ocean salinity, and circulation. Yet, according to Jens H. Christensen of the Danish Meteorological Institute, estimates of the cryospheric variables, such as the polar ice sheet mass, sea ice, and snow-depth, are still poor. Satellite altimetry measurements cannot directly measure the depth of snow or ice sheets, though some good correlations are now being obtained between satellite and submarine measurements of ice depth.

Kirtman felt strongly about the usefulness of COPE: “The experiment must be directly related to predicting events that are relevant to society, and we must be able to say what is predictable and what is not, given today’s level of understanding. We’ll go back and look at large climate anomalies over the last 30 years and see if we can predict them.”

Andreas Villwock, International CLIVAR Project Office, hopes there will be considerable progress towards reliable seasonal predictions within the next 10 years. “This is only possible,” he says, “with an international team of scientists who bring to the task knowledge of the various elements of the climate system.”

The COPE Workshop was co-sponsored by the World Climate Research Programme, its subcomponent, the Climate Variability and Predictability Program, the Center for Land-Ocean-Atmosphere Studies, and the International Pacific Research Center.



*Participants of the COPE Workshop on Seasonal Climate Prediction.*