WORLD METEOROLOGICAL ORGANIZATION

El Niño Outlook

29 Aug 2002

Current Situation and Outlook

During the first half of 2002, most forecasters were warning of an increased risk of an El Niño event developing during the year, though the degree of confidence regarding such a development varied somewhat among different expert interpretations. Three El Niño Outlook statements have previously been issued in 2002, forewarning of the increased probability of the onset of an El Niño event and seeking to track the evolution of conditions in the tropical Pacific and the range of expert interpretations on the likely developments. The last statement, issued 17 June 2002, reported a substantial rise in Central Equatorial Pacific sea surface temperature anomalies during late May and into June. This warmer than normal water has persisted to this point, and there is now agreement amongst forecasters that this represents the early phase of an El Niño event that is expected to persist for the remainder of the year and into early 2003.

Since late May, the sea surface temperature across much of the Central Equatorial Pacific has been about 1 degree Celsius warmer than normal. The climate system is currently feeling this warmth, and a tendency can be expected for climate patterns consistent with those associated with previous El Niño events. Since the warmth has been present since late May, it is probable that some atypical climate patterns observed since that time have at least in part been related to these changes in the tropical Pacific. These would include the unusual nature of the summer monsoon season across the Indian Subcontinent, notably the rainfall deficiencies in central and southern parts contrasting with excessive rainfall in the north-east, and the dry conditions over Indonesia and across large tracts of the Australian continent.

Most models and forecasters anticipate that the warmer than normal water in the tropical Pacific will be maintained through early 2003 at approximately the same level, i.e. about 1 degree Celsius above normal. While some further modest warming is also possible, conditions are not expected to reach the level of the last, very strong El Niño event of 1997/98, when sea surface temperatures in the central and eastern equatorial Pacific were several degrees above normal. However, while the current event is expected to remain less intense overall than the last event, conditions in the tropical Pacific are expected to be sufficiently anomalous to create substantial consequences in some regions. There is concern, for example, that the dry conditions that have developed over large areas of Australia in the past several months may be worsened by a persistence of the current event.

No two El Niño events are identical and the evolution of this event has to date had its share of distinguishing features. For example, the year began with abnormally warm conditions close to the tropical South American coast, which caused heavy rainfall, severe flooding and landslides in some coastal and near inland regions. This area of

warm water, however, did not spread across the Pacific into a basin-wide El Niño event at that time. Furthermore, the warm water observed close to South America earlier in the year has now been replaced by cooler than normal water. Warm anomalies could, however, redevelop in the easternmost Pacific over the next few months, as historical records of previous El Niño events show occurrences of two peaks in the warming of surface waters in this area.

Therefore, when considering response strategies, it will be important to consult National Meteorological Services for detailed interpretations of possible regional consequences of the current El Niño event. These interpretations will take into account that local and regional seasonal climate fluctuations may have many additional causes, involving patterns of sea surface temperature (SST) beyond the Pacific and factors other than SST. For example, regional climate fluctuations can be driven by SST patterns in the tropical Atlantic and tropical Indian Oceans. However, it must be emphasised that forecasts of SST patterns in these ocean basins currently have very limited skill. This is largely due to inadequate observations of conditions beneath the ocean surface, and the lack of understanding of the mechanisms of systematic SST changes in these ocean basins.

In summary:

Sea-surface temperatures across the vast region of the Central Equatorial Pacific have been about 1 degree Celsius warmer than normal since late May.

This pattern in the tropical Pacific, together with analysis of current conditions beneath the surface of the ocean and forecast projections from models, indicate that we are in the early stages of an El Niño event that will persist through to the end of the year and into the early months of 2003.

The magnitude of the warming in the tropical Pacific may intensify to a modest extent over the coming months, but is not expected to reach levels that were experienced in 1997/98. Nonetheless, severe consequences in particular regions are likely.

The area of warm water that had developed early over the eastern equatorial Pacific, has now been replaced by cooler than normal water in the easternmost equatorial Pacific. However, historical records of previous El Niño event suggest that warm anomalies could redevelop in this area, although this is by no means certain. This emphasizes the importance of consulting detailed interpretations of the expected climate anomalies and their possible effects on local weather, and not relying solely on the more general, historical tendencies on weather and climate associated with El Niño events.

It is likely that some unusual climate patterns observed in the last two months could be related at least in part to the basin-wide El Niño that has now developed in the tropical Pacific. However, the climate system functions by integrating many factors in addition to El Niño. Thus it can be difficult in the case of this relatively weak episode so far to attribute to it with confidence individual abnormal climate patterns or weather events that have been observed in recent weeks in Pacific and Pacific Rim countries. This is certainly the case for the several abnormal weather events that have been observed further afield.

The situation in the tropical Pacific will continue to be carefully monitored and further advisories will be issued. More detailed interpretations of regional climate fluctuations are likely to be generated routinely by the climate forecasting community over the coming months and will be made available through National Meteorological Services.

Climate Patterns in the Pacific

Research conducted over the past few decades has thrown considerable light on the important role played by interactions between the atmosphere and ocean in the tropical belt of the Pacific Ocean in altering global weather and climate patterns. During El Niño events, for example, sea temperature at the surface in the central and eastern tropical Pacific Ocean becomes substantially higher than normal. During La Niña events, the sea surface temperatures in these regions become lower than normal. These temperature changes can drive major climate fluctuations around the globe and once initiated, such events can last for 12 months or more. The last El Niño event occurred during 1997-1998 and was followed by a prolonged La Niña phase that extended from mid-1998 to early 2001. El Niño events change the likelihood of particular climate patterns around the globe, but the events are never exactly the same. Furthermore, while there is generally a relationship between the global impacts of an El Niño event and its intensity, there is always potential for an event to generate serious impacts in particular regions irrespective of its intensity.

Monitoring and Forecasting the El Niño/La Niña Phenomenon

The forecasting of Pacific Ocean developments is undertaken in a number of ways. Complex computer models project the evolution of the tropical Pacific Ocean from its currently observed state. Statistical forecast models can also capture some of the precursors of such developments. Expert analysis of the current situation adds further value, especially in interpreting the implications of the evolving situation below the ocean surface. All forecast methods try to incorporate the effects of ocean-atmosphere interactions within the climate system. The meteorological and oceanographic data that allow El Niño and La Niña episodes to be monitored and forecast are drawn from national and international observing systems. The exchange and processing of the data are carried out under programmes coordinated by the World Meteorological Organization.

Acknowledgements

The preparation of this El Niño Outlook statement has been coordinated by the World Meteorological Organization as a contribution to the United Nations International Strategy for Disaster Reduction. It has drawn on contributions and support from the International Research Institute for Climate Prediction (IRI)*, Australian Bureau of Meteorology, China Meteorological Administration, National Institute of Meteorology and Hydrology of Ecuador, European Centre for Medium Range Weather Forecasts, Japan Meteorological Agency, Korea Meteorological Administration, National Institute of Water and Atmospheric Research in New Zealand, National Meteorological and Hydrological Service of Peru, Met Office United Kingdom, United States Climate Prediction Center (CPC)*, and the Climate Variability and Predictability (CLIVAR) Project of the World Climate Research Programme.

* CPC is a component of the National Centers for Environmental Prediction in the US National Oceanic and Atmospheric Administration (NOAA). IRI operates under a cooperative agreement between NOAA and Columbia University, and is further supported through other national and international sponsors.