6-Drought Prediction

Empirical studies conducted over the past century have shown that meteorological drought is never the result of a single cause. It is the result of many causes, often synergistic in nature.

A great deal of research has been conducted in recent years on the role of interacting systems, or teleconnections, in explaining regional and even global patterns of climatic variability. These patterns tend to recur periodically with enough frequency and with similar characteristics over a sufficient length of time that they offer opportunities to improve our ability for long-range climate prediction, particularly in the tropics. One such teleconnection is the El Niño/Southern Oscillation (ENSO).(Dr.Michael j. Hayes,The National Drought Mitigation Center.U.S.A.

6-1:High Pressure

The immediate cause of drought is the predominant sinking motion of air (subsidence) that results in compressional warming or high pressure, which inhibits cloud formation and results in lower relative humidity and less precipitation. Regions under the influence of semipermanent high pressure during all or a major portion of the year are usually deserts, such as the Sahara and Kalahari deserts of Africa and the Gobi Desert of Asia. Most climatic regions experience varying degrees of dominance by high pressure, often depending on the season. Prolonged droughts occur when large-scale anomalies in atmospheric circulation patterns persist for months or seasons (or longer). The extreme drought that affected the United States and Canada during 1988 resulted from the persistence of a large-scale atmospheric circulation anomaly.

6-2:Too Many Variable

Scientists don’t know how to predict drought a month or more in advance for most locations. Predicting drought depends on the ability to forecast two fundamental meteorological surface parameters, precipitation and temperature. From the historical record we know that climate is inherently variable. We also know that anomalies of precipitation and temperature may last from several months to several decades. How long they last depends on air–sea interactions, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of dynamically unstable synoptic weather systems at the global scale.

The potential for improved drought predictions in the near future differs by region, season, and climatic regime.

6-3:TheTropical Outlook

In the tropics, for example, meteorologists have made significant advances in understanding the climate system. Specifically, it is now known that a major portion of the atmospheric variability that occurs on time scales of months to several years is associated with variations in tropical sea surface temperatures. The Tropical Ocean Global Atmosphere (TOGA) project has produced results that suggest that it may now be possible to predict certain climatic conditions associated with ENSO events more than a year in advance. For those regions whose climate is greatly influenced by ENSO events, TOGA project results may help produce more reliable meteorological forecasts that can reduce risks in those economic sectors most sensitive to climate variability and, particularly, extreme events such as drought.

6-4: TheTemperate Zone Outlook

In the extratropical regions, current long-range forecasts are of very limited reliability. The ability that does exist is primarily the result of empirical and statistical relationships. In the tropics, empirical relationships have been demonstrated to exist between precipitation and ENSO events, but few such relationships have been confirmed above 30 north latitude. Meteorologists do not believe that reliable forecasts are attainable for all regions a season or more in advance.