

Experimental Regional Climate Forecast for the Winter Season, 1997-98

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Abstract

The observed Pacific sea surface temperature (SST) in the spring of 1997 showed a strong signal of the onset of El Nino. Several campuses of the University of California, including the Lawrence Livermore National Laboratory and the Los Alamos National Laboratory have decided to carry out an experimental climate forecast for the winter season of 1997-98. The winter season coincides with the rainy season over California, and the purpose of the experiment is to examine the usefulness of the climate forecast on the management of California water resources. This climate forecast starts from the prediction of SST, the global climate, the regional climate, and down to the surface and subsurface water resources of the watershed, and ends with the prediction of the river flow. This paper reports the work of a regional climate forecast experiment using the UCD/LLNL Mesoscale Atmospheric Simulation (MAS) model.

The MAS model has a comprehensive physical package including microphysical processes, radiation, and soil and surface processes. It was originally designed for regional climate simulation. One unique strength of the MAS model is the adoption of a third order advective scheme which increases the computational accuracy, reduces the instability generated by the steep mountain slopes, and minimize the computational diffusion. Recently, the MAS model also incorporated DieCAST, a regional ocean model. This paper will discuss the results without coupling the ocean model.

The global data used to drive the MAS model started from the SST prediction of the National Center for Environmental Prediction (NCEP). This SST prediction was used to run the UCLA Atmospheric General Circulation Model to make an ensemble of global climate forecasts. Among this ensemble of forecasts, the one closest to the ensemble mean was chosen to provide the initial data and the lateral boundary condition for the regional climate prediction. A five-month prediction was made, starting from November 1, 1997 to March 31, 1998. The results show a higher than average rainfall over California. The amount of rainfall is less than the rainfall produced by the last major El Nino of 1992-93. The possible reason is that the El Nino of this winter reached its maximum strength in November and its strength started to decrease rapidly after that time. The temporal pattern of the precipitation showed no prolonged period of heavy precipitation, therefore, a major flood event may be avoided.