AOGS 2005

Interannual Variations in Pacific SST Deviations through AVHRR

JUN YU[1] and PER GLOERSEN[2]
[1]*Department of Mathematics and Statistics University of Vermont*
[2]*Oceans & Ice Branch/Code 971 NASA Goddard Space Flight Center*

We study variability of Pacific sea surface temperature (SST) utilizing the data of Advanced Very High-Resolution Radiometer (AVHRR) from 1985 to 1997. First, we model, and then remove from the AVHRR SST data, the seasonal cycle by using an intercept, a trend and first five harmonics of the annual cycle to best fit the data at each grid point in the least squares sense. We then apply a low-pass filter defined by a Gaussian smoother to the data to suppress any variability at spatial scales smaller than about 5°x5°. The resulting Pacific SST deviations are similar to the SST anomalies derived by removing monthly and zonally averaged temperatures.

In order to understand the propagation patterns of the Pacific SST deviations, we study Hoffmueller diagrams for the SST deviations along paths in different regions in the Pacific. These paths include latitude lines at 30, 35, 40, 45, and 50 degree north, latitude lines at 7.5, 20, 30, and 40 degree south, and paths in north Pacific and along the equator. Both 1987 and 1997-98 El Niño events as well as the 1984-85, 1989 and 1996 La Niña events are clearly depicted in the Hoffmueller diagram along the equator. The diagrams along the latitudes 35, 45 and 50 degree north show an eastward moving trough during 1986 to 1989. In the diagram along latitude 45 north the pattern is followed by moving crests up to about 1993. These patterns are clearer in the diagram along a path in the North Pacific. We also demonstrate spatial propagation of SST waves over interannual and decadal scales in south Pacific. Finally, we compare our current results with those from an earlier study using the NASA data of scanning multichannel microwave radiometer.