

MID-LATITUDE SEASONAL-TO-INTERANNUAL VARIABILITY OBSERVED BY TOPEX/POSEIDON

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We have constructed a time series of monthly anomalies of global sea surface topography for our TOPEX/POSEIDON investigation between 1978 and the present, using all available altimetry data. The grids have been validated with tide gauge observations. The most accurate data are from TOPEX/POSEIDON (3 cm rms) for the period 1992 to the present, whereas SEASAT and Geosat, covering 1978 and 1985 to 1989, had an accuracy of 5 cm rms.

Our analysis of these data for climate studies is underway with an emphasis on the propagation of planetary waves, and the interannual near surface advection of heat. A study has been completed with these data in the South China Sea. Altimetry and temperature data indicate that there exists significant quasi-biennial and quasi-penta-annual variability, which is strongly modulated both interannually and decadal. Strong decadal variability and a strong linear trend are also found in the XBT data. In addition to low-frequency variability, there is also strong intra-annual variability in both the altimetry data and the XBT data, which is also strongly modulated interannually.

Other studies have addressed the intra-annual, annual, and interannual variability in the regions of the Kuroshio Extension and Gulf Stream. The major results are:

- (1) in both the Kuroshio Extension and Gulf Stream regions we find a strong linear trend in the 4-year period from October of 1992 to February of 1997, with the one in the former region twice as large as that in the latter region. Presence of the strong linear trend suggests that there is strong decadal variability in the two regions, which is supported by the analysis of 30-year historical XBT data.
- (2) In both regions, there exists strong intra-annual (around 8 to 9 months) variability. In the Kuroshio Extension region the intra-annual variability is closely tied to bottom topography, while it is not tied to bottom topography in the Gulf Stream region.
- (3) In addition to large-scale strong annual steric height oscillation, there also exists strong annual wave activity in the Kuroshio extension region, which is closely tied to bottom topography.
- (4) Estimates of the transport in the Gulf Stream, similar to studies of transport in the Kuroshio off Japan by other T/P PIs, suggest that the Gulf Stream transport has much less variability than the Kuroshio.

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