High-Frequency Variability of Currents along the West Coast of India

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Current observations along the coast of India have been restricted to short-duration (usually a month long) records. We present the first, six-month-long direct current measurements from the west coast of India. These observations were made during March–October 2008 using six Acoustic Doppler Current Profilers (ADCPs) located on the shelf (water column depth ~ 100 m) and slope (water column depth ~1100 m) off the central west coast of India. The mooring pairs were located roughly at 13◦N, 15◦N, and 17◦N, implying a spacing of about 200 km between successive pairs. The 50 m current from the slope mooring at 15◦N has presented earlier [1], but the complete set of data are being presented for the first time. Though the moorings were spaced about 200 km apart, there was considerable difference in the measured currents. Spectral analysis (FFT) shows a 12day
period in all six moorings, a 25–35day period on the shelf, and a 40–50day period on the slope. Wavelet analysis shows that only the 12day period is coherent, the other periodicities appearing at different times along the coast. Analysis of the 12day period, done by band-pass filtering (10–14daysfilter width) the current data using a Butterworth filter shows poleward propagation along the coast during April and July–August. The lag between 13◦N and 15◦N, or between 15◦N and 17◦N is about 1 day. Wavelet analysis of the alongshore winds (from QuikSCAT) shows that this propagation occurs when the wind forcing is present only to the south of the southernmost mooring. At other times, which includes the period of monsoon onset during May–June, the wind forcing is present all along the coast, and there is no evident propagation. At such times, the local forcing is strong and the observed current includes a strong locally forced component, precluding an estimate of the remotely forced component. At higher periods, poleward propagation is not as apparent as at the 12day period.
Keywords: Intraseasonal variability; Direct current measurements; Eastern boundary currents; Equatorial oceanography; Kelvin waves; Indian Ocean.

References

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