C O N T E N T S

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Editorial

The measurement of ocean surface topography has gone a long way since the pioneer missions of Seasat and GEOS-3 in the 1970s. Topex/Poseidon (T/P) and its successor Jason-1 have pushed the level of measurement accuracy close to three centimeters (total rms error). Averaging the data over time and large areas has further reduced the measurement errors and allowed scientists to monitor the change of global mean sea level at a rate of a few millimeters per year. We have gained new understanding of large-scale ocean dynamics ranging from El Niño to tidal mixing in the deep ocean. While such fundamental progress is being made, we also realize the limitations of sampling by a single altimetry satellite. The wide spacing between adjacent tracks has prevented us from resolving the energetic mesoscale eddies that carry most of the kinetic energy of the ocean.

Since September 2002, T/P and Jason-1 have been in formation flight to create twice the coverage of the ocean, thereby increasing cross-track resolution. T/P has been moved to a new orbit so that its ground tracks are midway between the Jason-1 tracks. The equatorial crossing times of the two satellites are only seven minutes apart. These nearly simultaneous measurements allow computation of the along-track geostrophic velocity component. This is a fundamentally new capability, not achievable with un-coordinated multiple satellites such as the combination of Jason-1 with Envisat or GFO. Another unique opportunity offered by the Tandem Mission is for improved modeling of coastal tides, which have not been well resolved by T/P due to its coarse spatial resolution With this improvement, the decade-long data record from T/P in many coastal areas will then become much more useful for the study of coastal circulation and its low-frequency variability.

The spacing between the Tandem Mission tracks, about 110 kilometers at 45° latitude, is still larger than the Rossby radius of deformation-the scale for ocean eddies. To resolve ocean eddies and achieve more accurate estimations of the surface current velocity, we will need a spatial resolution comparable to the smallest radius of deformation at high latitudes, i.e., about 15 kilometers. The Wide-Swath Ocean Altimeter (WSOA) developed by the Jet Propulsion Laboratory (JPL) as an experimental payload for the follow-on mission to Jason will have such capability. Using the technique of radar interferometry, WSOA will measure the ocean surface topography over a swath of 200 kilometers and cover nearly the entire world ocean in 10 days. We envision a future operational altimetry system composed of a standard-precision, nadir-looking system like Jason with a WSOA to achieve global measurement with high accuracy and resolution.

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