Model Validation and Data Assimilation using Surface Current Maps from HF Radar

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Shore-based remote sensing of ocean surface currents is possible using HF radiowave backscatter. These data are becoming more common and widespread and, as such, represent one of the important new observing capabilities for the coastal ocean. HF radar-based velocity estimates have potential benefits for both real-time and retrospective systems for a wide range of applications, including search and rescue, hazardous spill mitigation, larval transport mapping, and optimal ship routing. It is also likely that these two-dimensional surface velocity observations will be most beneficial when used in conjunction with high resolution coastal ocean circulation models.

In this presentation, examples from a network of four HF radar sites surrounding Monterey Bay, California will be presented showing the real-time velocity mapping capability that has been developed under the auspices of several local observing system programs. The evolving velocity patterns under the cycle of upwelling- and downwelling-favorable wind forcing will be compared to predictions from two separate, nested ocean model configurations, one based on POM and the other based on ROMS. Preliminary results from simulations that assimilated the radar-derived surface velocity fields will also be shown, including verification using independent data at and below the surface layer from two deep-ocean mooring sites. Those results show positive impacts of surface velocity assimilation down to depths around 100 m. They also point out important areas for future research into better error characterization schemes to insure that the generally positive influences of surface velocity assimilation do not lead to model degradation in the regions outside the HF radar footprint.