

Surface Transport and Mixing in Monterey Bay III: Variability from Hours to Years

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Abstract: The analytical techniques described in the previous talk are used to construct synoptic Lagrangian maps (SLMs) from HF radar measurements in Monterey Bay for August 1994 and August through October 1999. The velocity fields are dominated by diurnal and semidiurnal fluctuations due to combined wind and tide effects, so that the statistical characteristics of the flow change little from day to day. However, the spatial patterns in the SLMs and incoming/exiting regions show remarkable variability over time scales ranging from hours to years.

Hourly changes correlate well with semi-diurnal and diurnal velocity fluctuations. A sequence of twelve weekly snapshots shows marked weekly changes in the large scale SLM structure, with no apparent repetition. At

monthly scales, the period August through October 1999 showed dramatic short period shifts in the percentage of particles that escaped to the open ocean. In early September there was a five-day period when virtually no particles left the bay. Yet less than two weeks later approximately 60 % of all particles left the bay. Dramatic interannual variability also exists. A comparison of the synoptic Lagrangian maps for August 1994 and August 1999 shows vast differences in the fate of surface particles, although the wind patterns for these months were quite similar. In August 1994 most of the particles to the open ocean, while in 1999 most encountered the coast. These results provide new insight and analysis tools for studying the role of surface transport variability in ecology and pollution management.