Oceanographic applications and hardware and software developments using an array of high frequency radars as part of the Southern California Coastal Ocean Observing System

Libe Washburn, Brian M. Emery, Cyril Johnson, and Carter Ohlmann
West coast and UCSB & CalPoly HR radar networks

- New site being installed at Nicholas Canyon
- Permitted site at Gaviota
- ARG1 = 5 MHz & 12 MHz systems
- SCI1 = plan to install 5 MHz system, current system is 12 MHz
Outline

1. Primary productivity and eddy rotation

2. Estimating antenna patterns using Automatic Information System (AIS) data

3. Coverage patterns from experimental transmit antennas
Patterns and drivers of phytoplankton primary productivity in the Santa Barbara Channel
Productivity patterns

mean & seasonal patterns

EOF patterns

- mode 1: seasonal variations
- mode 2: eddy rotation?
Estimating relative vorticity

\[ \zeta \approx \frac{\Delta V}{\Delta x} - \frac{\Delta U}{\Delta y} \]

- also estimated circulation \( \Gamma \) and spatially-averaged \( \zeta \)
High relative vorticity and productivity

\[ \frac{\zeta}{f} \]
Low relative vorticity and productivity
Relative vorticity: HFR vs. ADCP

- high $\zeta$ necessary, but not sufficient condition for productivity max

- spring
- fall
- winter
- high mode 2
Automatic Information System (AIS) data

AIS data in SB Channel

5 December 2008 00:00 UTC –
7 December 2008 23:00 UTC

EAST COAST AND PUERTO RICO
NAIS I-1 Actual Coverage for 01-16 October 2007
Spectral signature of ship traffic

![Graph showing spectral signature of ship traffic at different times. The x-axis represents radial velocity (cm/s), the y-axis represents dBm, and the graph is labeled with GMT times from 2025 to 2042.]
AIS vs ship-measured antenna patterns
End