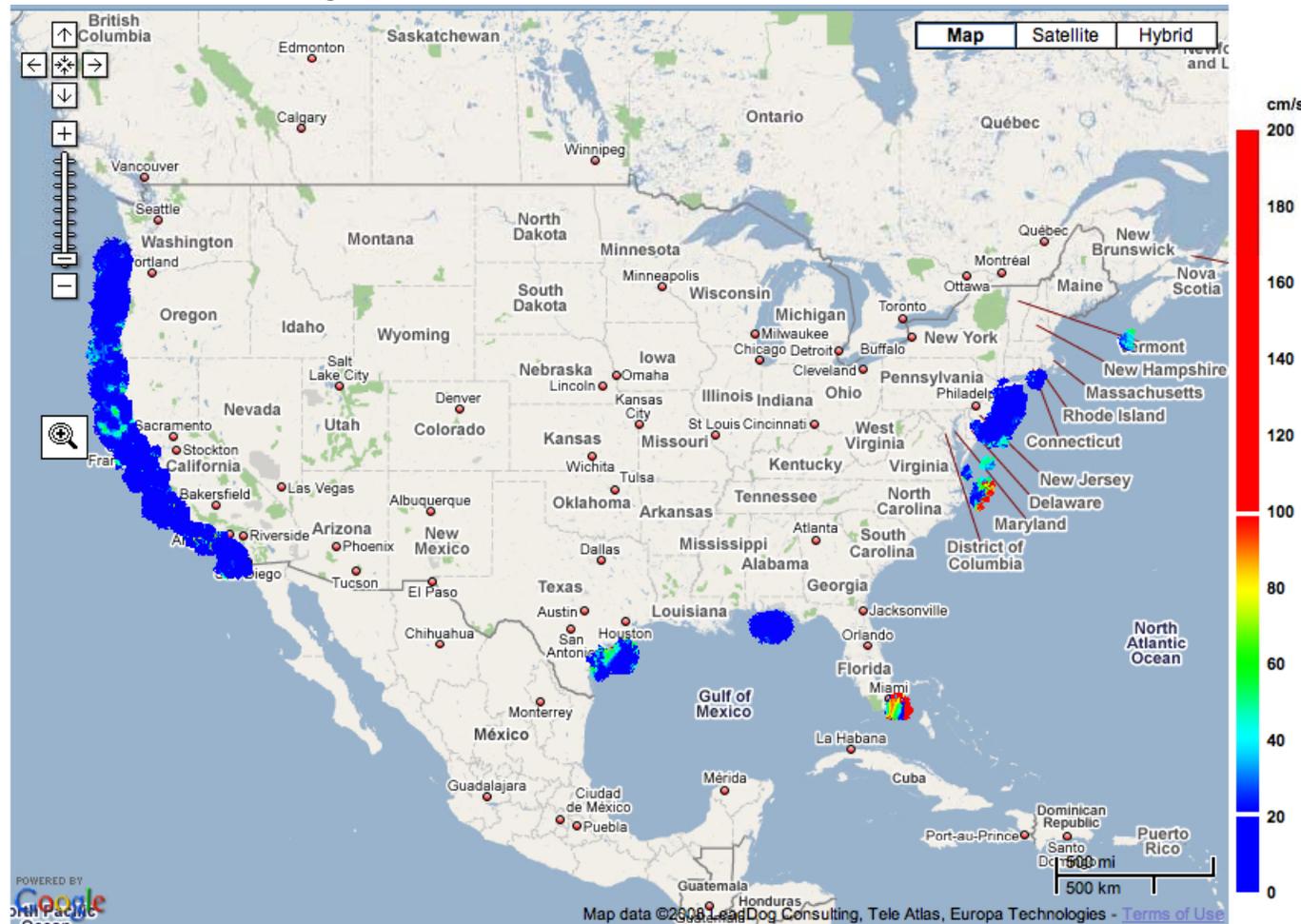


High Frequency (HF) Radar Applications-A Few Comments

Jeffrey D. Paduan
Naval Postgraduate School



HF radar ocean surface currents on 17 Oct 2008

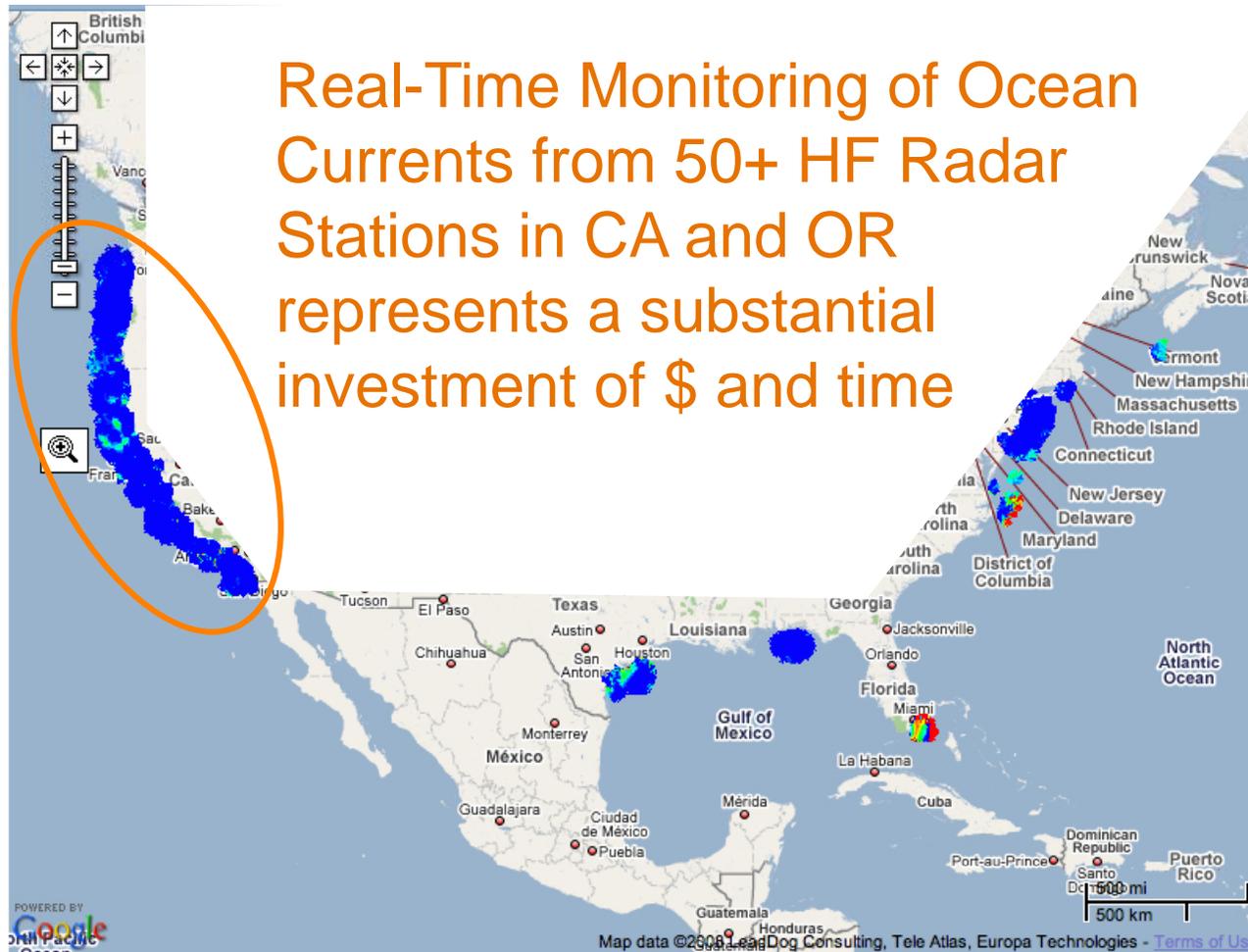
High Frequency (HF) Radar Applications-A Few Comments

Maritime ✓

Rapid?

Environmental ✓

Assessment ✓

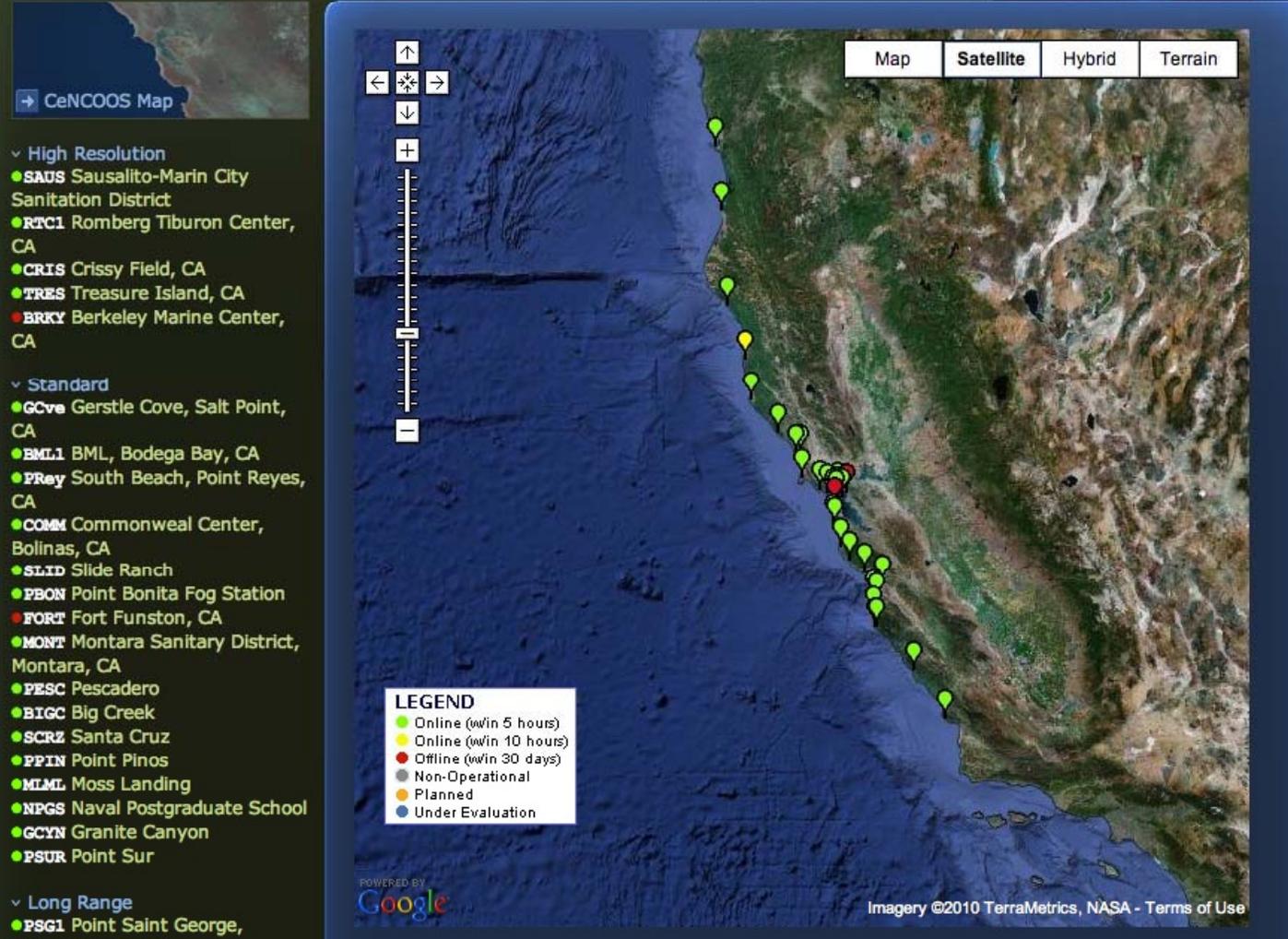


HF radar ocean surface currents on 17 Oct 2008

California Surface Current Mapping Sites

Central & Northern California Ocean Observing System Sites

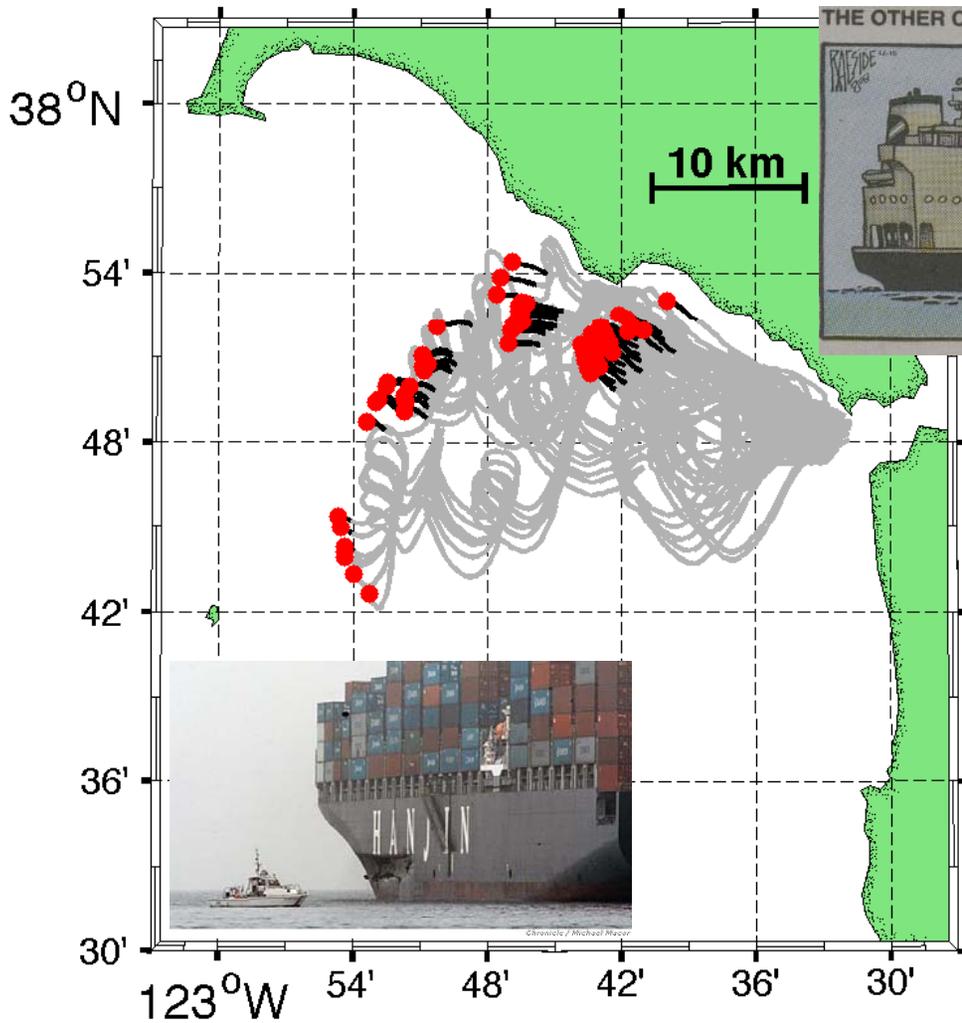
CeNCOOS Map
SCCOOS Map



If it takes years to establish a wide-area surface current mapping network, does that exclude HF radar from MREA applications?

No for, at least, two reasons

Particle Trajectories From
OMA Derived Currents at 15-Nov-2007 16:00 GMT



Sometimes you just need to be ready and waiting

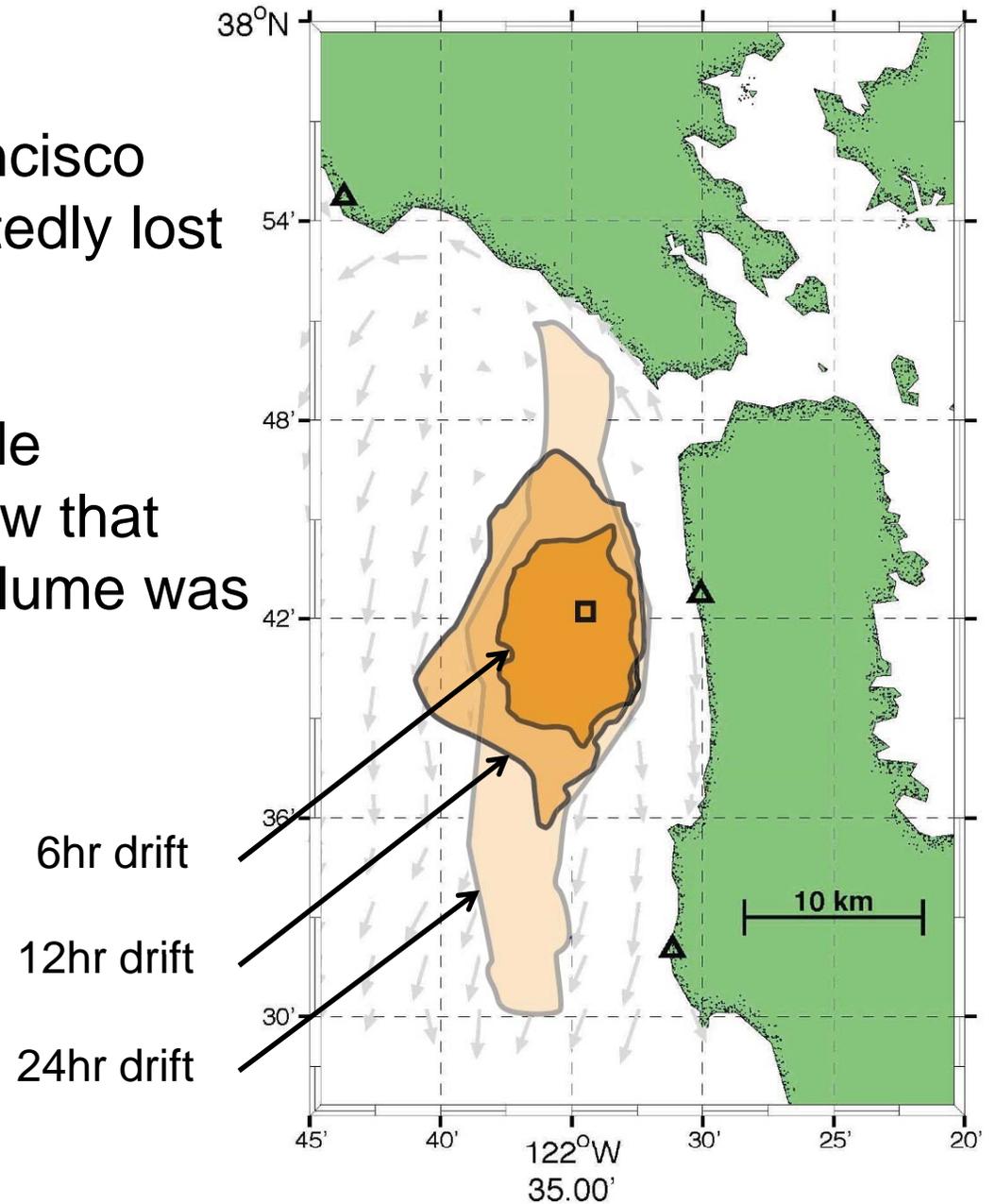


The November 2007 Costco
Busan spill in San Francisco Bay

1-10 October 2007

Period when the San Francisco municipal outfall unexpectedly lost its end cap

Statistics of surface particle movements helped to show that beaching of the sewage plume was unlikely



It took about two years to obtain site and frequency permissions for the 50 HF radar installations along the California coast

During real emergencies, permissions are not as critical—you should have your choice of ideal sites



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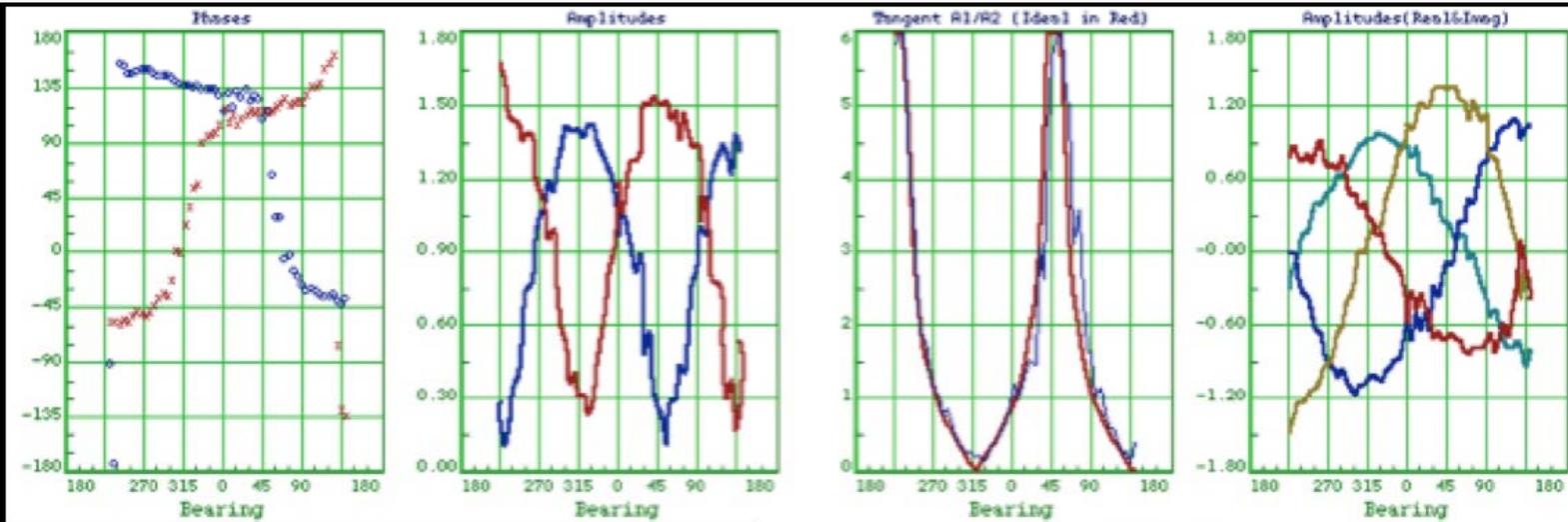


Its possible to swing into action and deploy HF radar instruments in as little as a few hours—remember the helicopter deployment example of Vicente?

But what about calibrations?

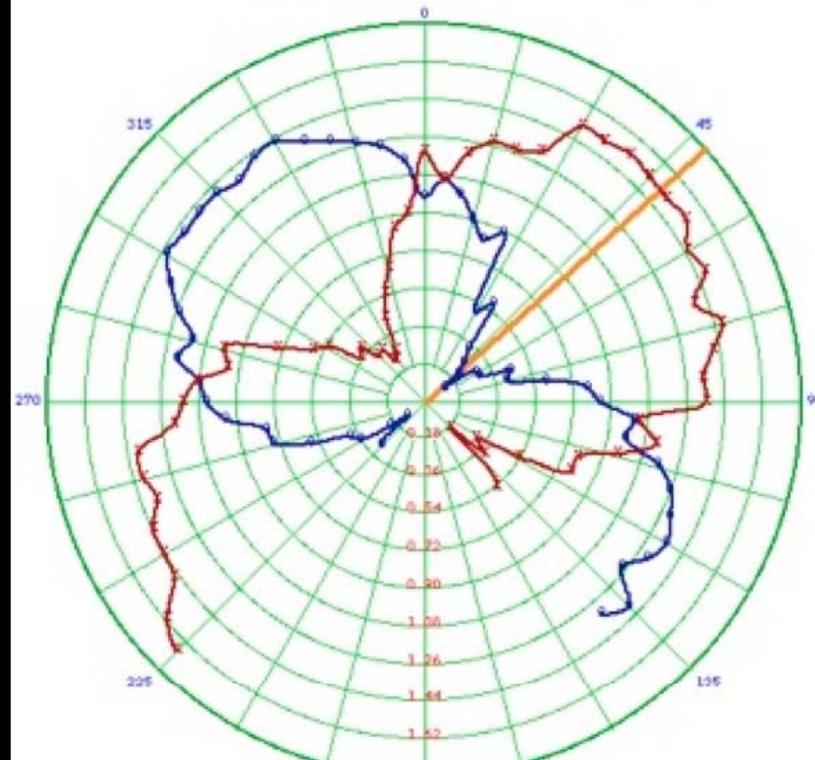


Use the
helicopter!



It works!

**Pattern was confirmed by
measuring with transponder
aboard a boat**



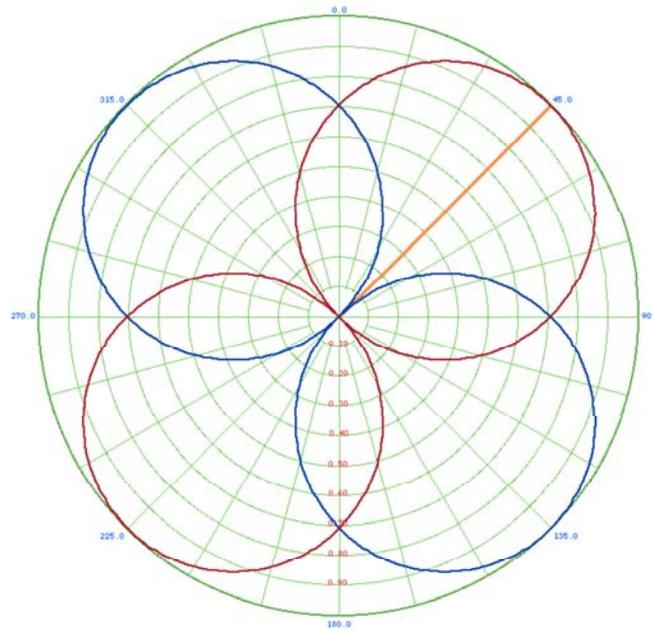
Another option is to deploy an HF radar onboard a survey ship



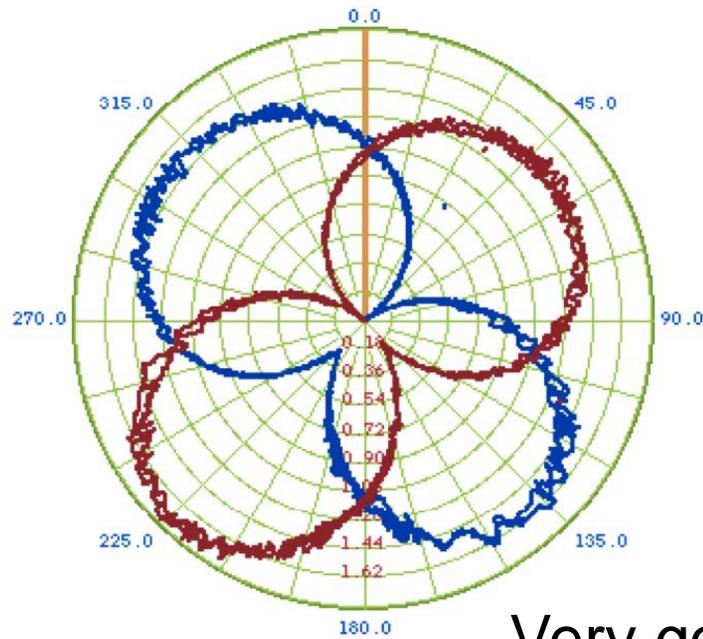
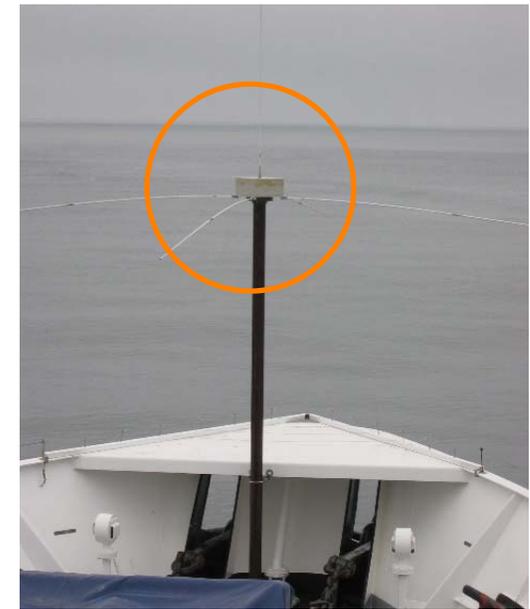
R/V Pt Sur



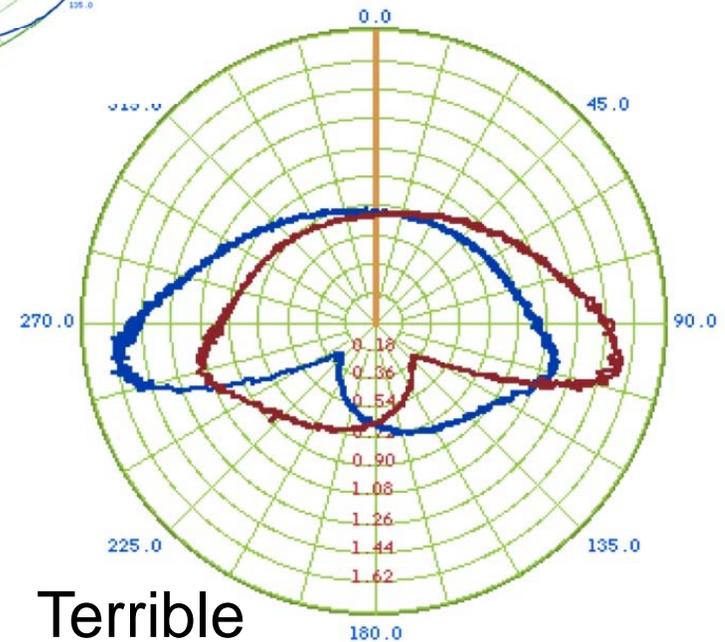
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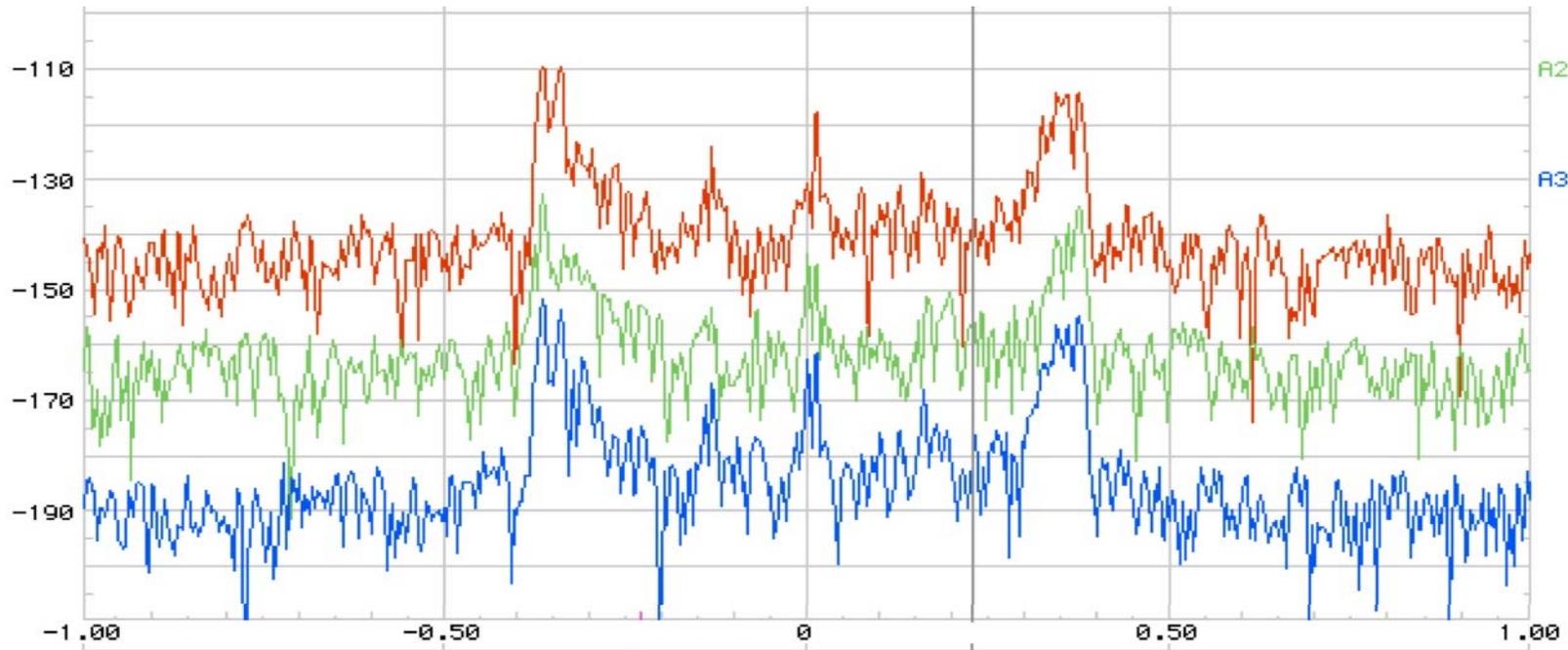
Ideal



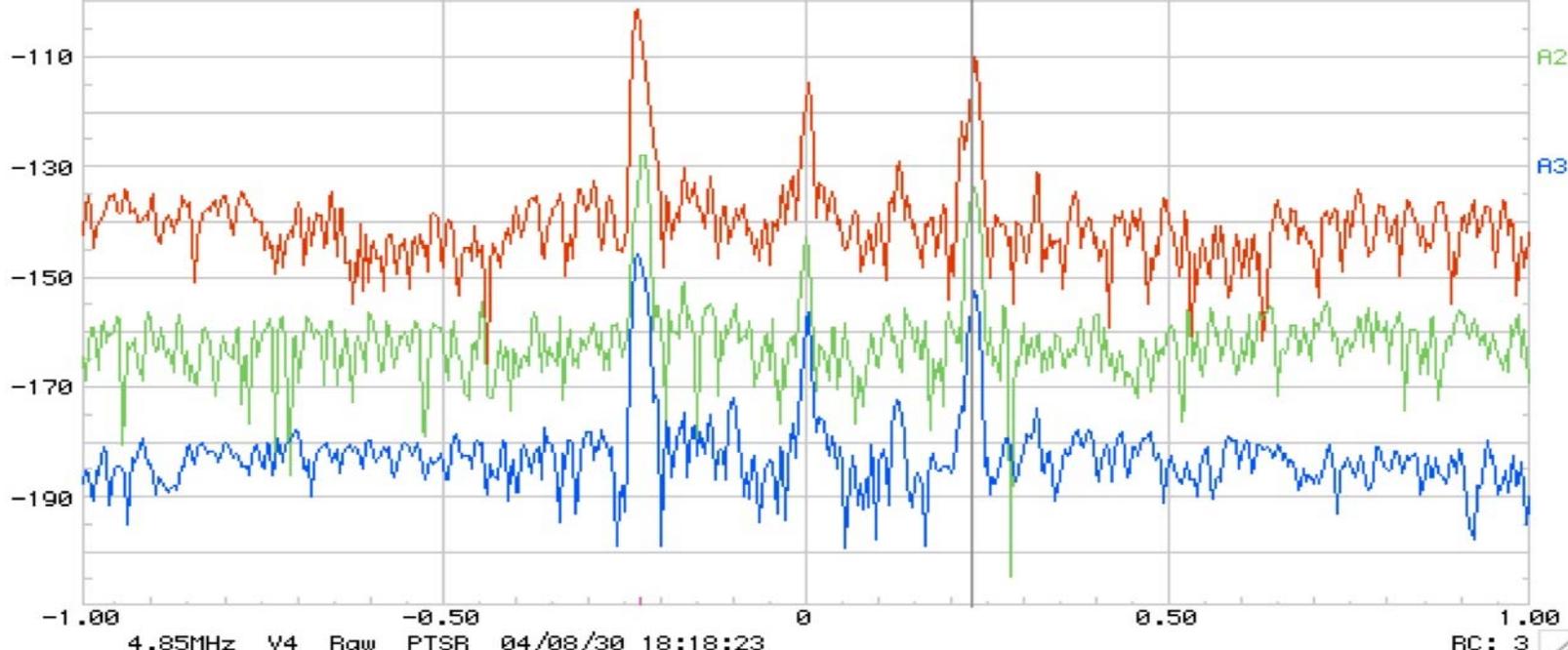
Very good



Terrible



Ship moving at 8 knts- not useable



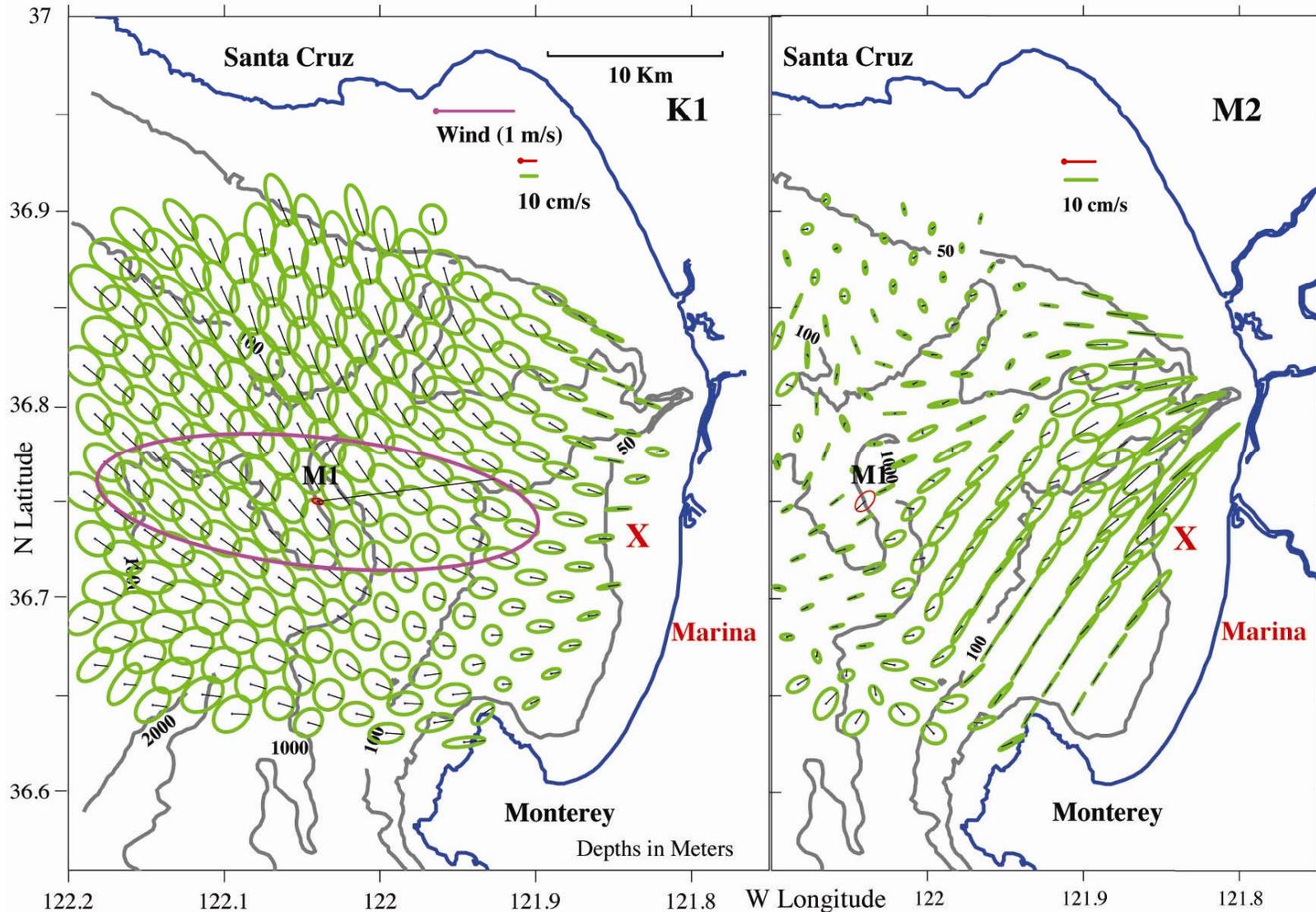
Ship at rest- useable

4.85MHz V4 Raw PTRS 04/08/30 18:18:23

RC: 3

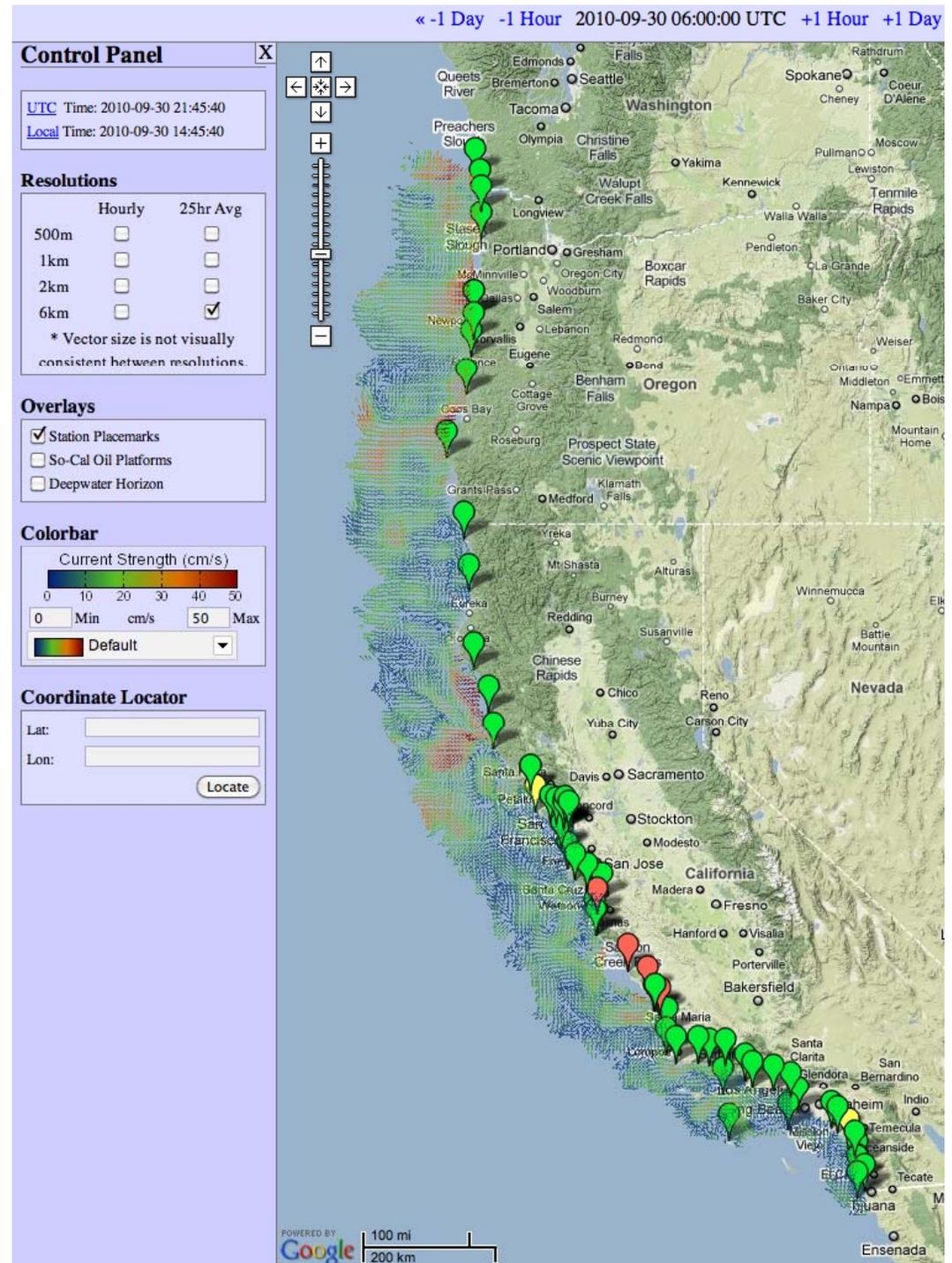
Even if restricted to survey ships at rest, it could be still useful to have a moveable surface current mapping capability

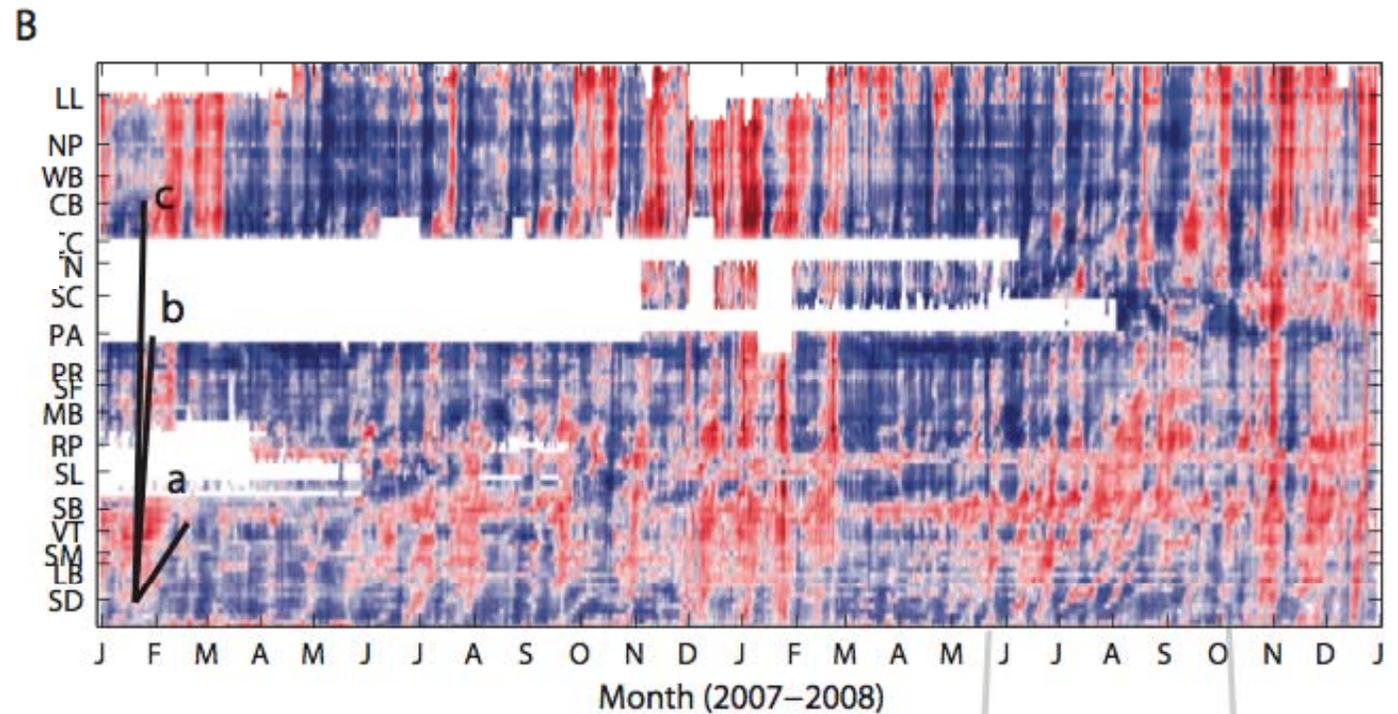
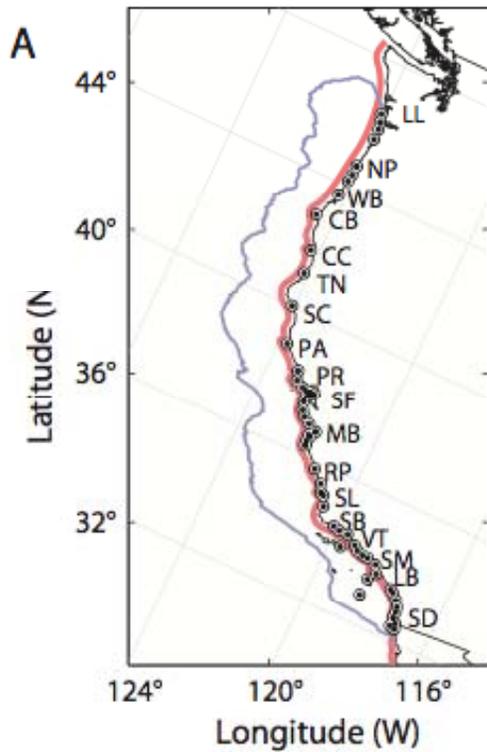
No site permission needed; e.g., tidal current surveys



In-place surface current mapping networks can help 3-D models perform better in the upper ~100m (recall Yi Chao's results as well as published results of Shulman and Paduan)

The California network has been working long enough to begin showing new physical insights as well

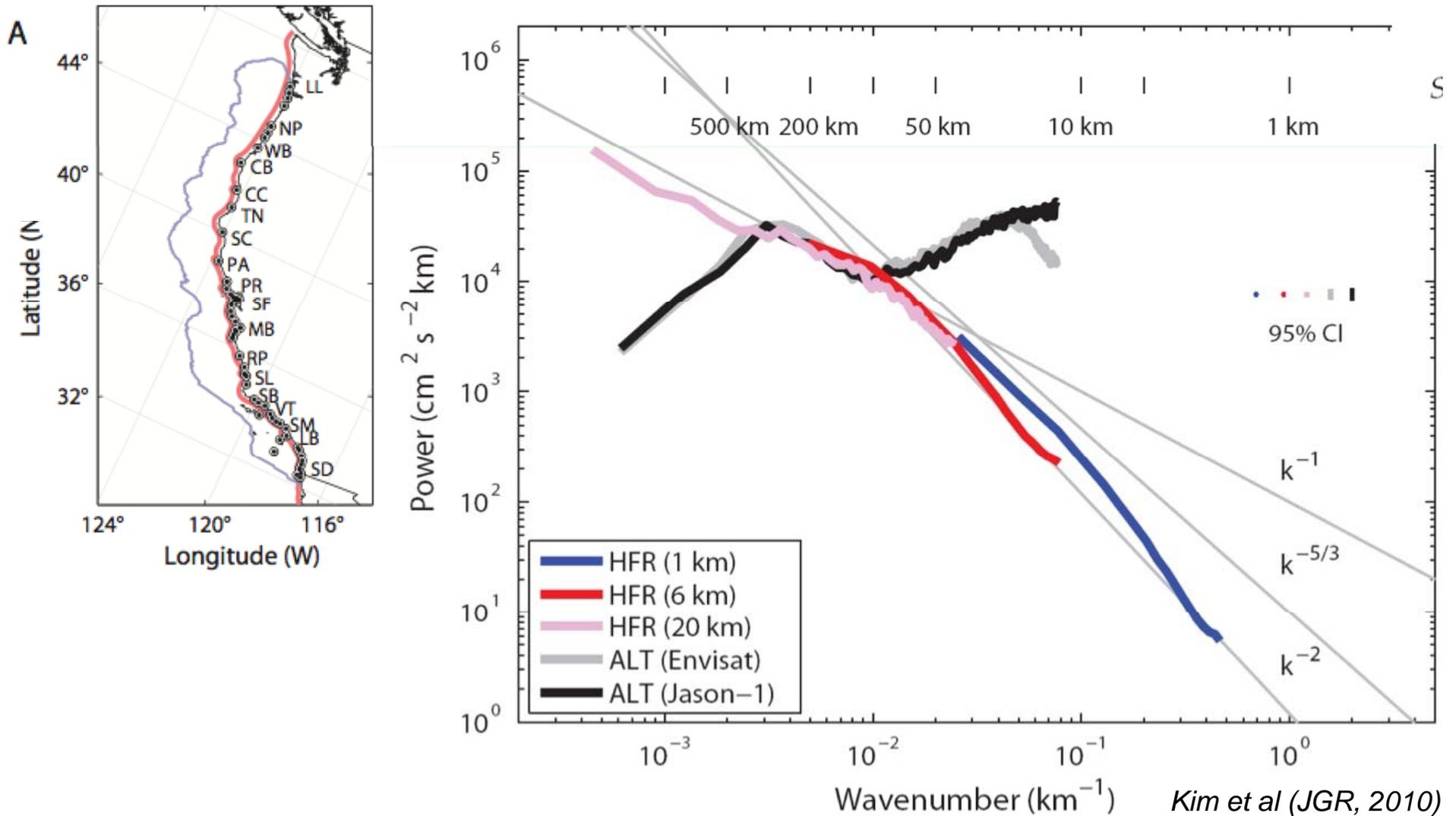




Kim et al (JGR, 2010)

The California network has been working long enough to begin showing new physical insights as well

Coastally trapped wave signatures are well represented in the surface current data



Wavenumber spectra from the upper 1m of the water column exhibit slopes more similar to 2-D surface turbulence than 3-D quasi-geostrophic turbulence—does your model?

Thank you

