Observations to Operations: Why validation is important?

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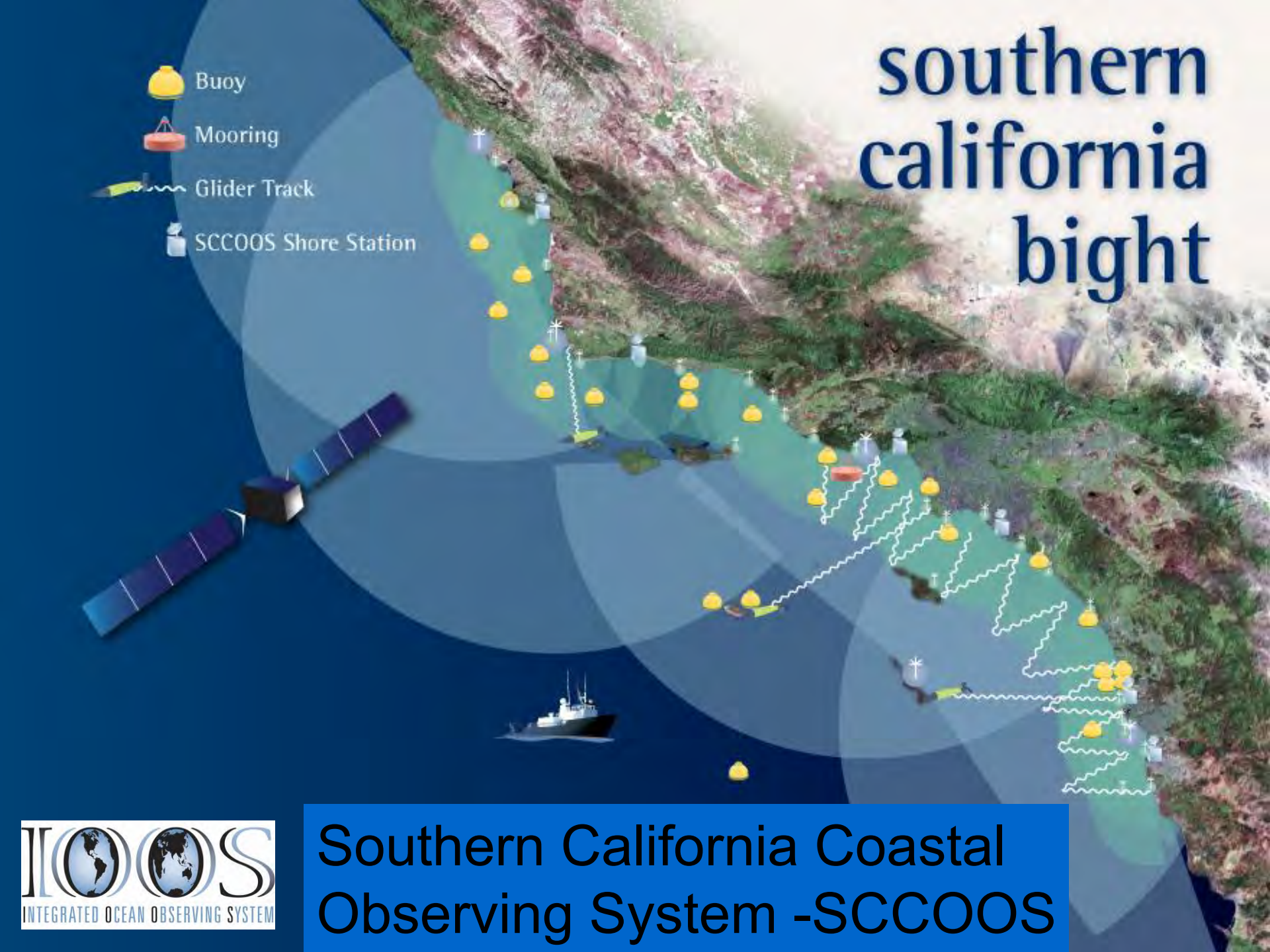
Hydrographic Review Panel
Los Angeles, CA
April 9, 2015

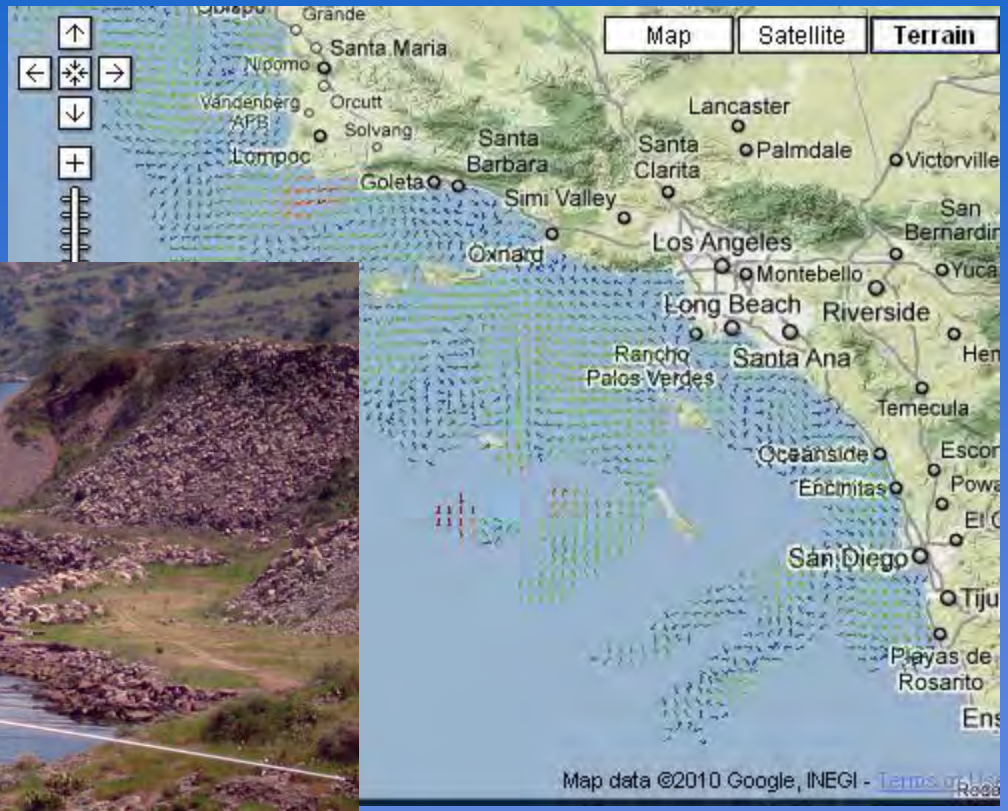
IOOS® INTEGRATED OCEAN OBSERVING SYSTEM



IOOS
INTEGRATED OCEAN OBSERVING SYSTEM

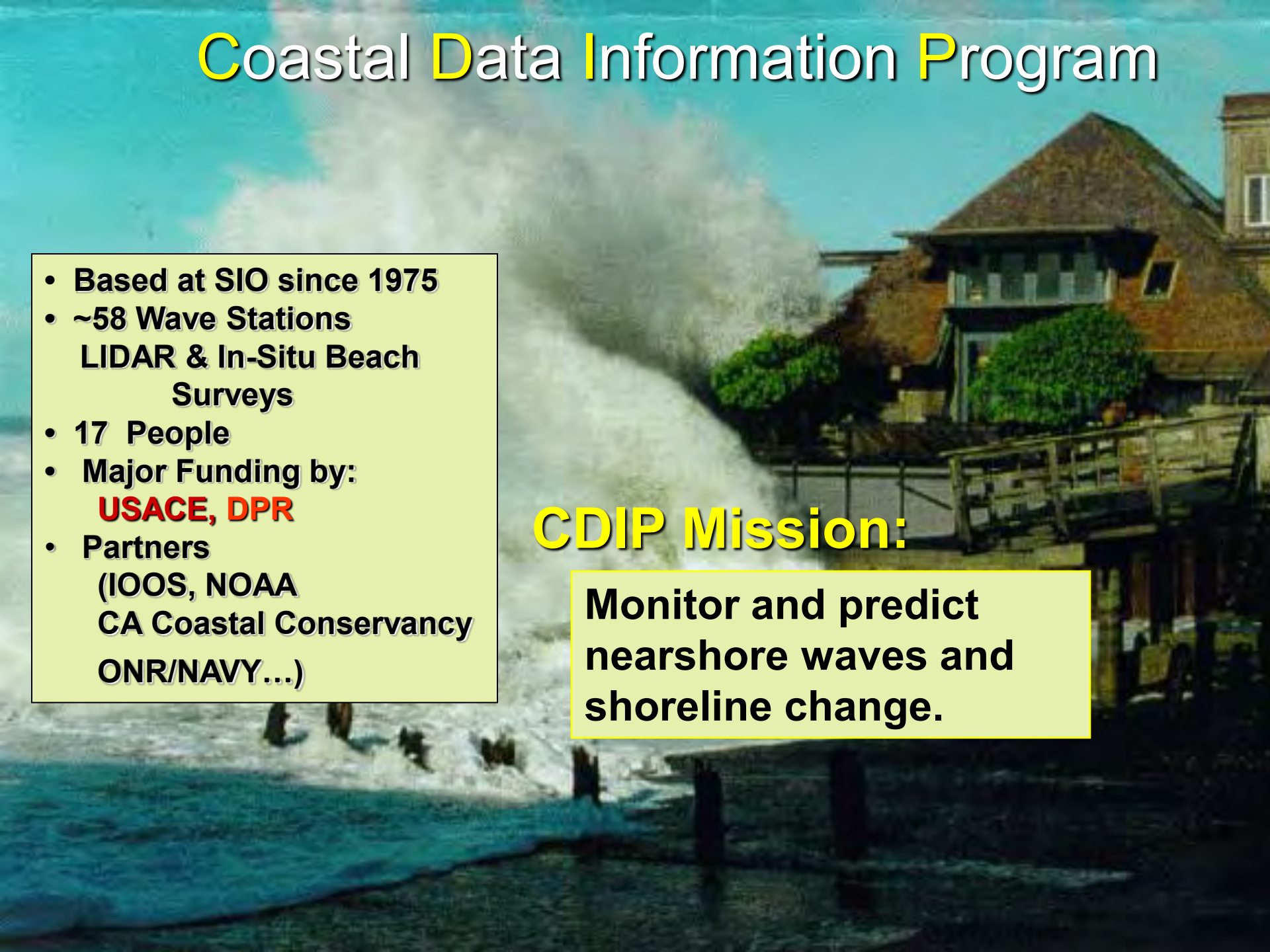
Southern California Coastal Observing System -SCCOOS

SCCOOS Surface Currents



HF Radar, Santa Catalina provides surface currents

Coastal Data Information Program



- Based at SIO since 1975
- ~58 Wave Stations
  LIDAR & In-Situ Beach Surveys
- 17 People
- Major Funding by:
  USACE, DPR
- Partners
  (IOOS, NOAA
  CA Coastal Conservancy
  ONR/NAVY…)

CDIP Mission:

Monitor and predict nearshore waves and shoreline change.

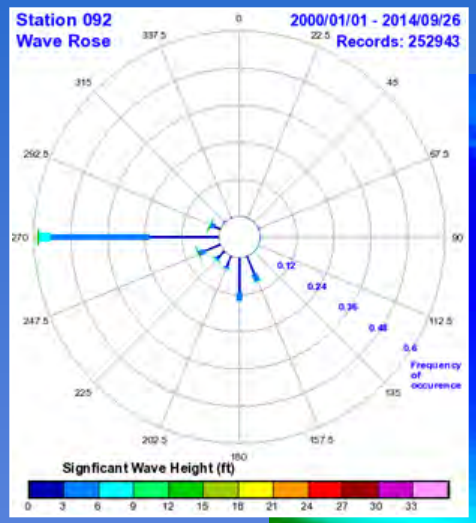
CDIP Wave Buoys – *NAVIGATION*

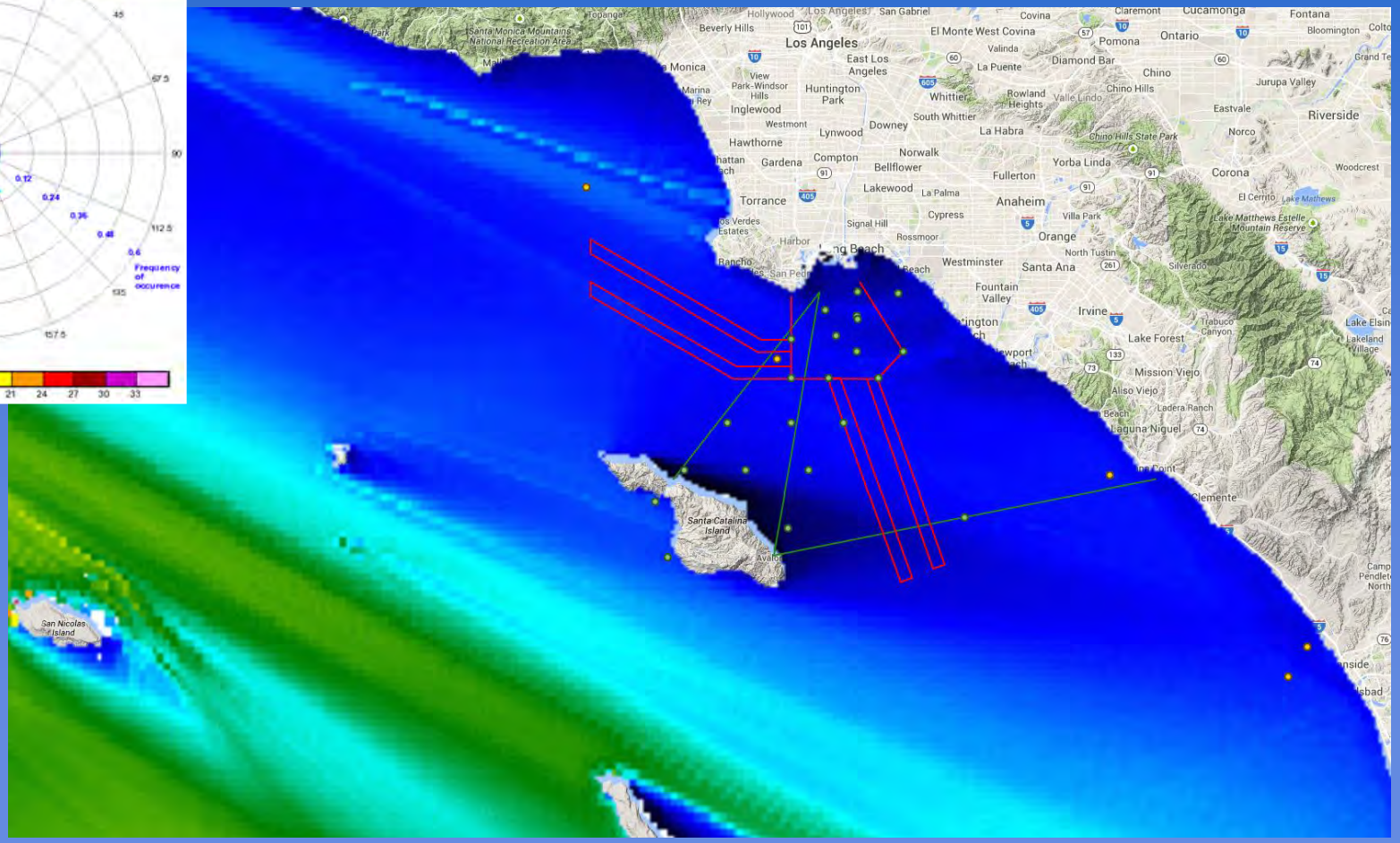
http://cdip.ucsd.edu

4.4 million page views from Jun 2013 – Jun 2014

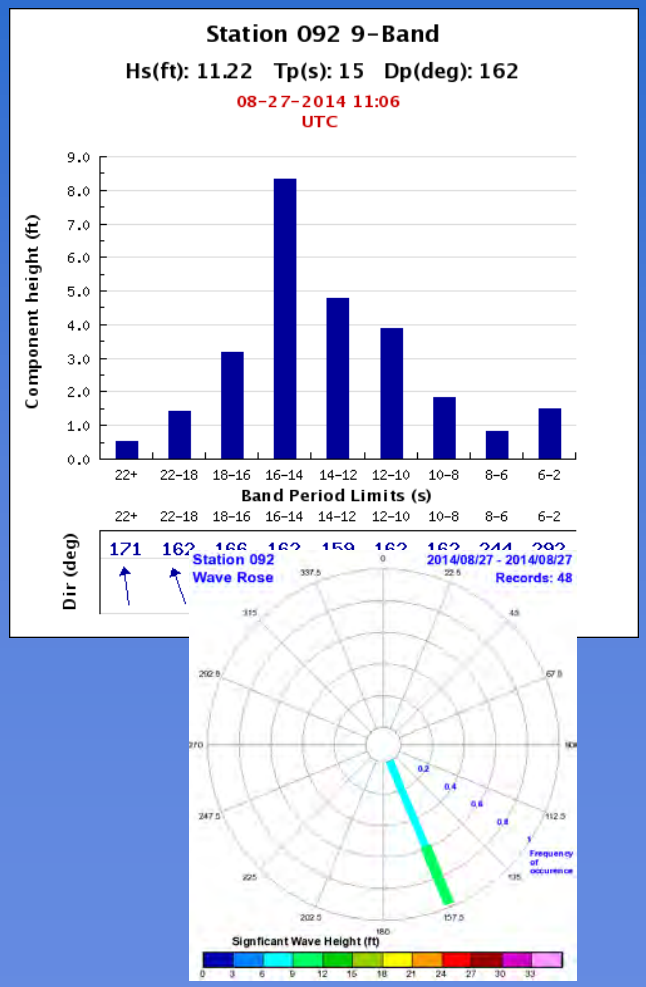
Data sent to NDBC @ 30 min and distributed to NWS

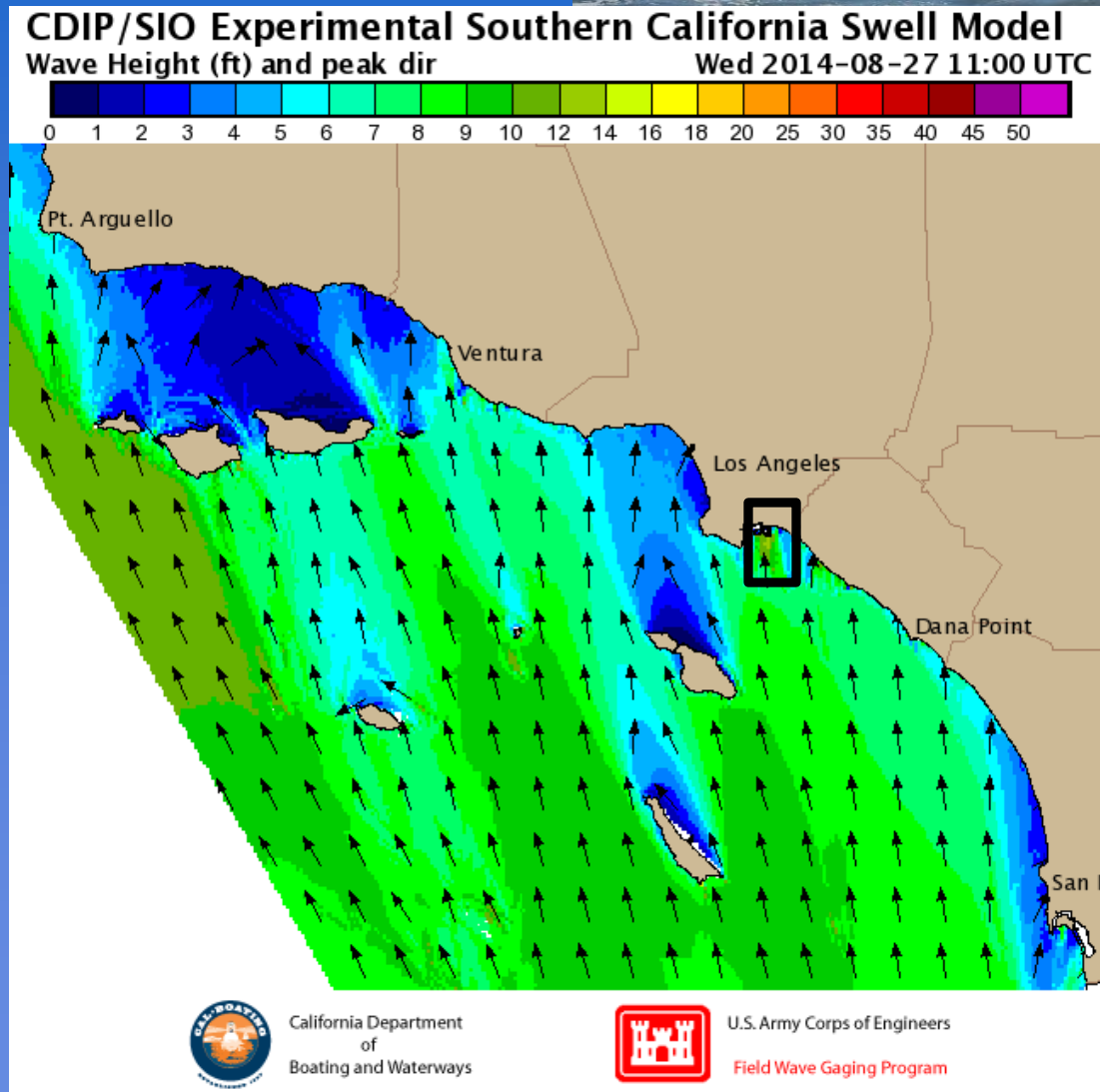
Full Directional Spectrum exposure for San Pedro buoy (2000-present)





Recent Damage to the Breakwater: >8ft South Swell

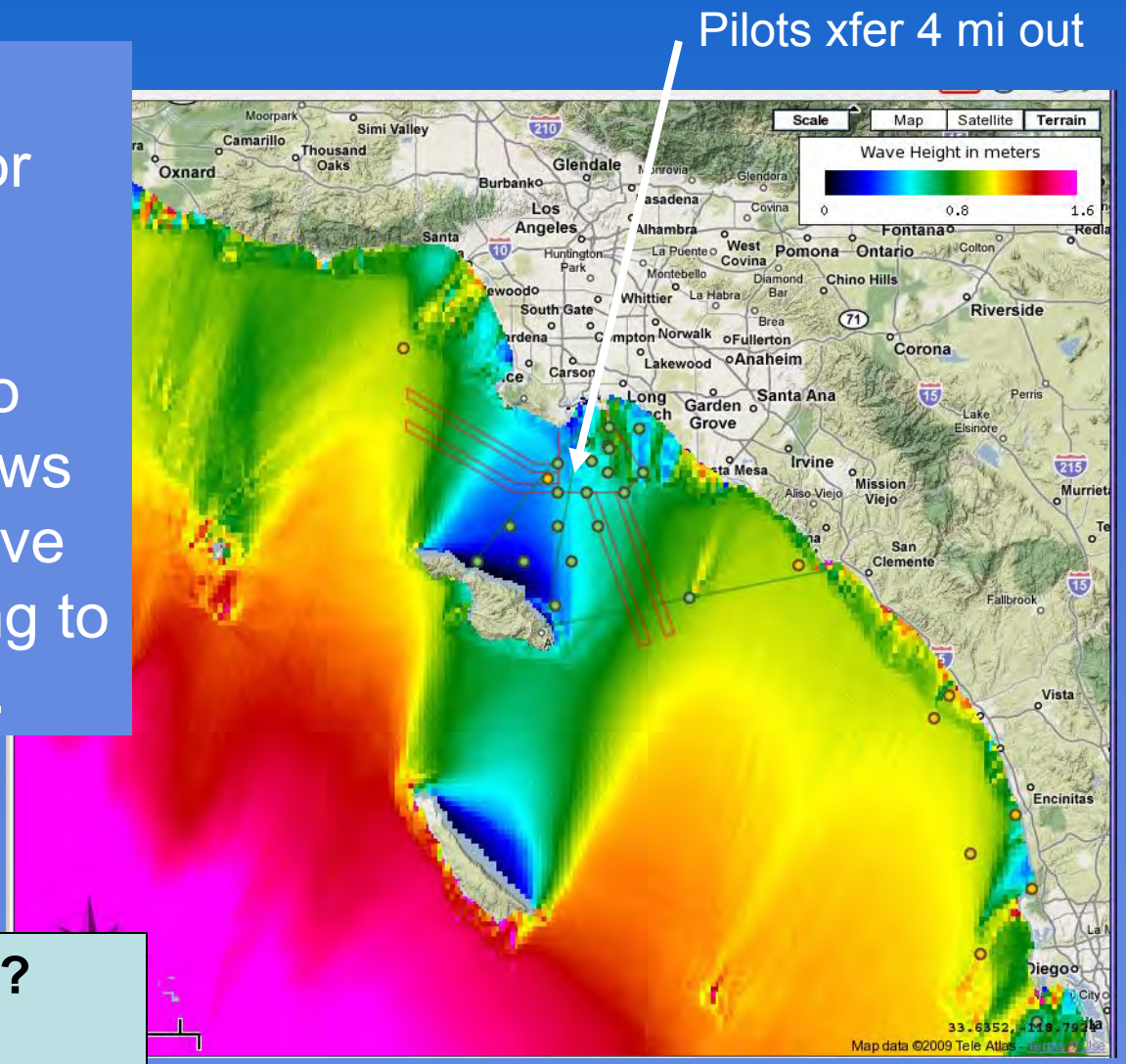




PORT of Los Angeles and Long Beach

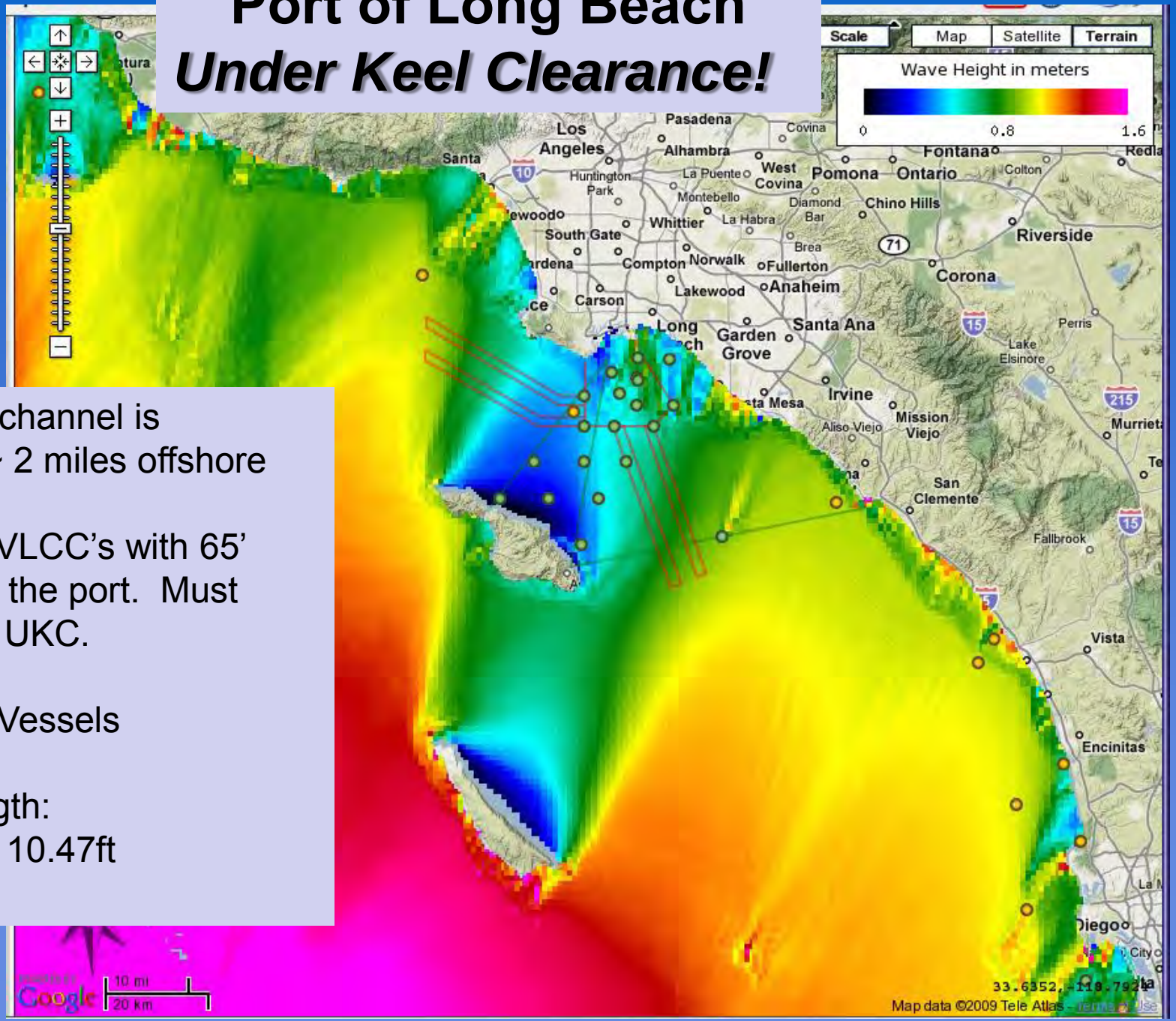
CDIP's high resolution wave models allows for accurate forecasts.

Spatial variation due to island shadowing allows coastal variability. Wave heights Differ according to direction of the waves.



Big waves, big trouble?
headline in
Occounty.com, Jul 24, 2009

Port of Long Beach
Under Keel Clearance!



Approach channel is Dredged ~ 2 miles offshore

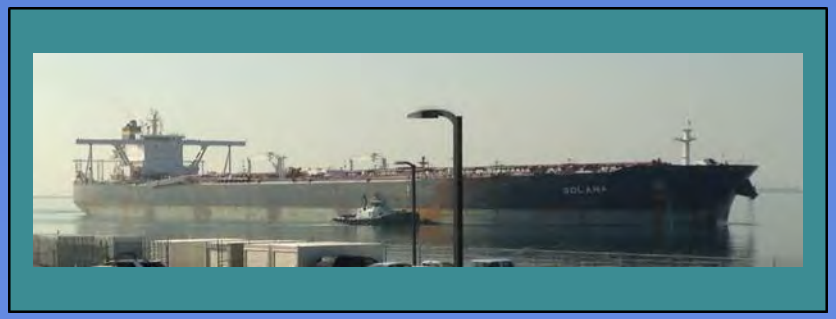
Presently VLCC's with 65' draft enter the port. Must have 10% UKC.

Panamax Vessels
69ft draft
1200' Length:
1^0 pitch = 10.47ft

Importance of Validation

Accuracy of Under Keel Clearance is critical for human and vessel safety.

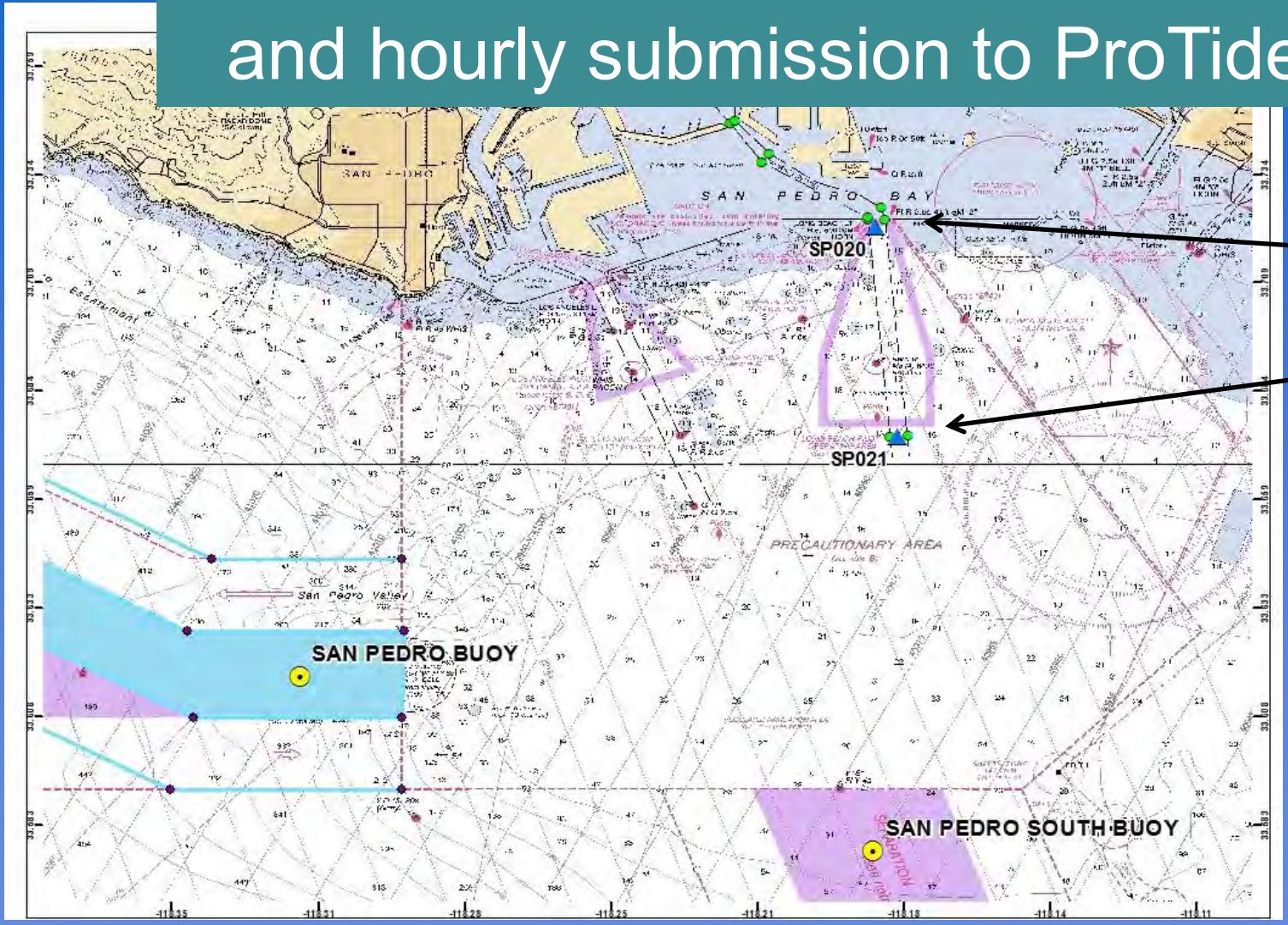
- *MODELS need to be tested under all conditions (Approximately 1 year of wave heights and wave directions). Small errors due to boundary conditions, island shadowing, bathymetry can propagate.*



VLCC – 1200 ft length

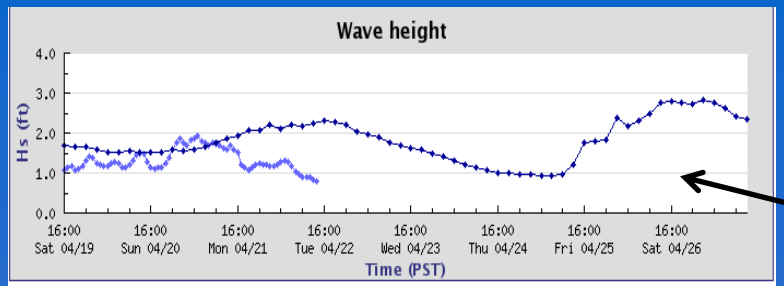
June 2014 - San Pedro Wave Buoy measured 21ft peak, at 13-14 sec. An ATC Oil Tanker rolled 10 degrees at the Long Beach Breakwater entrance. The vessel had a 55 ft draft, 160 ft wide.
The roll increased the draft to 64 feet. (Channel currently dredged to 69ft)

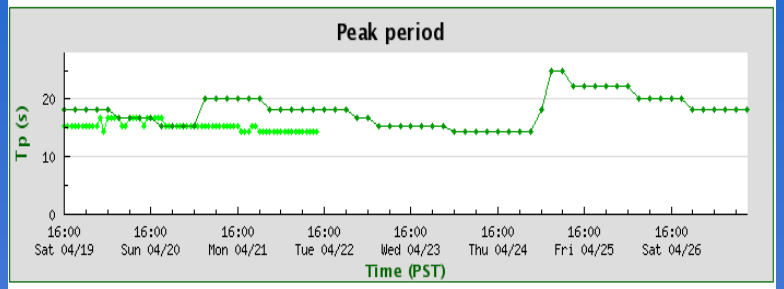
- Installation of San Pedro South
- Wave model locations identified and hourly submission to ProTide

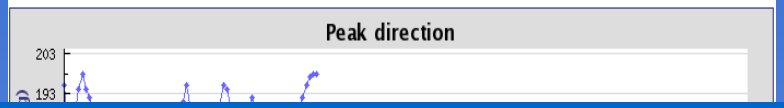


SP 020 20.81 m Depth (68.27 ft)

SP021 25.36 m Depth (83.20 ft)







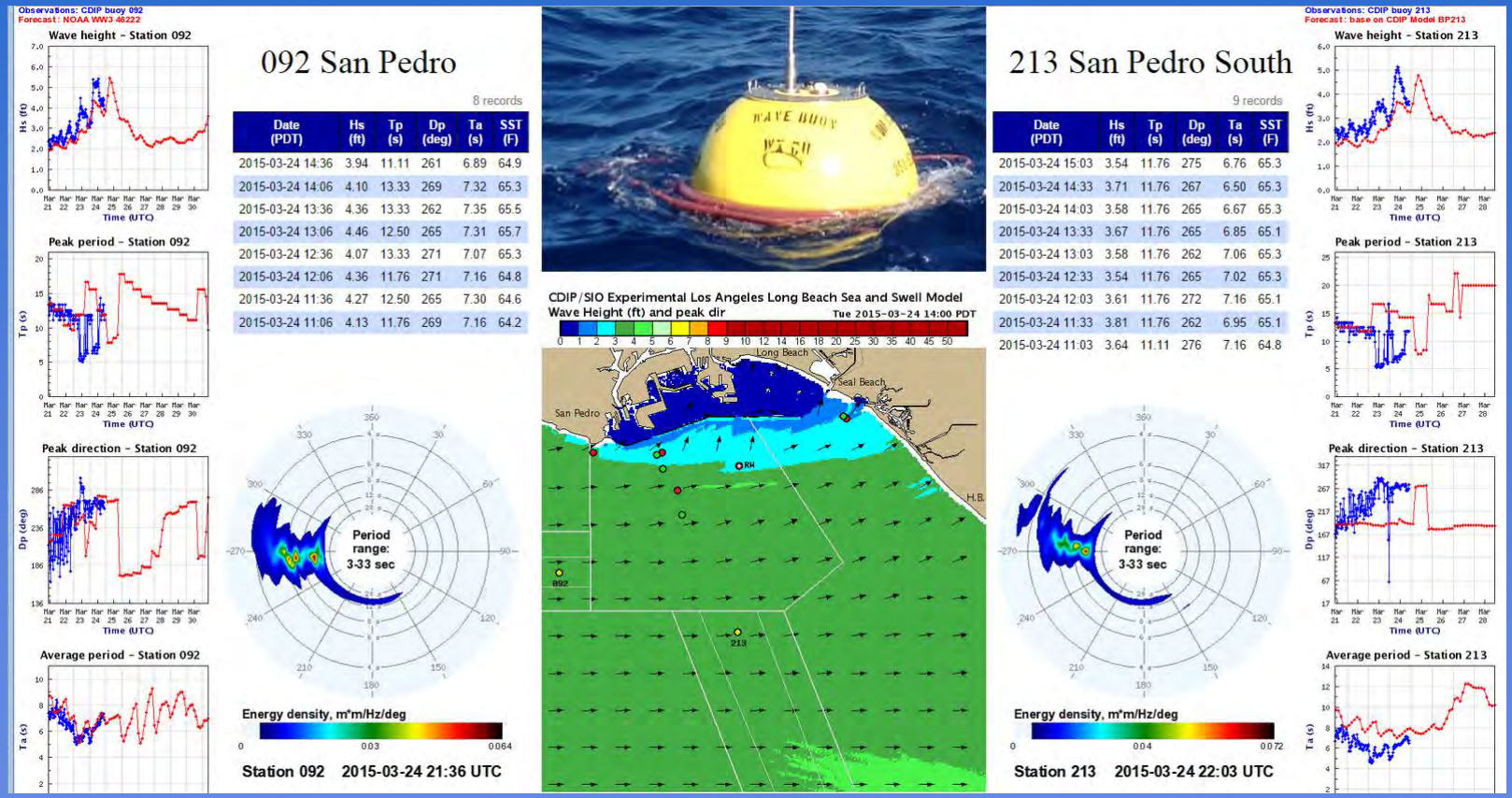
Model is over predicting by >1 ft Significant Wave height.

Prediction site: SP018

Date (PST)	14+ Hs (ft)	14+ Tp (secs)	14+ Dp (deg T)	Tot Hs (ft)	Tot Tp (secs)	Tot Dp (deg T)
2015-03-25 04:00 pm	2.82	18.18	175	3.18	18.18	175
2015-03-25 07:00 pm	2.85	18.18	175	3.28	18.18	175
2015-03-25 10:00 pm	2.89	16.67	173	3.41	16.67	173
2015-03-26 01:00 am	2.85	16.67	173	3.38	16.67	173
2015-03-26 04:00 am	2.82	16.67	173	3.25	16.67	173
2015-03-26 07:00 am	2.82	16.67	173	3.18	16.67	173
2015-03-26 10:00 am	2.72	15.38	173	3.05	15.38	173

San Pedro Buoy observation vs WW3 Model Predictions - Messaging to Jacobsen Pilots

San Pedro Real-Time Observations and Models



http:http://cdip.ucsd.edu/custom_pages/marine_exchange/marine_exchange.html

UKC project is a perfect example of federal, state and local partnerships are working!