

# AirSWOT-SCal:

## AirSWOT 2012 Field Experiment off the Southern California Coast

Yi Chao, Lee Fu, Ernesto Rodriguez (JPL)

With contributions from Andy Thompson (Caltech),  
Burt Jones (USC), Mark Moline (Calpoly)

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# Primary Objective for AirSWOT

- Assess the performance of radar interferometry for studying oceanic processes

# Other Objectives for AirSWOT

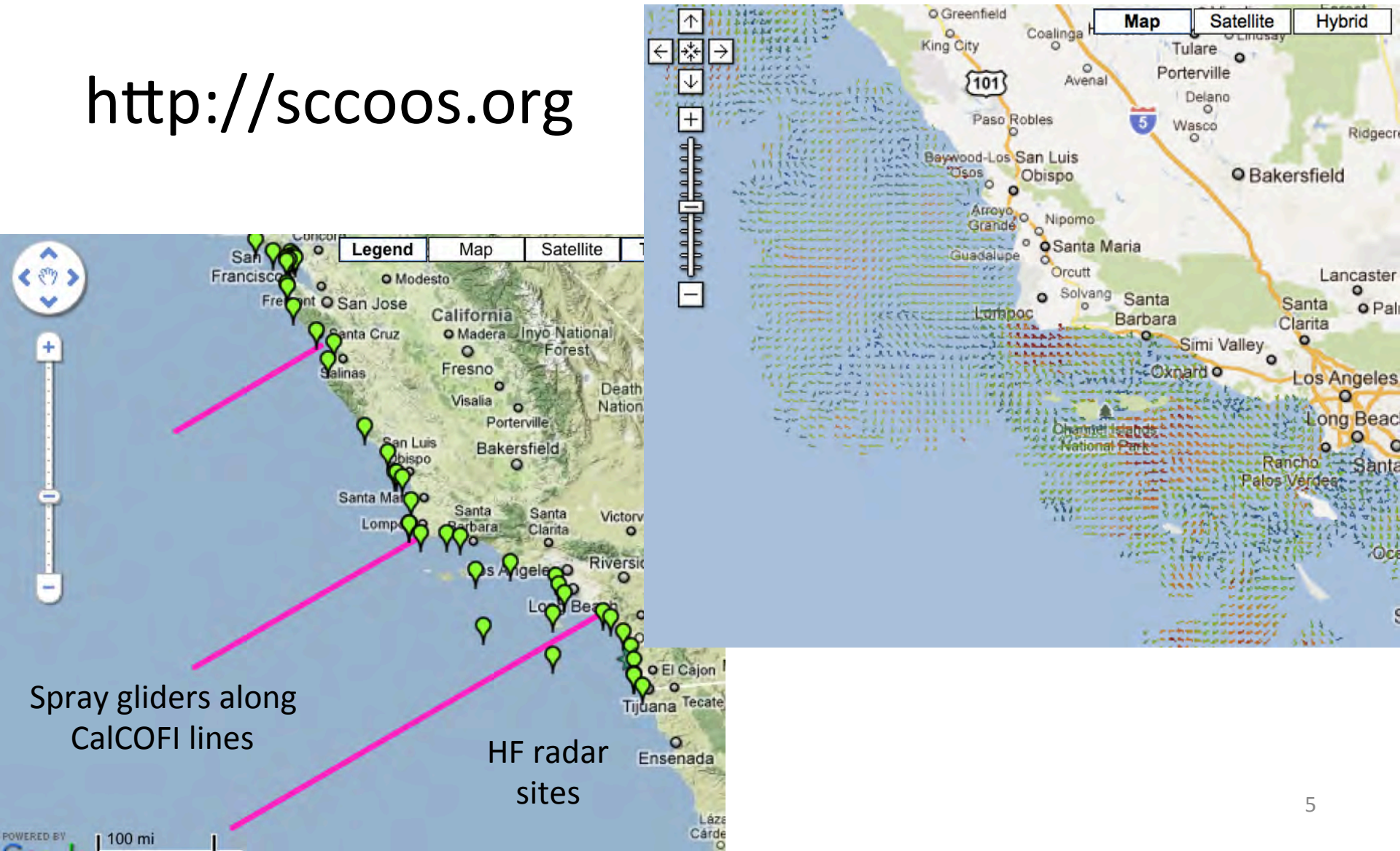
- Characterize the spatial and temporal decorrelation scales of ocean variability
- Validate numerical ocean models (e.g., ROMS) at the submesoscales
- Assess the ability of ocean models (e.g., ROMS) in assimilating the data for dynamical interpolation of sub-sampled data
- Investigate optimal design of the fast-sampling phase of the SWOT mission

# AirSWOT Field Experiment Site Selection

- Southern California Coastal Ocean (SCal)
  - Close to the aircraft base, JPL
  - Existing ocean observing systems
  - Local (UCLA, JPL, Caltech) expertise in mesoscale/submesoscale theory and modeling
  - Synergy/coordination with other field experiments

# Southern California Coastal Ocean Observing System (SCCOOS)

<http://sccoos.org>

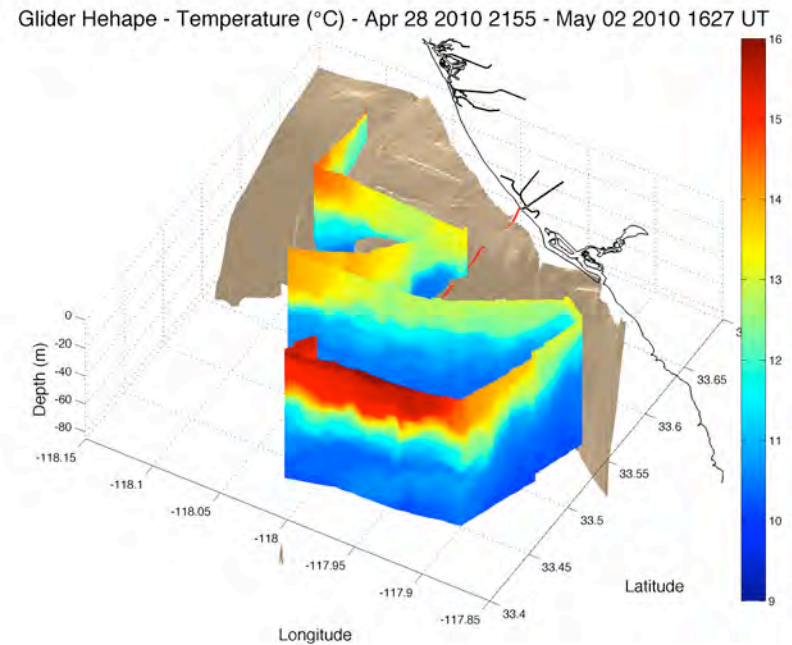


Spray gliders along CalCOFI lines

HF radar sites

# Proposed Additional Measurements to support AirSWOT-SCal

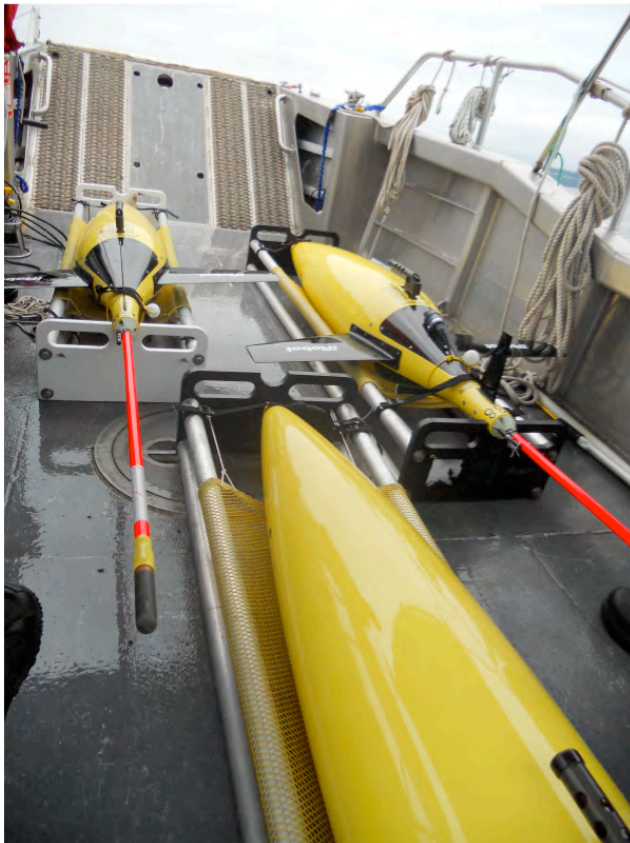
- Slocum gliders (2) for shallow coastal ocean



(Prof. Burt Jones, USC)

# Proposed Additional Measurements to support AirSWOT-SCal

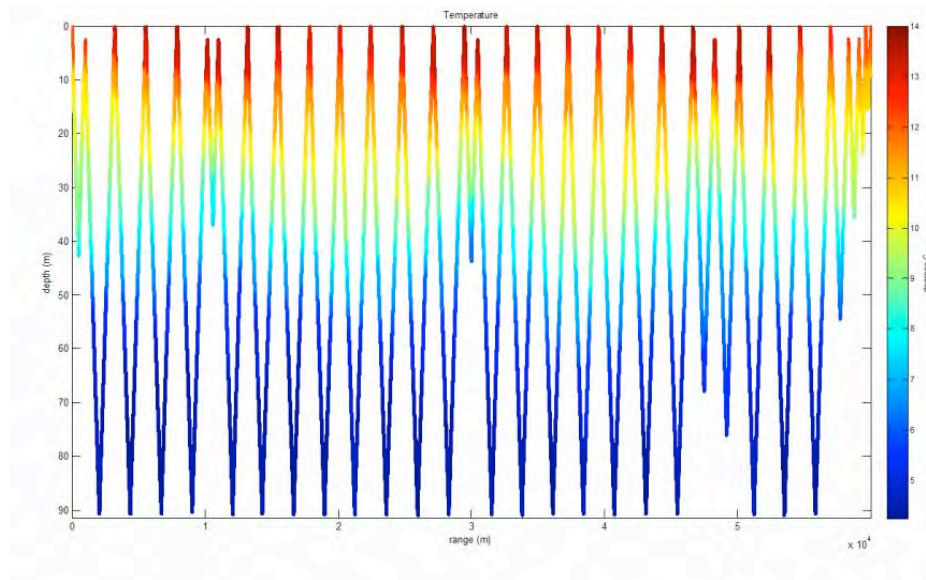
- Seaglider (1) for deep open ocean



(Prof. Andy Thompson  
Caltech)

# Proposed Additional Measurements to support AirSWOT-SCal

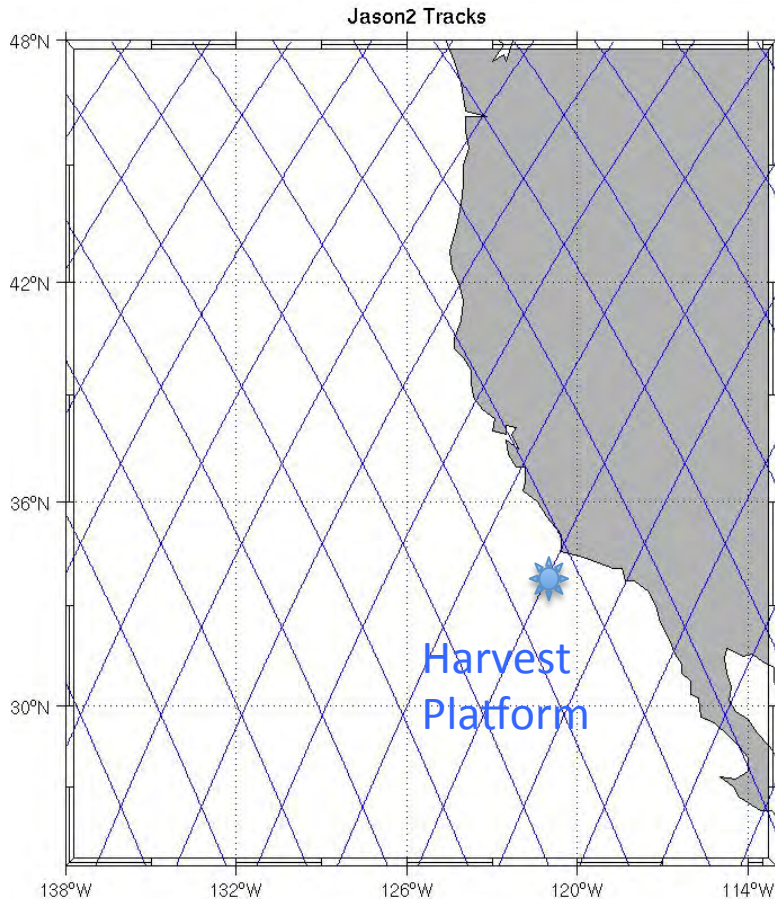
- REMUS 600 AUV (1) for fast sampling but short (e.g., 1~3 days) duration



(Prof. Mark Moline, Calpoly)

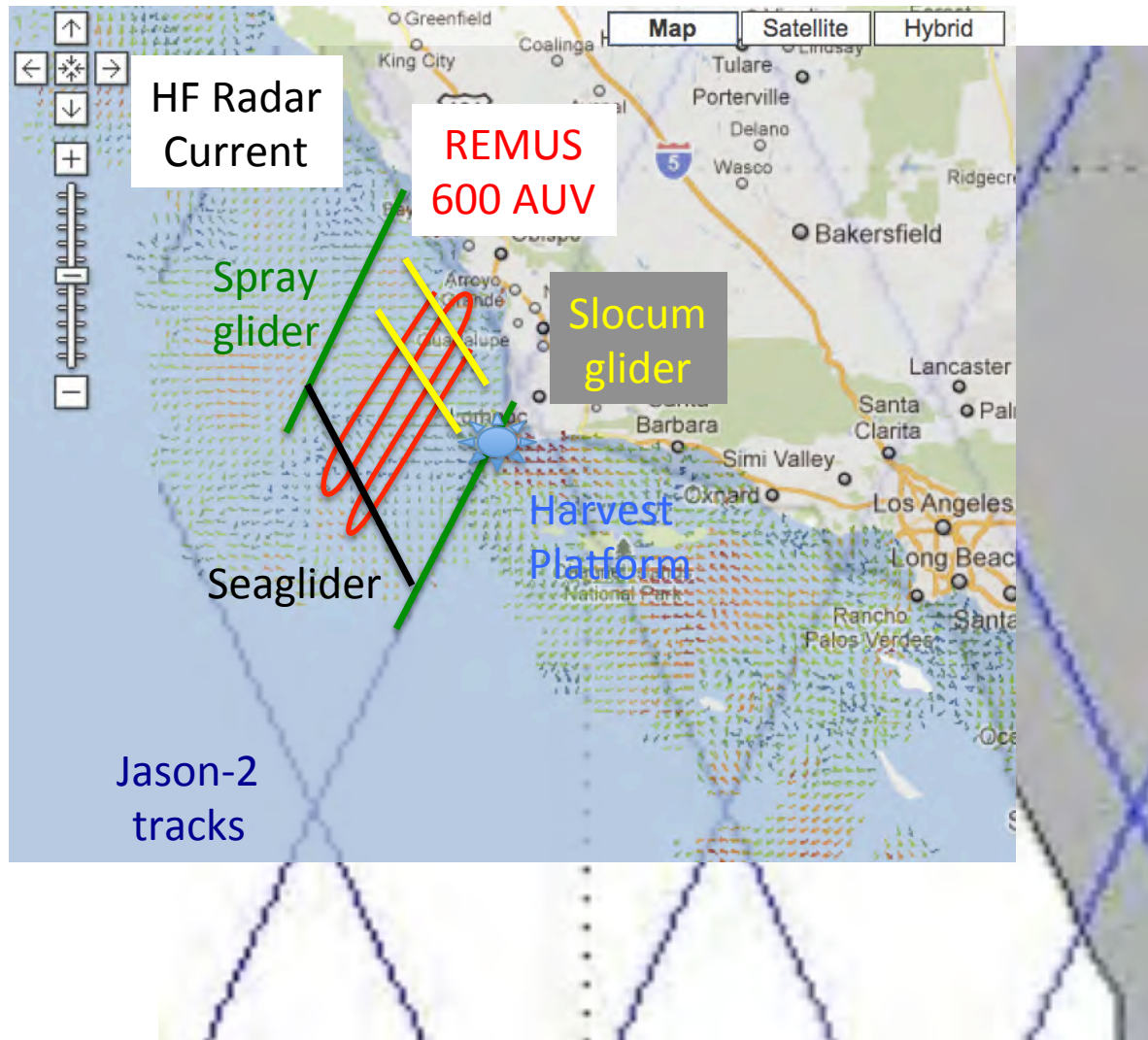


# AirSWOT-SCal Design Considerations



- Underfly Jason-1/2 tracks
- Strong mesoscale & submesoscale signals
- Little or no island effect
- Small internal tides
- Existing observing systems
- Existing data assimilation models

# AirSWOT-SCal: Daily AirSWOT flight during 4-week, underfly Jason-1/2 satellite tracks, HF radar coverage, vertical profiles of Temperature/Salinity from glider/AUV, data assimilation models

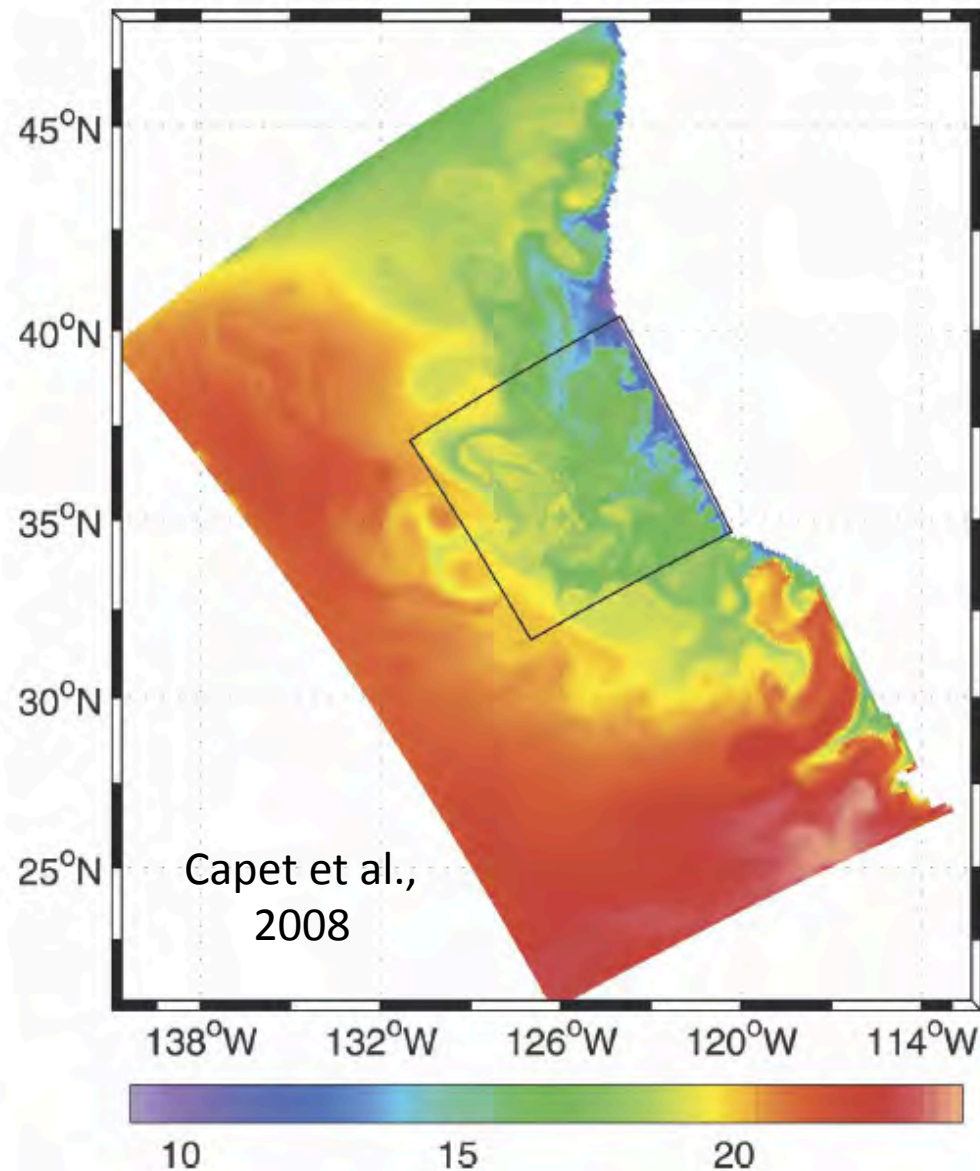


Coverage:  
100x100 km<sup>2</sup>

Gliders:  
0.5 kt.  
20km/day

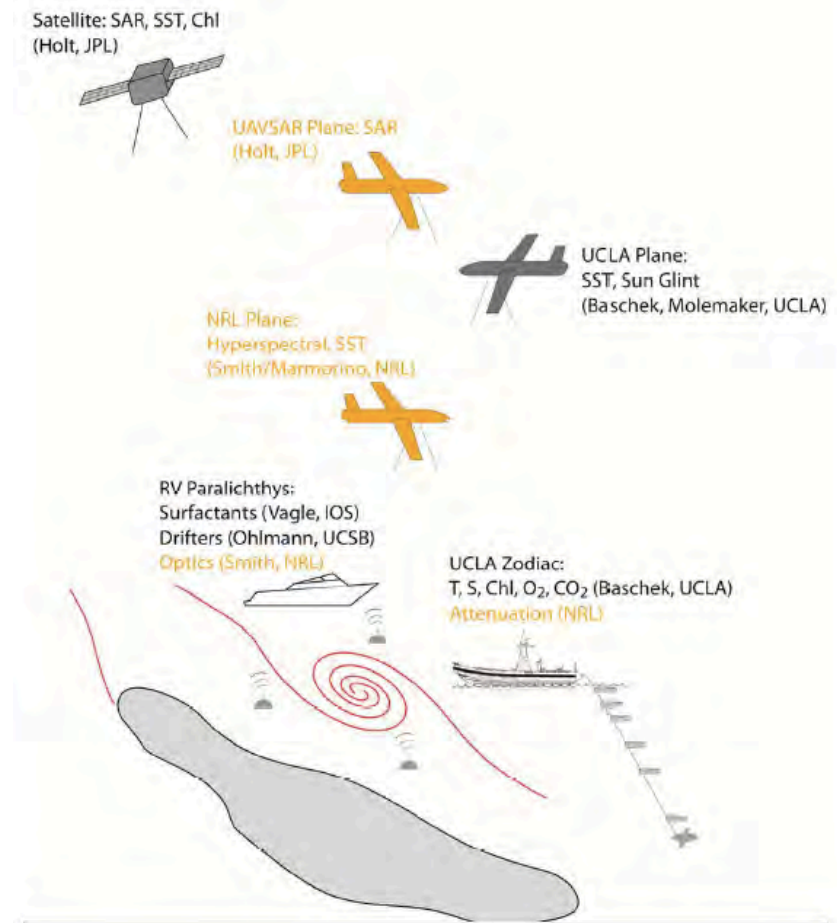
AUV:  
2.5-5 kt  
100-200 km/day

# Data Assimilation Models



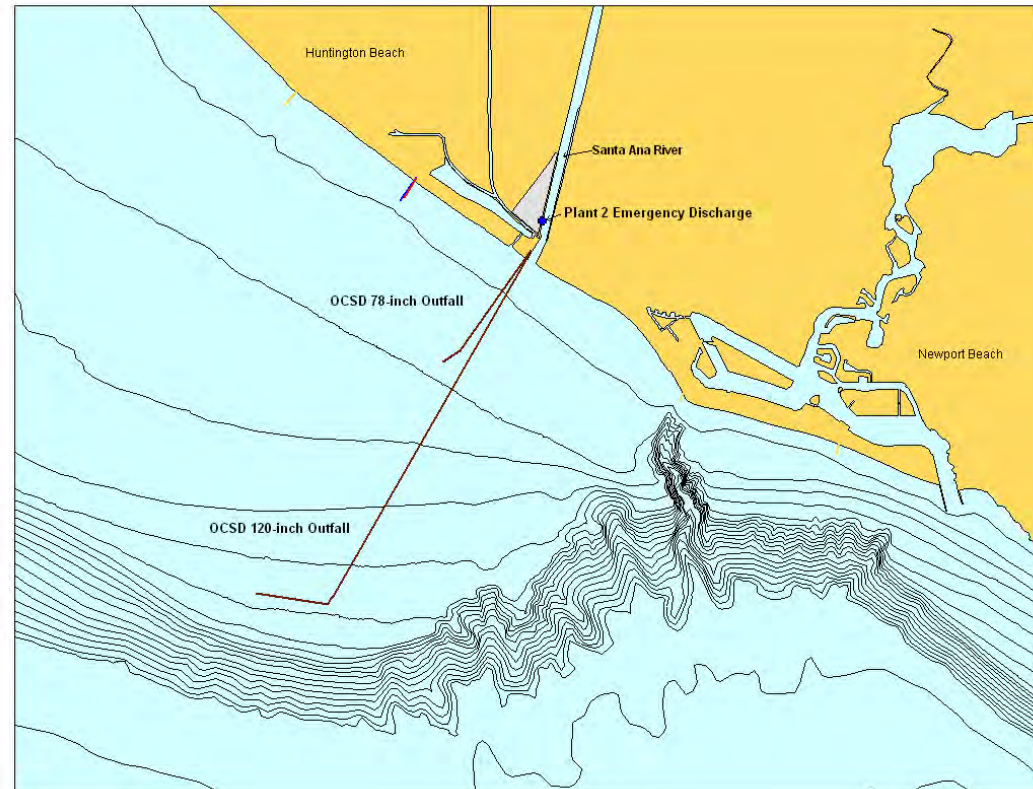
# Synergistic Opportunities (2012 Fall)

- Submesoscale Experiment III (SubEx III) funded by NASA
  - Aircraft IR SST mapping, Boat survey (Burkard Baschek, Jeroen Molemaker, UCLA)
  - SAR images from satellite and aircraft (Ben Holt, JPL)
  - Surface drifters (Carter Ohlmann, UCSB)
- Overlap with AirSWOT-SCal



# Synergistic Opportunities (2012 Fall)

- Background: Orange County Sanitation District (OCSD): third largest wastewater agency west of the Mississippi River. Each day, 230 million gallons of wastewater are treated and pumped into the ocean
- The OCSD outfall diversions will occur in the fall 2012
- Before and during the diversions, OCSD will sponsor a systematic survey (gliders) and modeling efforts
- Overlap with AirSWOT-SCal



# Summary: AirSWOT-SCal to address Primary AirSWOT Objectives

- Assess the performance of radar interferometry for studying oceanic processes
  - Underfly Jason tracks, co-located in situ data from gliders (1 seaglider, 2 spray gliders, 2 Slocum gliders) and AUV (REMUS 600) as well as HF radar

# Summary: AirSWOT-SCal to address other AirSWOT Objectives

- Characterize the spatial and temporal de-correlation scales of ocean variability
  - In situ (slow gliders & fast AUV; HF radar surface current) and AirSWOT data over 100x100 km<sup>2</sup> during 4-week
- Validate numerical ocean models (e.g., ROMS) at the submesoscales
  - High resolution (250-m) nested ROMS simulations will be compared against the AirSWOT-SCB data
- Assess the ability of ocean models (e.g., ROMS) in assimilating the data for dynamical interpolation of sub-sampled data
  - AirSWOT and/or in situ data will be assimilated into ROMS using multi-scale 3DVAR method
- Investigate optimal design of the fast-sampling phase of the SWOT mission
  - Twin experiments can be constructed to compare different designs of the fast-sampling SWOT phase

Questions about AirSWOT-Scal?  
Discussions...

Contact: [Yi.Chao@jpl.nasa.gov](mailto:Yi.Chao@jpl.nasa.gov)