AirSWOT-SCal:

AirSWOT 2012 Field Experiment off the Southern California Coast

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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
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^2

**Gliders:**
- 0.5 kt.
- 20 km/day

**AUV:**
- 2.5-5 kt
- 100-200 km/day
Data Assimilation Models

Capet et al.,
2008
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^2 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...

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