Progress on QuikSCAT Coastal Wind Retrievals

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Funded by NASA/NOAA
Outline

• Overview
• Characterizing $\sigma_0$ Near Coast
• Construction of land mask
• Processing Infrastructure
• Validation Status
• Future work
Overview of Land Masks

• Basic assumptions:
  – Accurate scatterometer wind retrieval requires that temporal variability in backscatter measurements (\(\sigma_0\)) are owing to changes in winds
  – Land contaminated \(\sigma_0\) (at a fixed viewing geometry) will vary much less than wind-induced open-ocean \(\sigma_0\)

• Current QuikSCAT land mask is fixed
  – \(\sigma_0\) within 20km of coast are not used

• Use backscatter measurements to determine “empirical” land mask
Characterizing $\sigma_0$ Near Coast

• Calculate temporal variability ($sdev$) of $\sigma_0$ near coast
  – Function of:
    • Measurement center, $(lat, lon)$
    • Viewing geometry
      – azimuth angle, $\chi$
      – incidence angle, $i$
  – $sdev(lat, lon; i, \chi)$;
• Use 7 years of QuikSCAT $\sigma_0$ data
Variability of Coastal $\sigma_o$
Variability of Coastal $\sigma_0$
Construction of Land Mask

- Determine value of $s_{dev}$ that delineates between land-contaminated and open-ocean
- Your eye can “see” difference (aided by choice of color palette)
- Apply median filter to “de-speckle” standard deviation image
  - Robust and quick calculation
  - Two variables: spatial extent of filter; cutoff (dB)
Variability of Coastal $\sigma_0$
Variability of Coastal $\sigma_0$

Median Filter: 3km radius, 3dB

H-pol, azi=45, ascending
Variability of Coastal $\sigma_o$
Variability of Coastal $\sigma_o$

Median Filter: 3km radius, 3dB

H-pol, azi=135, ascending
Processing Infrastructure

• Purpose
  – Reprocess winds near coast using new land mask

• Solution
  – Use modified version of NOAA MGDR/NRT high resolution processing code (from Paul Chang)
  – Retrieve winds only within 50km of coast using empirical land mask
  – “Stitch” open-ocean wind vectors with locally retrieved coastal wind vectors
  – Use merged wind vectors for validation
  – Short processing times; allows for iteration
Validation Status

- Comparisons with NDBC buoys
Validation Status

• Comparisons with NDBC buoys
• WEST buoys from SIO/UCSD via Clive Dorman
Future Work

• Complete validation with WEST Buoys
• Refine land mask generating algorithm; (median filter parameters)
• Expand analysis to other regions
• Validate using SAR