Coastal Scatterometer Winds Working Group

IOVWST Meeting 2016
Sapporo, Japan

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The Coastal Working Group currently has 3 sub-groups. 2 groups are developing parallel SCIENCE and APPLICATIONS examples. Each example indicates a need for higher Spatial and/or Temporal resolution of scat winds.

1) Strong winds within a few km of the coast
   Steve Morey, Dmitry Dukhovskoy

   * science questions:
     - How do wave-current-wind interactions affect storm surge? (S, T)
     - In landfalling storms, why does the wind field within ~25 km of coast sometimes increase and sometimes decrease? (S, T)

   * applications:
     - Coastal flooding forecasts & timing of peak storm surge relative to high tide (T)
       [regional models need scat winds every ~90 min to avoid bias?]
     - Search and rescue (S, T)
     - Siting wind farms (S)
     - Oil spill trajectories/persistence (S, T)

Presentation at this conference:
Alberto Rabaneda:
   Development of a tool for offshore wind resource assessment for wind industry (talk Thursday)
2) Atmosphere-ocean coupling within ~50 km of the coast
Larry O’Neill, Melanie Fewings

* science questions:
- Does SST-wind coupling in coastal upwelling regions enhance or suppress upwelling and relaxation events? (S,T)
- In wind features tied to orography, how does the SST-wind coupling differ from the 1-way coupling assumed in the open ocean? (S,T)
- Does SST-wind-current coupling at submesoscale features like fronts and filaments lead to enhanced upwelling on small scales? (S,T) [models are ahead of observations]
- In productive island wakes, is upwelling due more to wind wake or oceanic wake? (S,T)

* applications:
- Fish catch enhanced at fronts (S)
- Hypoxia and fish die-offs in upwelling systems (S,T)
- Nutrient supply to fisheries via submesoscale features (S,T)

Presentations at this conference:
Renato Castelao:
  Winds, eddies, and fronts in Eastern Boundary Currents (poster Thursday)
Kayla Flynn / Melanie Fewings:
  SST anomalies during wind relaxations in California Current System (poster Thursday)
Melanie Fewings:
  Wind stress and curl anomalies along western North America during 2014-16 (talk Thursday)

other possibilities:
Polar lows (not coastal)
Sea ice
How does variability of northern winds influence thermohaline processes in the EGC and western Nordic Seas?

- The EGC is the main route of freshwater export from the Arctic Ocean to the North Atlantic.
- The northern winds dominate the western part of the Nordic Seas in winter, when winds are downwelling favorable for the eastern coast of Greenland.
- Northern winds steepen the front, deepen and narrow the buoyant coastal current reducing stratification within the current.
- In summer, northerly winds subside and downwelling abates.
A 3rd sub-group pursues the production and use of coastal scat products with global coverage.

3) Methods for improving Scat resolution / applications near coast
   Julia Figa-Saldaña, Bryan Stiles

   * Methods for producing “coastal” products from existing missions:
     - Coastal ASCAT (Eumetsat/OSI-SAF) (S)
     - NOAA coastal products (S)
     - Stiles et al. QuikSCAT/OSCAT/ASCAT product in progress (S)

   * How should “coastal” products be validated?
     Need global product so many users can validate it regionally against buoys, land winds, etc.

   * Future missions:
     - Advocate for little/no on-board aggregation to permit high-resolution reprocessing (S)

Presentations at this conference:
Jur Vogelzang / Ad Stoffelen:
   Resolution enhancement for ASCAT (talk Wednesday)
Bryan Stiles:
   Discovering a decade of coastal winds from scatterometers (talk Wednesday)
Ted Strub:
   Evaluation of coastal scatterometer products (poster Wednesday)
Steve Morey:
   Interannual variability of global coastal upwelling… (talk Thursday)
3) Methods for improving Scat resolution / applications near coast

Resolution enhancement for ASCAT (talk Wednesday)

Ad Stoffelen and Jur Vogelzang, KNMI
Isabel Monteiro, IPMA

- ASCAT-6.25 will become operational very soon (grid size 6.25 km; spatial resolution 17 km)
- ASCAT-5.6 products under study (average grid size 5.6 km): spatial resolution 19 km but better buoy comparison
- Spatial resolution estimated from extent of Cumulative Spatial Response Function by Richard Lindsley
- Coastal validation along Iberian coast in collaboration with IPMA
3) Methods for improving Scat resolution / applications near coast

Bryan Stiles: Discovering a decade of coastal winds from scatterometers (talk Wednesday)

QuikSCAT coastal data product using Land Contribution Ratio
Bryan Stiles and Alexander Fore (JPL), Ted Strub and Corinne James (OSU)

Southern Japan, QuikSCAT data Jan 21, 2009 6:00 PM

- Swath (L2B) netcdf files with LCR processing available now for all QuikSCAT orbits 1999-2009.
- Geographically gridded data on a 0.075 degree grid available in 1-2 months, need to discuss format with potential users.
EUMETSAT coastal wind products update

- Lindsley et al. paper on Spatial Response Function for ASCAT ‘slices’ and Land Contribution Ratio (LCR) for ASCAT has been accepted

- Now implementing a LCR field in the operational ASCAT ‘slice’ Level 1 products.

- NRCS values in ‘coastal’ products from KNMI have been examined globally over land and sea ice and look good

- So, now implementing coastal processing in the ASCAT Level 1 processor; will activate for 12.5 km products
Progress in the modelling and validation of the ASCAT Spatial Response Function and land flag

Lindsley & Anderson
2015:
A Parameterized ASCAT Measurement Spatial Response Function

See for more details in this session:
✓ Lindsley&Anderson poster
✓ Stoffelen&Figa Saldana presentation
3) Methods for improving Scat resolution / applications near coast
David Long’s group: combining Land Contribution Ratio and ultra-high resolution retrieval. Also, in storms UHR helps to distinguish noise from rain contamination.

UHR wind speed after wind retrieval using a Land Contribution Ratio (LCR) discard threshold of -27dB

Land contamination eliminated
Can now see “stopping zone” in front of island
Overall Goal
Develop a new global database of coastal upwelling indices corresponding to the satellite wind record suitable for use in climate and ecosystem studies.

Example: Mean Oct-Dec upwelling index map. Climatology (gray bars) monthly means for each year (colored bars) are shown for the East Siberian Sea and East Greenland Shelf.

Recent Updates
• A modification to the “classic” upwelling index accounts for the influence of remote upwelling signals (coastal trapped waves), extending applicability to more shelf areas with complex geometry.
• Global model data are analyzed to show areas where upwelling indices are strongly related to cross-isobath bottom velocities.
• Seasonal influences (changes in stratification) on the applicability of the upwelling indices are being determined.
Coastal Scatterometry Working Group

Discussion suggestions:

1) Goals: come up with
   - “good stories” in anecdotal form rather than science form
   - (multi-platform) climate applications in coastal regions

2) Future collaborative projects
   - work with Stress Working Group to address fetch-related effects on stress?
   - work with Stress Working Group on review paper?

3) Problems that need to be addressed?