The Advanced SCATterometer (ASCAT) is a vertically polarized C-band ocean wind radar sensor carried on the Metop series of three polar-orbiting satellites launched between October 2006 and November 2018. The NOAA produces two global ocean wind products with the resolution of 12.5 km and 25.0 km up to 15 km of the coast for its operational users. While the ASCATs provide invaluable data in the open ocean, due to land contamination of the signal, most inner coastal zones are left void of the data. Most coastal marine activity occurs within a few kilometers of the coast, coastal observations are also needed for ocean forcing for upwelling affected areas. In order to retrieve winds closer to the coast, a coastal wind retrieval algorithm that utilizes enhancement resolution technique and the land contamination removal was developed and applied to the ASCAT measurements. This allowed us to retrieve winds within 20 km inner coastal zone.

The enhanced resolution can be achieved by utilizing overlapping measurements of the ASCAT antenna gain. For each near coastal measurement amount of the land signal contamination is determined by computing land contamination ratio (LCR). The normalized radar cross section (NRCS) measurements over near by land mass are used to calculate a mean and a standard deviation of the land brightness for each coastal observation. By using the LCR and the mean and the standard deviation of the land brightness we have developed the land contamination correction for each coastal NRCS slice is determined within a few iterations. However in the vicinity of strong land brightness, the proposed NRCS corrections alone cannot completely remove land contamination. A post wind retrieval processing is developed and applied before final coastal wind product is produced. This post wind retrieval processing involves processing of the corrected NRCS using varying LCR threshold.

The first version of the coastal wind and ice ASCAT product is being produced in NRT for operational validation. New products will be presented and discussed.

**Abstract**

The Advanced SCATterometer (ASCAT) is a vertically polarized C-band ocean wind radar sensor carried on the Metop series of three polar-orbiting satellites launched between October 2006 and November 2018. The NOAA produces two global ocean wind products with the resolution of 12.5 km and 25.0 km up to 15 km of the coast for its operational users. While the ASCATs provide invaluable data in the open ocean, due to land contamination of the signal, most inner coastal zones are left void of the data. Most coastal marine activity occurs within a few kilometers of the coast, coastal observations are also needed for ocean forcing for upwelling affected areas. In order to retrieve winds closer to the coast, a coastal wind retrieval algorithm that utilizes enhancement resolution technique and the land contamination removal was developed and applied to the ASCAT measurements. This allowed us to retrieve winds within 20 km inner coastal zone.

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**NOAA ASCAT Coastal Winds**

- NOAA ASCAT coastal wind build upon the BYU’s previous work on the Ultra High Resolution (UHR) coastal wind retrievals [1-3] utilized an enhanced resolution normalized radar backscattered cross section (signal0) processing technique and land contribution ratio (LCR).
- The improvement of the land contamination is done by dynamically correcting for the land contribution using the mean and standard deviation of the land sigma0 from each measurement. This technique was first demonstrated in [4].
- The land sigma0 correction allow for the use of aggressive LCR threshold up to 50%; thus, wind retrieval can get much closer to the coast.
- The NOAA CMOD5.H high wind G MF [5] is used in the wind retrieval and the ocean calibration.
- Post processing best wind ranking is used to further remove the land contamination.
- The first version of the UHR ASCAT coastal wind and ice product is being produced in near real-time for operation validation.

- UHR winds processing with high resolution land mask can retrieve wind in the coastal zone but suffer large land contamination.
- Previous works by other investigators:
  - Empirical Land Mask (Verhafft 2015)
  - Land Contribution Ratio (LCR) (Green 2009, Lindsey 2016)
  - LCR Expected Sigma0 (LORES) (Stiles 2014)

**Land Contamination Correction**

- The initial ocean-only sigma0 can be solved using (1).
- Sigma0 can vary greatly depending on the geographical features and observation orientation, (1) is modified to include the land stand deviations $\sigma_{L0}$.
- The iteration process is carried out until the correction reaches a non-negative sigma0 or it reaches a maximum of $\sigma_{L0} = 3$.

**References**