Evaluation of Coastal Scatterometer Products
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Abstract
The routine retrieval of scatterometer vector wind data is not attempted within a small distance of land, to avoid contamination of the winds by land reflections of the radar signals. At the Jet Propulsion Laboratory, the entire QuickSCAT data set is being reprocessed to remove coastal wind values from regions that are partially covered by land. To evaluate these coastal winds, we compute measured winds (buoy and coastal land stations) to QuickSCAT winds from the new processing, as well as from the most recent traditional processing. Our initial comparison is for winter (December-February) along the U.S. West Coast. Since the newly reprocessed data set is global, our evaluation should provide guidance for applications of the new wind product in other regions.

Introduction
Nominal processing of the QuikSCAT data is done to avoid any possible land contamination with a fixed distance from coast threshold not taking into account the highly non-uniform spatial response function of the satellite. If we consider the shape of the spatial response function for each QuikSCAT scan, we can obtain Ocean Vector Wind (OVW) estimates significantly closer to the coast than in the nominal processing.

We investigate two methods, the Land Contamination Ratio method (LCR) and the LCR Expected Sigma0 (LCRES) method. The LCR (1) is the ratio of the spatial response function of each slice over land to the total integrated spatial response. We use a 3120° land mask to demarcate land and ocean. This requires an integration of the spatial response over every slice, for every pulse, in every orbit of QuikSCAT data over 10 years. The LCR method is the less aggressive of our coastal processing methods and is a simple threshold on the LCR value for each slice. We have used the value 0.1 in our processing for rejecting possibly contaminated data. The LCRES method is the more aggressive of our coastal processing methods. This method builds upon the LCR method in that we compute the LCR value times the Expected Sigma0 (ES) for every slice. The ES is computed again using the spatial response functions, however, instead of integrating over each slice we project the slice signal into a higher-resolution grid using each slice’s spatial response function. The LCRES value is then compared to a threshold and rejected if larger. Thus this method will discard less measurements near low σo land areas, conditioned on the observation geometry, as compared to the LCR method.

Land Contamination Ratio Processing Status and Evaluation
We have completed the LCR processing for the entire 10 year mission, requiring nearly 1700 CPU days of computer time, and have already made a portion of this data available to our co-investigators for preliminary validation studies.

Progress
• Full-mission reprocessing with LCR method complete.
• Generation of LCRES map underway.
• Buoy analysis of LCR data shows added value of wind estimates close to coast.

Land Contamination Ratio Expected Sigma0 Processing Status
We have also begun the generation of the expected σ0, which again requires the same full X-factor computations for every slice, from every pulse, for every orbit of QuikSCAT. We have already completed processing of the LCRES maps for 2008 and we expect the LCRES map processing to be complete by mid June 2016. After completion of the LCRES maps we will begin parameter studies for choosing the LCRES thresholds for flagging the possible land contamination.

Next Steps
• Full-mission validation of LCR processing.
• Evaluate QuikSCAT winds at different distances offshore against land stations.
• Make LCR data available to public.
• Finish generation of LCRES maps.
• Begin study of LCRES threshold values.

References

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