# Tropical Cyclogenesis Detection in the East Pacific Hurricane Basin

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The SeaWinds scatterometer provides high-resolution spatial coverage and temporal observations of vector winds over the global oceans. These data can be accessed in near-real-time (NRT) to provide another means of identifying areas that are favorable for tropical cyclogenesis (TCG). Liu (2001) and Katsaros et al. (2001) both used subjective analysis to identify when the closed circulation of the tropical cyclones (TCs) in the Atlantic could first be identified in the SeaWinds data. Sharp et al. (2002) used an objective method that specifically looked for a minimum vorticity derived from the SeaWinds data to identify potential areas of TCG in the Atlantic hurricane basin.

This report follows up on the work of Sharp et al. (2002) by reporting on the success of the method in identifying areas of TCG in the East Pacific hurricane basin during the 2001 and 2002 seasons. We apply the vorticity-based test to the NRT QuikSCAT data for these seasons. Of the over 2000 swaths through the domain during that period, the objective test identifies a total of 415 that contain potential tropical systems. Most of these systems are pre-existing TCs (e.g., Adolph of 2001 was identified in 11 separate swaths).

Almost all of the TCs (29 of the 33) from the two seasons have at least one swath identifying the TCG that occurred prior to their development into TCs. The average lead time for these systems is 36 hrs before they became TCs. The longest lead time for 2001 was for tropical depression 6 with a 79 hr lead time (Fig. 1A). The wind vectors not contaminated by rain indicate a broad closed circulation. However, thunderstorm activity was not persistent in the area of the circulation, so the system did not qualify as a TC. For 2002, Lowell had the longest lead time at 56 hrs (Fig 1B), and again

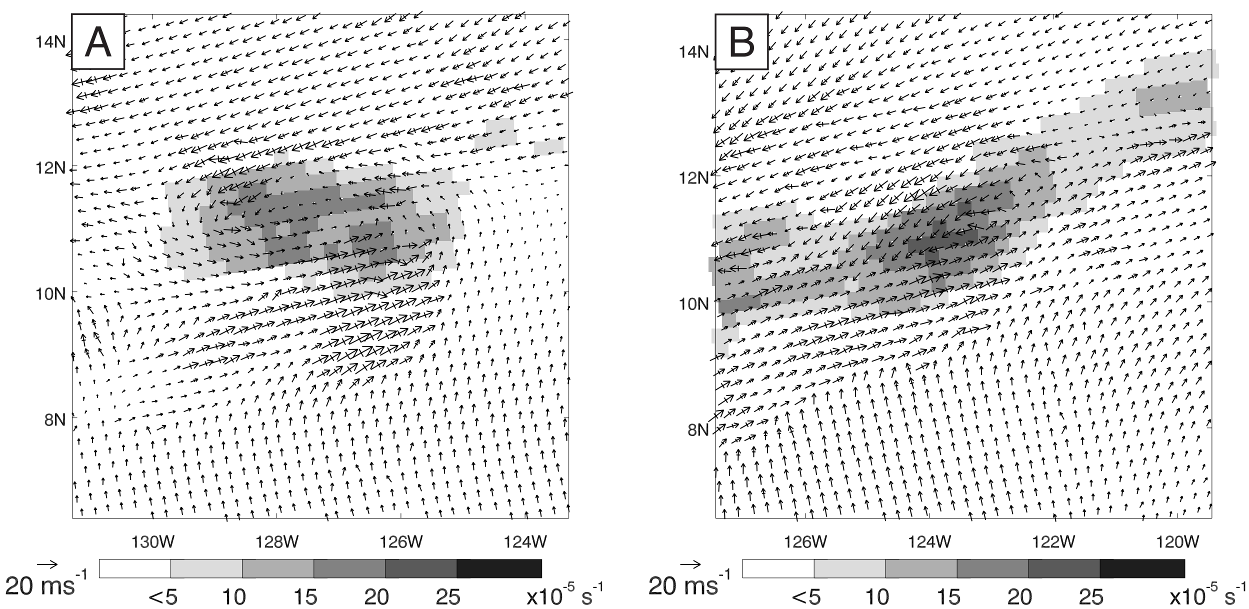


Fig. 1: SeaWinds wind and spatially averaged vorticity for T. D. 6 (A, 1419 UTC 19 August 2001) and Lowell (B, 1357 UTC 20 October 2002). The background shading represents vorticity, and the length of the arrows indicates the strength of the wind. Arrows with a bar through them indicate data that may be contaminated by rain.

persistent thunderstorm activity did not follow this system. The structure of the wind field also indicated more of a shear line as opposed to a definite closed circulation.

The objective technique has an excellent probability of detection (94.8%) when a TC is within a swath. The false alarm rate, the number of identified systems that never became a TC divided by the total number of identified systems, is 42.1%. Some of these false alarms were apparent closed surface circulations that never fully developed the characteristics of a TC. The critical success index, the number of ‘good’ identifications divided by the sum of the total number of identified systems plus the number of missed identifications, is 0.566.

The circulations identified by our objective method during TCG indicate that processes occurring at the surface must be important to TCG. Further work is underway to determine why certain systems develop and others do not.

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