Reply

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Pasch et al. (2003, hereafter referred to as PSB) agreed with the intended purpose of our paper in saying "*QuikSCAT* has made a valuable contribution to tropical weather analysis and forecasting." Our goal was to develop and demonstrate an operational application (and scientific tool) based on ocean vector winds observed from the SeaWinds scatterometer. We developed a technique, based on vorticity of the surface winds, for identifying tropical weather systems that are likely to grow into tropical depressions or stronger systems. This operational product was a result of our efforts to develop an algorithm for detecting potential tropical cyclones (TCs) early in the genesis stage. The Tropical Prediction Center (TPC) was found to be monitoring most tropical systems at the time they were identified as likely to achieve at least the strength of tropical depression. Our intent was not to compete with the TPC on how quickly we could find tropical depressions or named storms; the vorticity-based technique helps identify the subset of tropical systems that are likely to develop into tropical depressions or stronger storms. PSB compared our early warning times to their lead times in identifying any tropical activity worthy of continued monitoring. Sharp et al. (2002, hereafter SBO) acknowledged that TPC was aware of the existence of most tropical disturbances prior to official classification; however, awareness of a disturbance is substantially different from predicting if that system will develop into a TC.

SBO found that a surface signal could be observed sometimes days before a tropical system develops into a TC. Previous subjective analysis (Katsaros et al. 2001) of scatterometer observations found early surface signatures for systems that grew into named tropical storms; however, SBO presented the first objective method for detection. PSB detailed the method that the TPC applies for the assignment of a Dvorak "T number": a center of cyclonic circulation in the cloud patterns, and persistent deep convection. In the context of cyclogenesis, this reference to observing the cloud formations implies that TCs develop above the surface and work their way down. In the context of identifying storms that have at least the power of tropical depressions, and are likely to maintain that power, this definition is well suited. The indication in SBO was that some systems have a surface signal before the associated cloud patterns develop.

A new development, which PSB referred to, is the vorticity-based technique's success in the eastern Pacific hurricane basin. For the 2001–02 seasons, 28 of the 33 TCs were identified an average of 35 h before they became TCs, which compares favorably with the average lead time PSB reported for that basin. This success again adds to the idea that *QuikSCAT* is a tool that can be used operationally to supplement the more conventional tools used by the TPC, especially in a basin where reconnaissance aircraft flights are typically reserved for TCs that pose an immediate threat to Mexico.

The findings of SBO also open up the possibility of new research programs into what happens near the ocean surface in developing TCs. Future improvements in data retrieval and the addition of new data coming in from the *Advanced Earth Observing Satellite-II (ADEOS-2)* should provide for several more seasons of studying tropical cyclogenesis.

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