Generation and Application of Special Satellite-Derived Atmospheric Motion Vector Datasets for TCS-08

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TCS-08 provided opportunities to obtain, test and validate special MTSAT datasets provided by JMA. In addition to the routine imagery provided by the MTSAT-1 satellite, special rapid scan imagery was also provided for selected time segments from the MTSAT-2 satellite. Both of these datasets can be employed to produce high resolution (space and time) fields of atmospheric motion vectors (AMVs), and were used by CIMSS to explore the optimization of AMV processing procedures, as well as direct applications to WestPac tropical cyclone analysis and potential impact on NWP track and intensity forecasts. The AMVs can capture crucial interactive storm/environmental flow regimes, and the derived products include upper-level divergence, low-level vorticity, and deep-layer tropospheric shear, all of which can be important diagnostic aids to better understand tropical cyclone structure and intensity change.

Two novel approaches to processing of AMVs in the WestPac are being explored using the TCS-08 period and datasets. First, AMVs from MTSAT-1 were derived every hour instead of the operationally-available six-hourly datasets. This appreciably increases the temporal coverage of the wind fields available for analysis continuity, and for NWP data assimilation. Examples of the AMV coverage and derived analyses will be shown, along with applications to ongoing NWP experiments.

In addition to these hourly AMV datasets, CIMSS is experimenting with approaches to optimize the processing quality of very-high resolution AMV datasets derived from the special MTSAT-2 rapid-scans during Typhoons Sinlaku and Jangmi. AMVs generated from more frequently-available satellite images will provide higher-quality information, and capture smaller-scale flows that may impact and/or identify tropical cyclone intensity change. Examples of applications will be shown.

The presentation will describe the current state and availability of these AMV datasets and derived analyses. It will also introduce our preliminary research findings, including NOGAPS data impact experiments using the hourly MTSAT AMVs.