POLAR SATELLITE COMPOSITE ATMOPSHERIC MOTION VECTORS

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1. ABSTRACT

Deriving atmospheric motion vectors (AMV) from satellite observations has been successfully done for many years from geostationary platform and more recently from polar orbiting platform. The spatial coverage of satellite-derived AMV is generally equatorward of 60° latitude for geostationary satellites and poleward of 70° latitude for the polar satellites. This coverage results in a 10° gap, which has been noted as a problem by numerical weather prediction (NWP) centers. Specifically, the dynamically active polar jet stream can be located in this latitudinal zone and improper model initialization can lead to rapidly growing errors in the forecasts. Therefore, developing a means to fill this AMV-void gap is the next logical step toward providing complete wind coverage for the NWP applications. This requires an advanced image compositing technique designed to blend the data from the many polar and geostationary weather satellites. Existing Antarctic and Arctic composites, which are a combination of geostationary and polar orbiting observations and are primarily used for weather depiction, are the initial dataset used in this effort. A new composite that improves upon the existing mosaic method is also successfully producing AMV. This presentation will discuss the different compositing methods, and the interrelation to the AMV generation as well as provide the latest validation results. One challenge in verification of the AMV is the very limited radiosonde observations network, especially in the Southern Hemisphere. This brings rise to the critical importance of aircraft reports (AIREPs) from US Antarctic Program aircraft (e.g. 109th New York Air National Guard LC-130s) and other aircraft that fly missions between the middle latitudes and the Antarctic. Similar needs exist over the Arctic. Observations of winds enroute have the potential to provide a significant set of validating observations needed to determine if the composite AMVs will be on the order of accuracy as its cousin polar orbiting and geostationary wind sets.

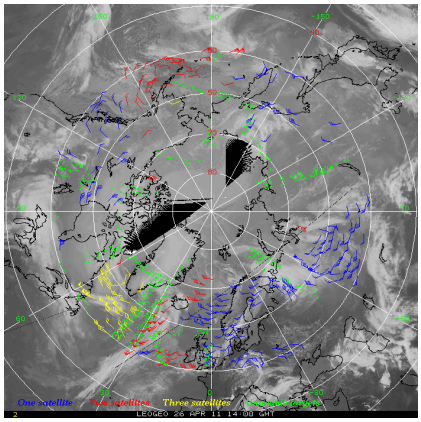

Figure 1. A sample display of atmospheric motion vectors derived from the Antarctic satellite composite imagery.

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