The Poleward Transport of Moisture and Clouds in the Antarctic

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Surface mass balance (SMB) and its variability is one of today's most challenging questions for the Antarctic. One key factor in Antarctic SMB relies on the amount of atmospheric moisture and clouds transported poleward over the coastline and its subsequent precipitation. Observing these phenomena in Antarctica is extremely difficult due to sparse nature of ground measurements and known problems with reanalysis data. This research project makes use of the unique infrared satellite composite dataset developed at the University of Wisconsin-Madison. Utilizing Antarctic composite satellite imagery at 3-hour and 1-hour temporal resolution and 10-km and 5-km spatial resolution, a manual evaluation of poleward pathways of clouds into the Antarctic interior has been conducted. The results identify several regions of preferred poleward pathways based on 20 years of available observations. In general, West Antarctic region reveals much more vigorous transport, consistent with documented maximum in synoptic and mesoscale storm activity in the Ross and Amundsen Seas. Poleward cloud and moisture transport in the East Antarctica is organized in trough narrow "favoring" sectors. Continent-wide, the most active month through the year is October, while late austral summer (December through February) is the least active season. Our unique data-driven approach provides an objective look at poleward moisture transport, which is useful for validating reanalysis data and regional climate model simulations.

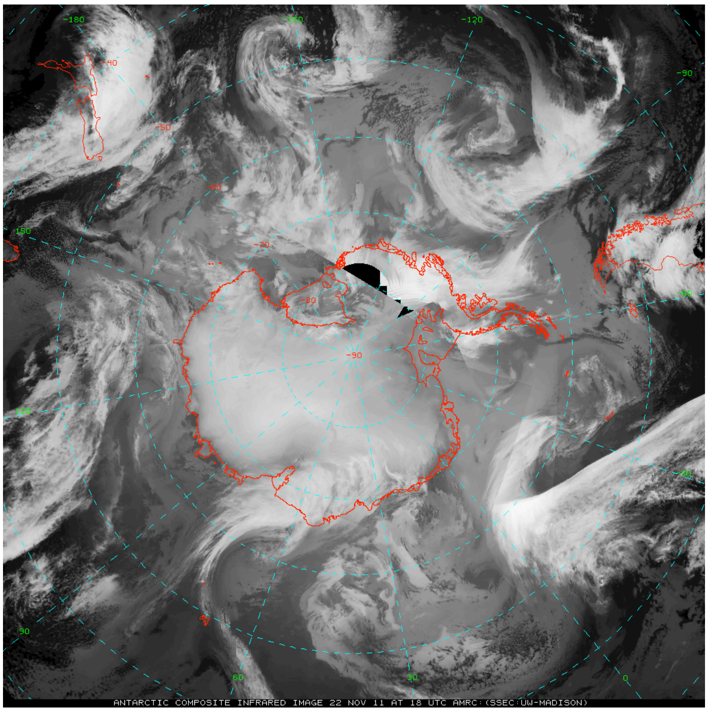

Figure 1. An example satellite composite imagery from 22 November 2011 at 18 UTC.

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