Surface wind speeds supporting satellite-based precipitation retrieval algorithms

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It is widely recognized that passive microwave (MW) sensors on low earth orbiting (LEO) satellites can provide a precious data source for global monitoring of precipitating clouds. The relatively frequent sampling of Polar Regions would represent a meaningful resource to study Antarctica atmospheric phenomena, but difficulties in estimating precipitation arise, mainly due to the high variability of surface emissivity and to blowing snow phenomena. Sensitivity studies based on simulated cloud-radiation datasets seem to support the use of MW sounding channels in retrieval algorithms for Antarctica precipitation, but sparse observational data in the area still do not allow cal/val. This is the reason why such tools are still at a very early consolidation stage.

Nevertheless, ancillary information concerning surface wind speed regimes could help to distinguish MW signals coming from cloud precipitating systems from MW signals due to drifting or blowing snow events.

In order to study this further, we have selected an event that occurred on Terra Nova Bay between 3 and 5 November 2006, building up a cloud-radiation database by applying radiative transfer schemes to the microphysical output of MM5, and analyzed and inter-compared both measured and estimated wind information to understand which data sources were eligible to operationally assist the MW-based precipitation retrieval algorithms.

In this perspective, wind data from the Polar MM5 simulation are compared with AWS data (from AWS/AMRC data archive of UW-Madison, and PNRA-Italy stations), rawinsonde data (McMurdo and Terra Nova Bay stations) and satellite-derived polar winds (SSEC-UW-Madison). Results show how surface wind speeds from the model can provide data fields precious for the application of satellite-based precipitation retrieval algorithms over Antarctica.