

**Unprecedented upper-air observations over Antarctic and surrounding ocean from Concordiasi driftsonde data**

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The 2010 Concordiasi field experiment took place over Antarctic from September to November, 2010. The aim of the experiment was to make innovative atmospheric observations in Antarctica, in part with a constellation of stratospheric super-pressure balloons deployed from McMurdo station, to achieve a better analysis and prediction of weather over Antarctica. During Concordiasi, thirteen NCAR driftsonde systems were launched from McMurdo station, ascended to the stratosphere and then drifted with winds. The Driftsonde system provides a unique platform to release dropsondes that measure atmospheric profiles of wind, temperature, humidity, and pressure and height from the lower stratosphere down to the surface in otherwise difficult to reach parts of the globe. Thirteen driftsondes were operated simultaneously, and most of them remained operational for longer than 50 days. Total 647 soundings were obtained and provide high-quality and high resolution (~10-30 m) atmospheric profiles from the surface to 18 km MSL over the Antarctic continent and surrounding ocean, especially the East Antarctic plateaus. Some of these regions have never been observed before. Preliminary analyses of the driftsonde soundings show some interesting thermodynamic and wind structures. The 45 soundings released from one driftsonde system show the detailed temperature structures from the surface to 60 hPa over the ocean, along coast and over east Antarctic Plateau. The temperature profiles over land show a very strong near-surface inversion, while those over the ocean have very complex lower-troposphere temperature structure. Waves are seen in the upper troposphere and lower stratosphere in all profiles. The composite of all 647 soundings show spatially coherent variability of winds at 100 hPa (clockwise circulation) which is characteristic of the polar vortex, while the winds at 500 hPa are much less spatially coherent and weaker. The wind over Antarctic is much stronger over the ocean than the interior. NOAA PROducts Validation System (NPROVS) is used to collect and compare co-located driftsonde and multiple satellite profiles. Preliminary analysis shows that the hyper-spectral infrared sounders have better performance in retrieving Antarctic near-surface temperature inversion comparing with the sounders with just a few channels. The co-located in-situ sounding data (both driftsonde and radiosonde), operational satellite data products, NCEP reanalysis and 6-hr forecast analysis over Antarctic during Concordiasi period will be created using NPROVS and analyzed in details. The comparisons will shed light on performance of satellite data products and ultimately improve their assimilation in numerical weather prediction models.