

Case Study Of A High Wind Event Off The
Coast Of The Prince Olav Mountains, Antarctica

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The Ross Ice Shelf air stream (RAS) is a barrier parallel flow along the base of the Transantarctic Mountains that is responsible for significant atmospheric mass transport from the Antarctic to lower latitudes (Parish et al. 2006). It has been hypothesized that the RAS is driven by a combination of katabatic flow, barrier winds, and the influence of mesoscale and synoptic scale cyclones. In February 2009 the Sabrina automatic weather station (AWS) was installed off the coast of the Prince Olav Mountains to study the dynamics of the RAS in this region, specifically an area of acceleration found downstream of the protruding Prince Olav Mountains. The wind speed observations from the Sabrina AWS show that a high wind event took place in September 2009. The high wind event had wind speeds in excess of 20 ms^{-1} for nearly 48 hours. A case study of this event using in-situ AWS observations and output from the Antarctic Mesoscale Prediction System shows that the strong wind speeds were caused by a combination of various forcing mechanisms. This forcing included: katabatic winds; barrier winds; a mesoscale surface low over the RIS; an upper level ridge positioned over the southern tip of the RIS; and topographic influences from the Prince Olav Mountains. The combination of these features induced a reverse tip jet (Renfrew et al. 2009) off the coast of the Prince Olav Mountains. The acceleration in a reverse tip jet occurs downstream of the protrusion, explaining the area of acceleration within the RAS downstream of the Prince Olav Mountains.

Parish, T.R., J.J. Cassano, and M.W. Seefeldt, 2006: Characteristics of the Ross Ice Shelf air stream as depicted in Antarctic Mesoscale Prediction System simulations. *J. Geophys. Res.*, **111**, D12109, doi: 10.1029/2005JD006185.

Renfrew, I.A., S.D. Outten, and G.W.K. Moore, 2009: An easterly tip jet off Cape Farewell, Greenland. I: Aircraft observations. *Q. J. R. Meteorol. Soc.* **135**: 1919–1933