

# Ross Island Region Wind Meso-Network Proposal

Joey Snarski  
DIGITALiBiz Inc, Charleston, SC, USA

## 1. OVERVIEW

Strong winds pose significant risk to the safety of the United States Antarctic Program's (USAP) physical assets and personnel, especially in the context of aviation operations. Since January of 2017, Phoenix Airfield has seen 14 discrete events in the manual observation record where the crosswind has exceeded the 15-knot threshold, half of which also reduced visibility. It is crucial for weather forecasters to predict the onset, strength, and duration of these winds with enough lead time to protect USAP aviation and ground functions. There is little in the scientific literature to characterize the downslope enhancement of winds to the south of McMurdo Station.

## 2. ROSS ISLAND REGION DOWNSLOPE WINDS

Severe winds that impact McMurdo Station and its supporting airfields are nearly always the result of an impending Ross Sea cyclone which create southerly barrier winds (Weber et al., 2016). These barrier winds can overcome the topography of Minna Bluff, Black Island, and White Island and undergo downslope enhancement. Chenoli et al. (2015) found downslope enhancement to be a significant contributor to the development of strong wind events (greater than or equal to 22 knots) in the

Ross Island region, warranting further observational analysis.

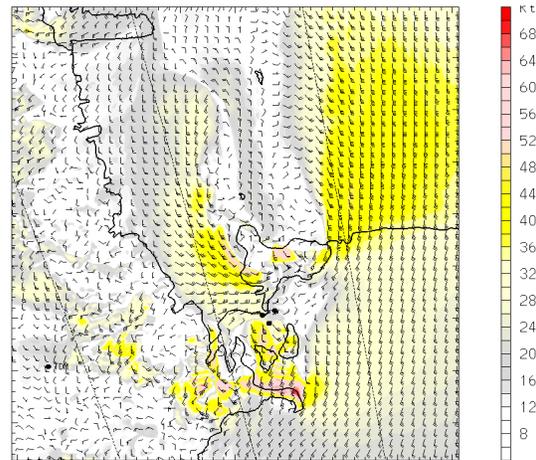


Figure 1. An Antarctic Mesoscale Prediction System horizontal wind chart valid at 05 UTC May 16 2018 exhibiting downslope-enhanced winds in the lee of Black Island, White Island, and Minna Bluff.

## 3. WIND MESO-NETWORK PROPOSAL

A mesoscale network of 15 automated weather stations to measure wind speed and direction to the north of Black Island and White Island is proposed to capture the temporal and spatial nature of the leeside downslope winds. An analysis of the static stability, upstream wind flow, and numerical weather prediction data from the Antarctic Mesoscale Prediction System juxtaposed with data collected from the proposed network will characterize the downslope wind patterns. This will ultimately yield new forecasting techniques to protect the people and property of the United States Antarctic Program.

#### 4. REFERENCES

Chenoli, S.N., J. Turner, and A.A. Samah, 2015: A Strong Wind Event on the Ross Ice Shelf, Antarctica: A Case Study of Scale Interactions. *Monthly Weather Review*, **143**, 4163-4180, doi: 10.1175/MWR-D-15-0002.1

Weber, N.J., M.A. Lazzara, L.M. Keller, and J.J. Cassano, 2016: The Extreme Wind Events in the Ross Island Region of Antarctica. *Weather and Forecasting*, **33**, 985-1000, doi: 10.1175/WAF-D-15-0125.1