

A 20 Year Assessment of the Frequency and Intensity of McMurdo Area Strong Wind Events



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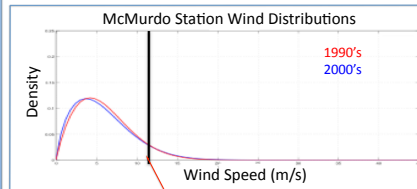


What is a “Strong Wind Event?”

- Intensity threshold: must be at or above the 95th percentile for wind speed at that location
- Duration requirement split up into three categories: 6, 12, and 24-hour time spans
- At least half of the observations collected within a time span must meet the intensity threshold
- Periods of missing data were only recorded if they surpassed half of the observations in one month

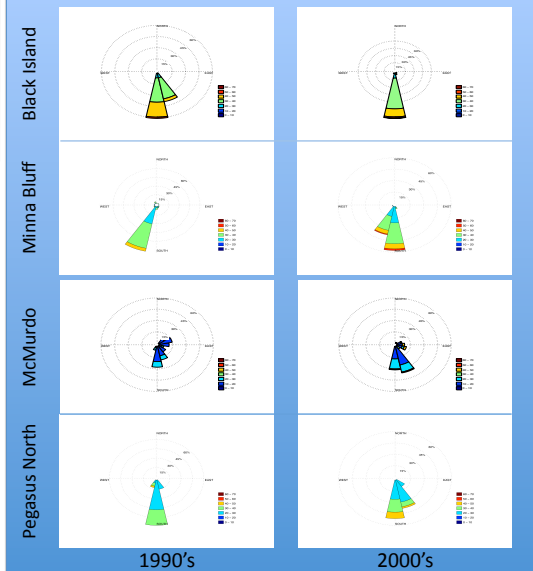
Abstract

Increased structural damage in the Ross Island vicinity, which houses the US McMurdo station, has been reported over the past decade. It has been hypothesized that this damage may have been the result of an increase in the frequency, duration, and/or magnitude of synoptic and mesoscale-forced “strong wind events” (SWE’s) in the region. In order to answer this question, our study utilized approximately 20 years of Automated Weather Station (AWS) wind data from four stations (Black Island, Cape Bird, Minna Bluff, and Pegasus North) in the Ross Island region. Both the University of Wisconsin Automatic Weather Stations Project and the United States Navy’s Space and Naval Warfare (SPAWAR) Systems Center in Charleston, South Carolina provided the AWS data.



The above graph shows the wind speed distributions at McMurdo for the 90’s and 2000’s. The black bar represents the 95th percentile, which is unique to the observations at McMurdo, and cannot be used to determine SWE’s at other sites.

Wind Roses



The six photos above were taken after the McMurdo storm that occurred on May 16, 2004. As is evident, the damage is widespread and varied. Through the study of these events, we hope to gain the insight to better forecast—and thus prepare for—future events. —Photos courtesy of Bill Spindler/southpole.com

Site	Period of Data Availability	Wind Speed 95 th Percentile (m/s)
Pegasus North AWS	Jan '90 to Dec '09	20
Pegasus South AWS	Jan '91 to Dec '08	20
Minna Bluff AWS	Jan '91 to Dec '09	25
Black Island AWS	Jan '94 to Dec '00, Oct '03 to Dec '09	27
McMurdo Station	Jan '73 to Dec '09	11.8
Scott Base (NZ)	Jan '67 to Dec '86, Dec '96 to Dec '09	11.8



McMurdo Station lies on the border of the Ross Ice Shelf, near the Transantarctic Mountains.

Instrument	Sensor	Location	Resolution (m/s)/"	Range (m/s)/"
Wind Speed	R.M. Young 05103	Pegasus North	0.195	1 to 100
		Pegasus South		
	Bendix/Belfort	McMurdo	0.250	2 to 63
		Scott Base		
Wind Direction	10K ohm potentiometer	Black Island	1.5°	0° to 355°
		Minna Bluff		

Results

- No trend was found indicating an increase in SWE’s in the past decade
- Meaningful trend analysis was obstructed by missing data
- Number of SWE’s actually *decreased* (albeit minimally) in the past decade
- In total, there have been 800 SWE’s in the past 20 years
- The average wind direction for SWE’s in the Ross island vicinity is SSE to SSW
- Fewer SWE’s occur in the summer

Future Efforts

Though our initial results were inconclusive, the study of these SWE’s is ongoing. Future efforts regarding the study of these events include doing case studies on the strongest of these SWE’s and using Antarctic Mesoscale Prediction System (AMPS) data in conjunction with station data to gain extra perspective.

Acknowledgements:

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