



A new 36.17 MHz all-sky meteor radar has been installed at McMurdo Station, Antarctica (77.8 S, 166.7 E) that will provide wind measurements in the mesosphere and lower thermosphere (MLT) region.



First Observations from Meteor Radar at McMurdo Station Antarctica

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The mesosphere and lower thermosphere (MLT) region, at an altitude between 50 and 120 km above the Earth's surface, lies between the lower atmosphere (troposphere/stratosphere) and the near-earth space environment. The region has a rich spectrum of wave activity including atmospheric tides, planetary waves, and gravity waves. These phenomena transport heat and momentum from the lower atmosphere into the upper atmosphere [1], which affect weather systems, winds, and other dynamics [2]. The MLT region, especially over polar latitudes, is considered particularly sensitive to long-term global-scale atmospheric changes [3].

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Current Campaign

March 15th 2018 – Present (June 9th 2018)

Days In Operation	Total Number of Meteor Echoes	Count / Hour			Average Count / Day
		MIN	AVG	MAX	
87	517,788	105	248	604	5,952

References

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- G. Hernandez (2004). "Winter mesospheric temperatures above South Pole and their relationship to springtime ozone hole size", *Geophysical Research Letters*, Vol. 31.
- W.K. Hocking; B. Fuller; and B. Vandepuer, (2001) "Real-time Determination of Meteor-related Parameters Utilizing Modern Digital Technology", *J. Atmos. Solar-Terr. Physics*, 63, 155-169.
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Live Data

ccar.colorado.edu/meteors

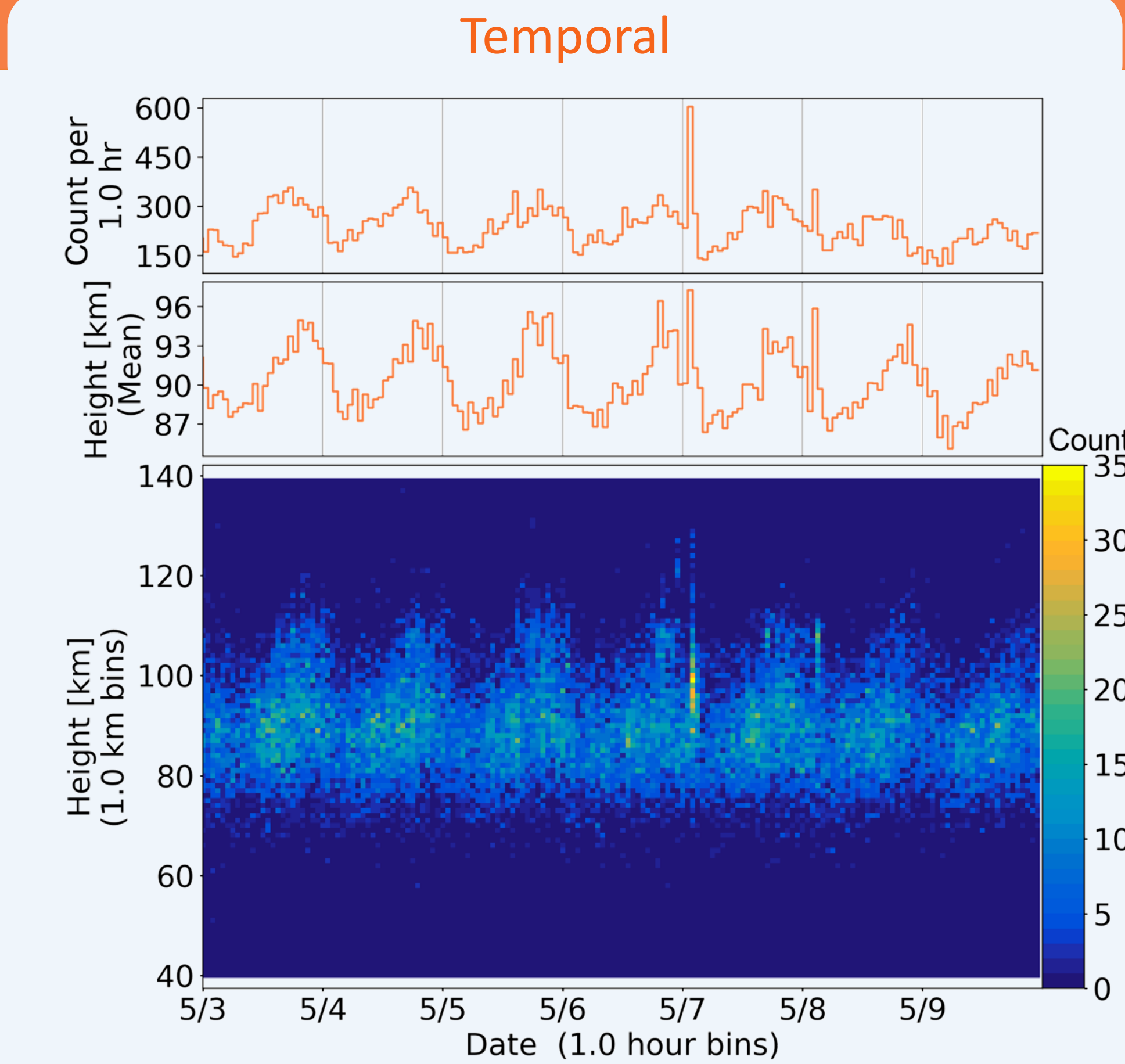
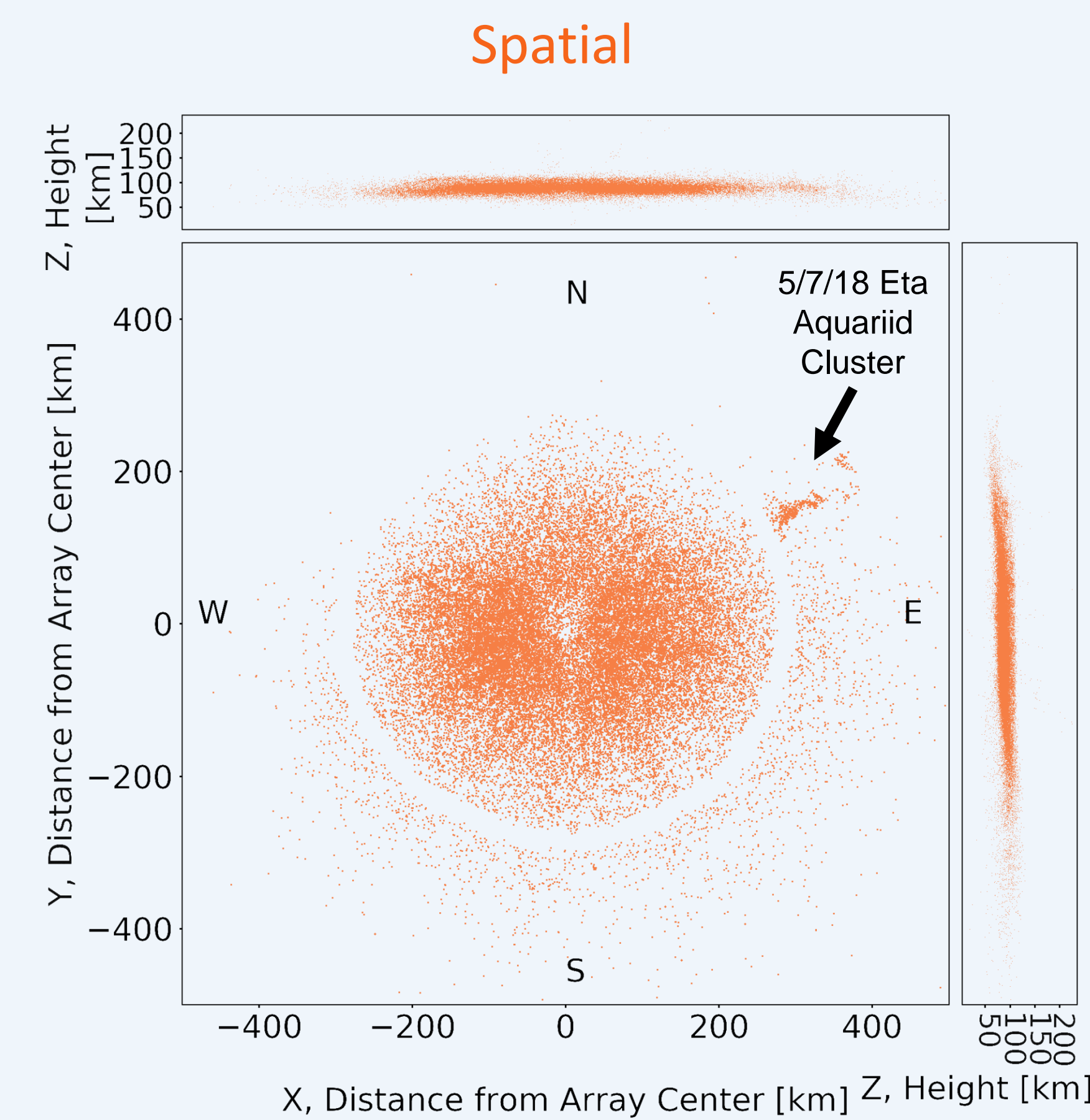
Meteors

Eta Aquariid Shower

[Left] A spatial distribution of detected meteors in a 7 day period surrounding the Eta Aquariid meteor shower event. The shower can be seen as a North-Easterly clustering of echoes. The empty ring around 300 km is caused by the receiver turning off during a transmit pulse.

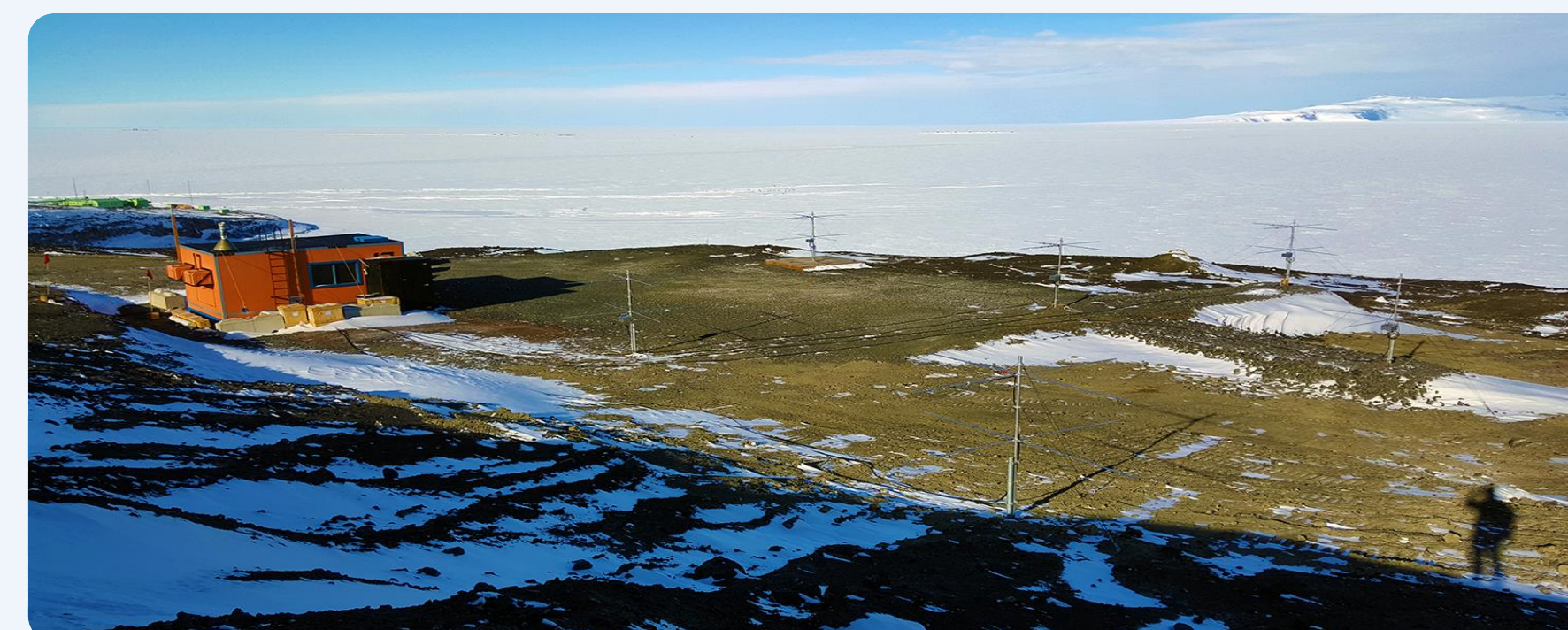
North refers to 'grid north' as defined for the Antarctic in the Universal Polar Stereographic (UPS) coordinate system. The antenna array is located at (0,0)

[Right] Hourly histograms of meteor heights for the same period.



Radar

Operating Frequency	36.170 MHz
Peak Power	16 kW
Pulse Repetition Freq.	500 MHz
Transmit (TX) Antenna	One circularly polarized, 2-element crossed dipole
Receive (RX) Antennas	Five circularly polarized, 2-element crossed dipole

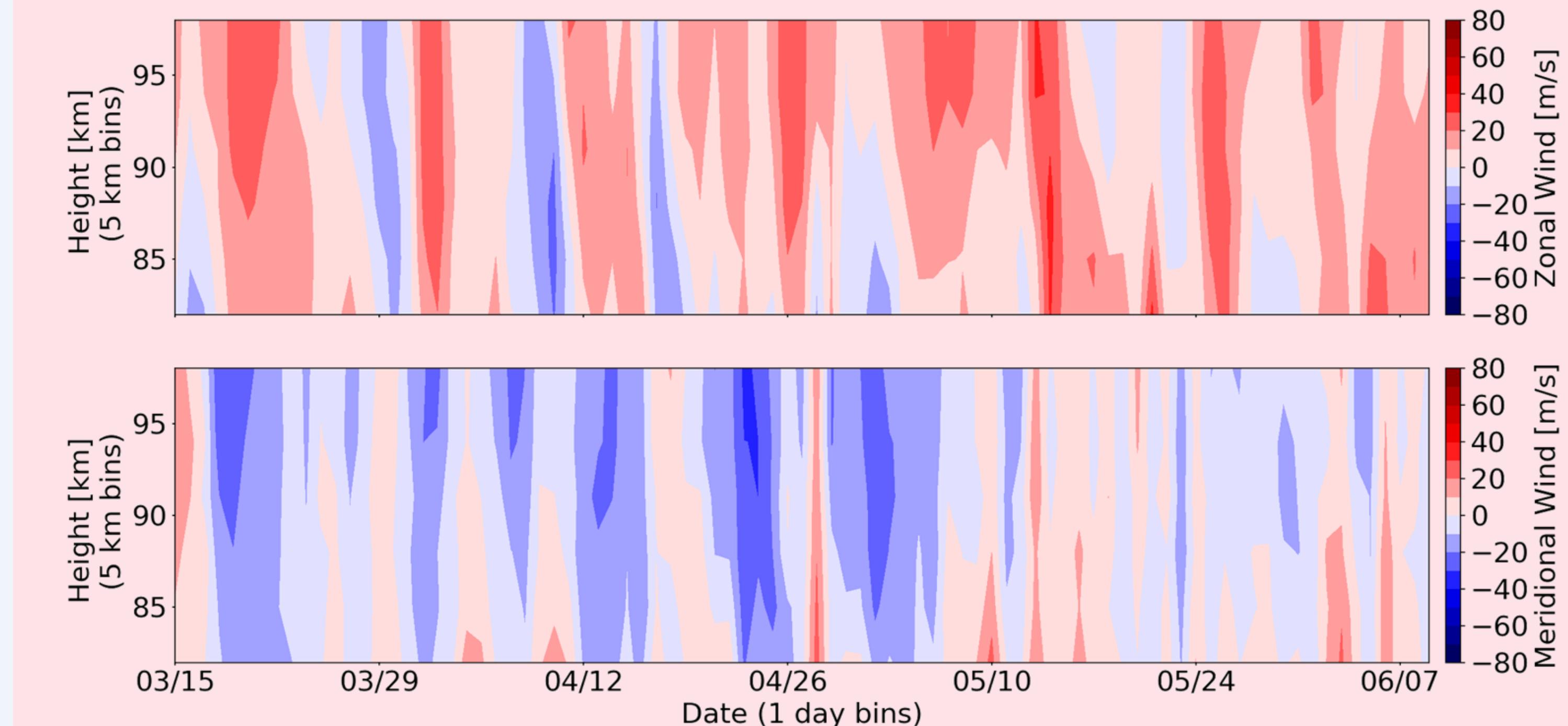


Region

Exosphere	500 km
Kármán line	100 km
Thermosphere	80 km
Mesosphere	50 km
Stratosphere	10 km
Thermosphere	

Winds

[Top] Zonal (E-W) and [Bottom] Meridional (N-S) hourly wind velocity components over the current observation campaign: 3/15/18 – Present.



Waves

[Left] [Top] Time-series of the zonal wind velocity component at 88 km for the duration of the radar's observation campaign 3/15/2018 - Present.

[Left] [Bottom] Power Spectral Density plot showing significant periodicities under a red-noise assumption.

Both diurnal (24 hr) and semi-diurnal (12 hr) periods are seen. Also shown are periods of 7.9 hr, 10.5 hr, and 7.1 days.

[Right] Wavelet Power Spectrum [5] of the same time series. Hatched area represents cone of influence.

