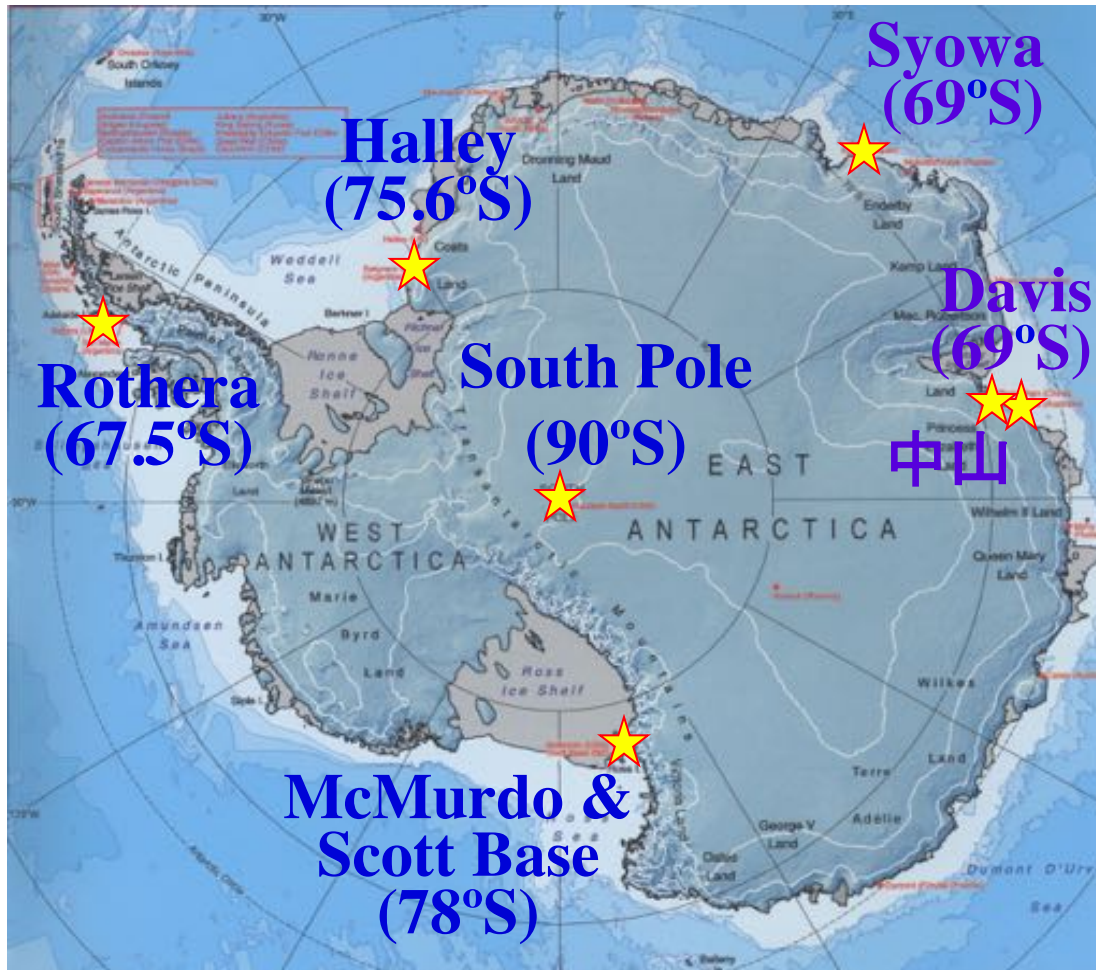




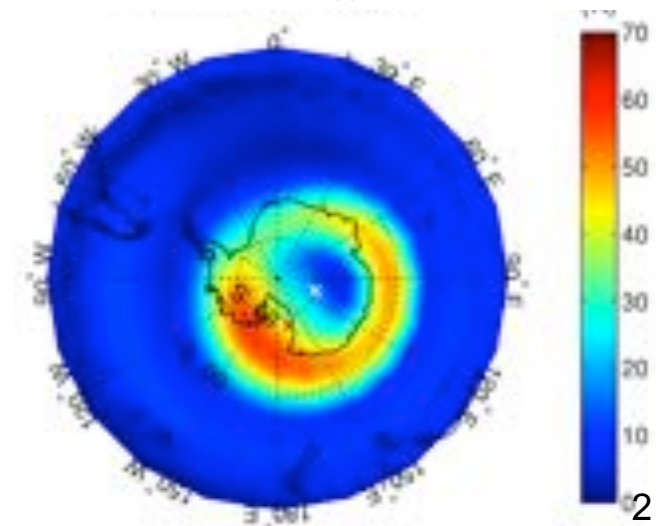
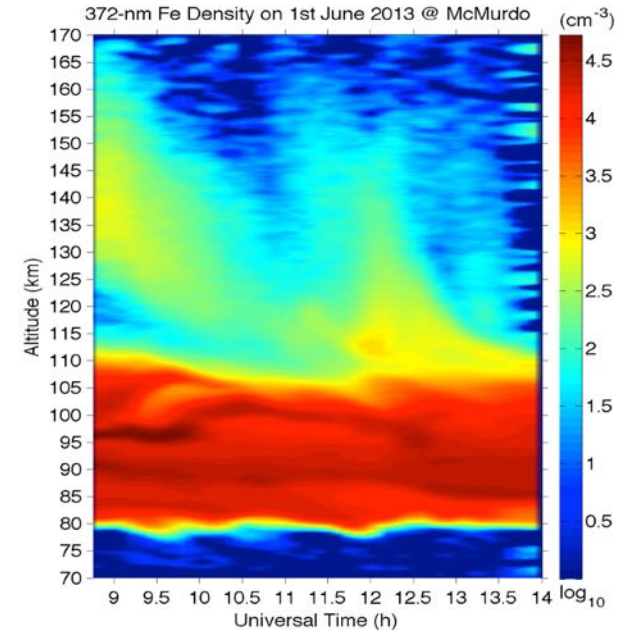
Updates on Fe and Na Lidar Observations at McMurdo

Xinzhao Chu
University of Colorado Boulder

McMurdo Lidar Campaign (77.8°S, 166.7°E)



TiFe Layer



Many new discoveries from McMurdo lidar observations are transformative to advancing space-atmosphere sciences

Advancing Science through Making Discoveries and Producing the Best Crop of Young Scientists



First Place Prizes at NSF/CEDAR student poster competitions

2011 Chihoko Yamashita

2012 Cao Chen

2013 Zhibin Yu

2015 Weichun Fong

2017 Ian Geraghty (**undergrad**)



Zhibin Yu	PhD	2014
John A. Smith	PhD	2014
Weichun Fong	PhD	2015
Cao Chen	PhD	2016
Brendan Roberts	MS	2012
Ian F. Barry	MS	2015

McMurdo Lidar Observations since Dec 2010

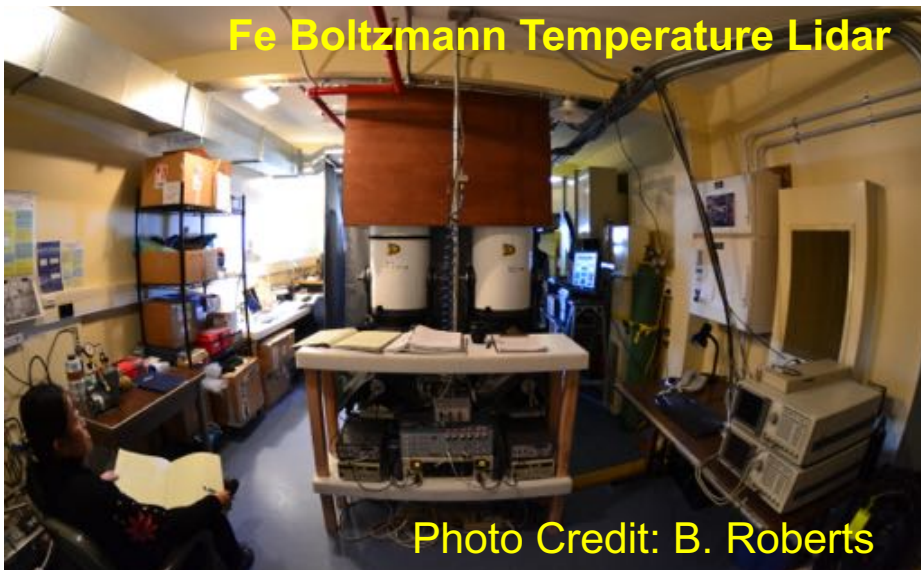
Collaboration between USAP and AntNZ



**Lidar beams @
Arrival Heights**

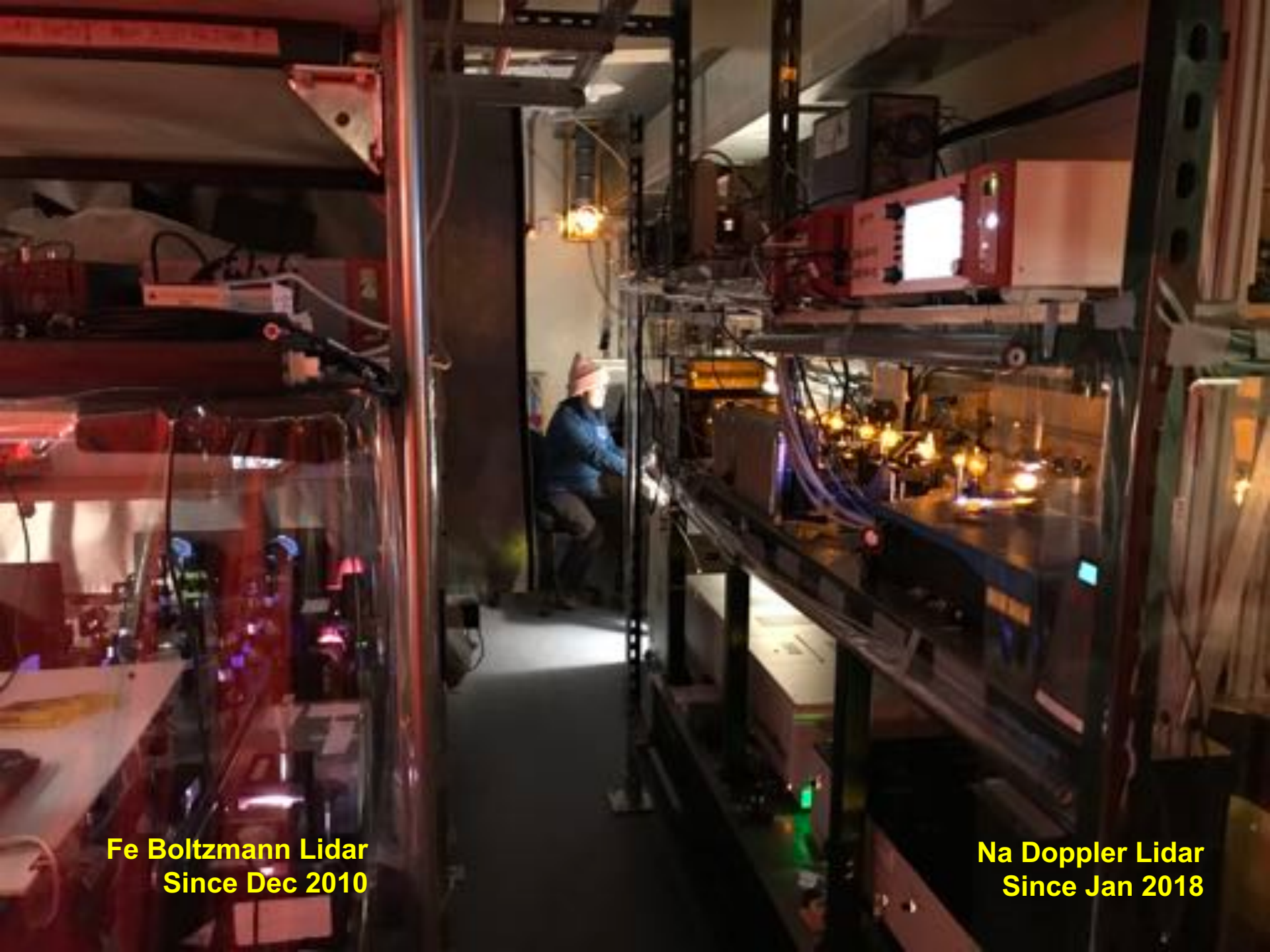


Fe Boltzmann Temperature Lidar



**Aurora on
28 May 2011**

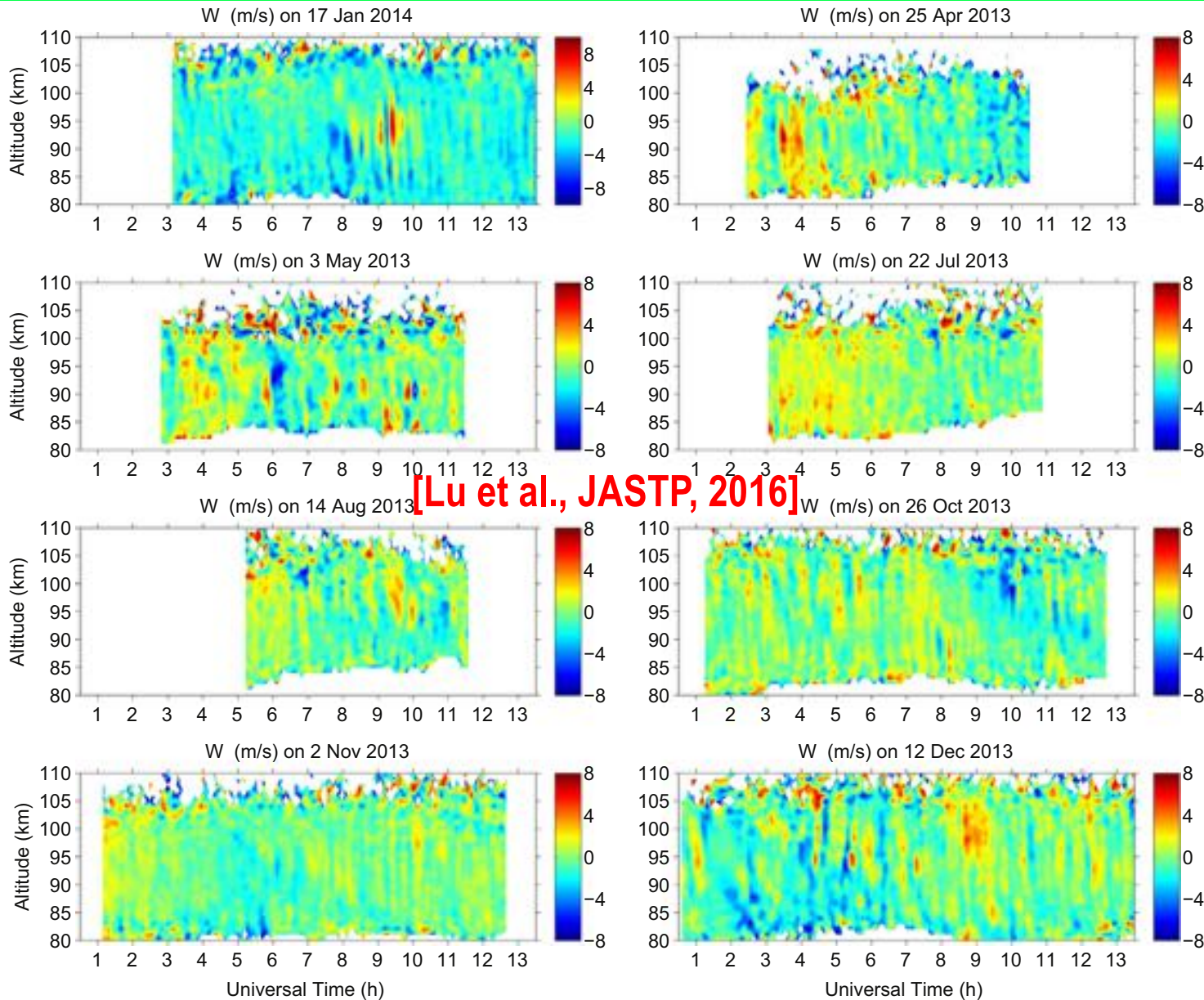




Fe Boltzmann Lidar
Since Dec 2010

Na Doppler Lidar
Since Jan 2018

Vertical Winds Measured by STAR Na Lidar



[Lu et al., JASTP, 2016]

Gravity Waves
Period = 0.25-3 h

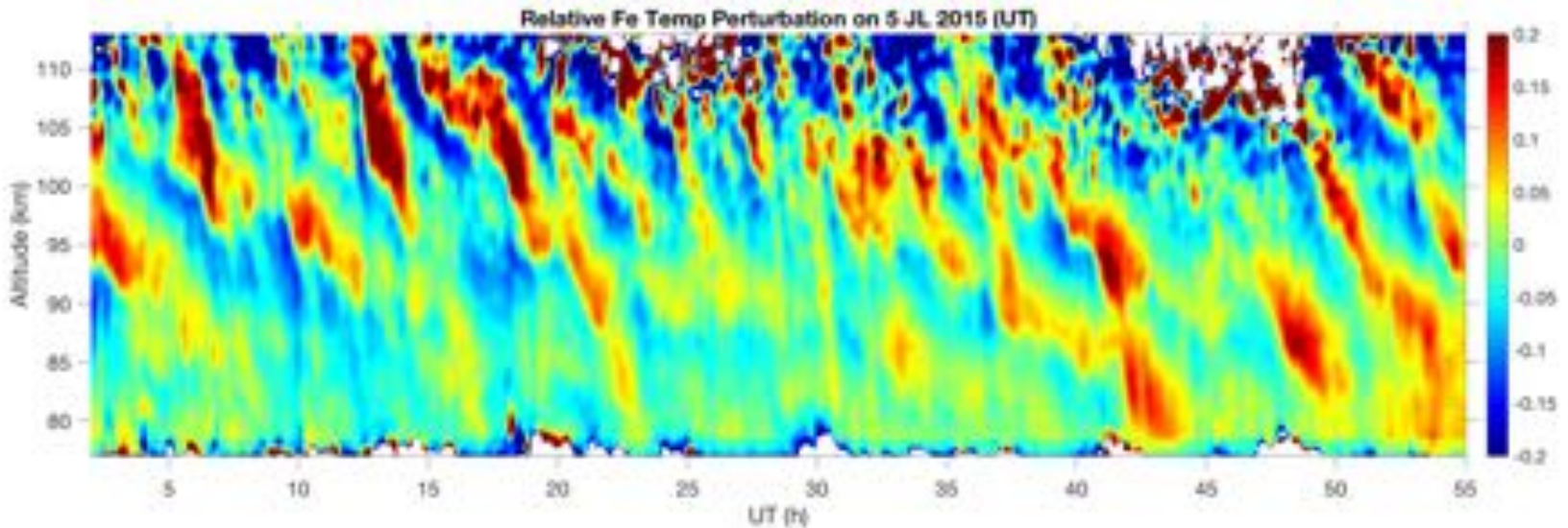
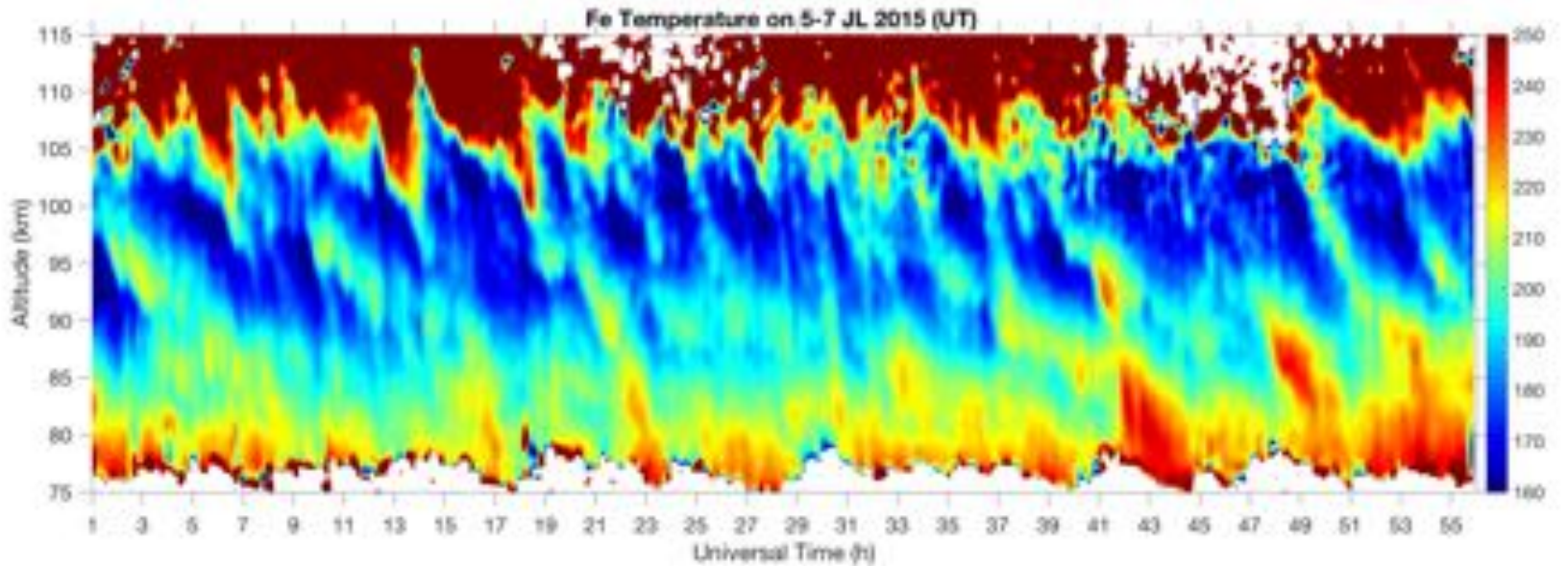
$$\tilde{T} \approx -\frac{iN^2}{g\hat{\omega}} \tilde{w}$$

$\Delta T = 0.3-1$ K
 $\Delta W = 0.2-0.5$ m/s
 @ 7.5 min &
 0.96 km

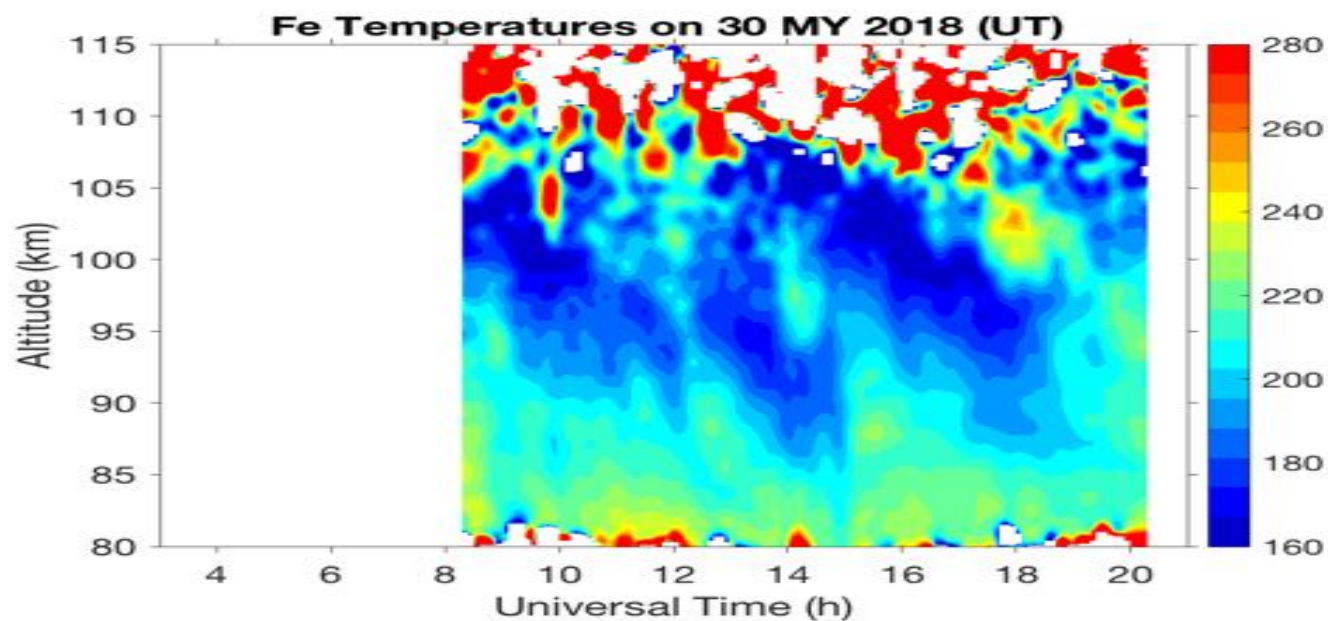
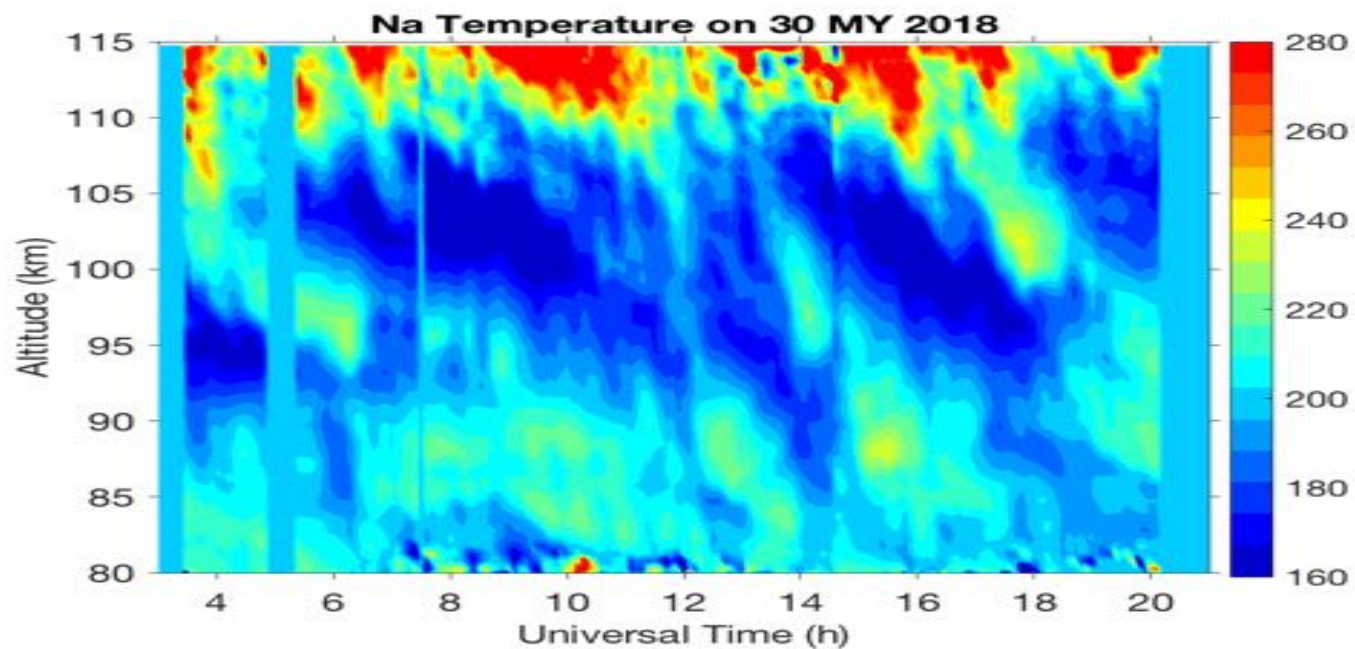
Raw Data
 @ 3 s and 24 m

STAR Na Doppler lidar enabled the very high-efficiency, high-resolution lidar!

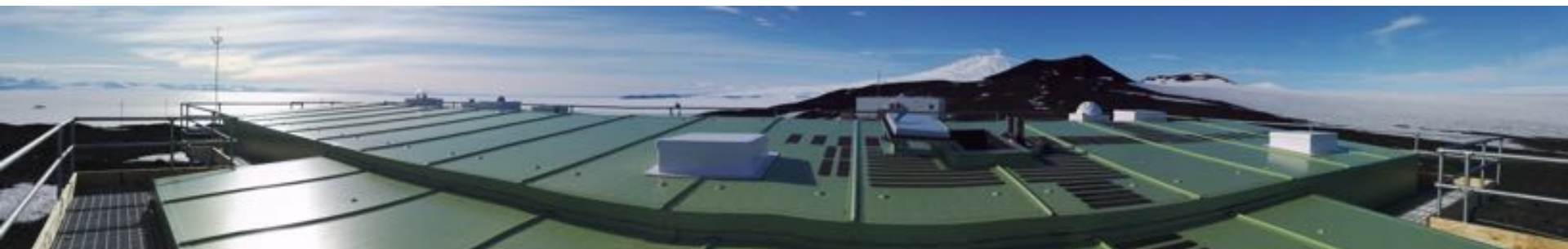
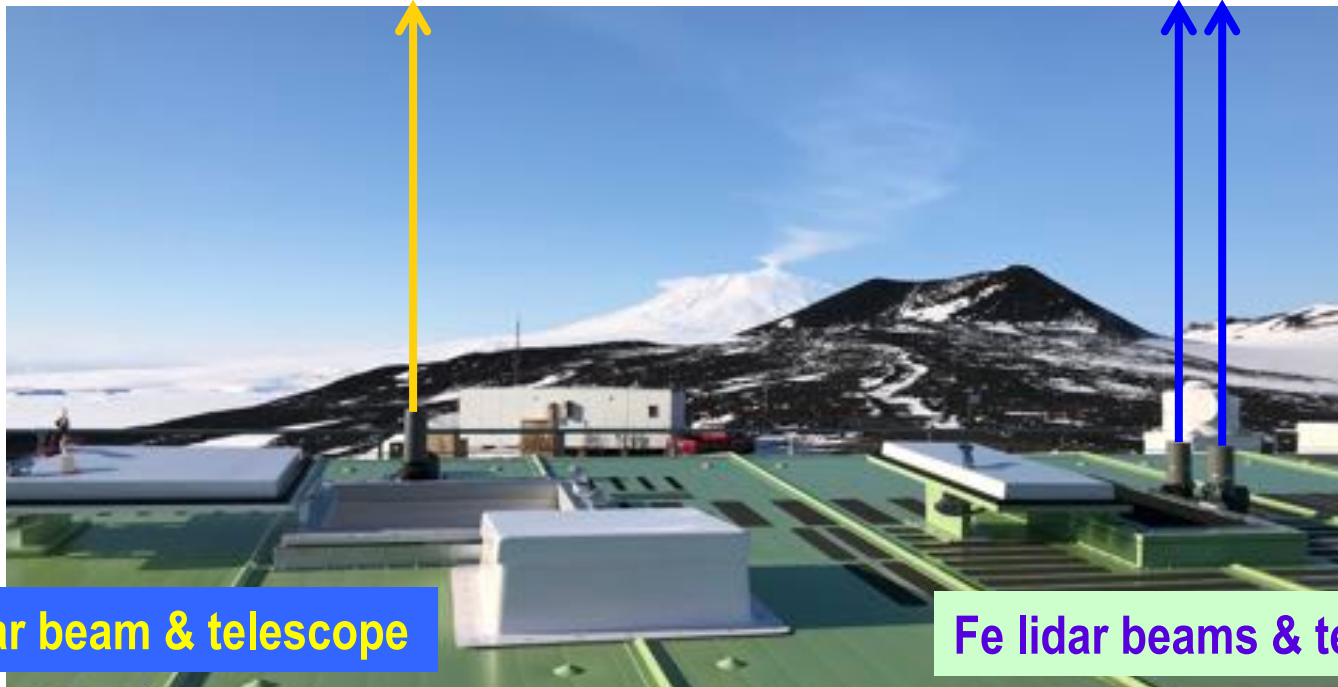
Persistent Gravity Waves and Higher-Freq Waves Revealed by Fe lidar at McMurdo



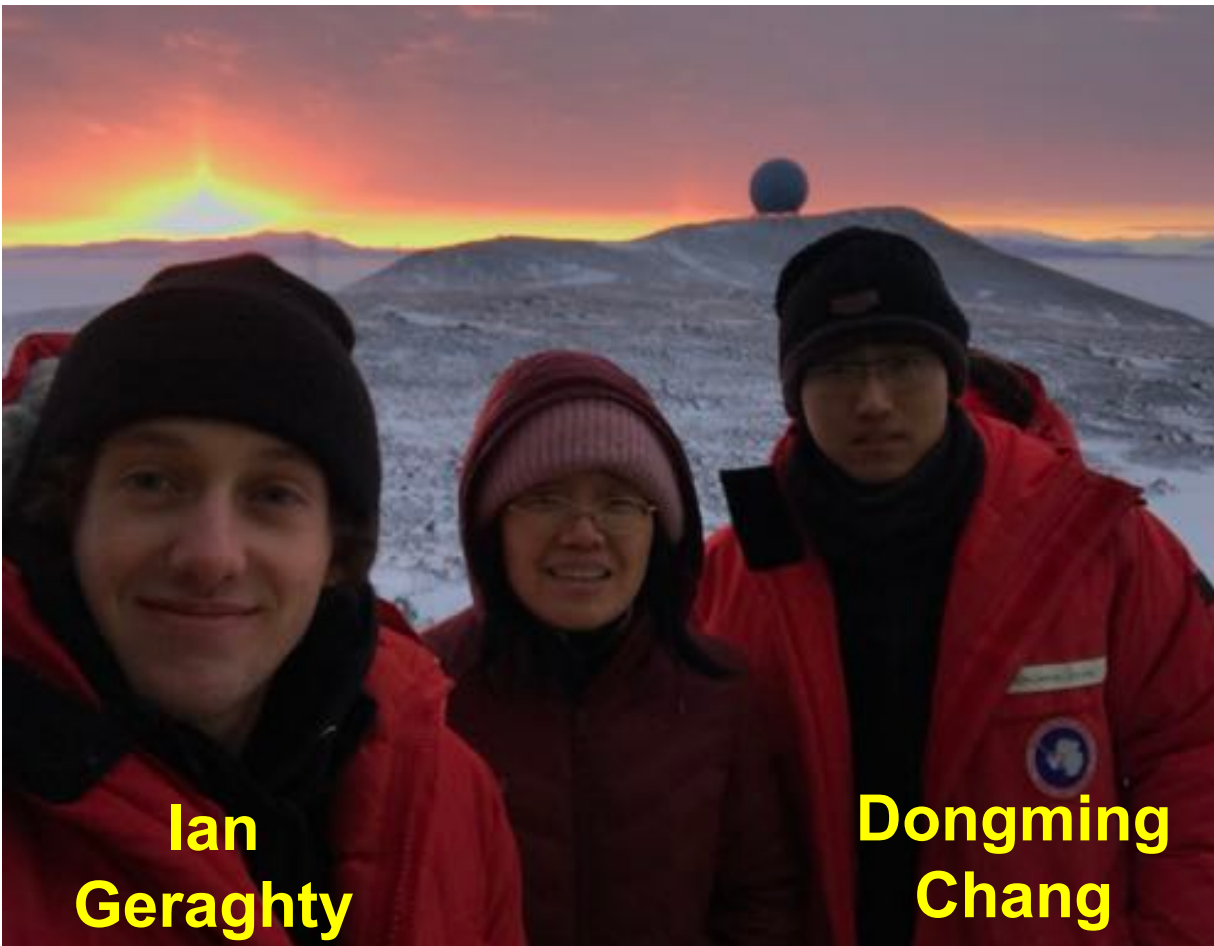
Simultaneous Na and Fe Lidar Observations



Na and Fe Lidars Located Next to Each Other



STAR Na Doppler Lidar Added in Dec 2018



Young energetic students are writing a new story in Antarctica