

Middle Atmosphere WACCM Studies at CU



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France, J. A., and V. L. Harvey [2013], A Climatology of the Stratopause in WACCM and the Zonally Asymmetric Elevated Stratopause, *J. Geophys. Res.*, doi:10.1029/2012JD018796.

France, J. A., et al. [2014], A Climatology of Planetary Wave-Driven Polar Mesospheric Inversion Layers, *J. Geophys. Res.*, in prep.

Greer, K., et al. [2014], Dynamical Mechanisms of Upper Stratosphere Lower Mesosphere Disturbances Studied in WACCM, *J. Geophys. Res.*, accepted.

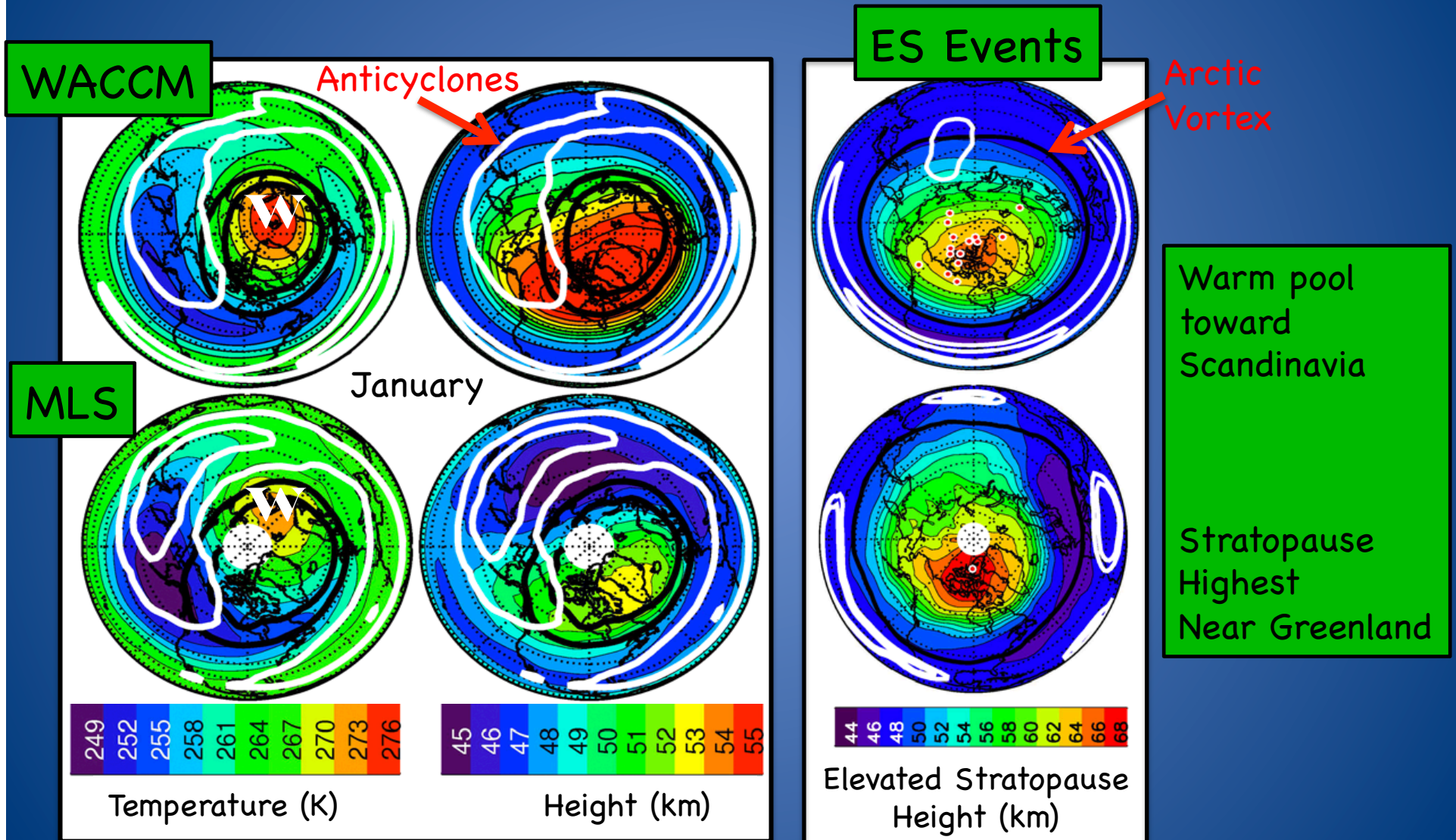
Harvey, V. L., et al. [2014], A Chemical Definition of the Mesospheric Vortex in MLS and WACCM, *J. Geophys. Res.*, in prep.

Holt, L. A., et al. [2013], The influence of major sudden stratospheric warming and elevated stratopause events on the effects of energetic particle precipitation in WACCM, *J. Geophys. Res.*, doi:10.1029/2013JD020294.

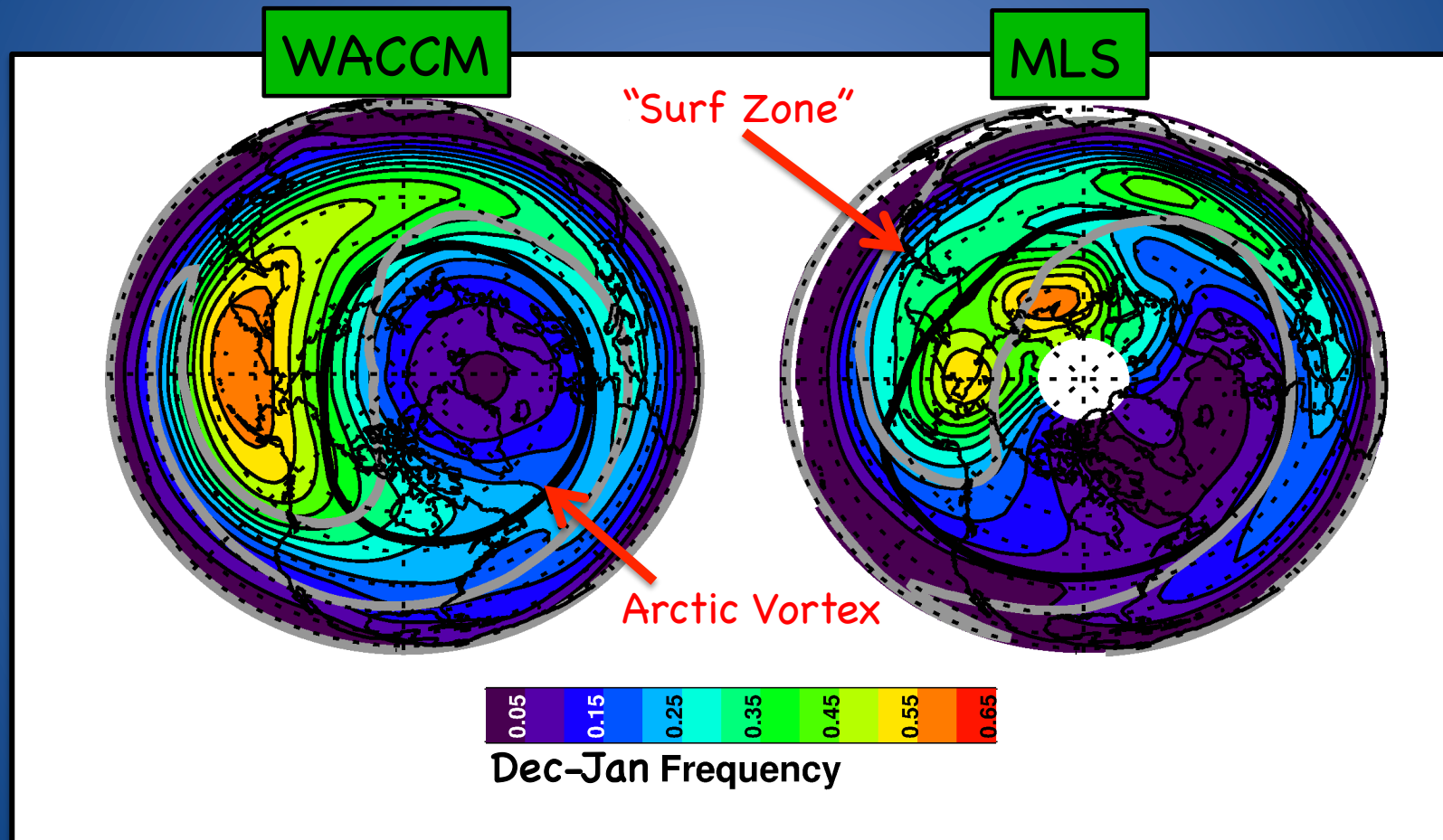
Peck, E. D., et al., [2014], Medium Energy Electrons in WACCM, *J. Geophys. Res.*, in prep.

Randall, C. E., et al. [2014], Auroral Energy Particle Precipitation: An Atmospheric Coupling Agent?, *J. Geophys. Res.*, in prep.

France, J. A., and V. L. Harvey [2013], A Climatology of the Stratopause in WACCM and the Zonally Asymmetric Elevated Stratopause, *JGR*.

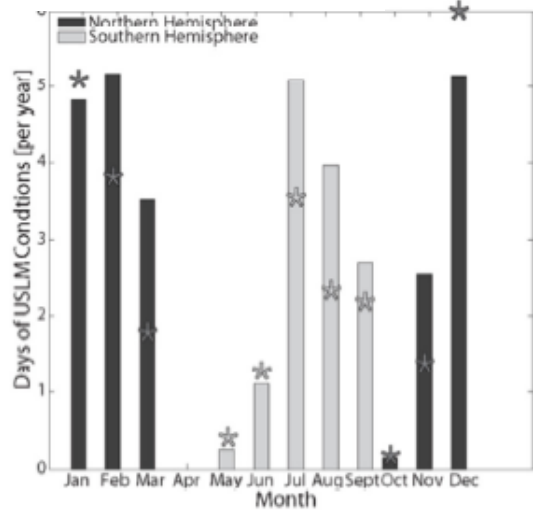


France, J. A., et al. [2014], A Climatology of Planetary Wave-Driven Polar Mesospheric Inversion Layers, *JGR*, in prep.

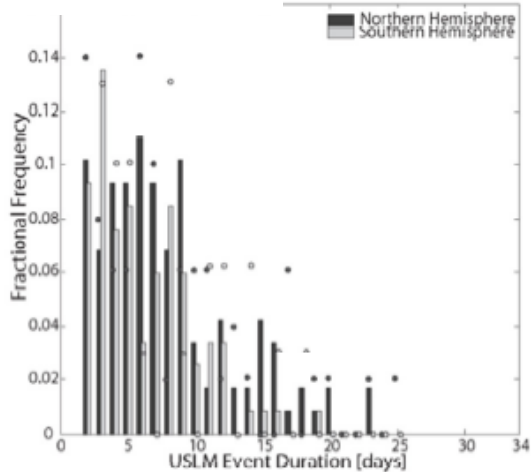


Greer, K., et al. [2014], Dynamical Mechanisms of Upper Stratosphere Lower Mesosphere Disturbances Studied in WACCM, *JGR*, accepted.

Seasonal Distribution

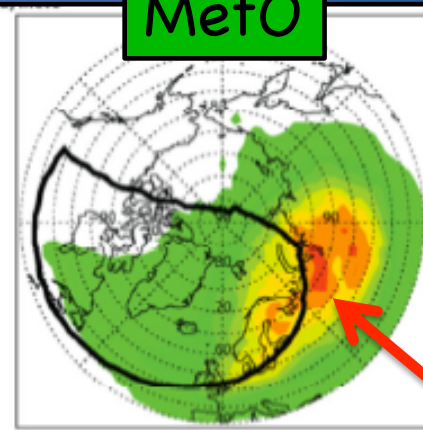
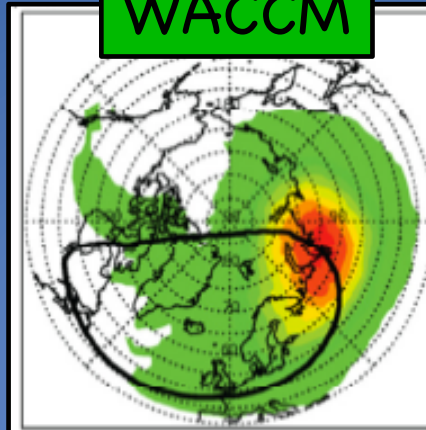


Event Duration



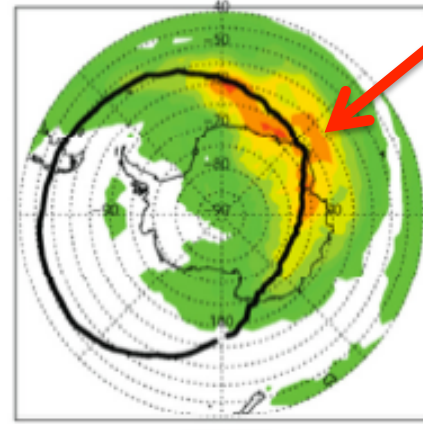
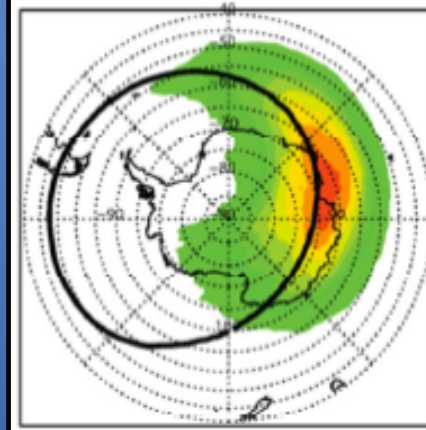
WACCM

MetO



NH

USLM disturbance "hotspots"

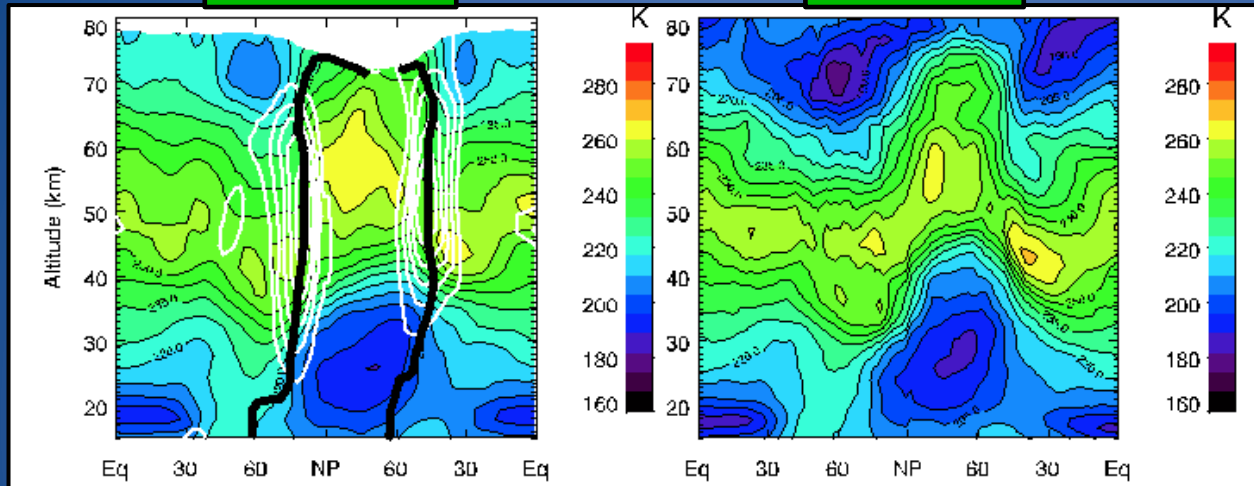


SH

Harvey, V. L., et al. [2014], A Chemical Definition of the Mesospheric Vortex in MLS and WACCM, *JGR*, in prep.

MERRA

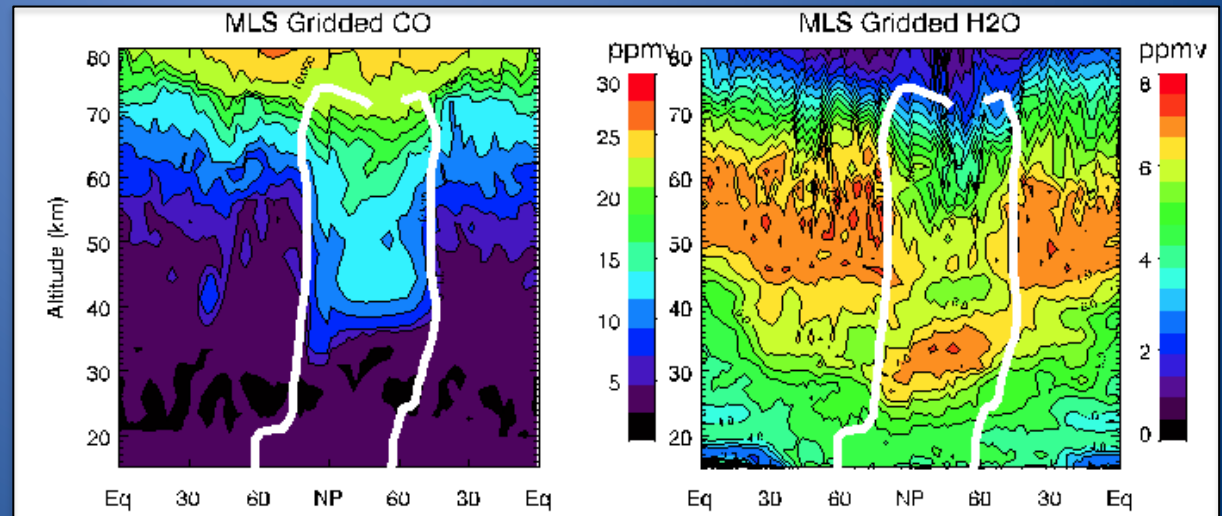
MLS



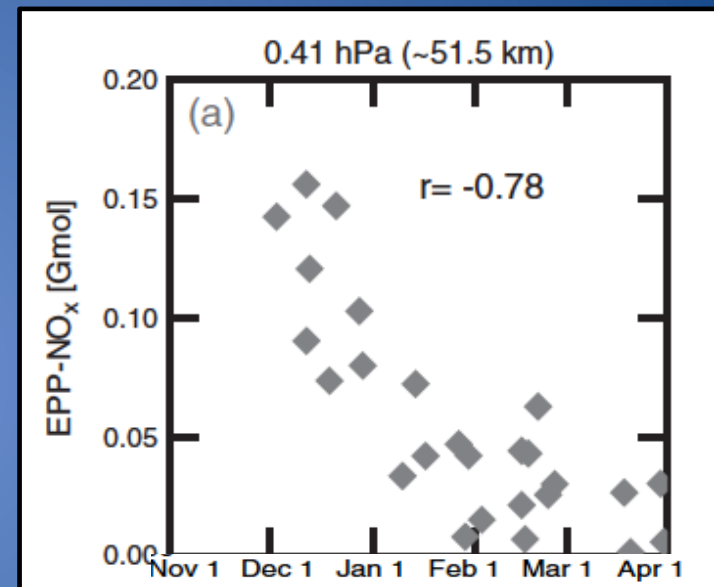
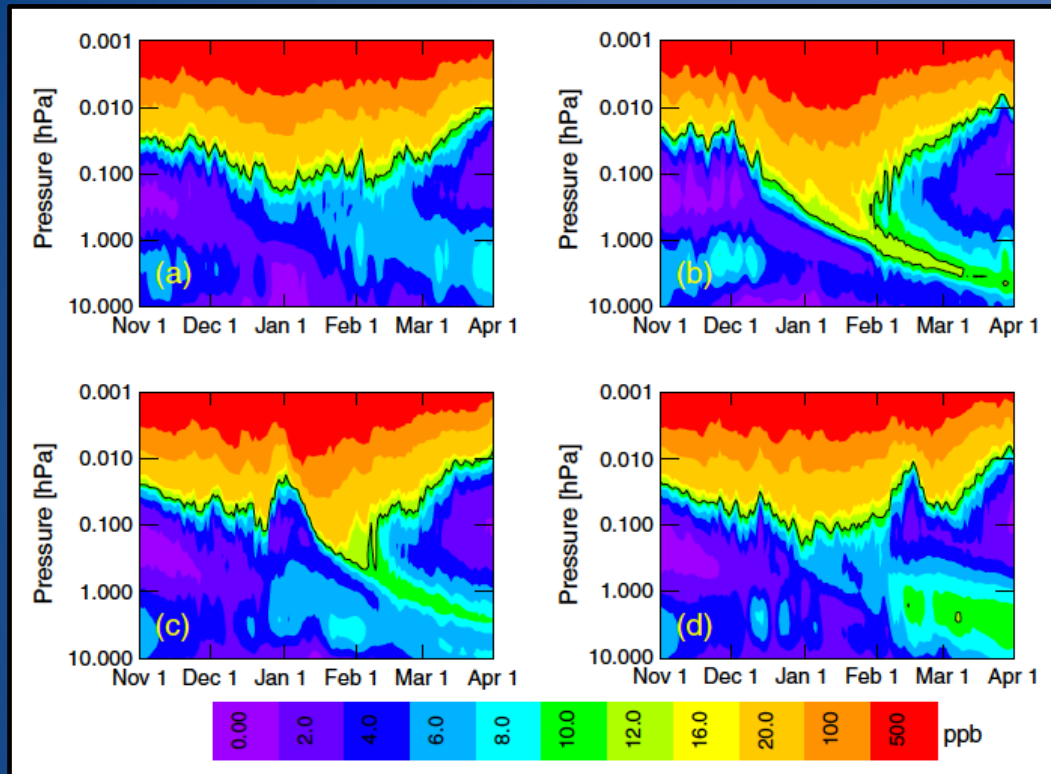
Vortex Shape
Diagnostics
based on CO

SD-WACCM

Focus on ES
Events

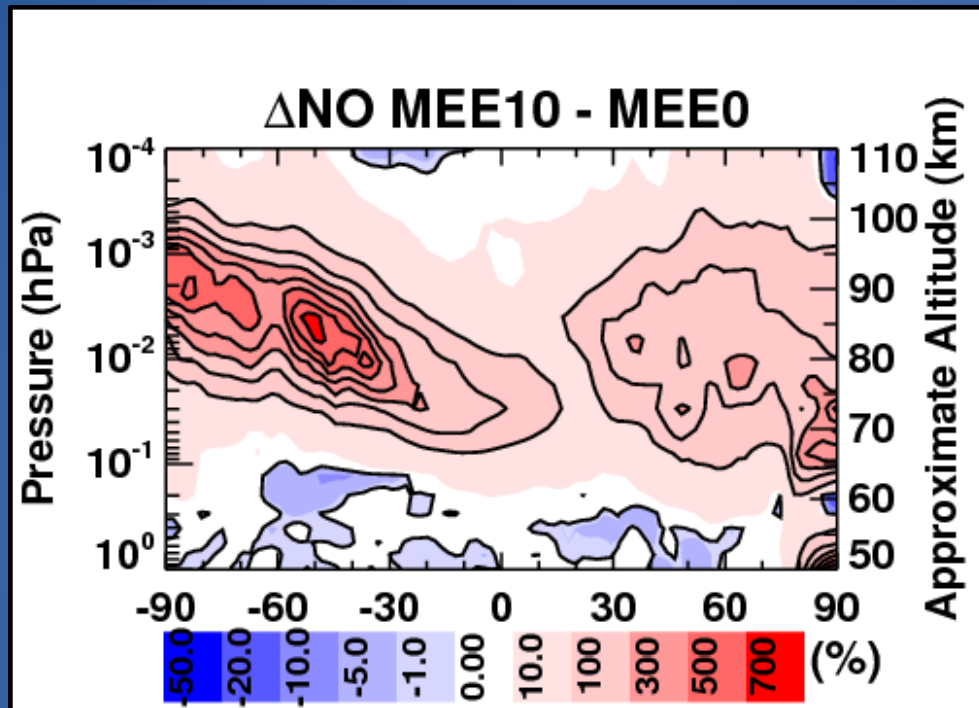


Holt, L. A., et al. [2013], The influence of major sudden stratospheric warming and elevated stratopause events on the effects of EPP in WACCM, *JGR*.



Does the timing of SSWs affect the amount of NO_x transported to the stratosphere?

Peck, E. D., et al., [2014], Medium Energy Electrons in WACCM, *JGR*, in prep.



Zonal mean ΔNO using
Codrescu MEE maps

~100-700% increases
at all latitudes between
70 km and 100 km.

MEPED Contamination
issues

1. Create hemispheric maps of corrected MEE for use in WACCM. June, 2014
2. Run WACCM with the new MEE maps. July, 2014
3. Submit paper. August, 2014
4. Distribute maps to the public. September, 2014

Results To Date

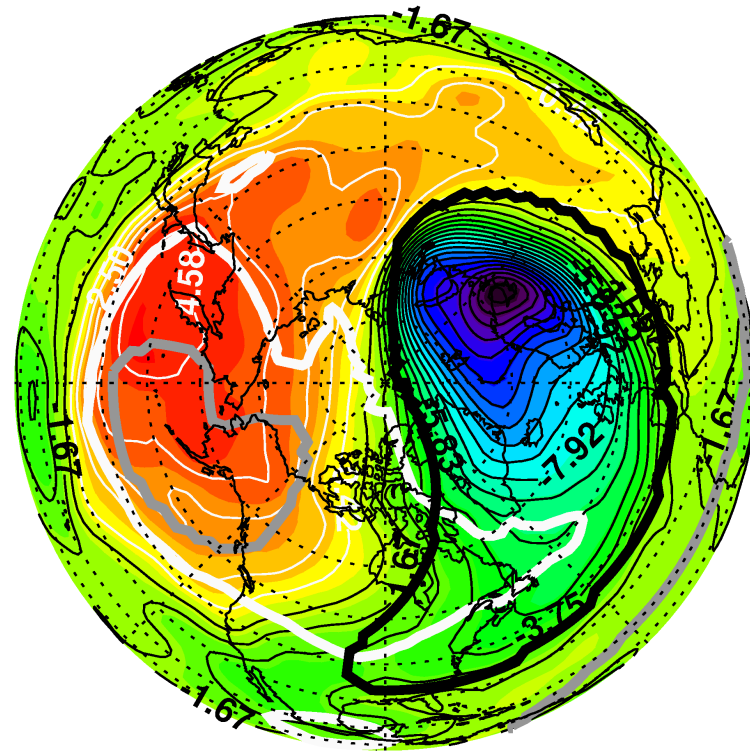
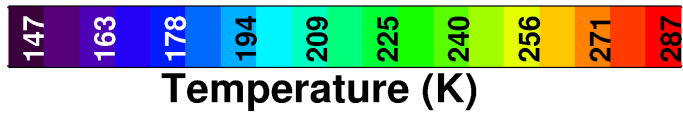
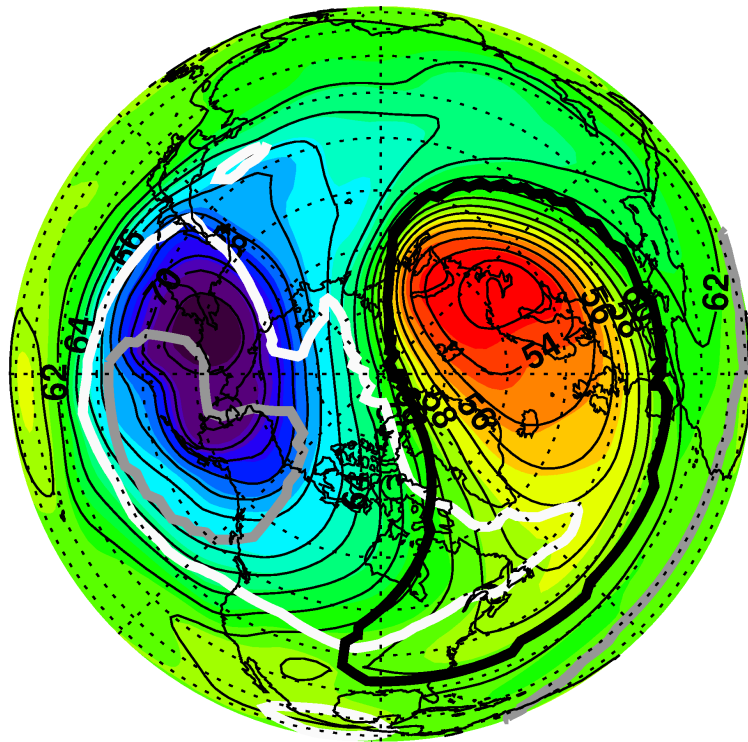
- WACCM reproduces zonal asymmetries in the elevated stratopause
- WACCM properly simulates polar mesospheric inversion layers
- UTLS warming disturbances in WACCM: Timing, Duration, Location match MetO.
- The timing of SSWs affect the amount of NO_x that descends to the stratosphere: the earlier the event occurs, the more NO_x descends to the stratosphere.

Next year: Medium Energy Electrons and Vortex Structure

Thanks!

Extra Slides

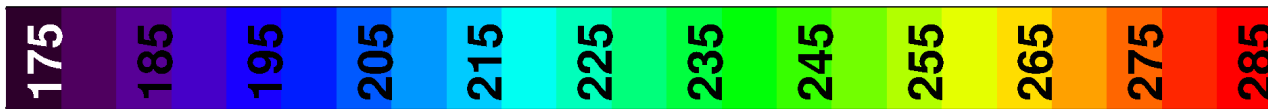
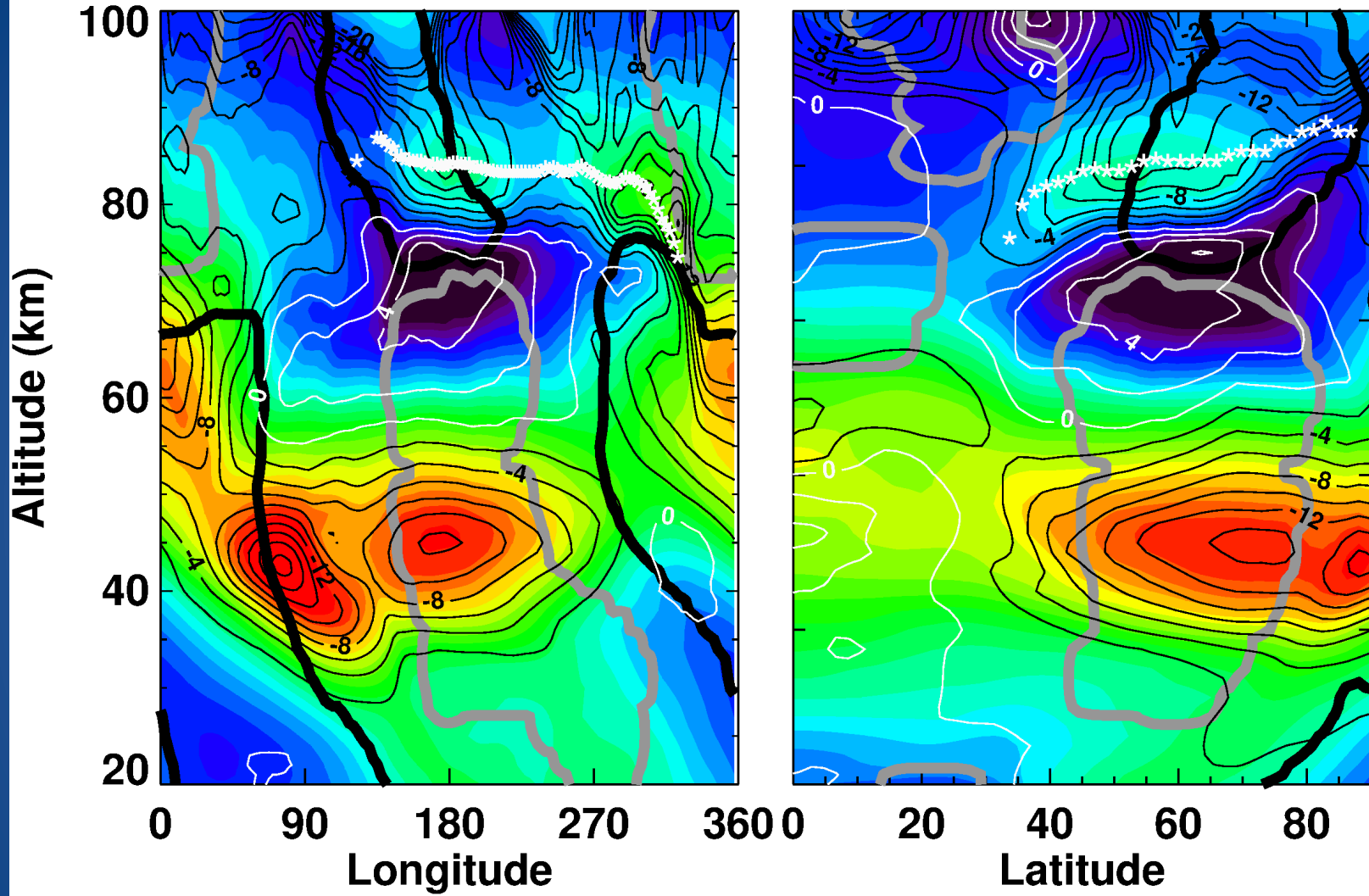
20060118 3000K WACCM



WACCM -- 20060118

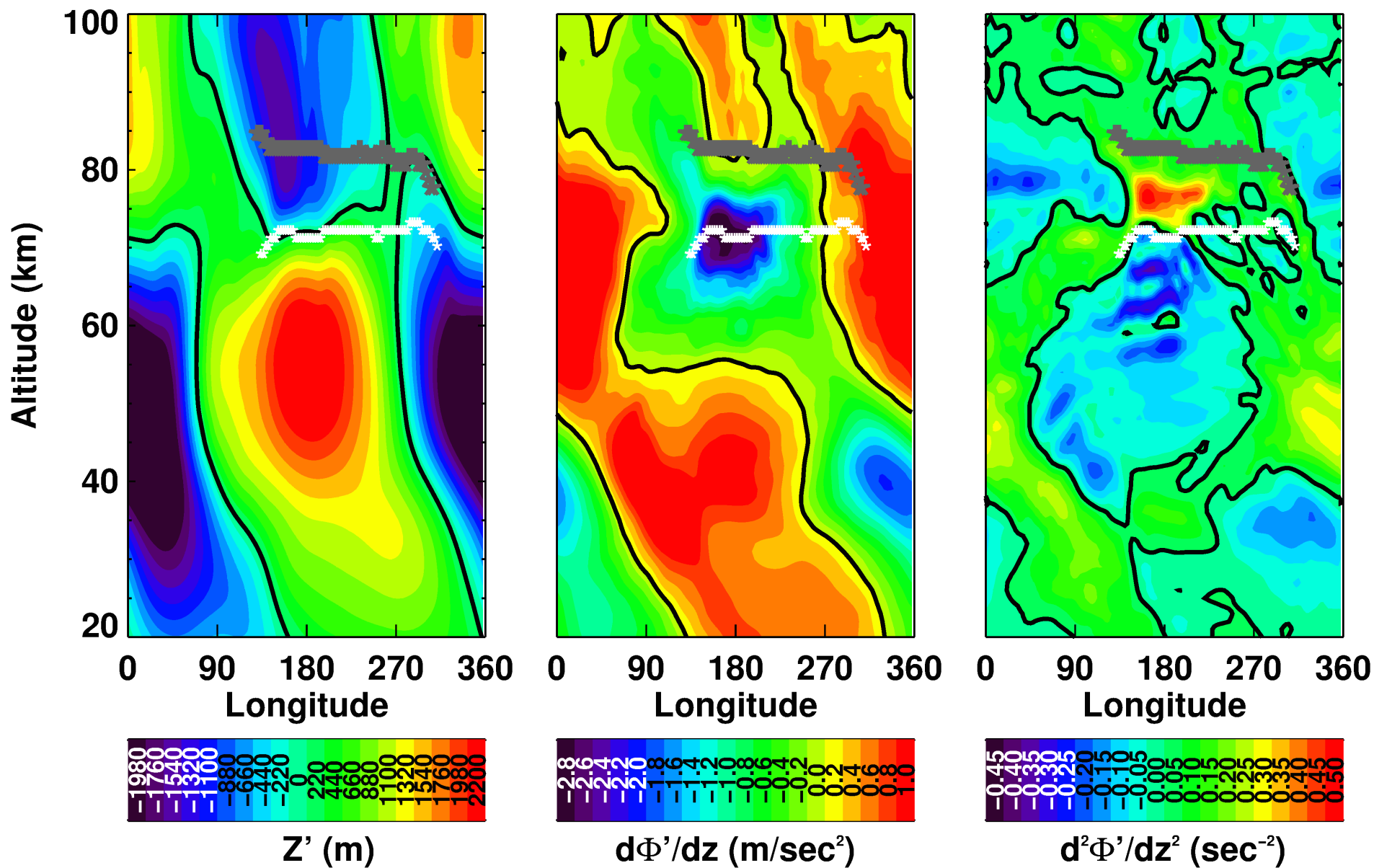
50-60N

170-190E

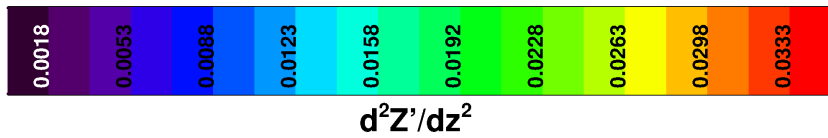
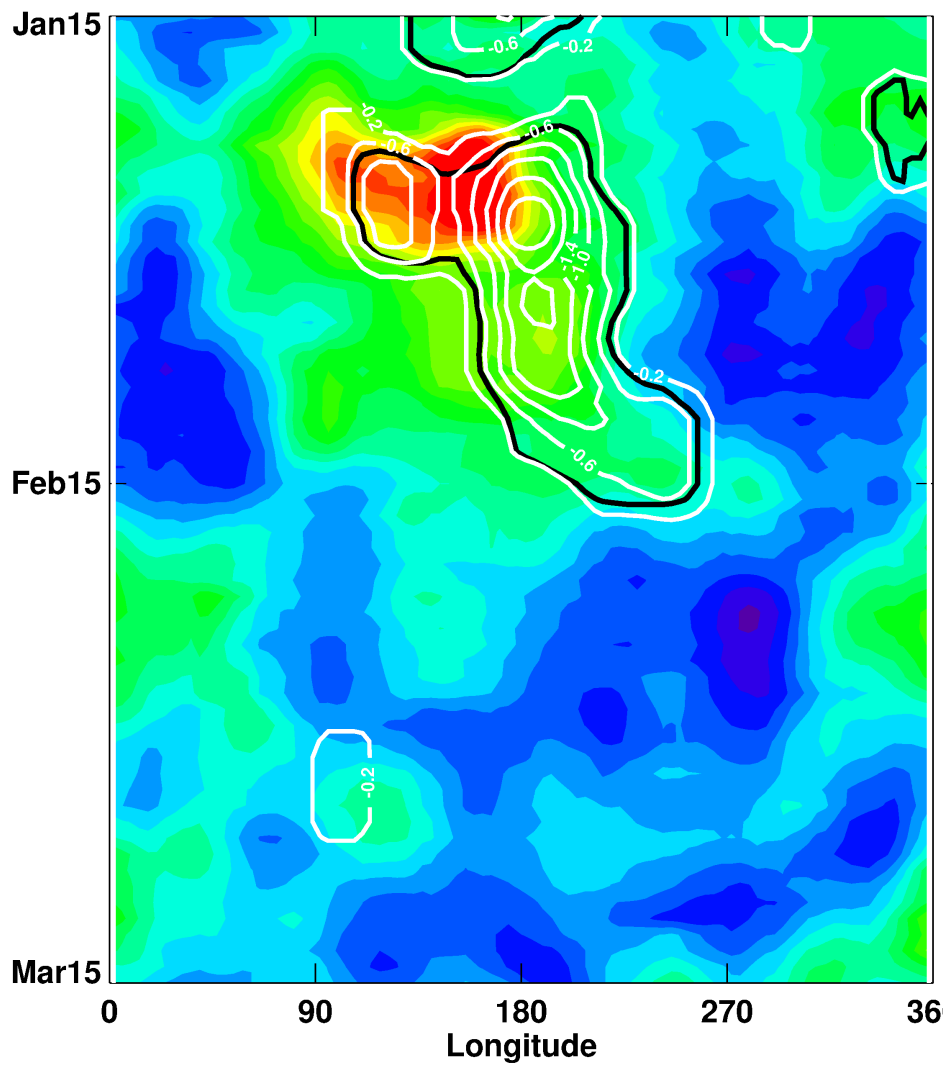


Temperature (K)

WACCM -- 20060118 55N



SABER -- Jan15 - Mar15 2005 Lat=55N



WACCM -- DJF 2010-2011 Lat=55N

