

Comparison of Temperature and Humidity Profiles between the “TqJoint” and “Standard” Data Group in AIRS Version 6 Product

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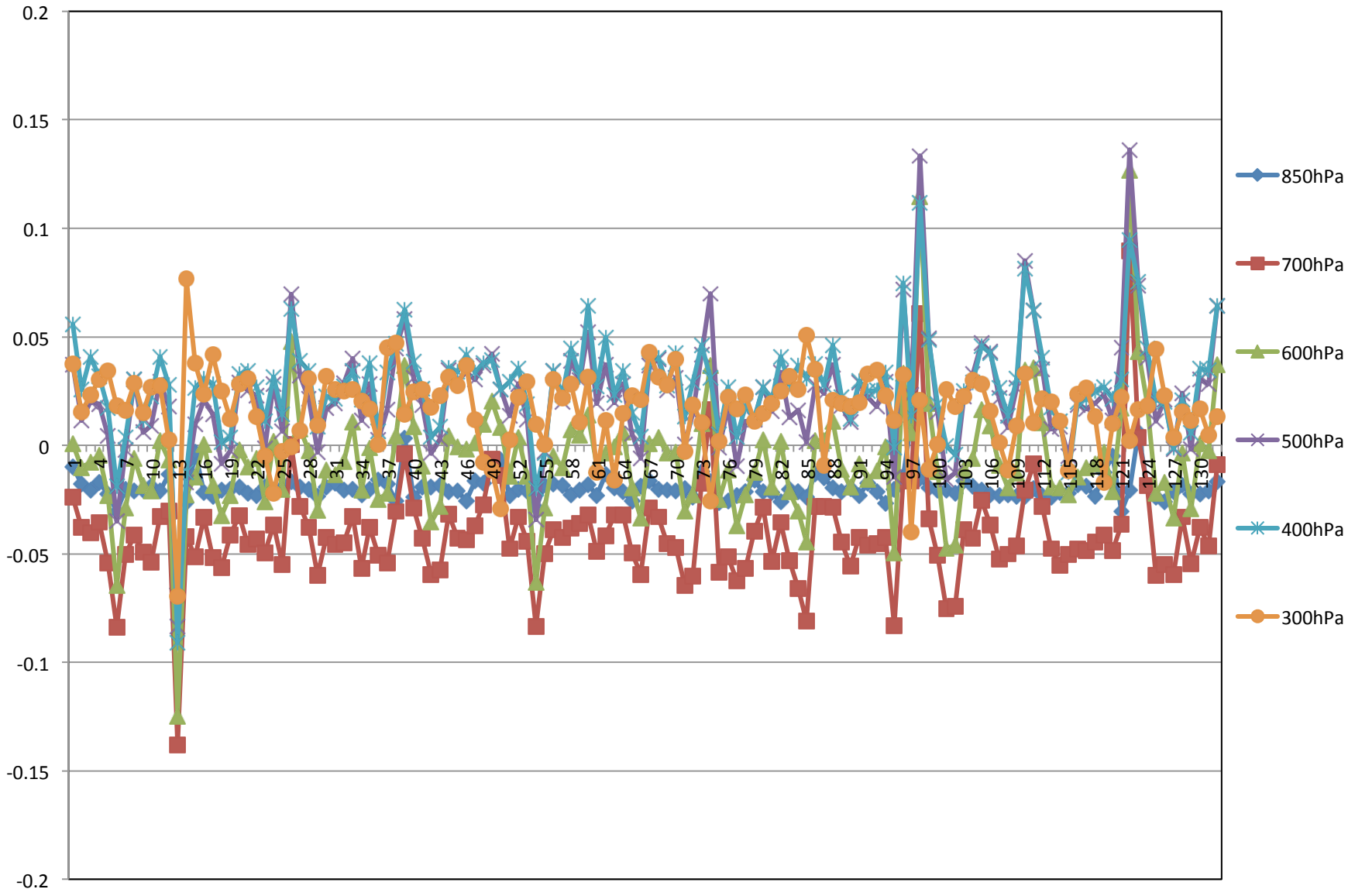
Background

- NextGen ESGF(Earth System Grid Federation)
Deliver a cyberinfrastructure to automatically precondition and publish NASA remote sensing datasets to the ESGF and its IPCC Assessment Report obs4MIPs activity. The cyberinfrastructure provides transparent access to ESGF models and facilitates their comparison with satellite data from JPL, LaRC and GSFC
- Temperature and Humidity profiles from AIRS level 3 monthly standard retrieval product
- Version 5: “standard” data group
- Version 6: new added “TqJoint” data group

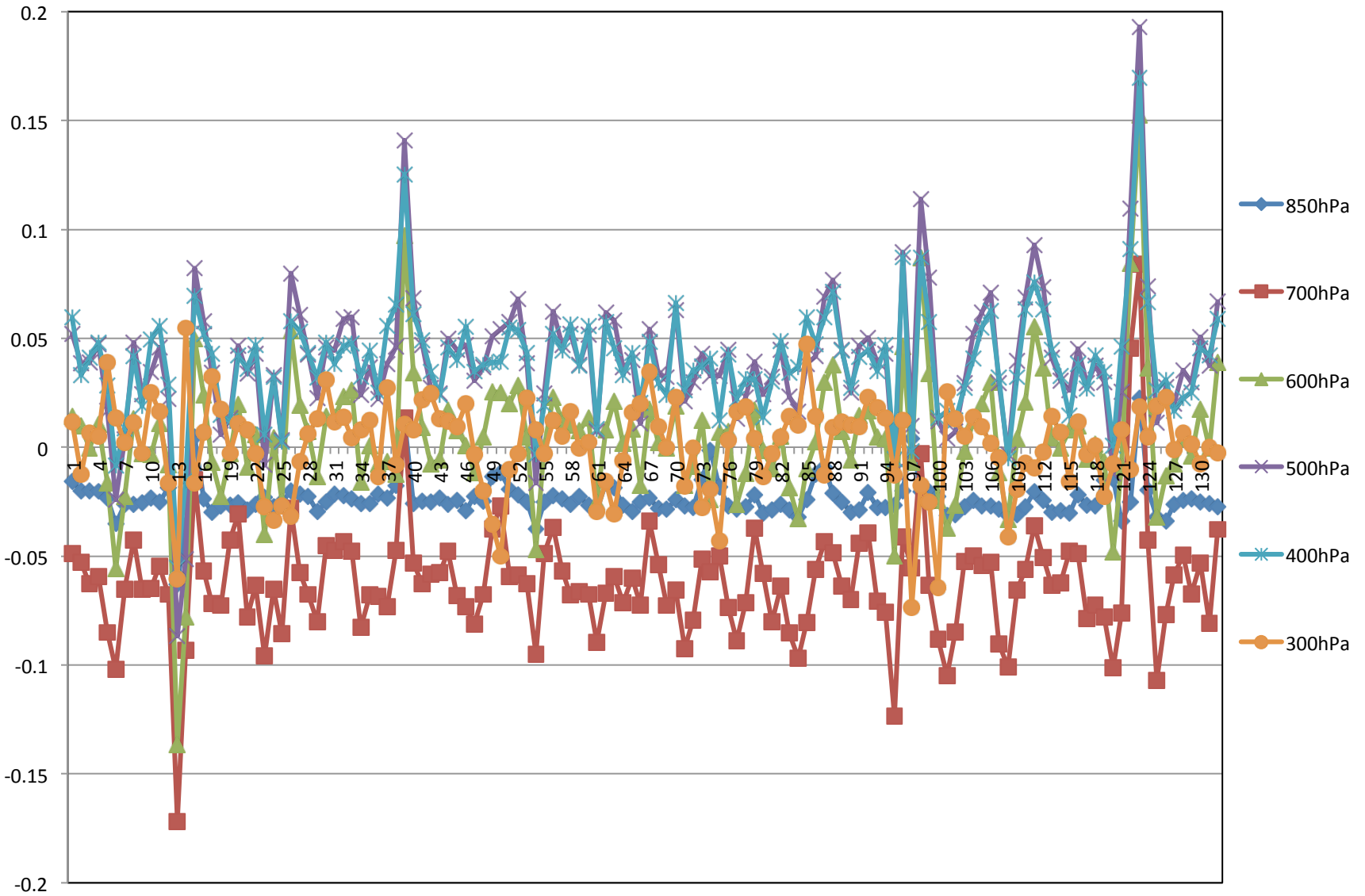
Comparison

- Version 6 level3 Monthly Standard Retrieval Product:
Temperature and Humidity (water vapor mass mixing ratio)
Year 2003 to year 2013 (132 months)
- 10 levels in 2 groups:
850hPa, 700hPa, 600hPa, 500hPa, 400hPa, 300hPa
250hPa, 200hPa, 150hPa, 100hPa
- Mean Arithmetic Difference over Global:
 $\Sigma(\text{Standard} - Tq\text{Joint}) / N$
- Difference of Global Mean(gridsize-weighted):
 $(\Sigma\text{standard} / N_1)_{\text{gridsize-weighted}} - (\Sigma Tq\text{Joint} / N_2)_{\text{gridsize-weighted}}$

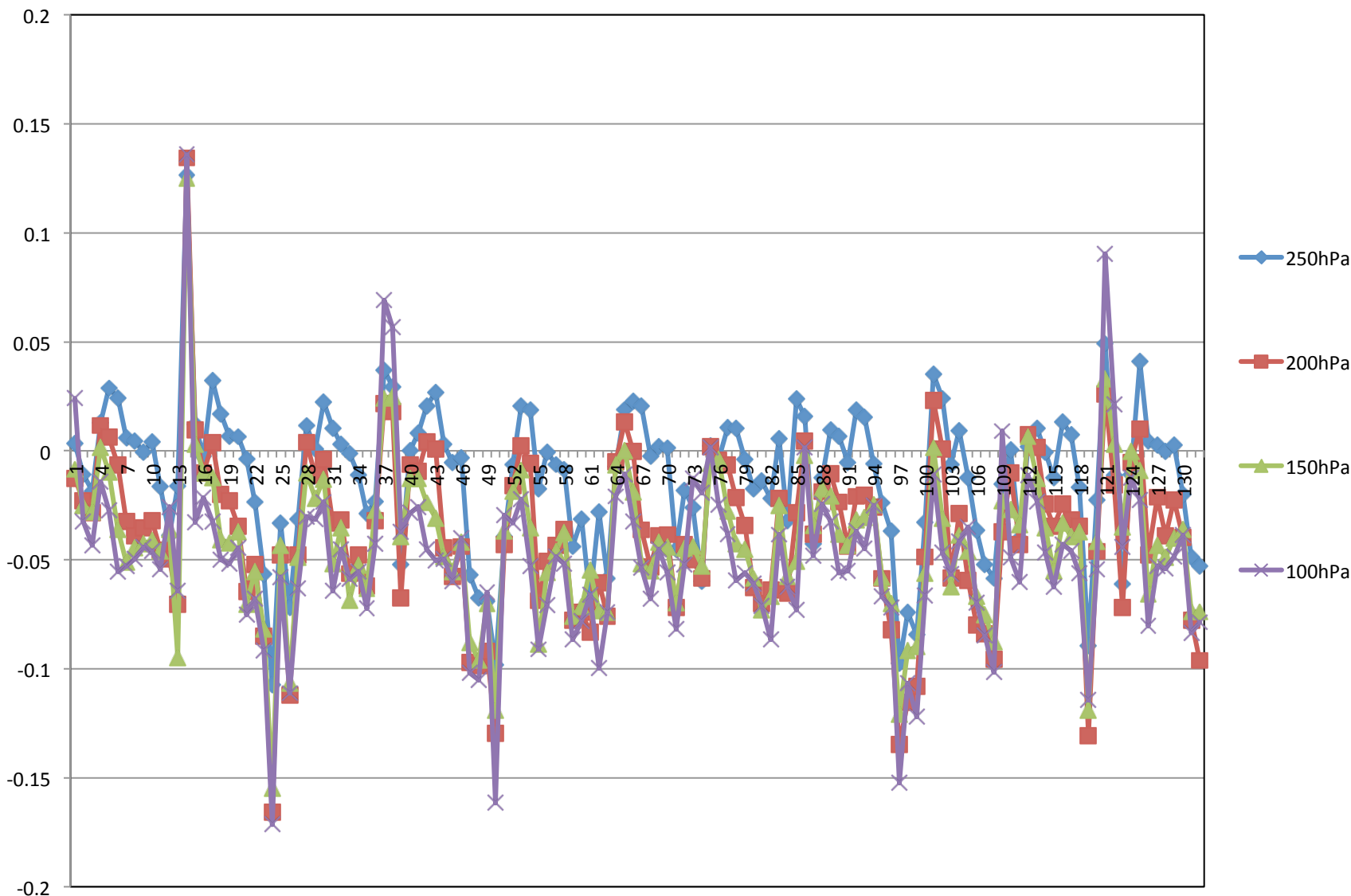
Mean Arithmetic Difference of Temperature ($^{\circ}\text{K}$) (Ascending/Daytime)



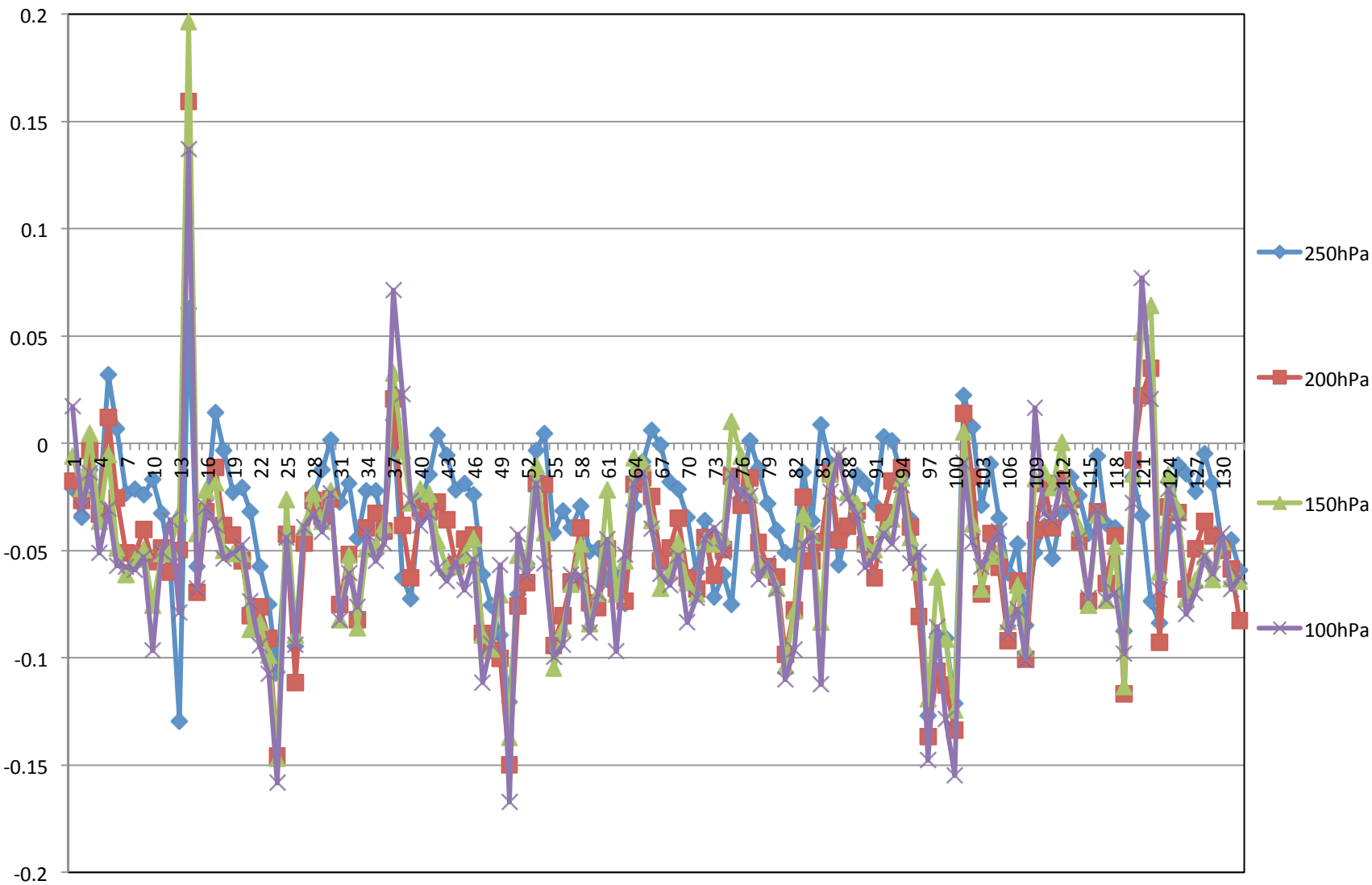
Mean Arithmetic Difference of Temperature ($^{\circ}\text{K}$) (Descending/Nighttime)



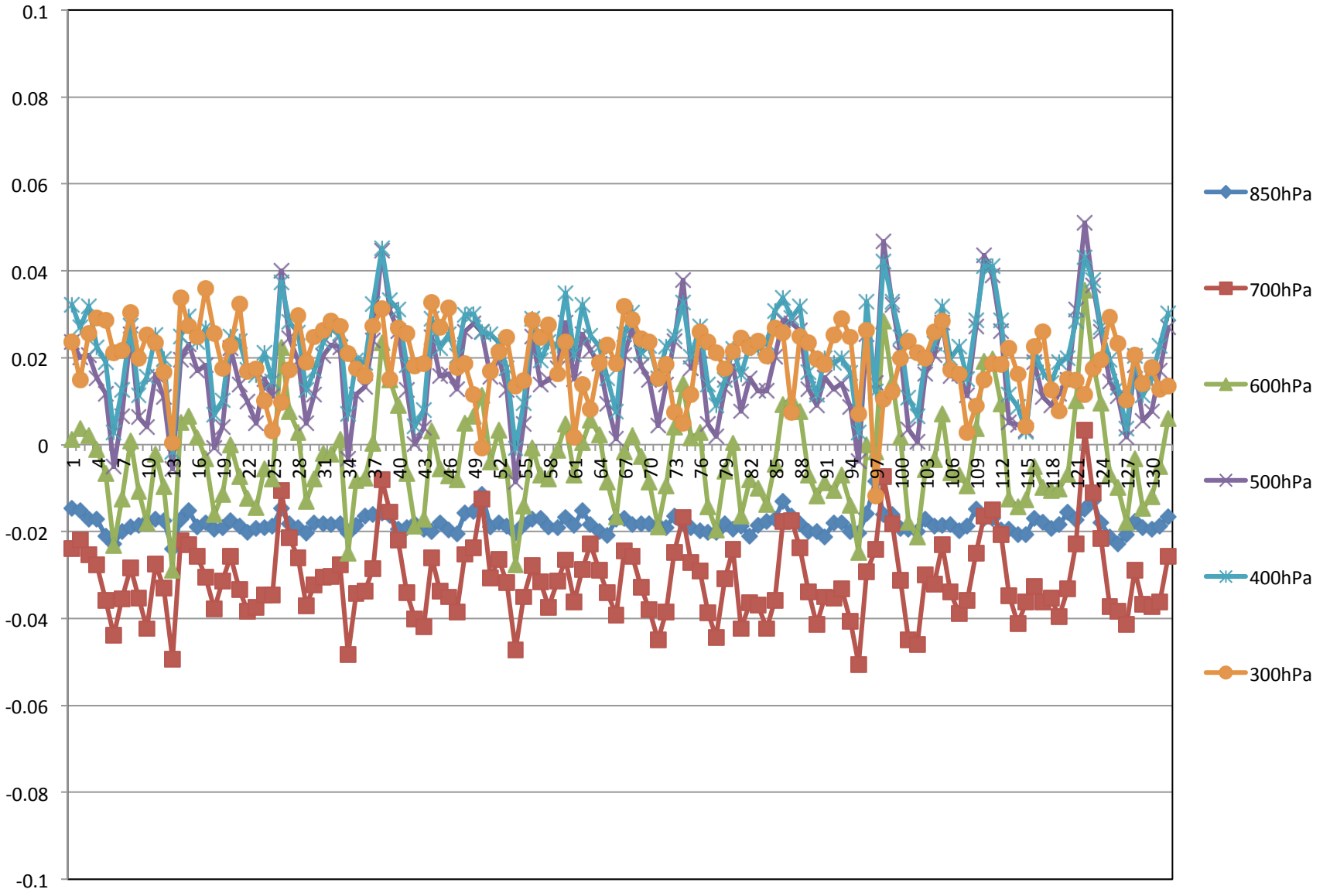
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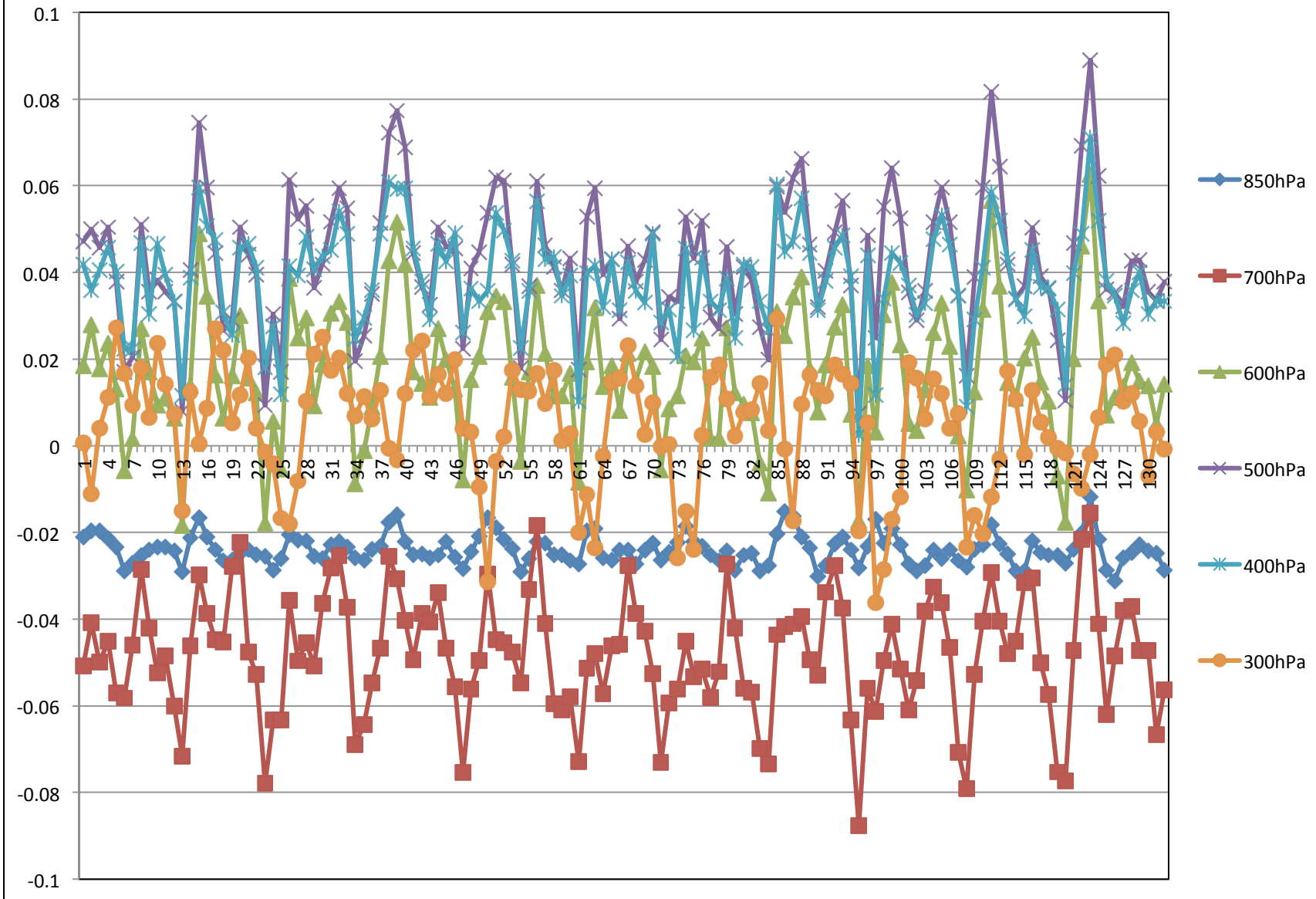
Mean Arithmetic Difference of Temperature ($^{\circ}\text{K}$) (Descending/Nighttime)



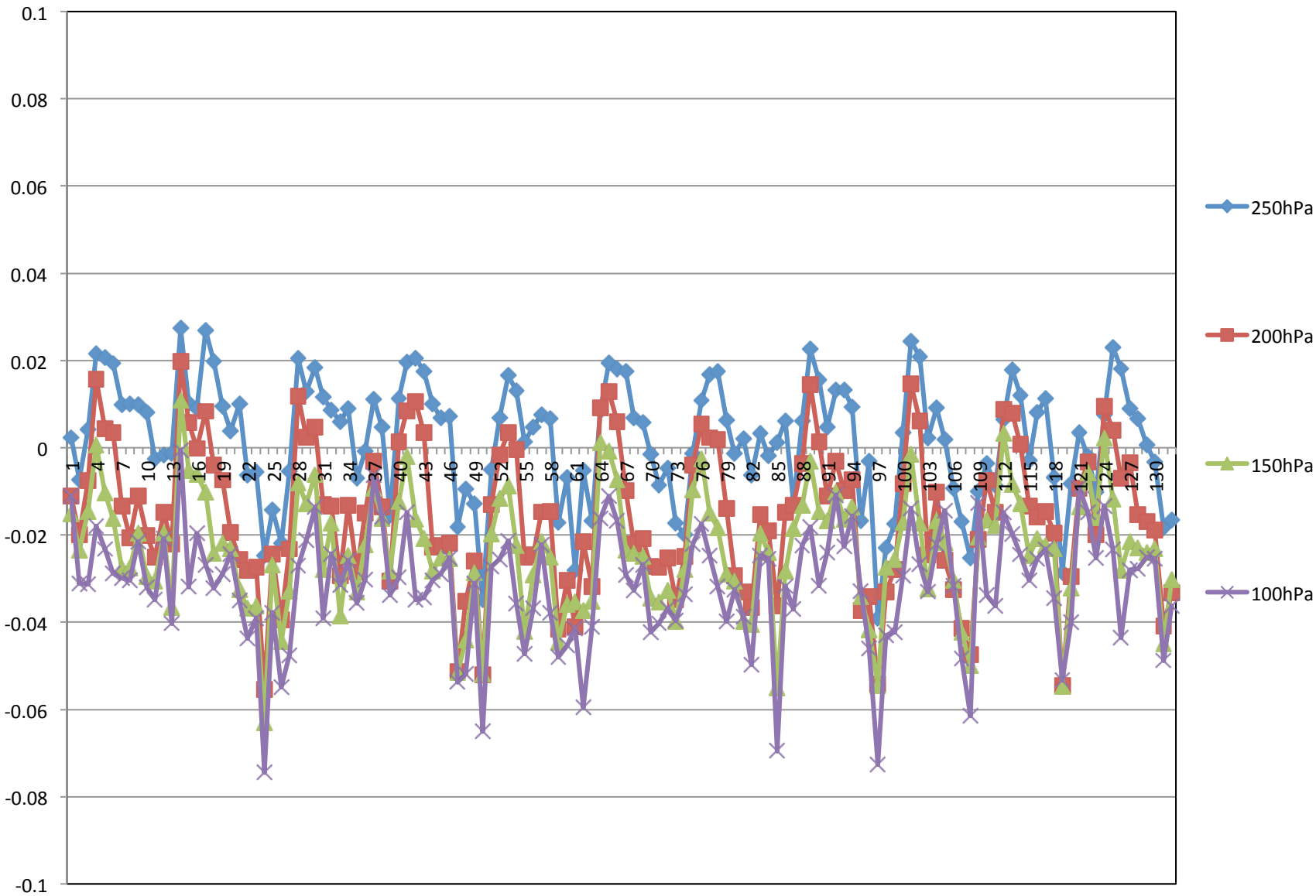
Difference of Global Mean of Temperature ($^{\circ}$ K) (Ascending/Daytime)



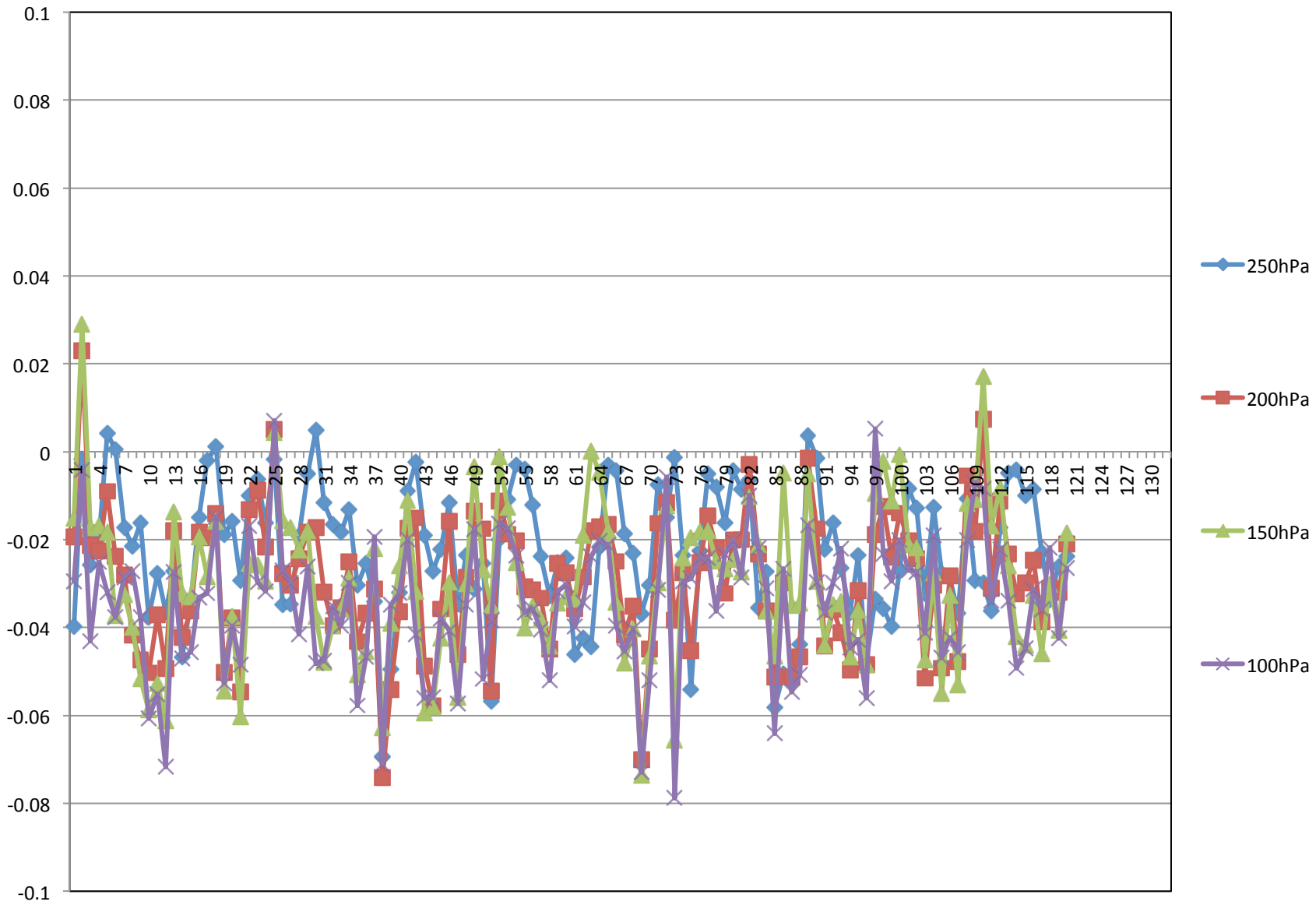
Difference of Global Mean of Temperature ($^{\circ}\text{K}$) (Descending/Nighttime)



Difference of Global Mean of Temperature ($^{\circ}\text{K}$) (Ascending/Daytime)



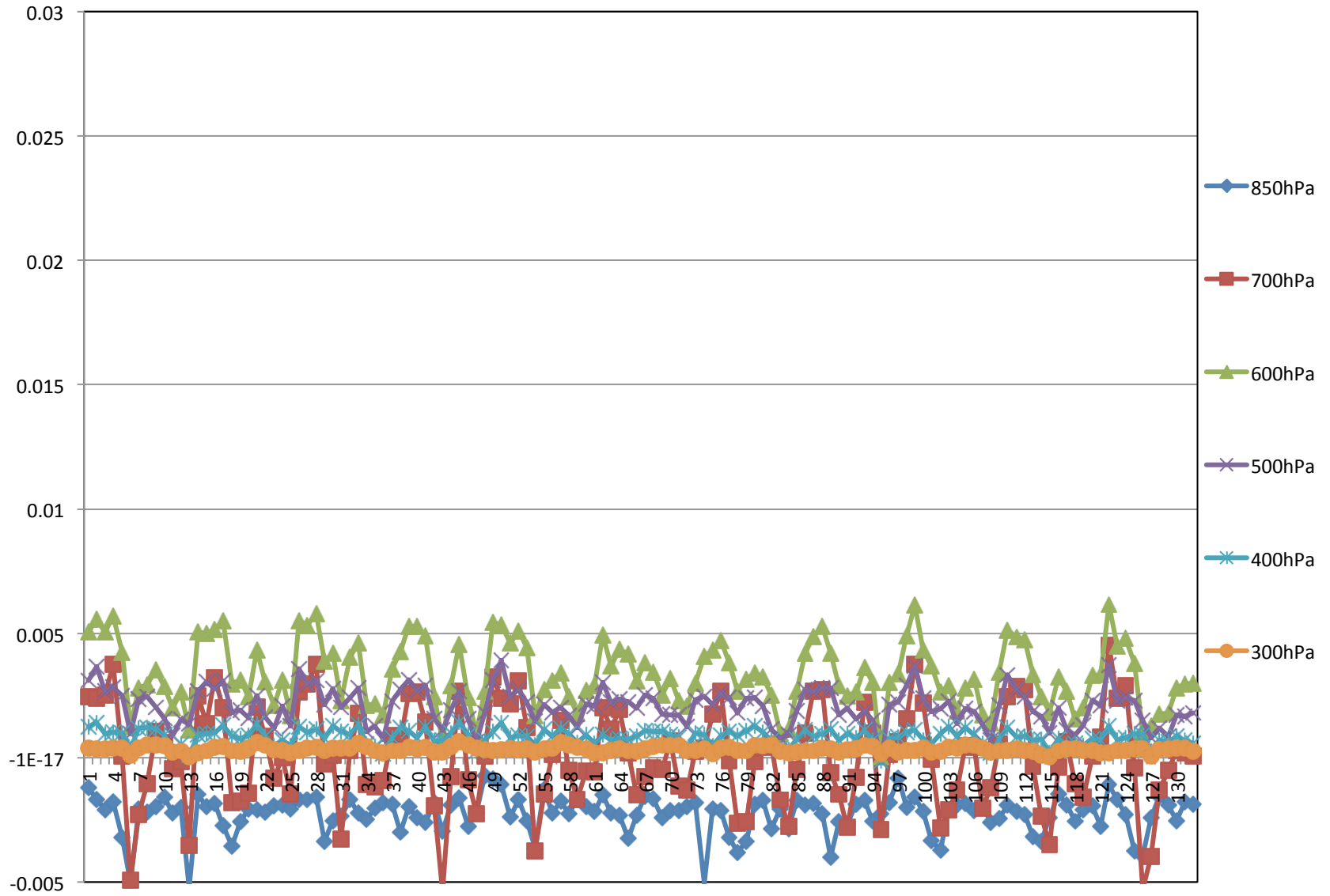
Difference of Global Mean of Temperature ($^{\circ}\text{K}$) (Descending/Nighttime)



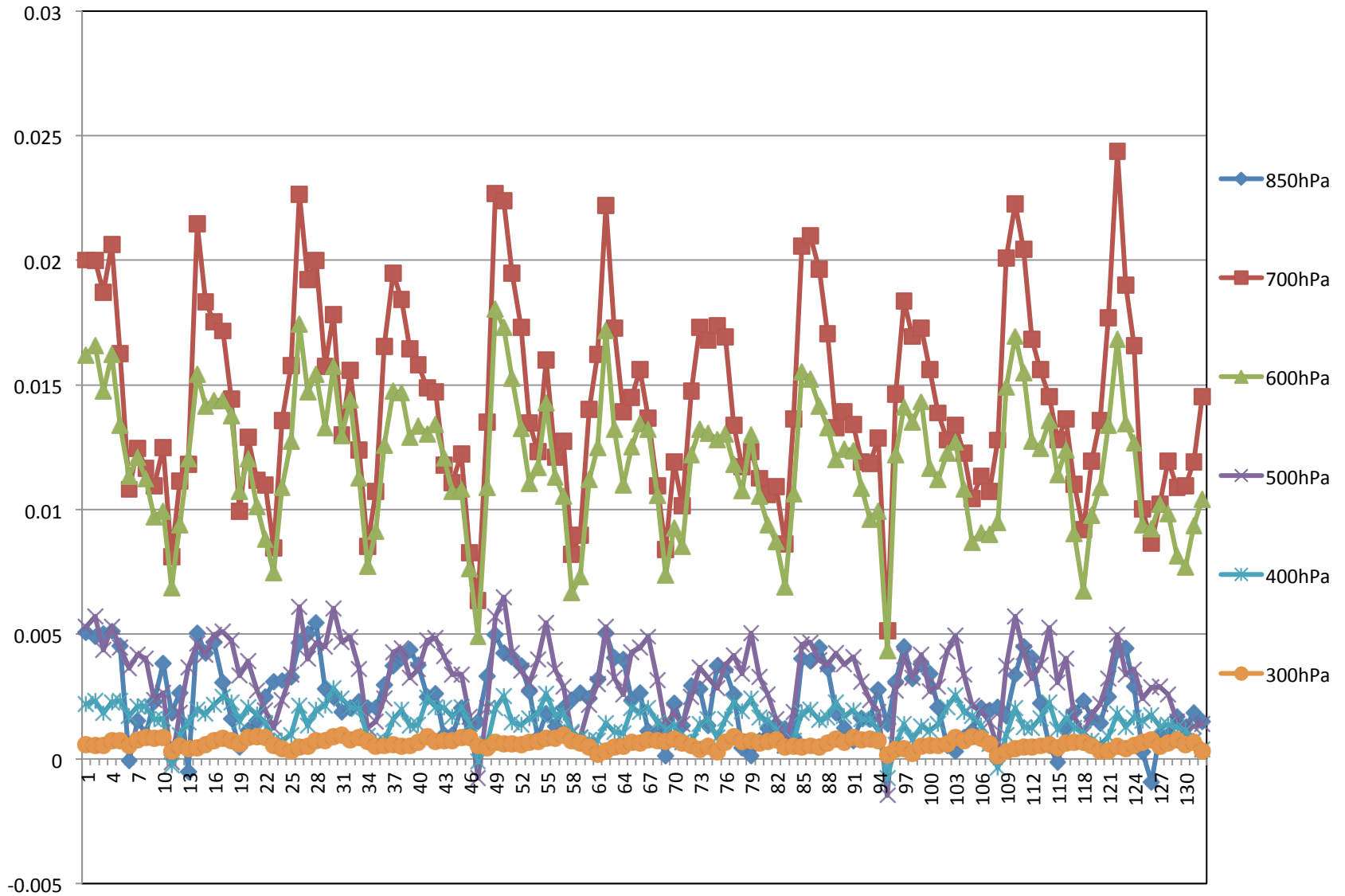
Temperature

- Mean Arithmetic Difference
 $\pm 0.2^{\circ}\text{K}$
850, 700hPa: Standard < TqJoint
600, 300hPa: Standard \sim TqJoint
500, 400hPa: Standard > TqJoint
- Difference of Global Mean
 $\pm 0.1^{\circ}\text{K}$
850, 700hPa: Standard < TqJoint
600, 500, 400, 300hPa: Standard > TqJoint
- $\Delta_{\text{descending/nighttime}} > \Delta_{\text{ascending/daytime}}$

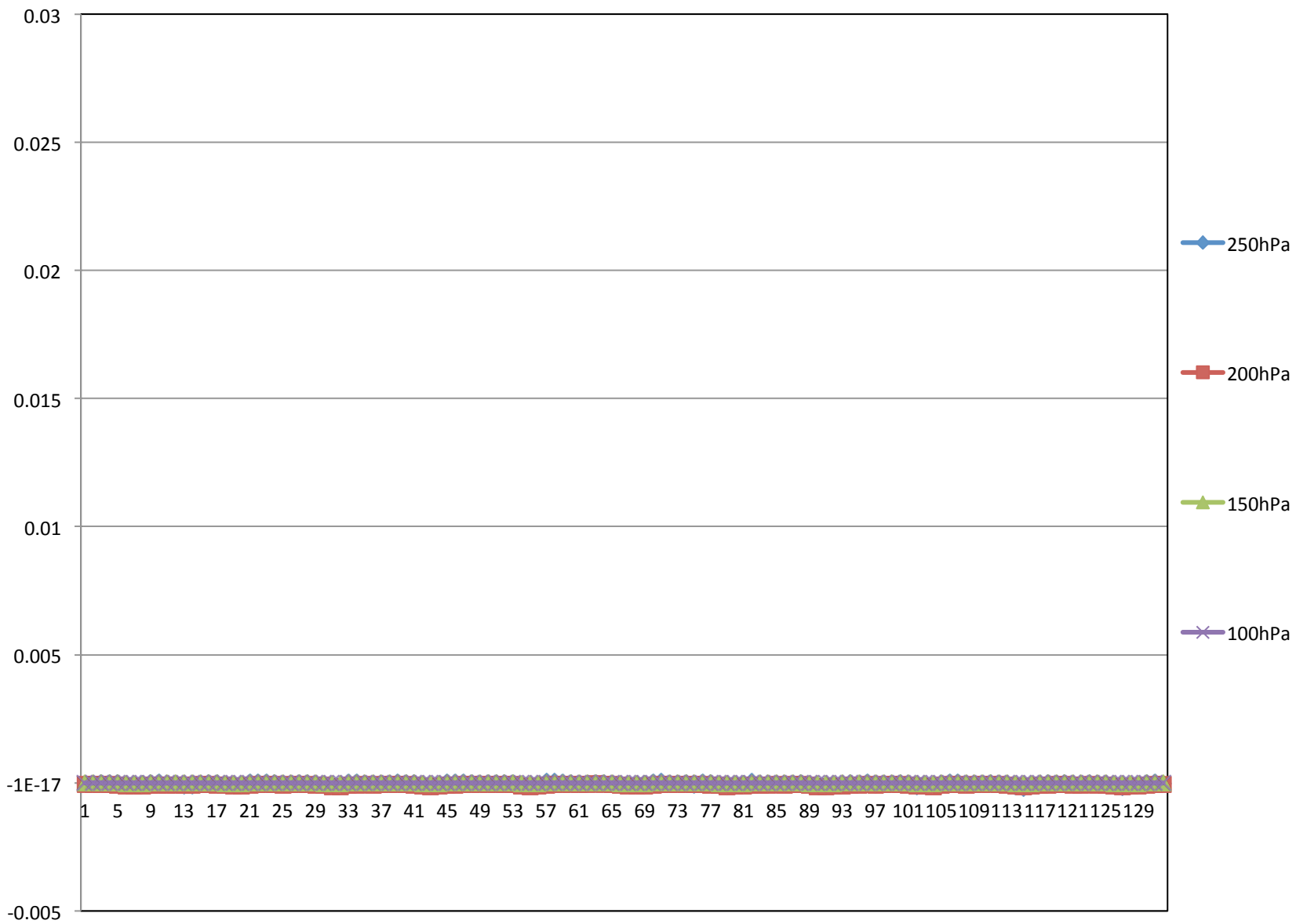
Mean Arithmetic Difference of Humidity (g/kg) (Ascending/Daytime)



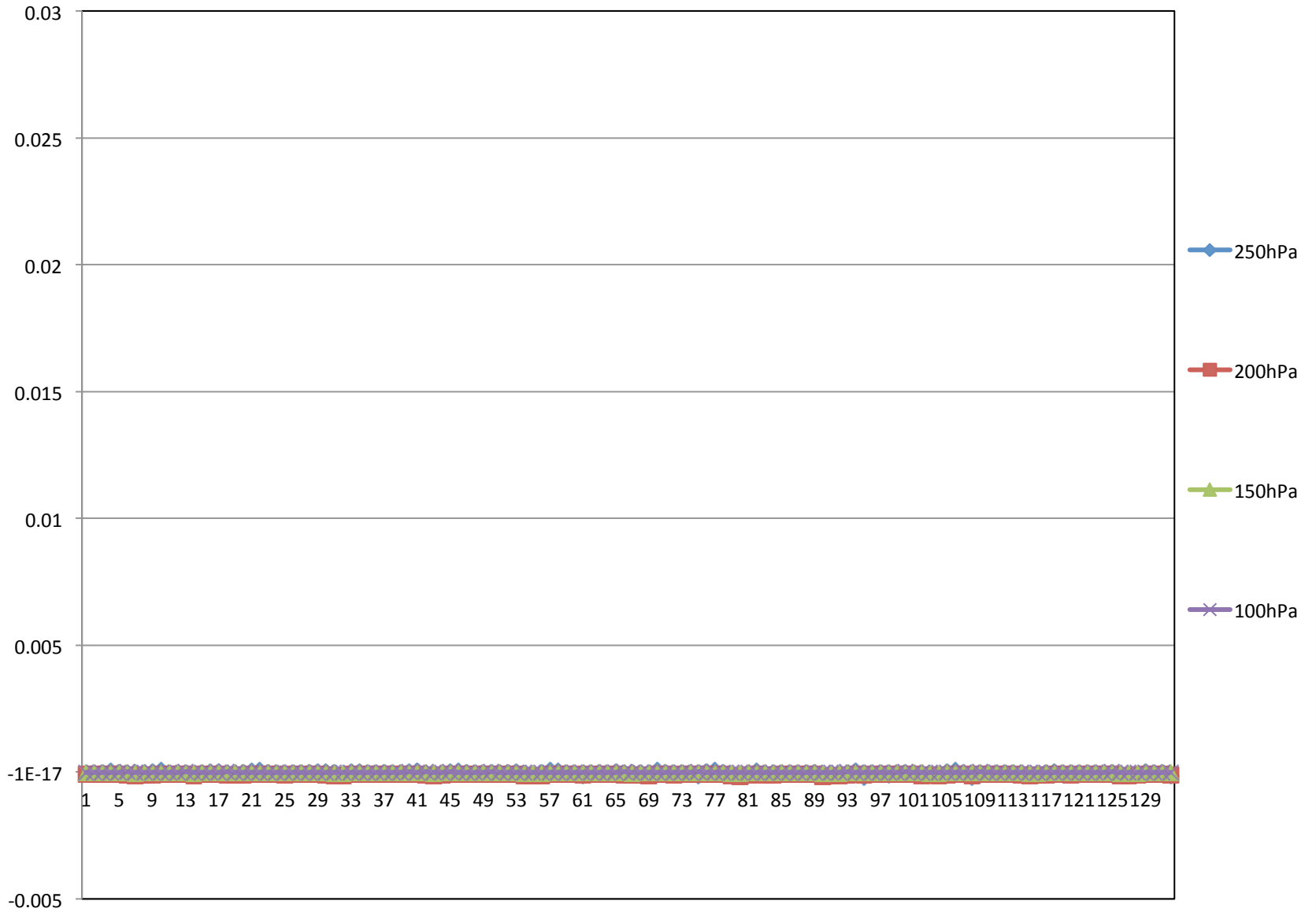
Mean Arithmetic Difference of Humidity (g/kg) (Descending/Nighttime)



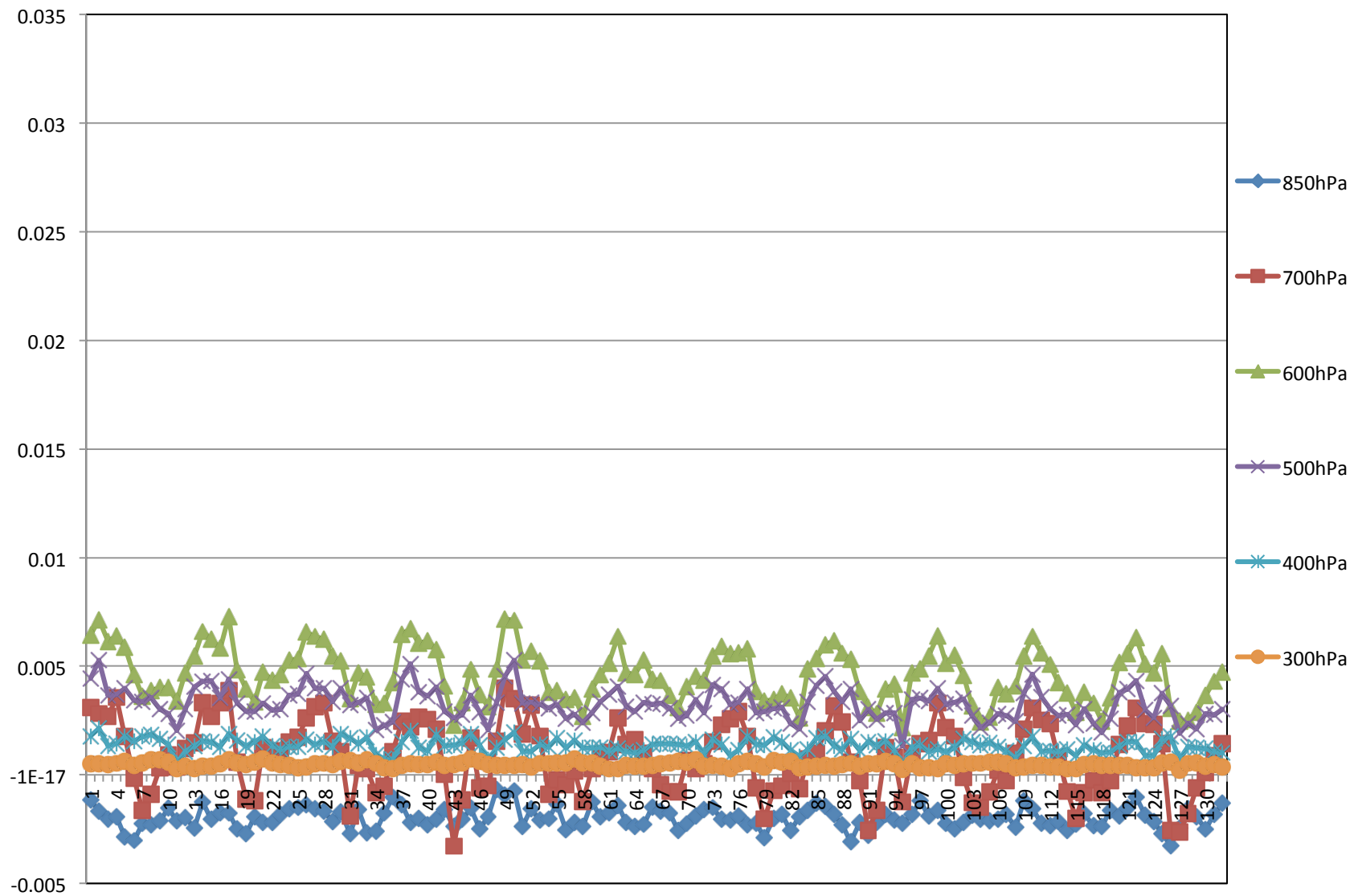
Mean Arithmetic Difference of Humidity (g/kg) (Ascending/Daytime)



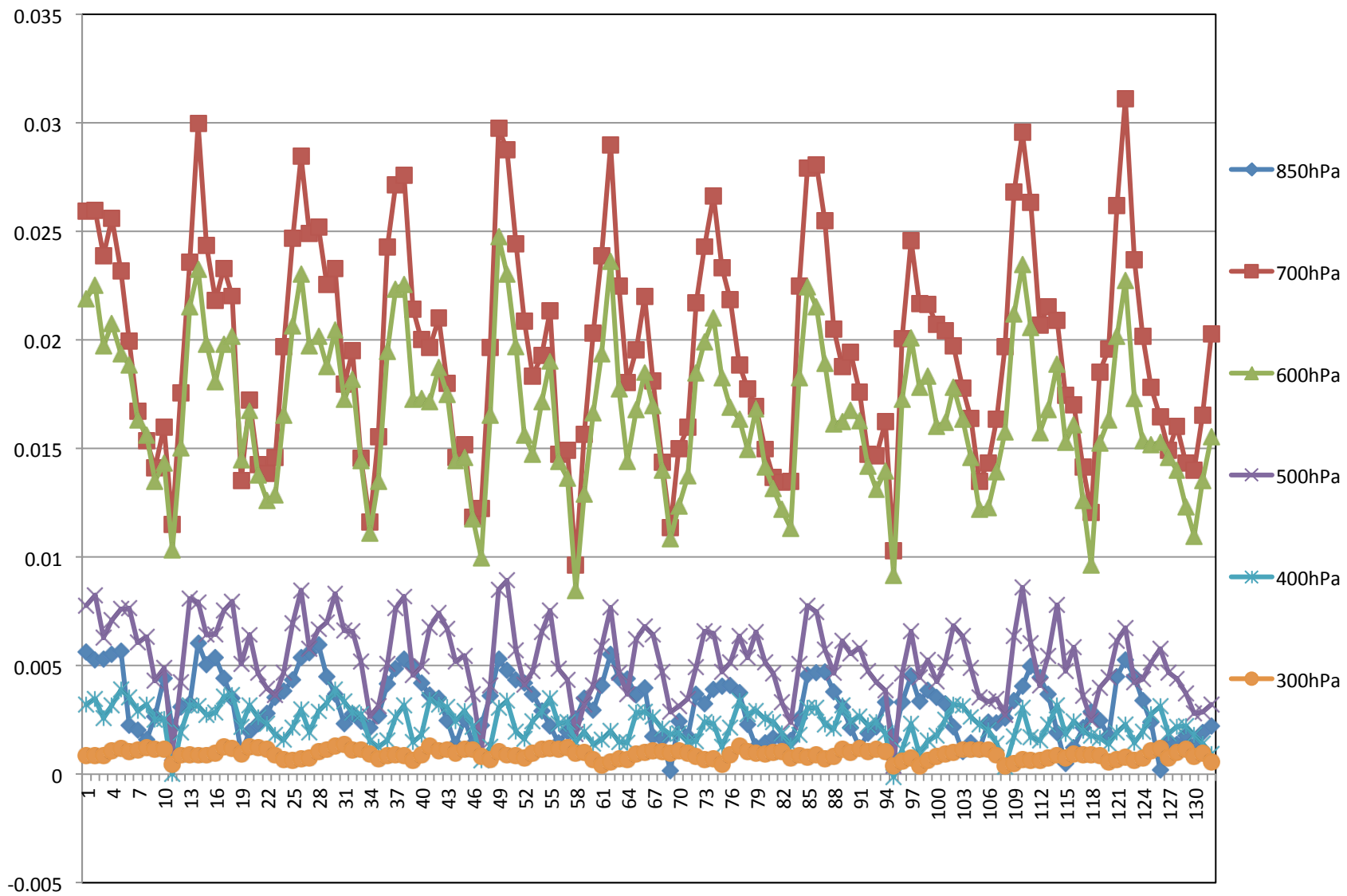
Mean Arithmetic Difference of Humidity (g/kg) (Descending/Nighttime)



Difference of Global Mean of Humidity (g/kg) (Ascending/Daytime)



Difference of Global Mean of Humidity (g/kg) (Descending/Nighttime)



Humidity

- Mean Arithmetic Difference

-0.005g/kg to +0.025g/kg

850hPa: Standard \sim TqJoint

700 to 300hPa: Standard $>$ TqJoint

Difference of Global Mean

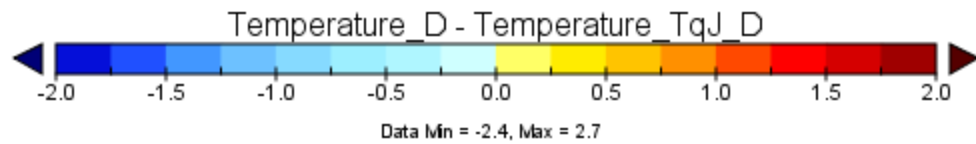
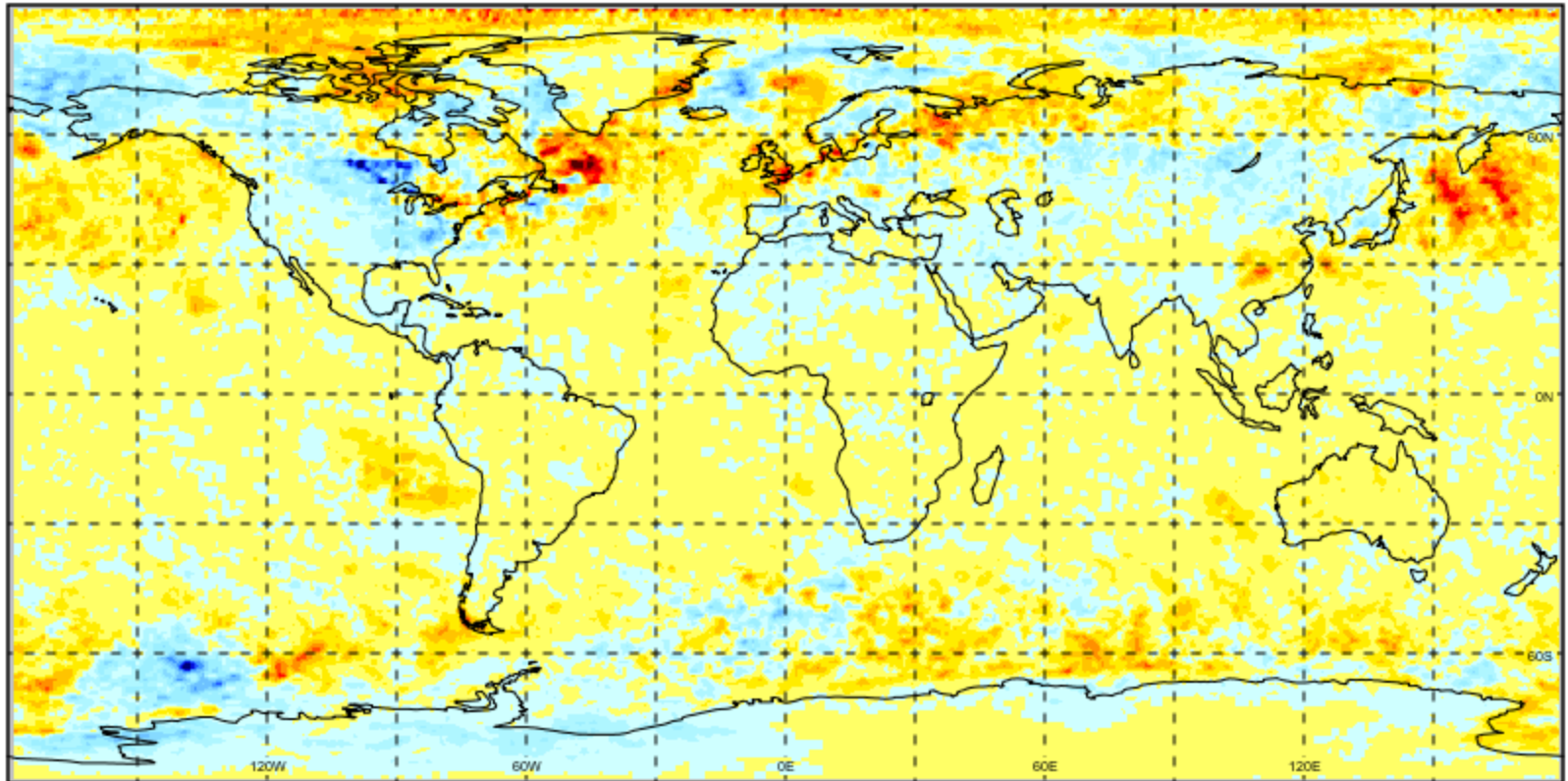
-0.005g/kg to +0.035g/kg

850hPa: Standard \sim TqJoint

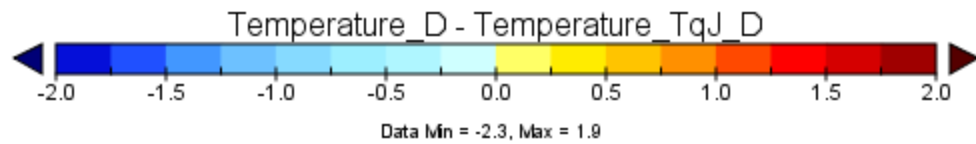
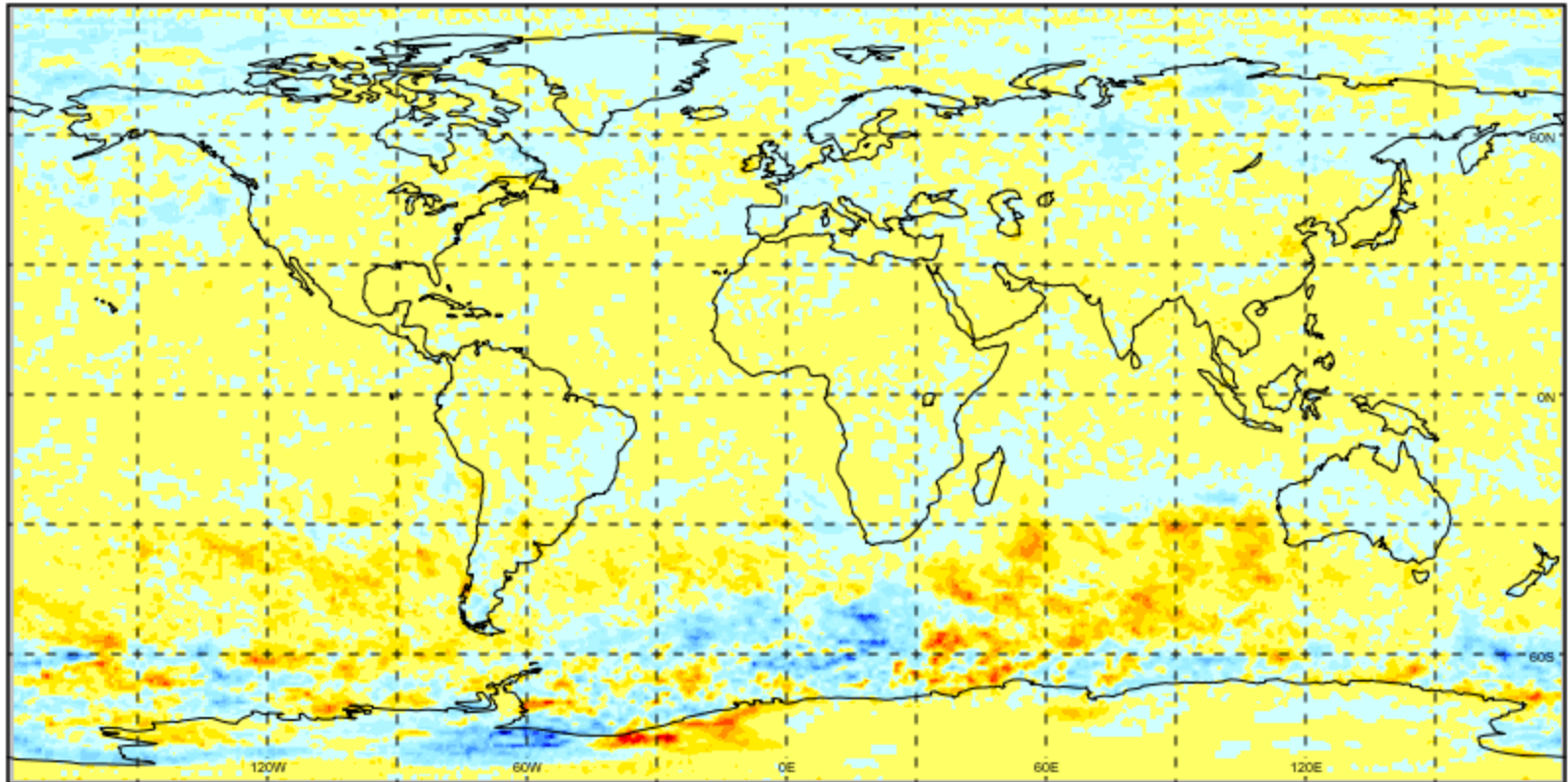
700 to 300hPa: Standard $>$ TqJoint

- $\Delta_{\text{descending/nighttime}} > \Delta_{\text{ascending/daytime}}$

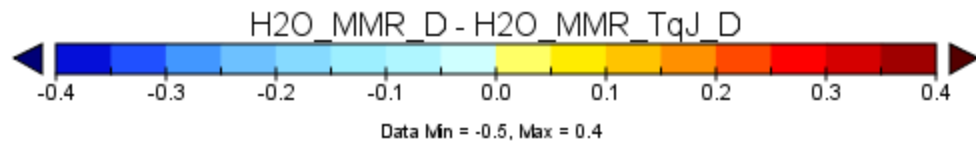
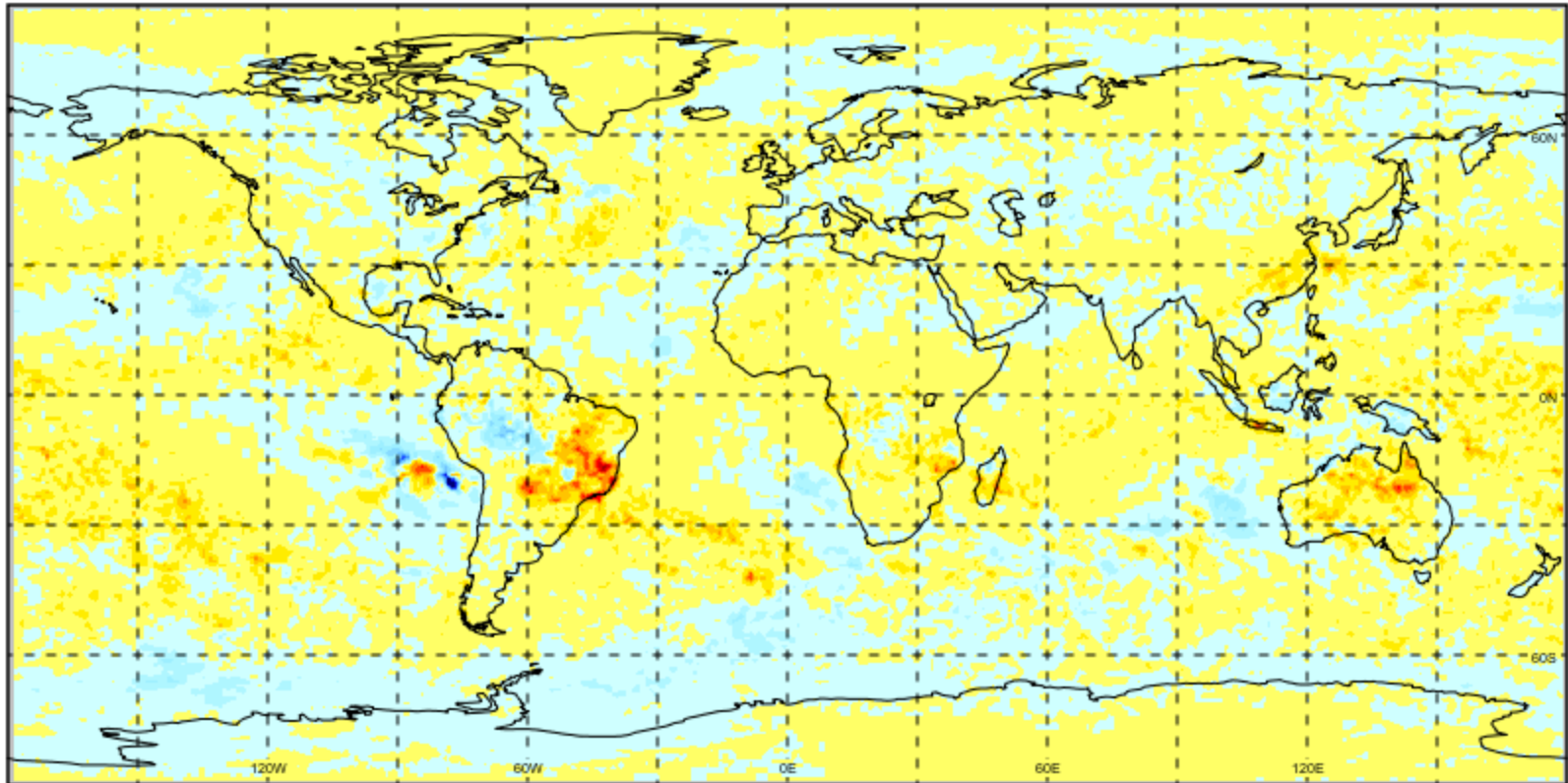
Temperature Difference (K, Descending/Nighttime) at 500hPa in January 2003



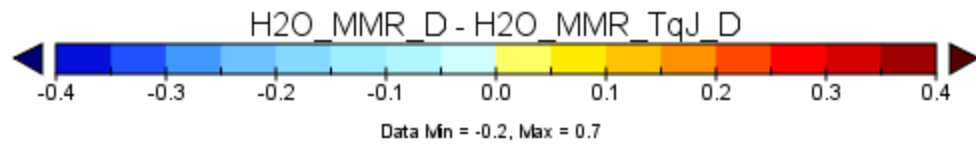
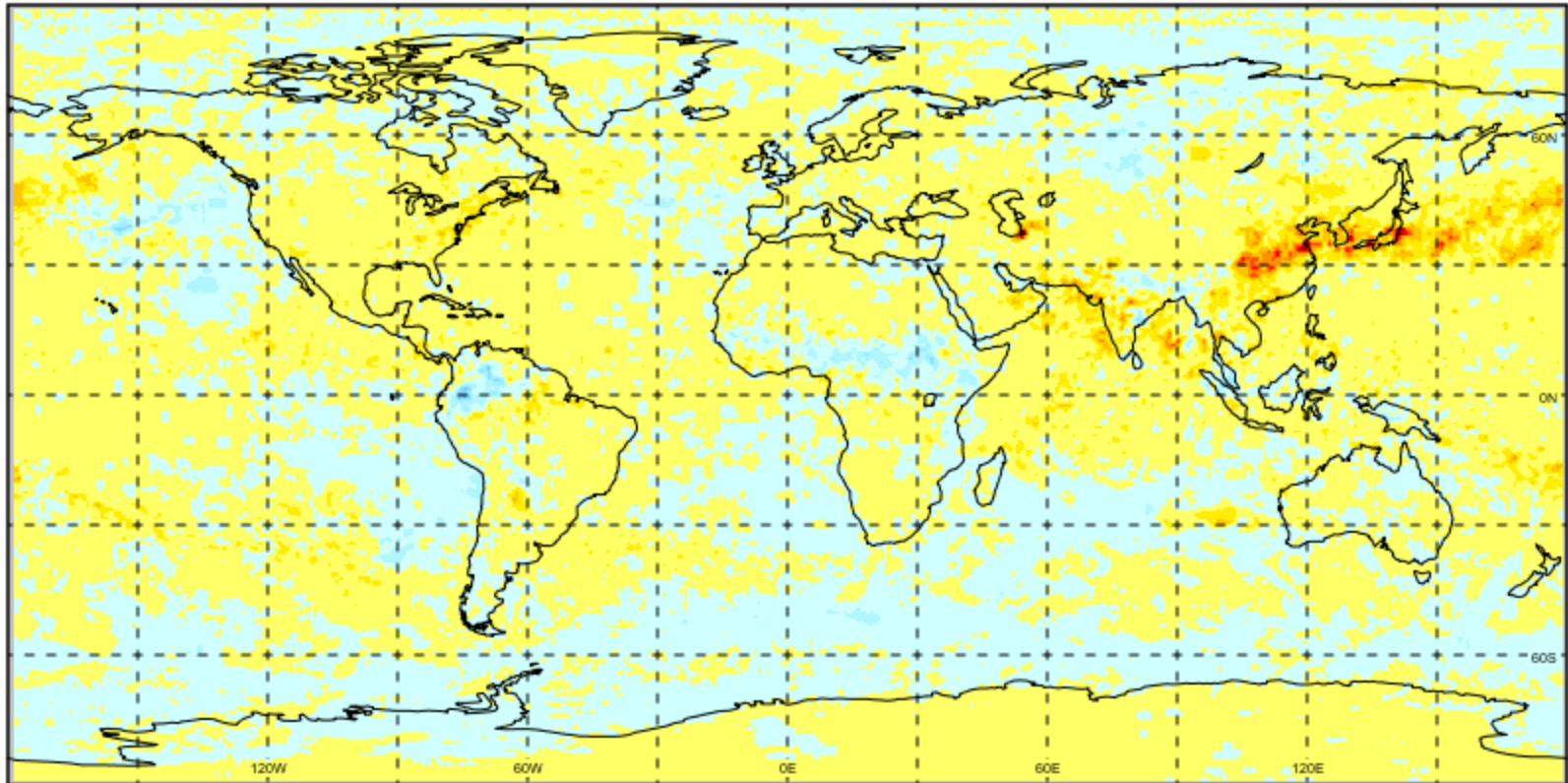
Temperature Difference (K, Descending/Nighttime) at 500hPa in July 2003



Humidity Difference (g/kg, Descending/Nighttime) at 500hPa in January 2003



Humidity Difference (g/kg, Descending/Nighttime) at 500hPa in July 2003



Conclusion

- The differences of temperature and humidity between “TqJoint” and “Standard” data group in AIRS version 6 level 3 standard retrieval product are within a very narrow range.
- At most pressure levels, values of one data group are consistently greater or less than the other data group globally.
- ESGF can use “TqJoint” data group in AIRS version 6.
- These differences need to be known to users.