Synergistic Studies between AIRS and GPS radio occultations: Broad relevance to scientific advancement applied to Earth's atmosphere

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NASA Sounder Science Team Meeting
Greenbelt, MD, USA, October 24, 2017

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Outline

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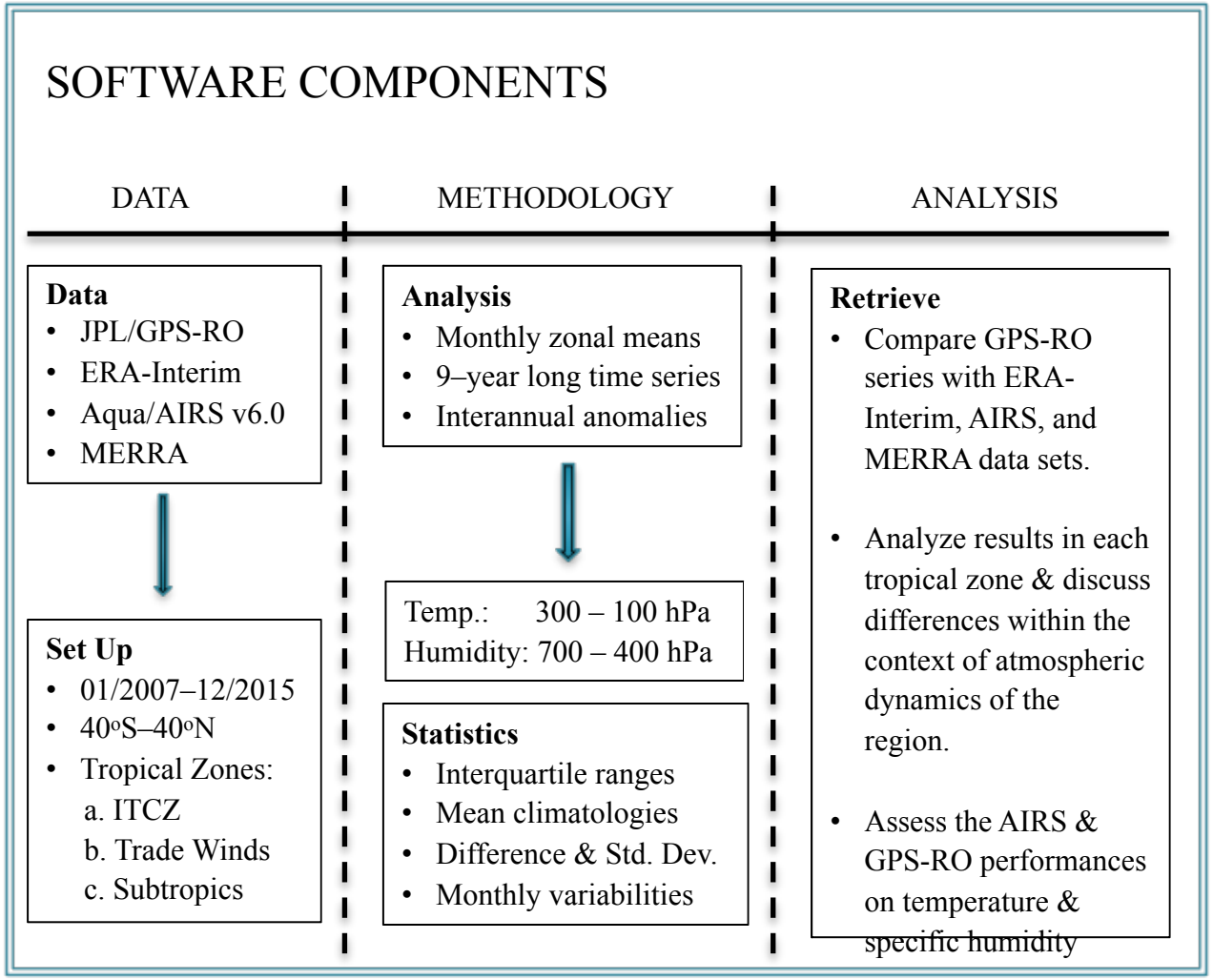
Objectives

1. Create a short-term data record of UT temperatures and LT specific humidity using five different databases.

2. How well do these databases agree with each other?

3. What can we learn from their inter comparison?

Introduction

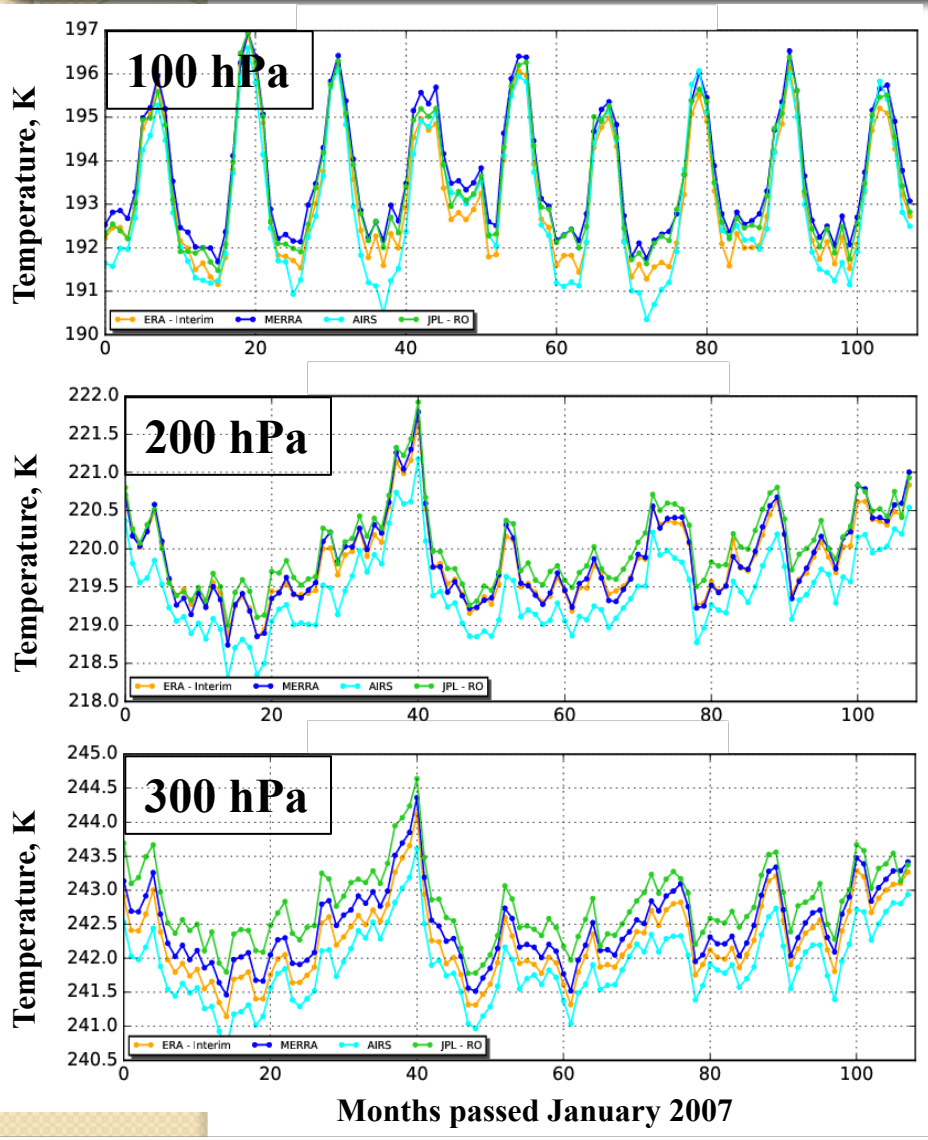


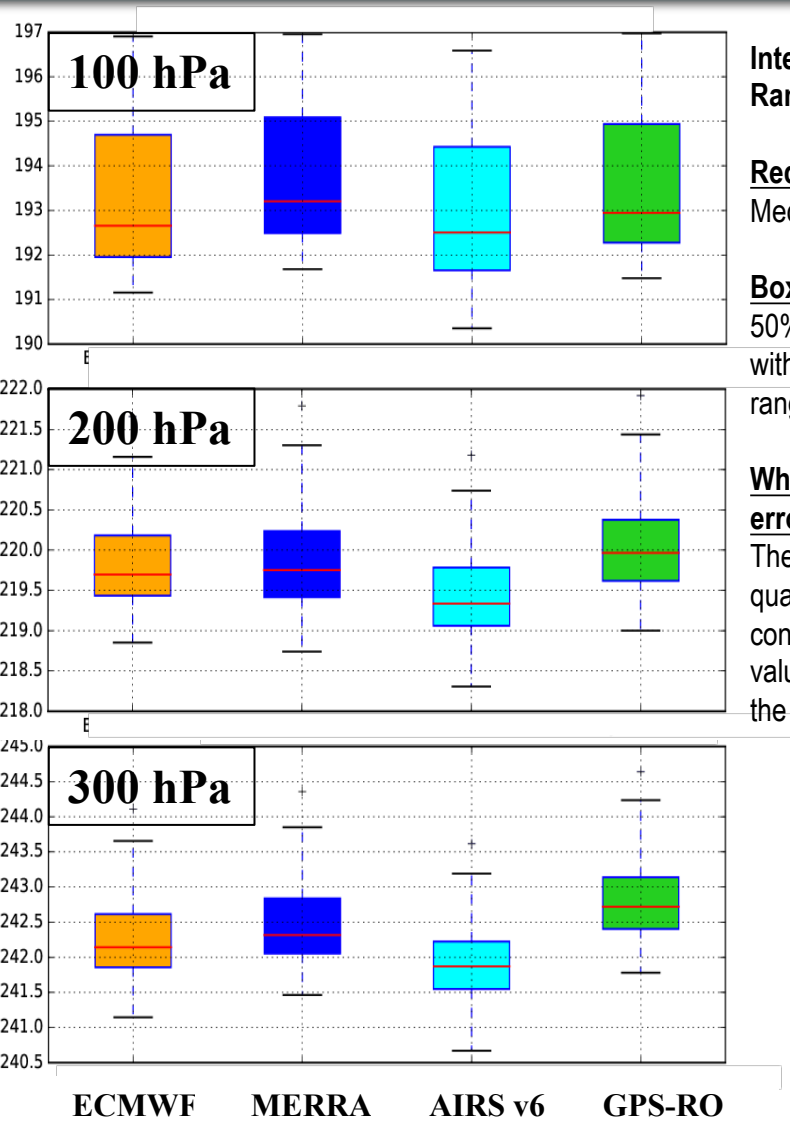
ERA-Interim
European Center for Medium-Range Weather Forecasts Re-Analysis Interim

AIRS
Atmospheric Infrared Sounder

MERRA
Modern-Era Retrospective Analysis for Research and Applications

Results (1/8) (Temp., ± 15º)





Interquartile Range (IQR)

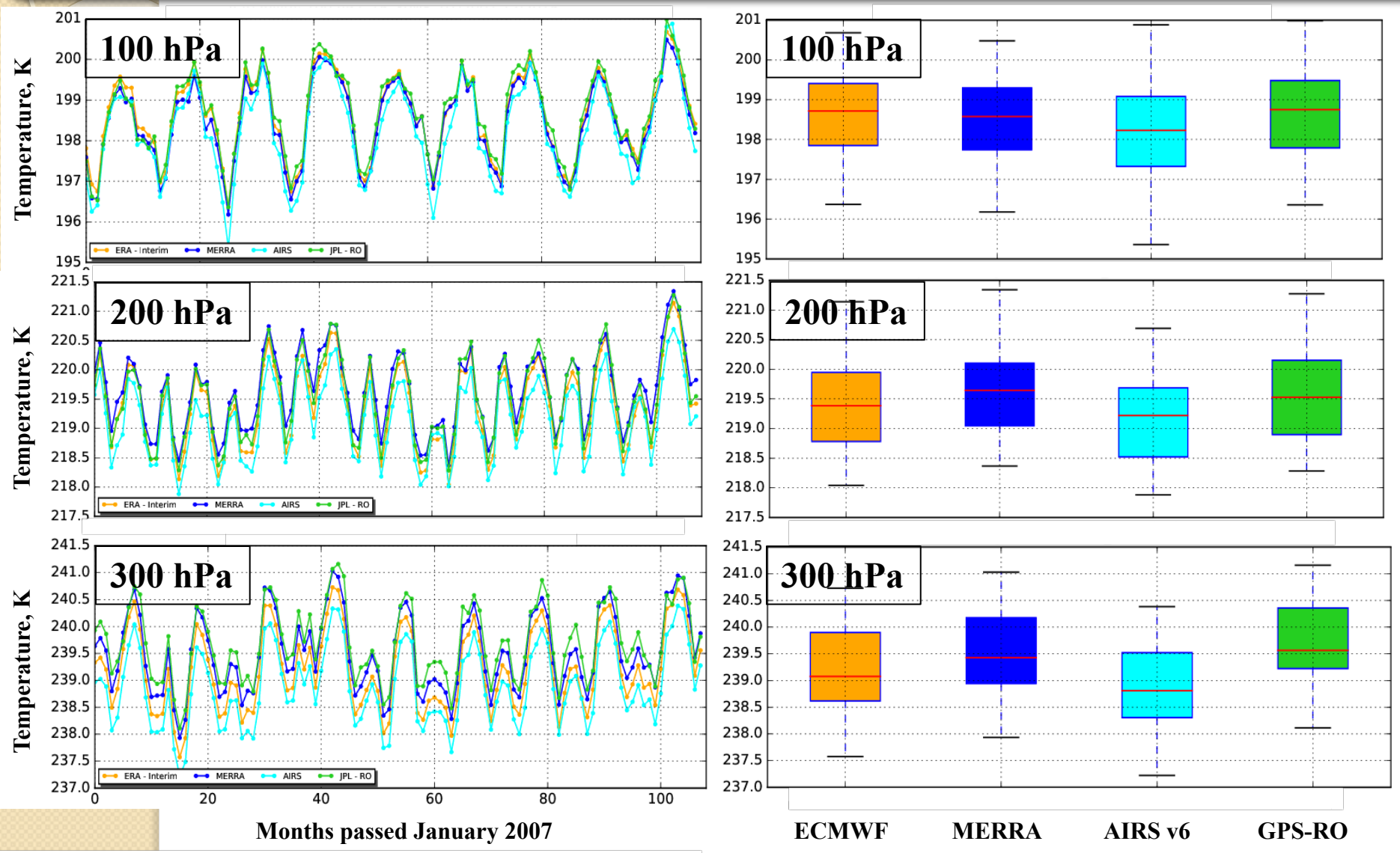
Red line: Median value

Box or IQR: 50% values fall within the range

Whiskers or error bars: The 25% quartile that contains all values within the 1.5*IQR

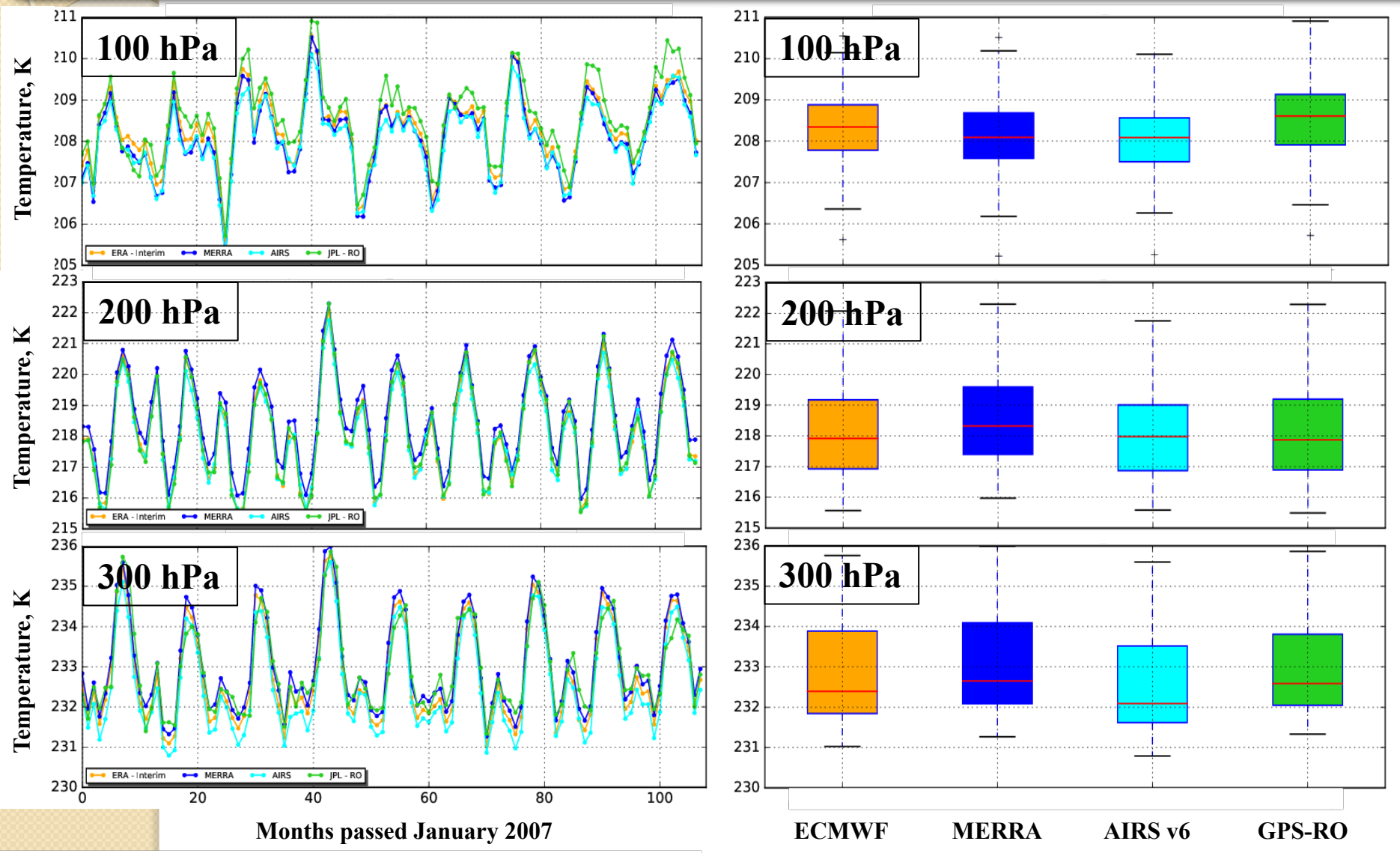
ERA-Interim MERRA AIRS GPS-RO

Results (2/8) (Temp., ± 15º-30º)



ERA-Interim MERRA AIRS GPS-RO

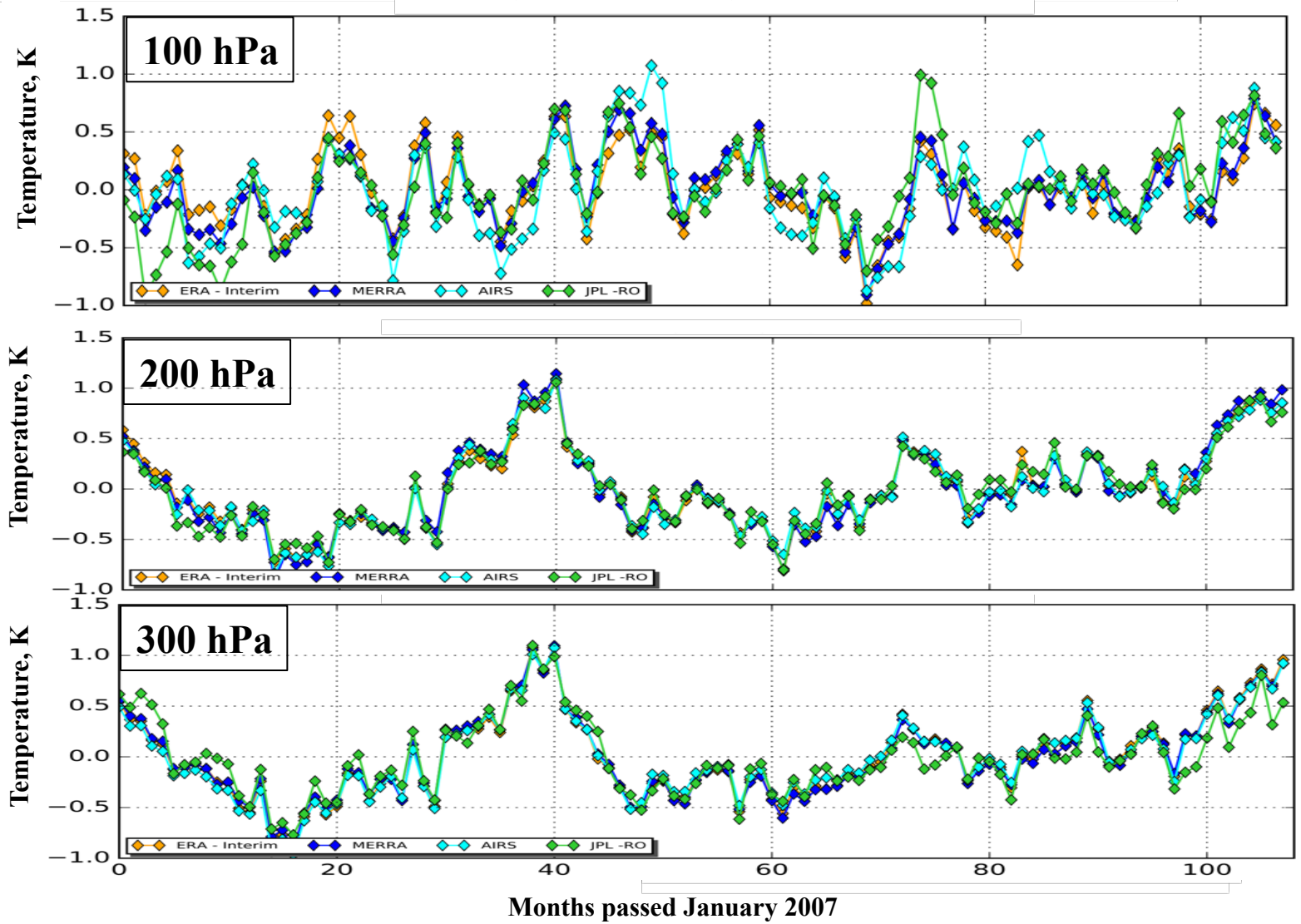
Results (3/8) (Temp., ± 30º-40º)



ERA-Interim MERRA AIRS GPS-RO

Results (4/8) (Temp., ± 30NSº)

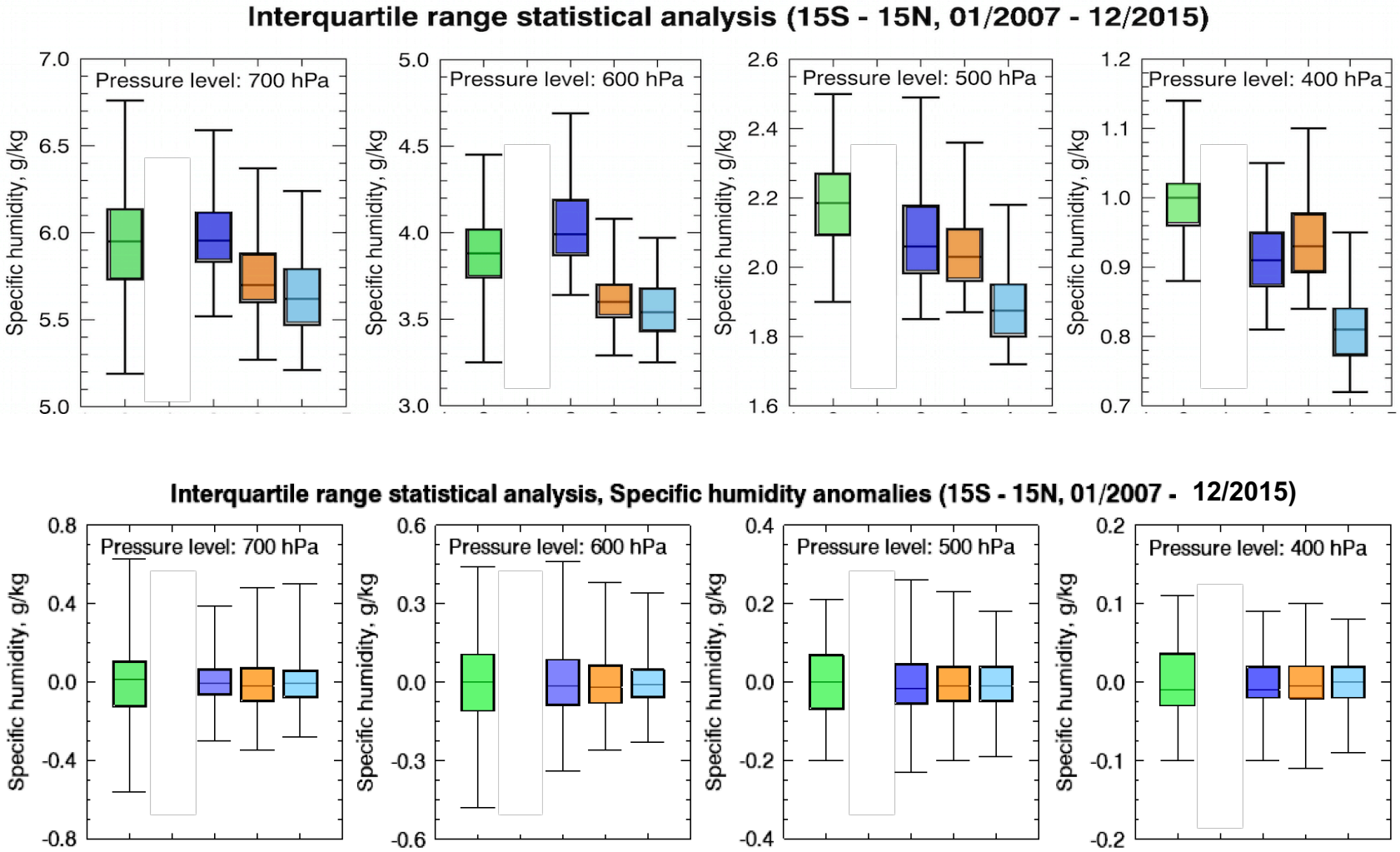
Temperature Anomalies



ERA-Interim MERRA AIRS GPS-RO

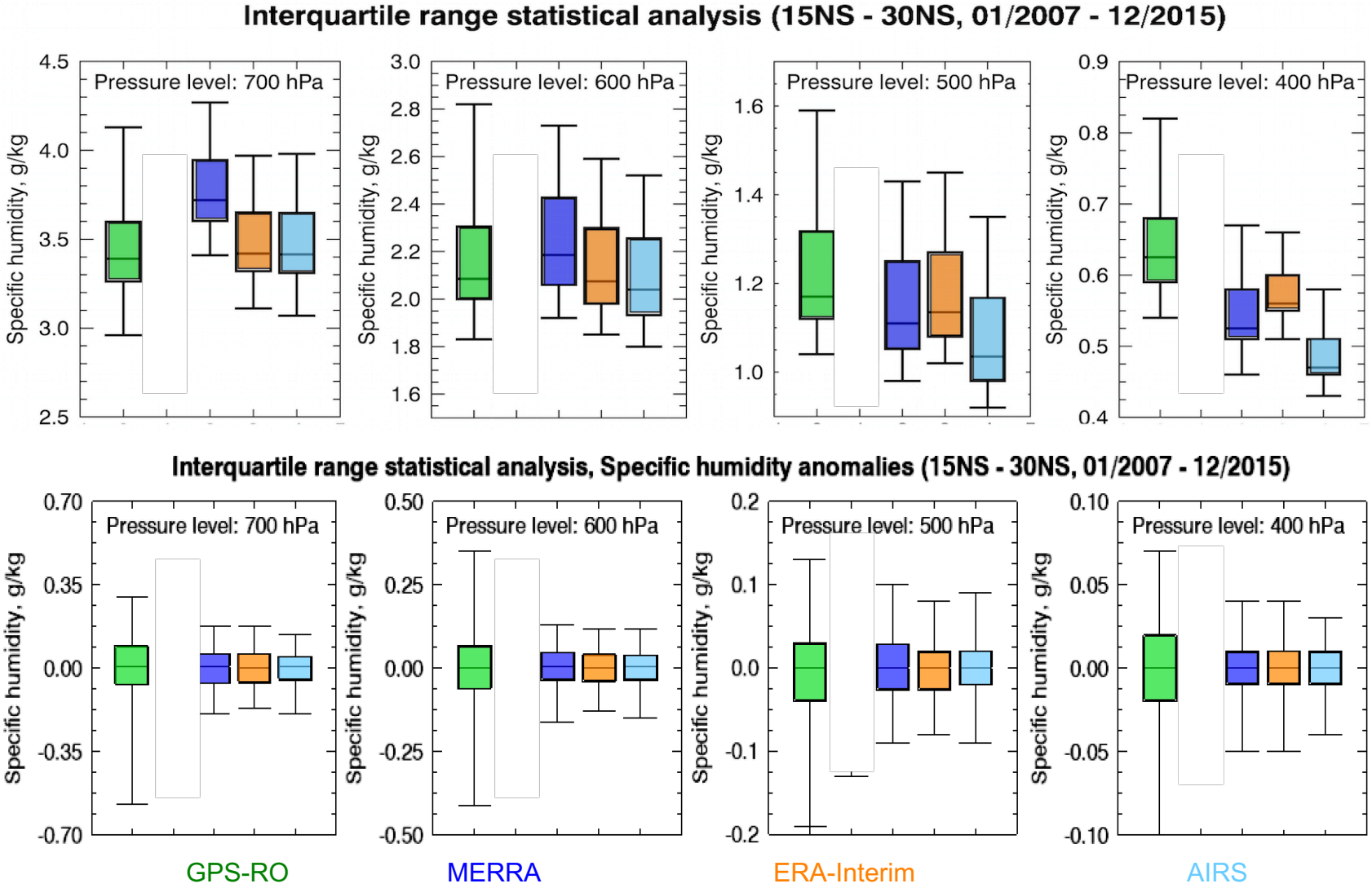
Results (5/8) (H_2O, ± 15º)

Deep Tropics – Strong Convection



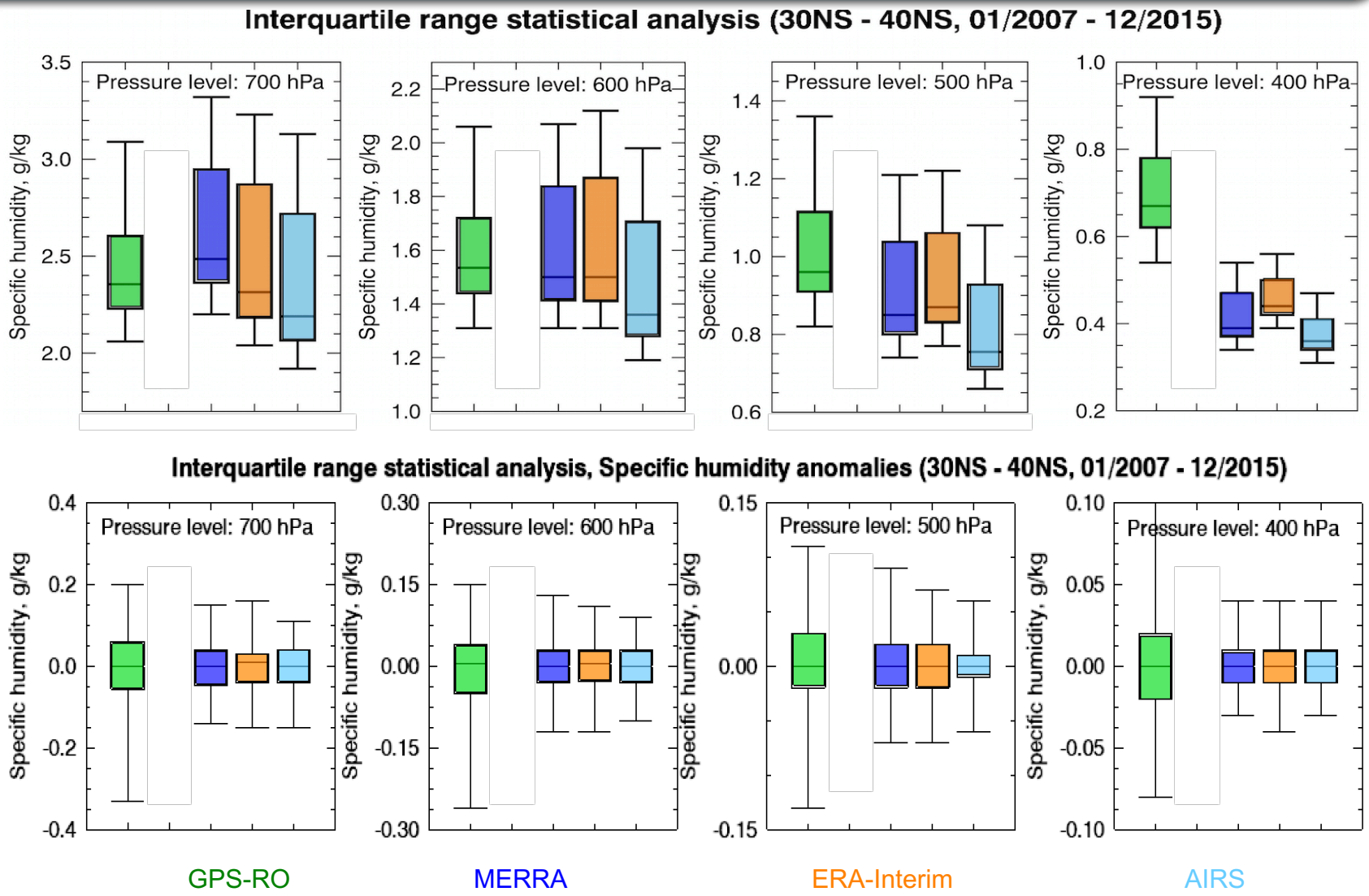
Results (6/8) (H_2O, ± 15º–30º)

Trade winds – Calm atmosphere



Results (7/8) (H_2O, ± 30º–40º)

Subtropics – Dry atmosphere



Conclusions

1. AIRS is systematically colder than all other data sets in the UT region (particularly at the 300 hPa level), but agrees much better higher up.

2. AIRS appears to be systematically drier than all data sets in the middle troposphere, while GPS-RO seems to be the wettest.

3. Despite the statistical differences, in the temperature and specific humidity climatologies among all data sets, their interannual anomalies are in excellent agreement with one another.