

Validation of Pre-V7 AIRS and Neural Network Temperature in the PBL against the IGRA Radiosondes

Sun Wong, Qing Yue, Adam Milstein, John Blaisdell, Evan Manning, Eric Fetzer, Bjorn
Lambrigtsen, and João Teixeira

Jet Propulsion Laboratory, California Institute of Technology, CA

Sounder Science Team Meeting (April 2018, Caltech.)

©2018 California Institute of Technology.
Government sponsorship acknowledged.

Brief History of the 3 Pre-V7 Versions Being Discussed

V6.50

- Lost MW, IR-only retrieval
- Improve lower stratosphere-upper troposphere retrievals for T
- Cold biases in the PBL inherited from NN

Bugging
Adam

V6.51

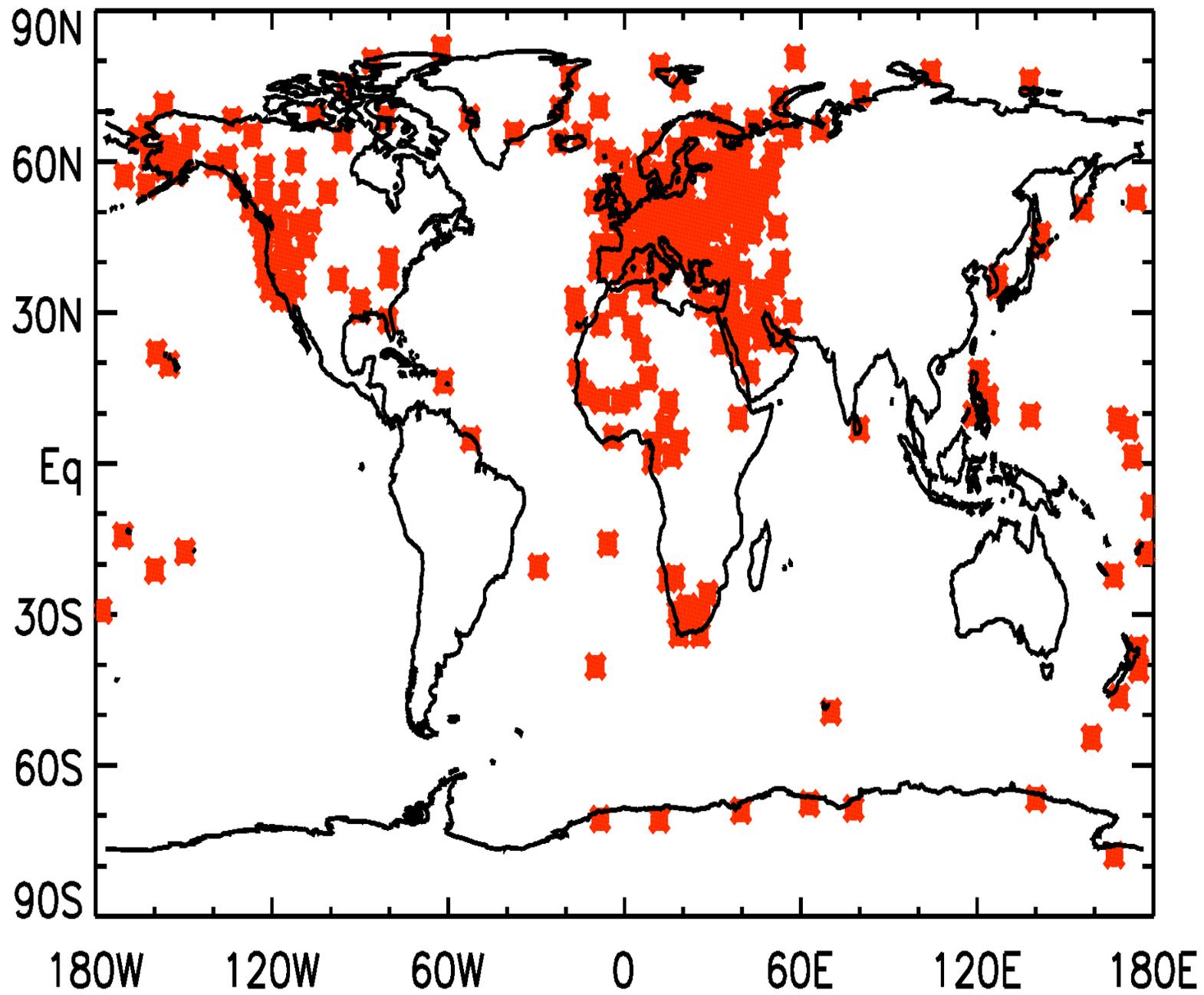
- Require more information from IR inputs than IR+MW for IR-only SCC algorithm
- Apply Projected Principal Components
- Reduce cloud-clearing errors in the lower troposphere

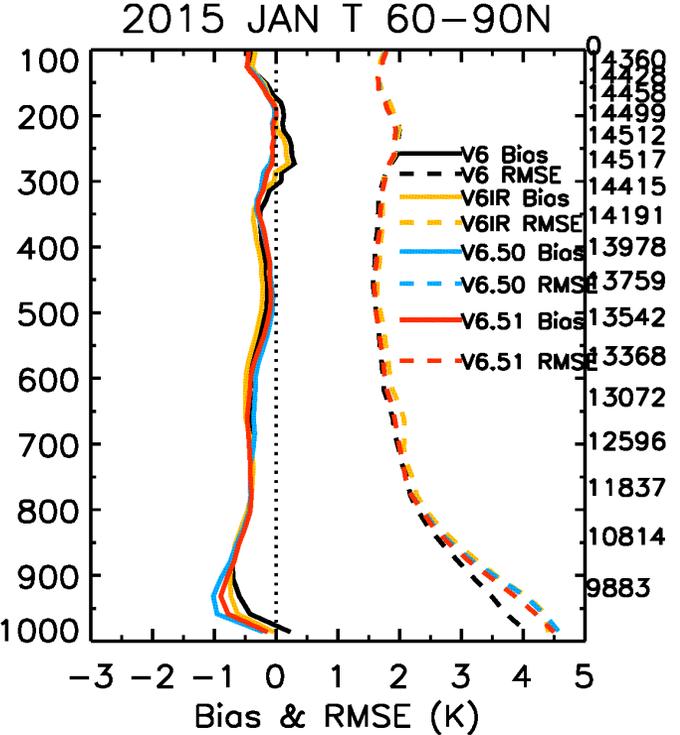
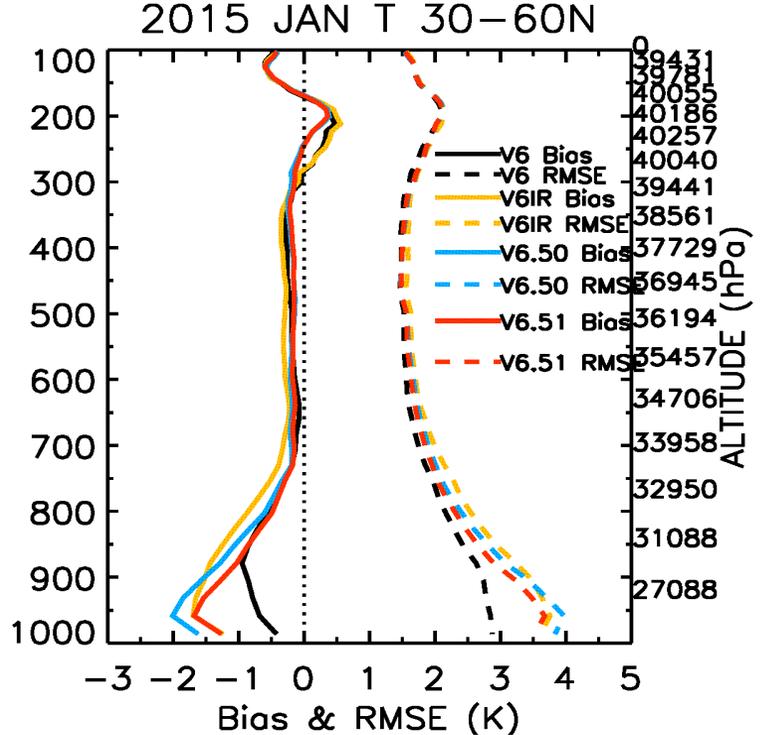
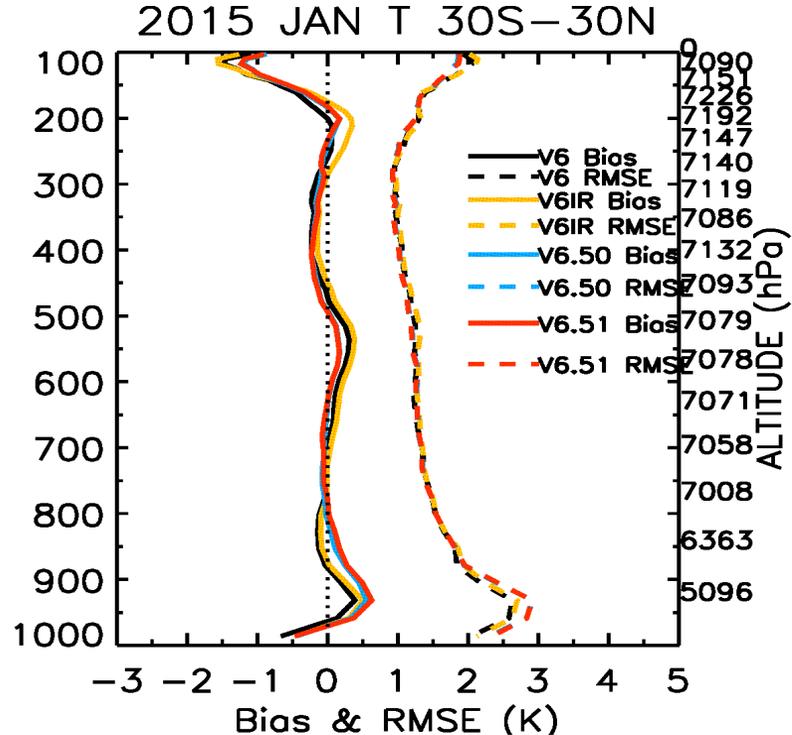
John
work on
QC

V6.52

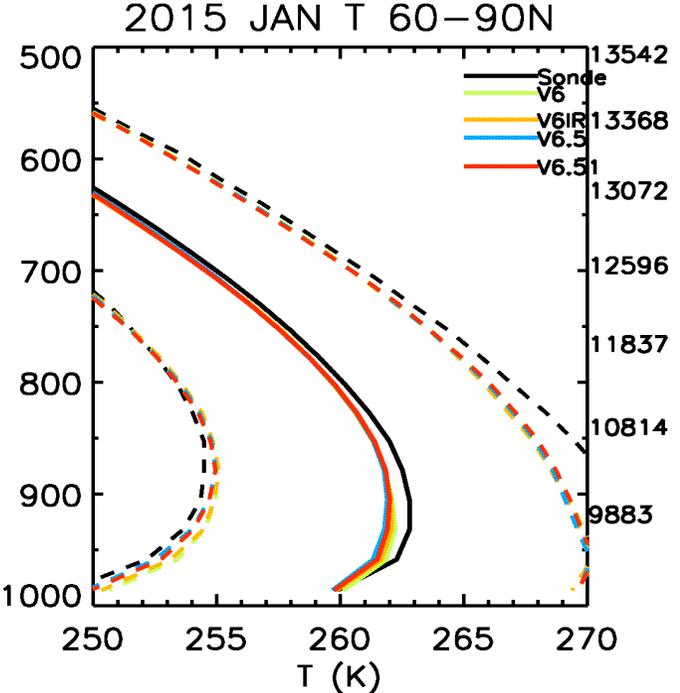
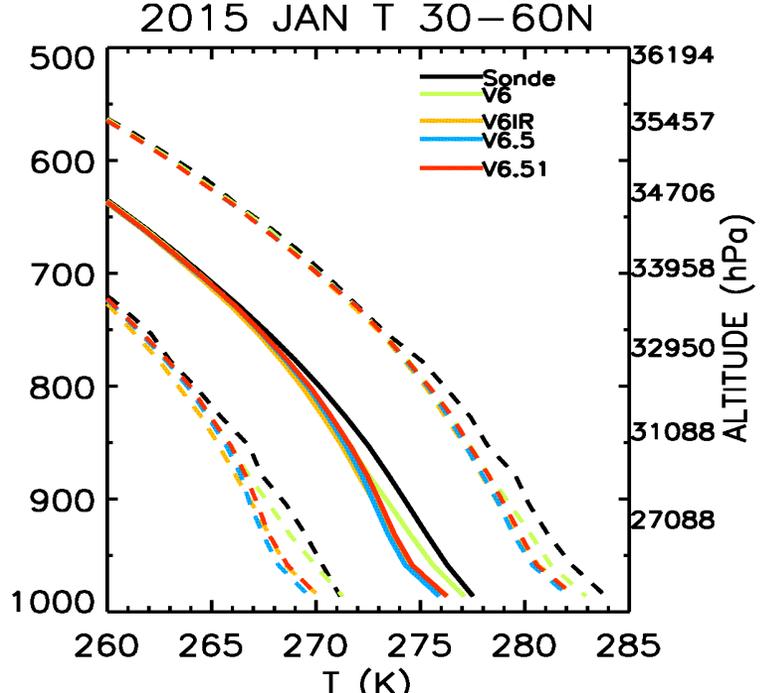
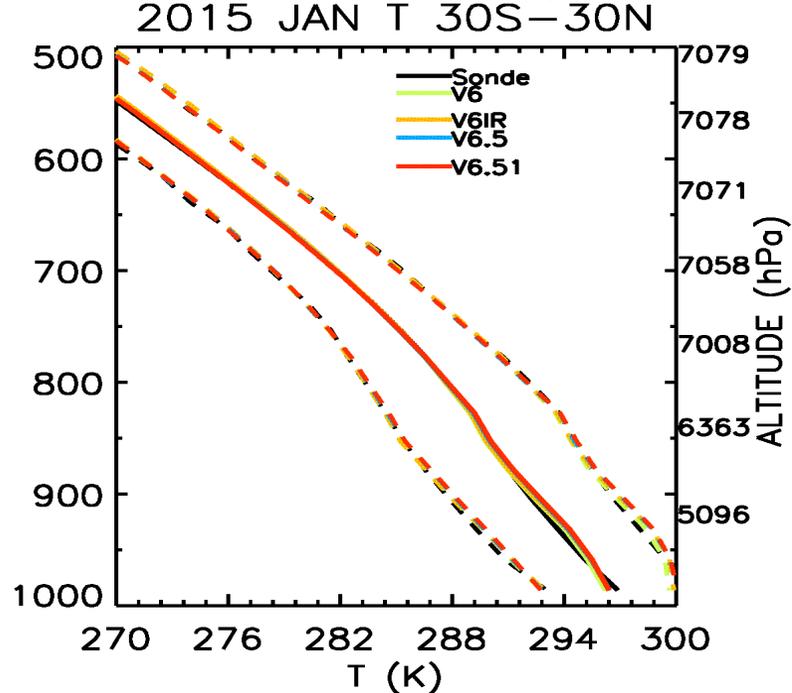
- Extend the examination of error estimates nearer to the surface
- Modify thresholds, more stringent for QF=1 (good retrievals)

JAN 2015 AIRS-IGRA Match

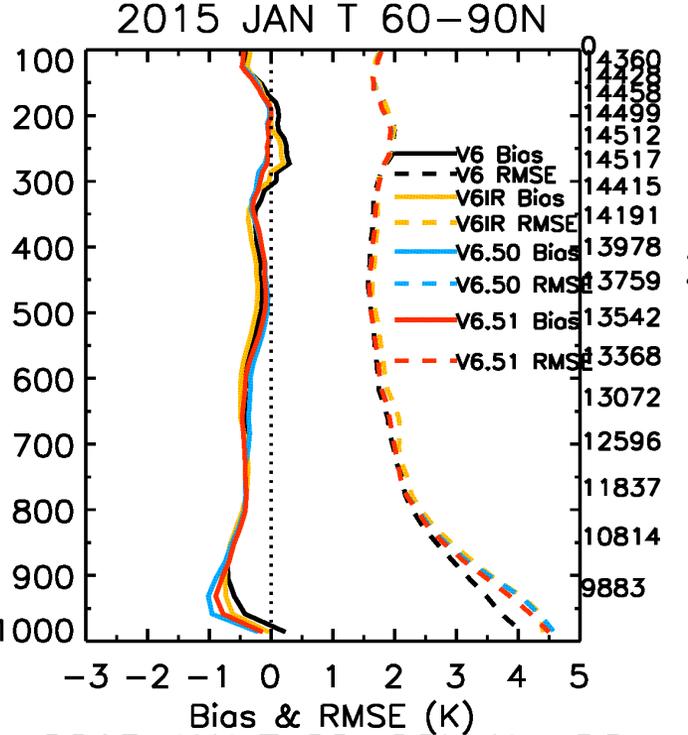
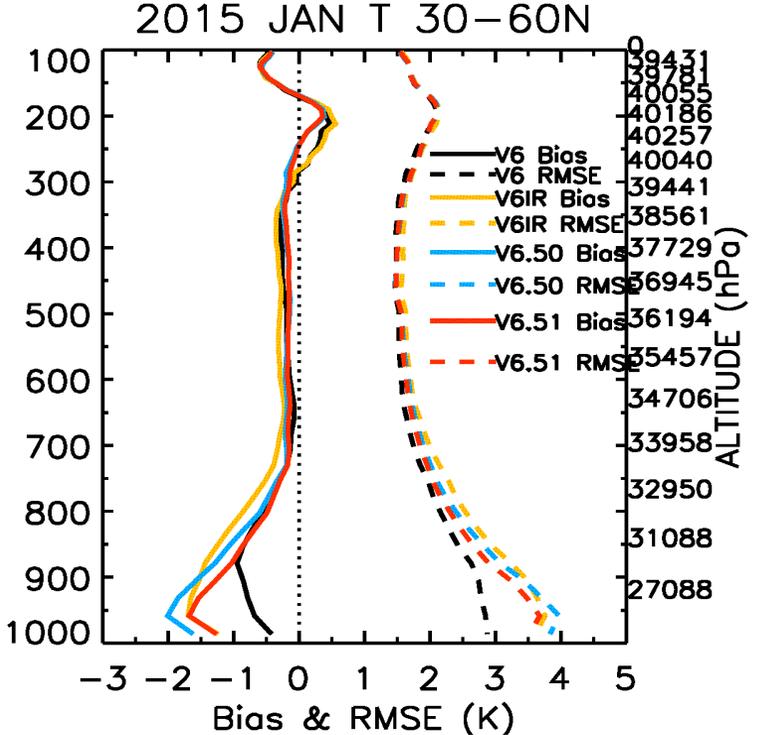
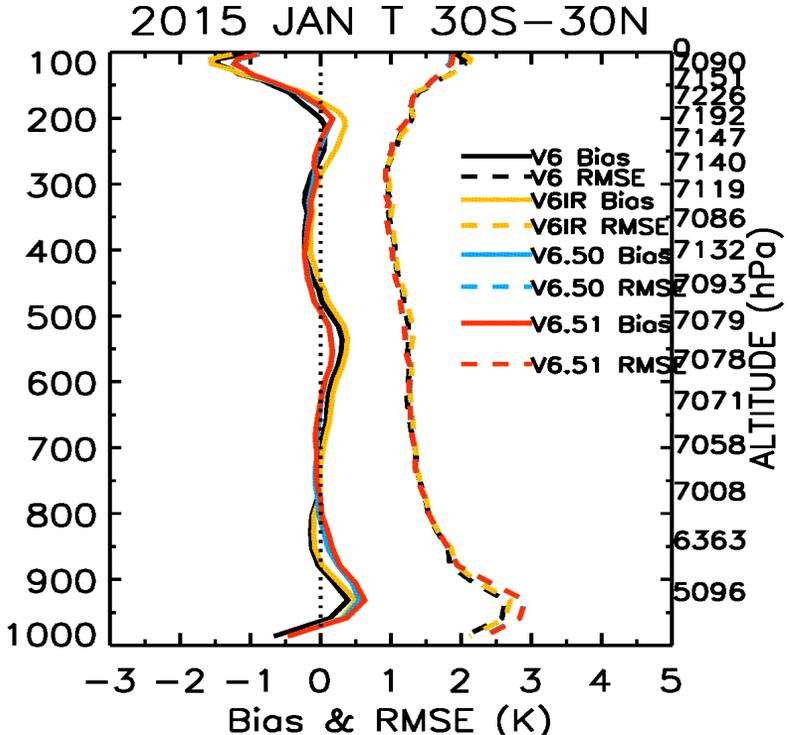




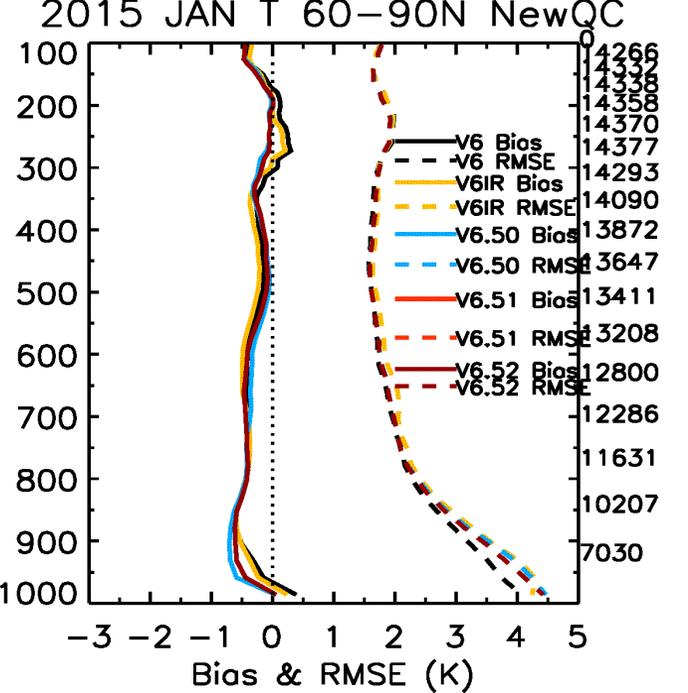
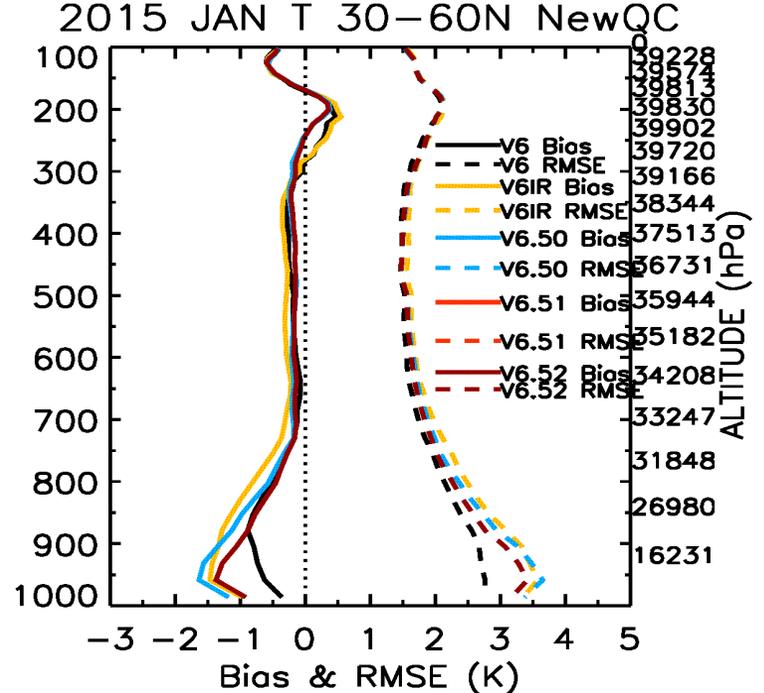
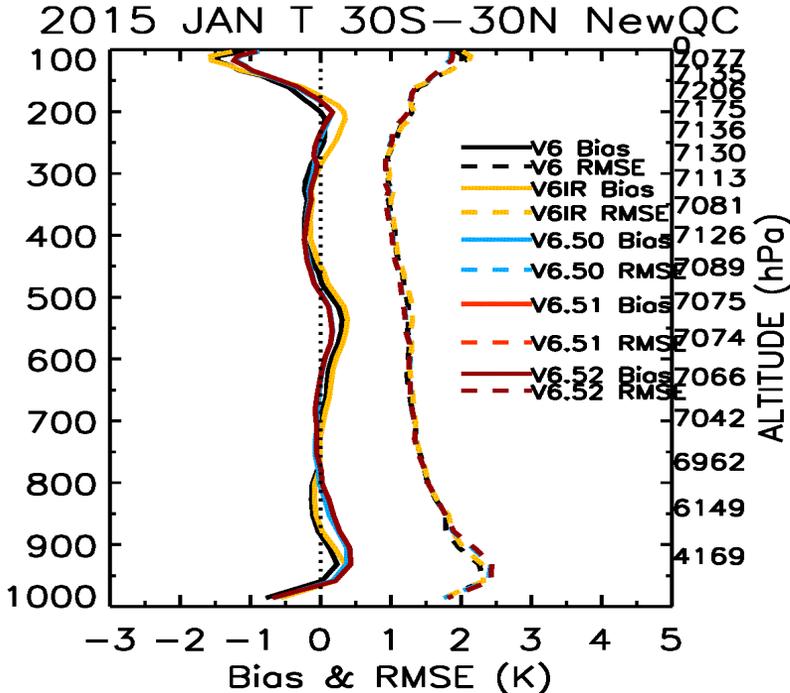
2015 Jan
Retrv. T
Errors



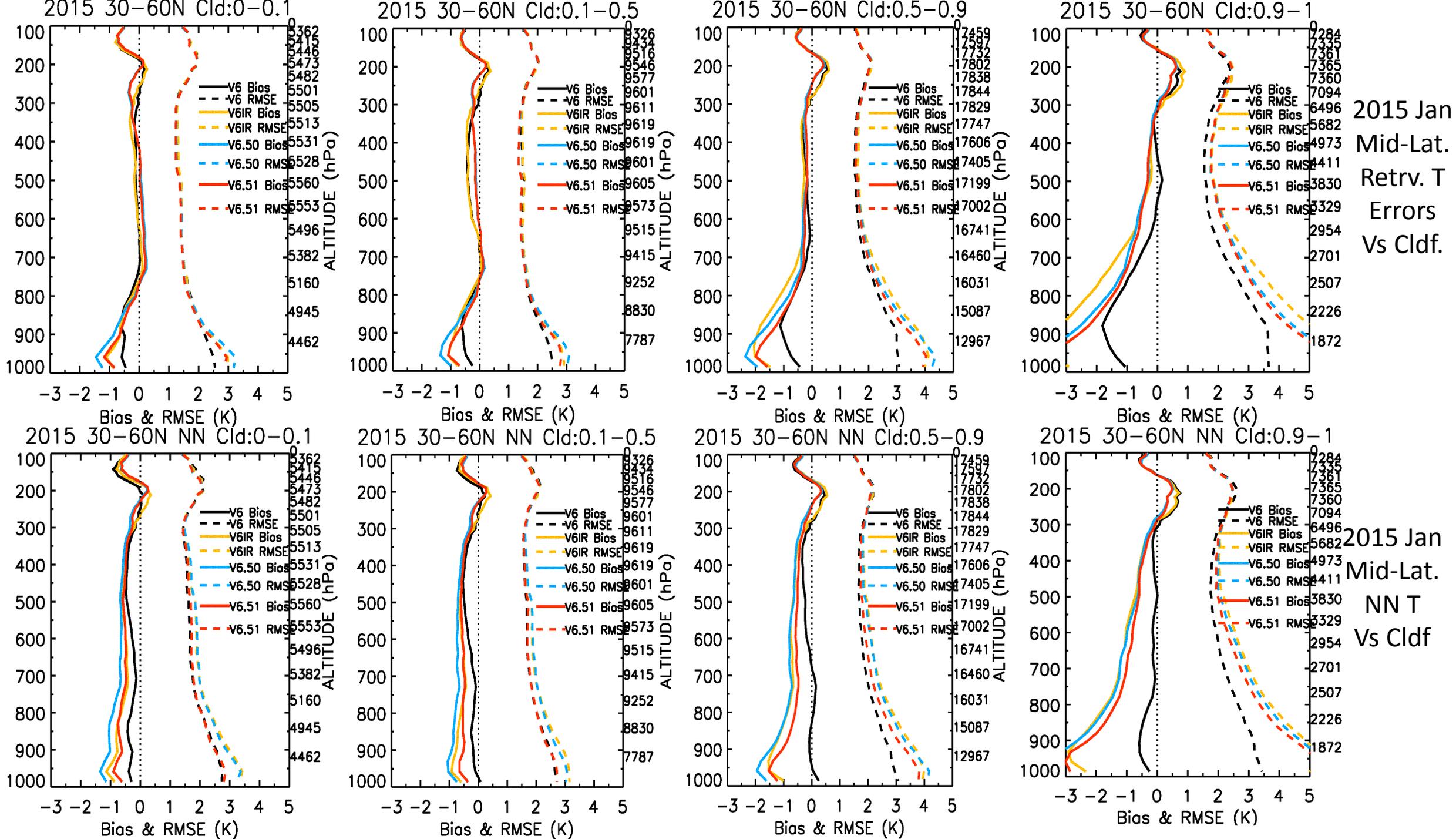
2015 Jan
Retrv. T

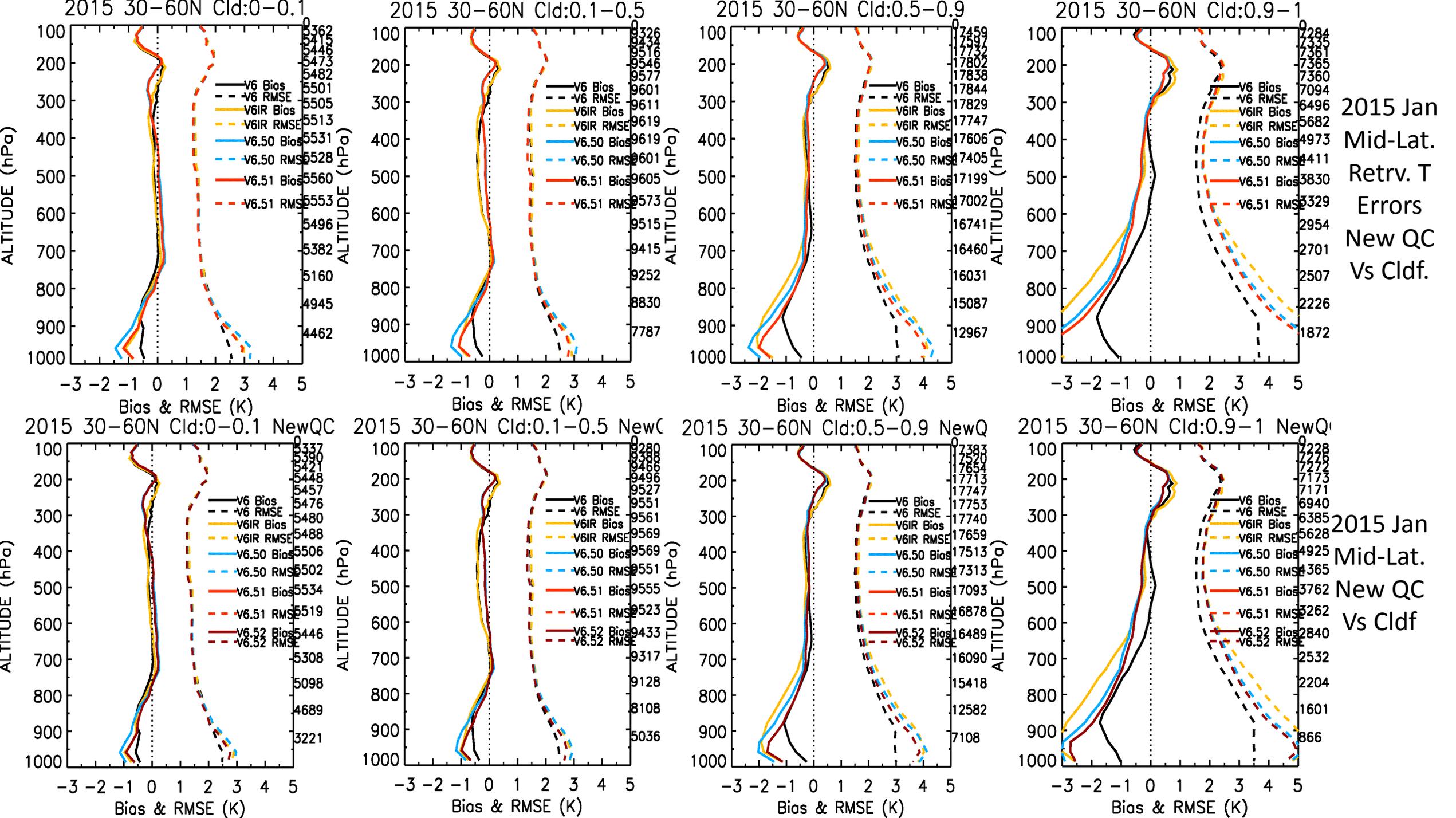


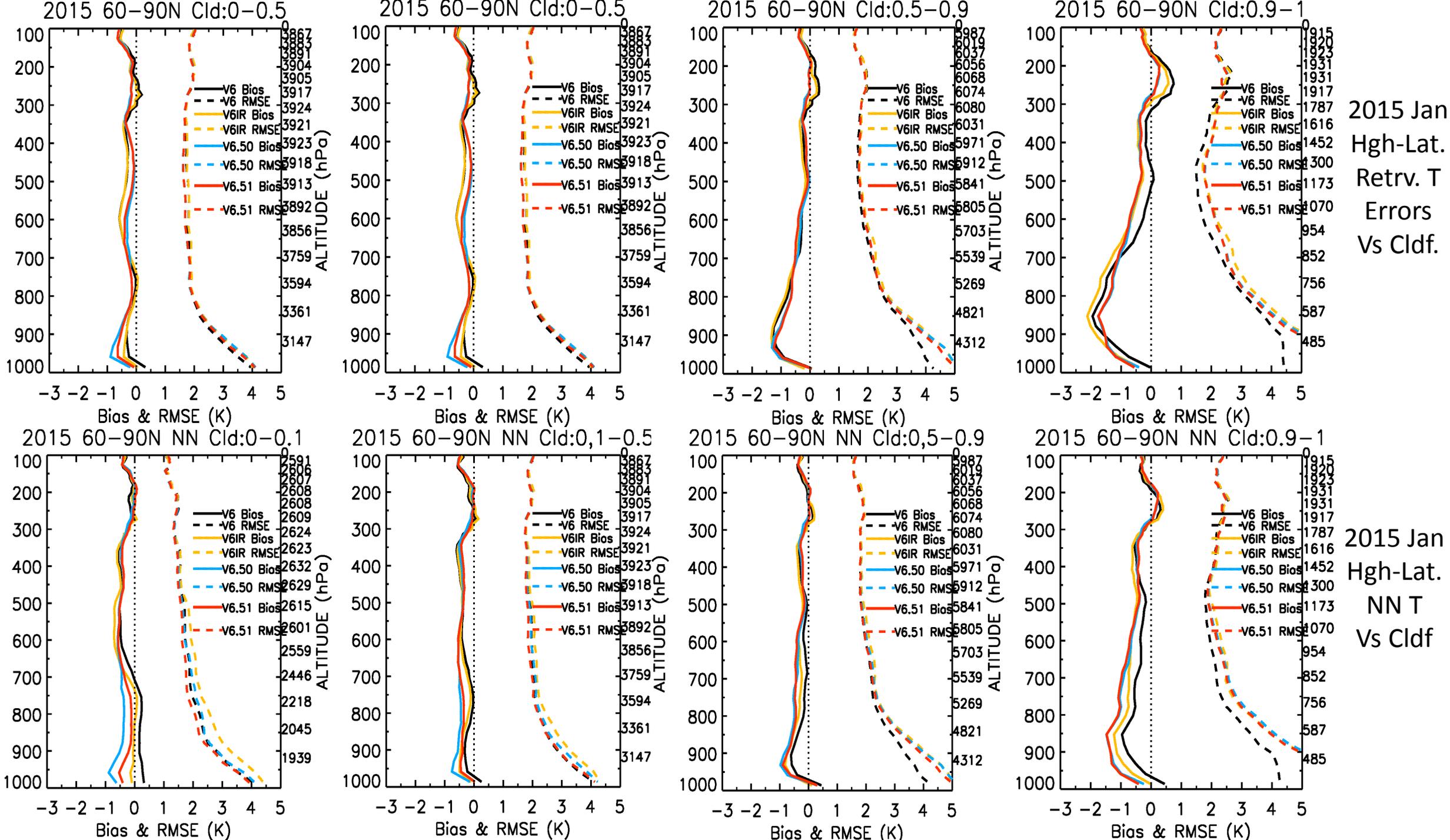
2015 Jan
Retrv. T
Errors
Old QC

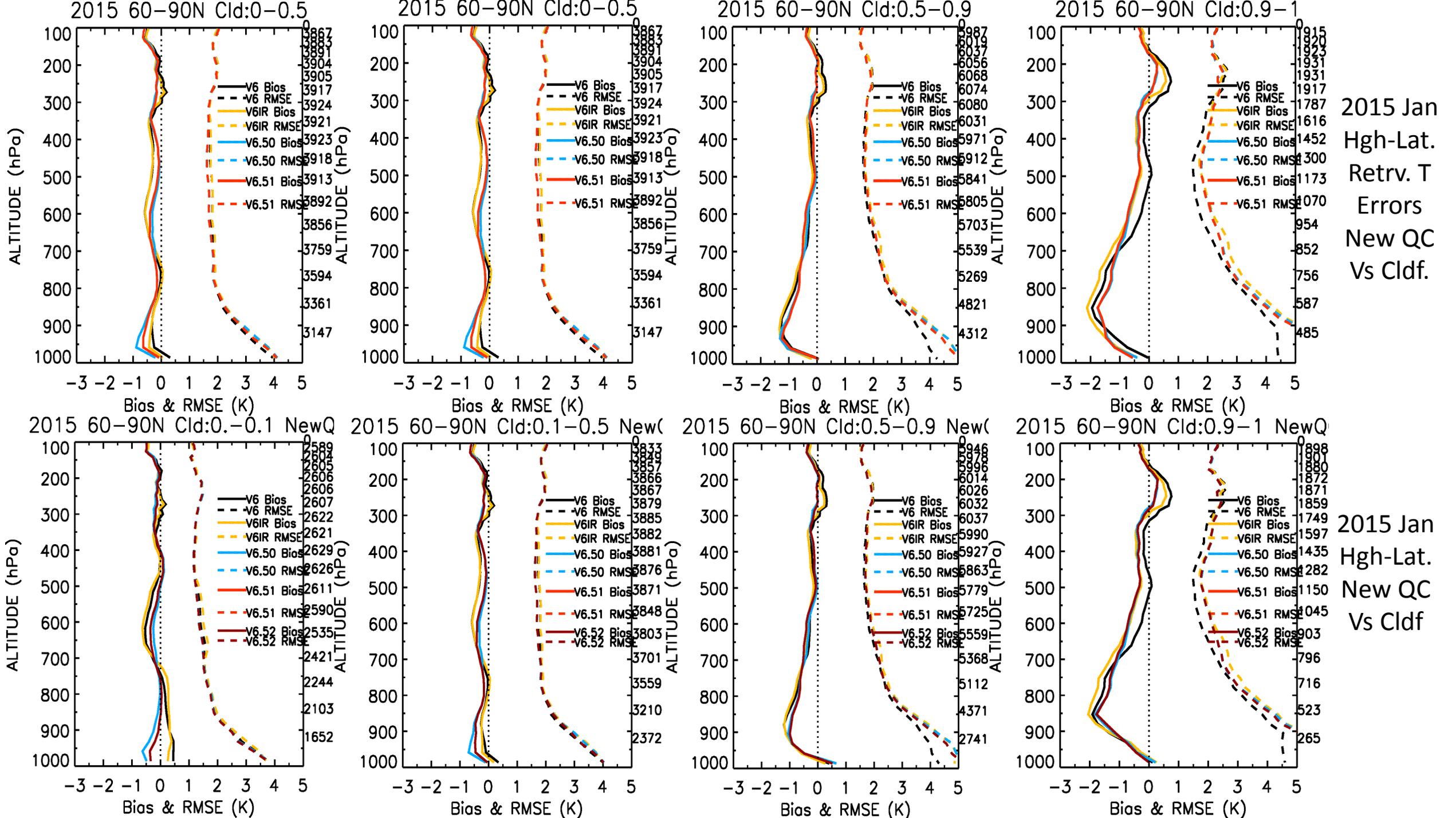


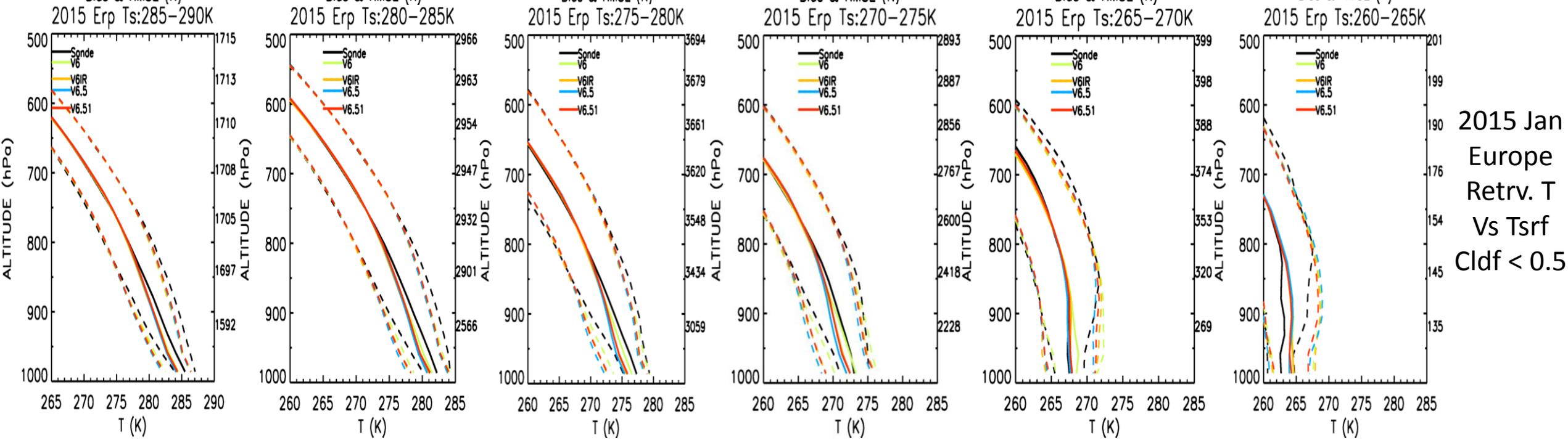
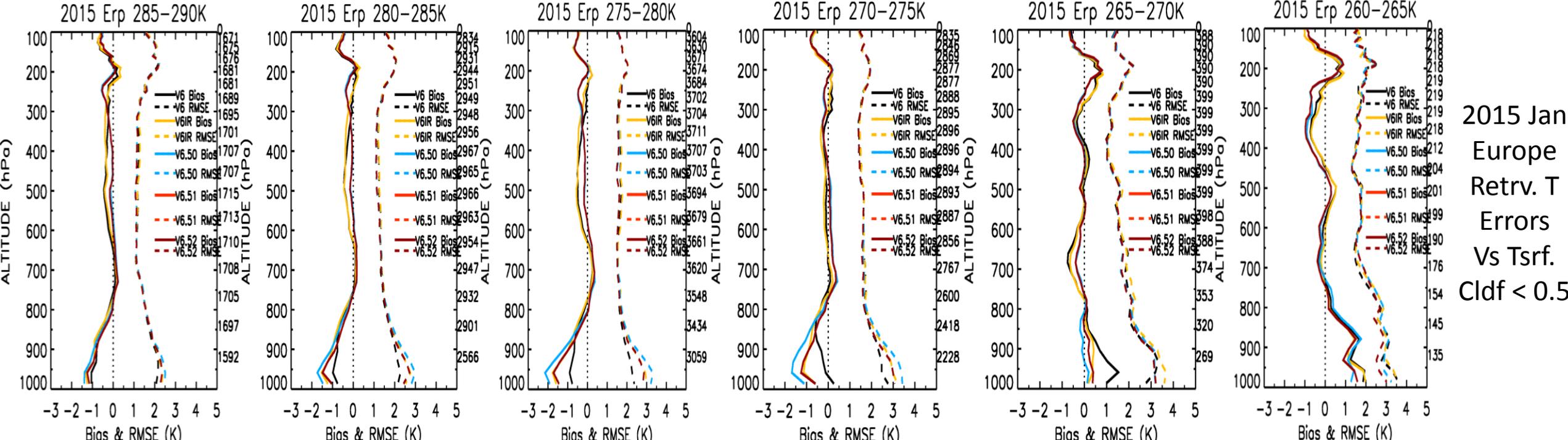
2015 Jan
Retrv. T
New QC

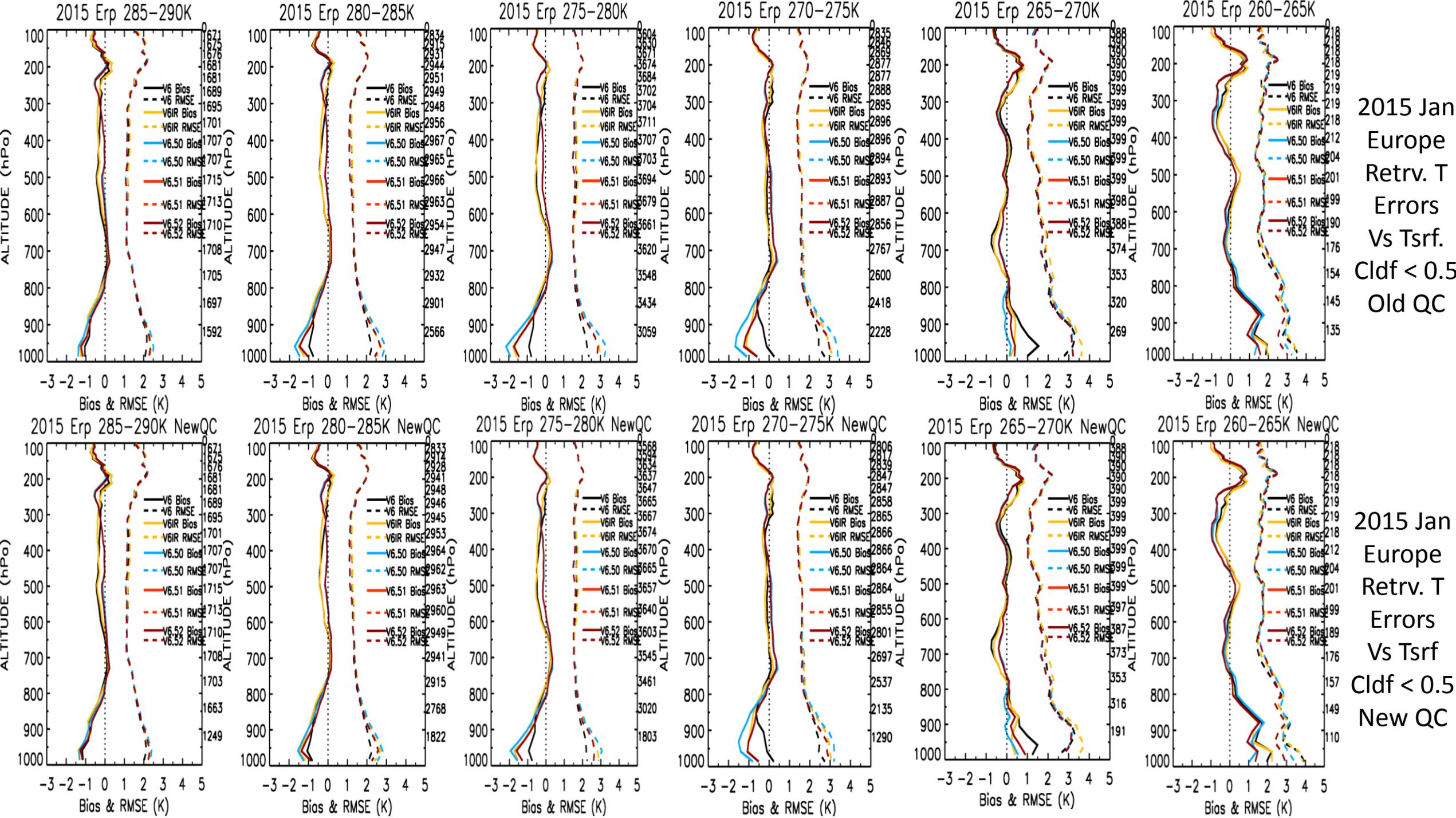


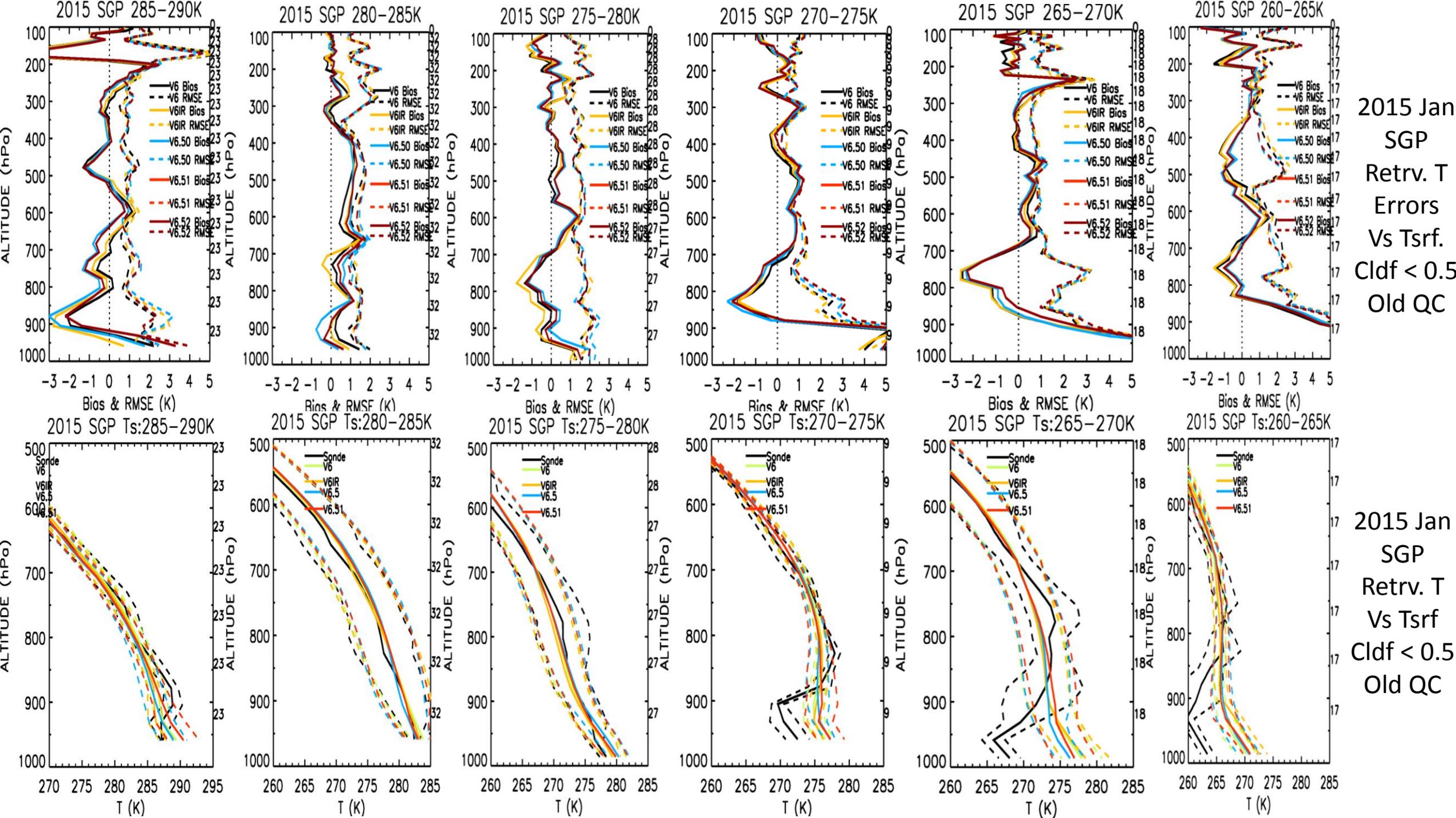


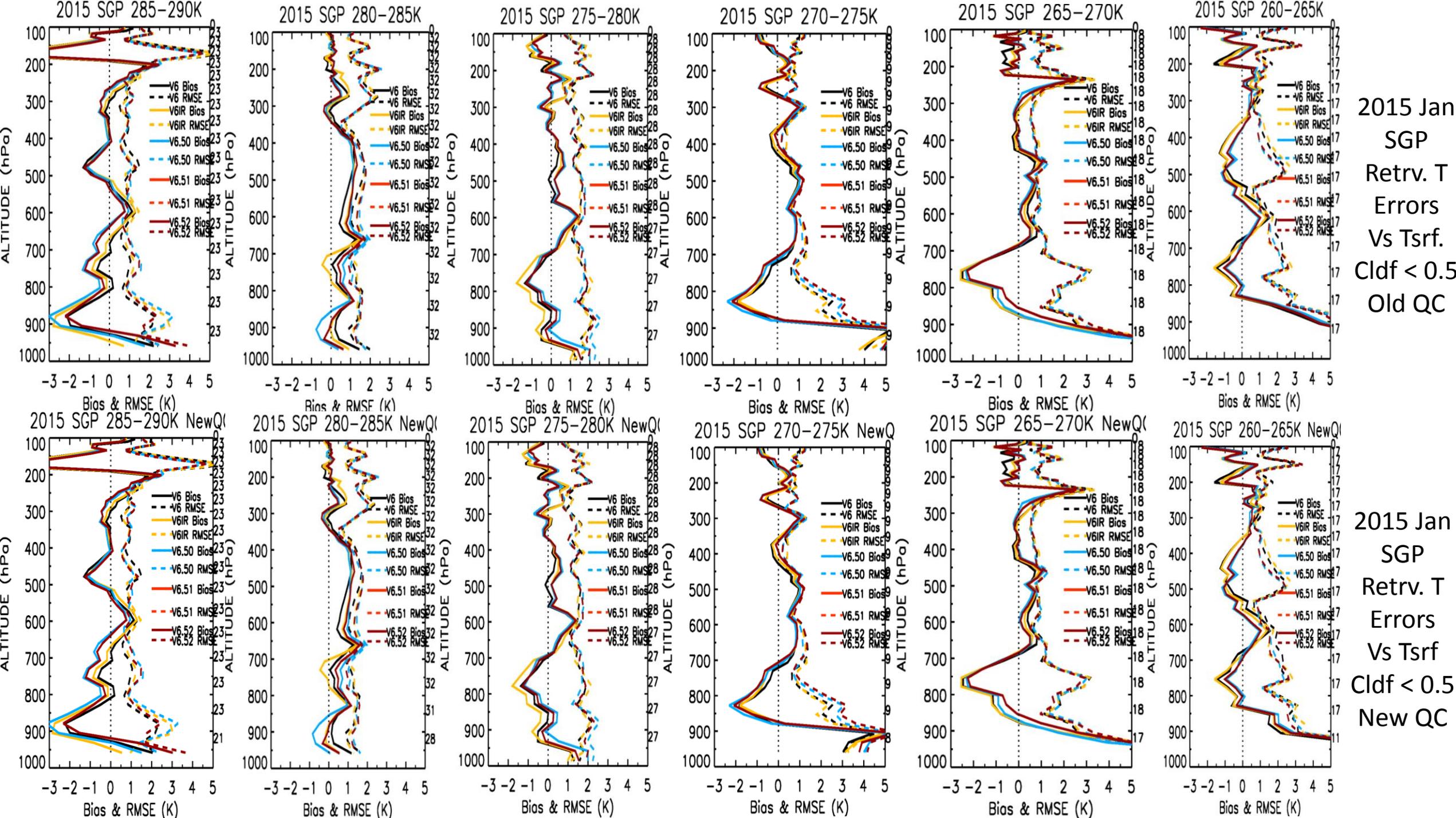












Conclusions

- With the new SCC for NN, V6.51 reduces biases and RMSEs in the PBL. The retrievals further reduces errors of NN in the mid-troposphere and keeps the quality in the PBL when cloud fraction is small (< 0.5). In cloudy conditions, V6.51 has smaller RMSEs than the V6 IR-only retrievals.
- V6.52 (with the new QC) in general reduces biases of V6.51 (with the Old QC) by 0.2-0.3 K in the PBL. The new QC has larger influences in heavy cloudy conditions ($\text{Cldf} > 0.9$) in mid-latitude, in which the sampling size in the PBL can be reduced to $\sim 1/2$ (for $\text{QC}=0$ and 1) of the V6.51, and the biases are reduced by ~ 0.6 K.
- For different conditions of near-surface T over Europe, the new QC is more influential near the freezing point, with the sampling size in the PBL reduced to $\sim 1/2$ of the V6.51's, and the biases are reduced by about 0.2-0.3 K.
- Transition to T inversion near freezing point posts a challenge to soundings in the PBL, indicating the lacking of information in changes in surface types during land frozen.

