Validation of NOAA-16/ATOVS Products from AAPP/IAPP Packages in Korea

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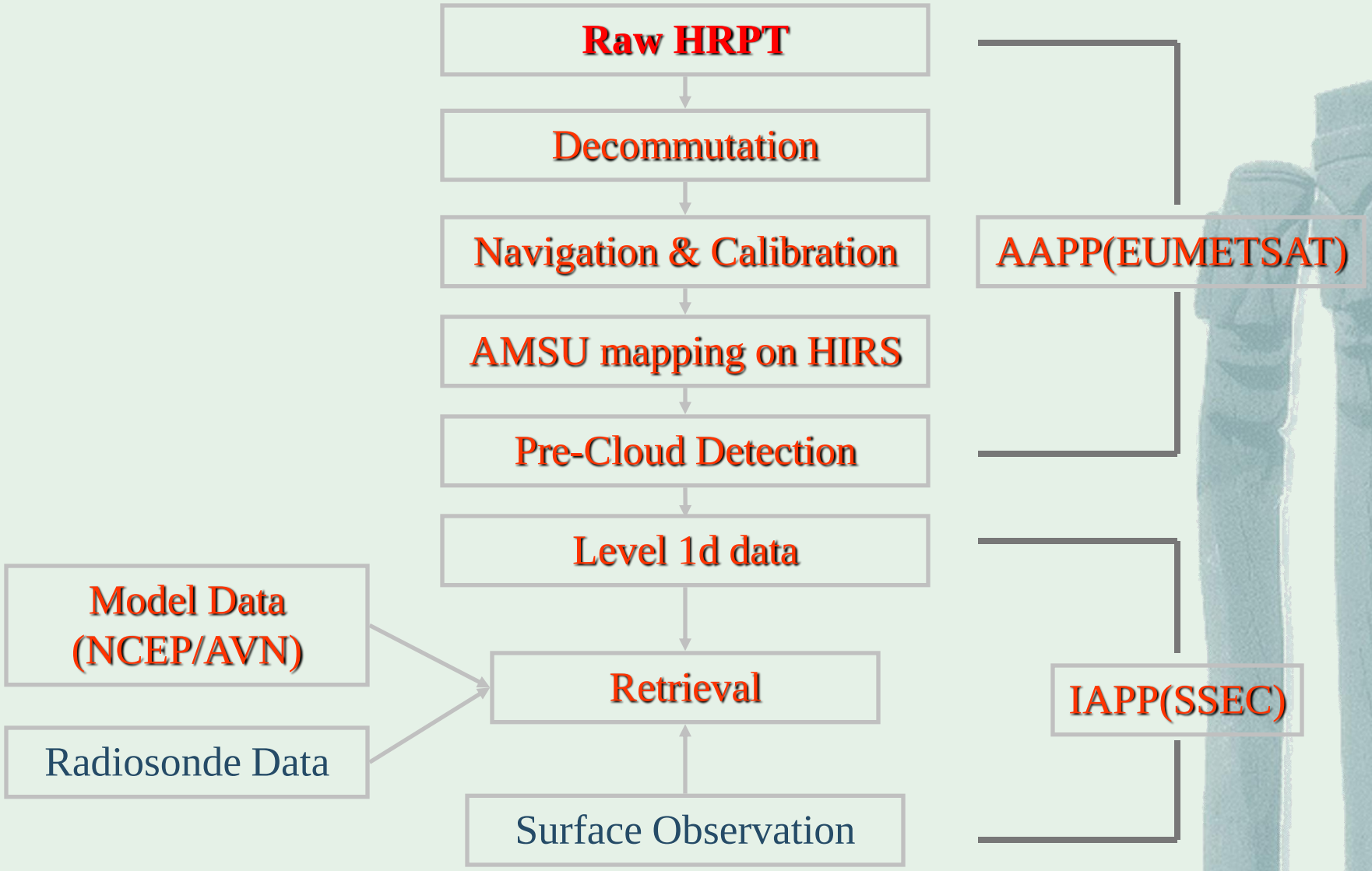
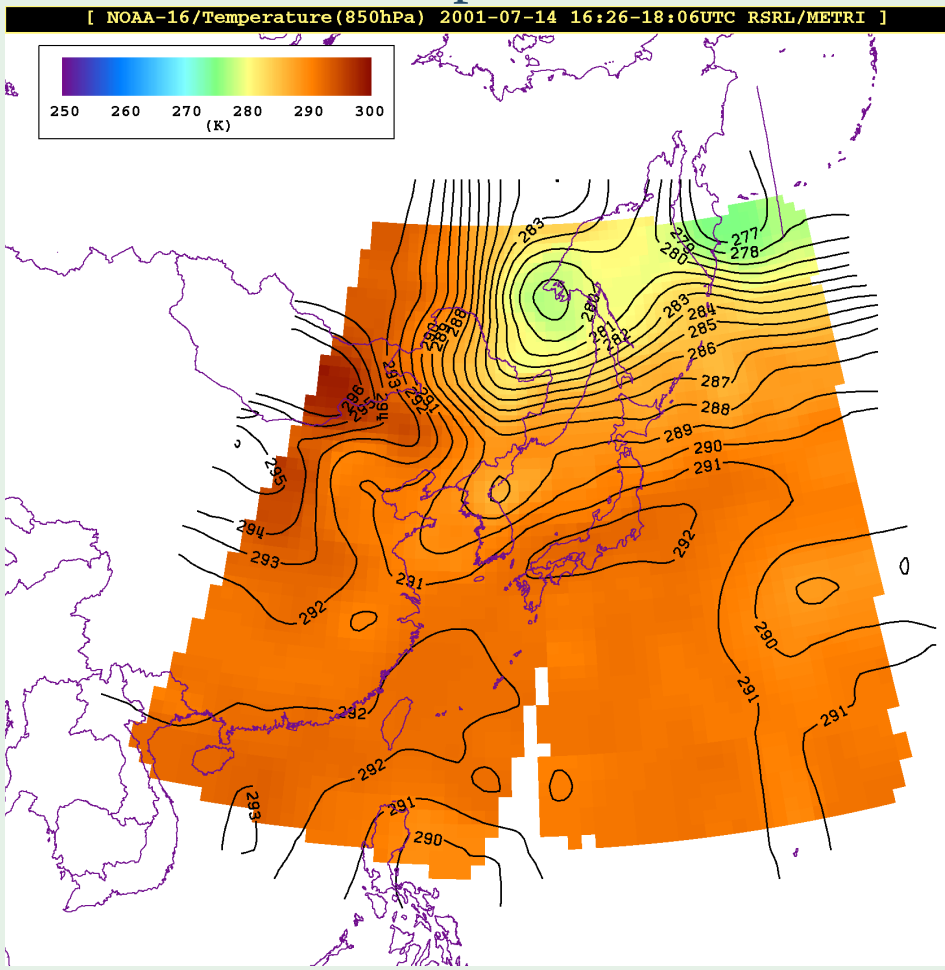
ATOVS Processing

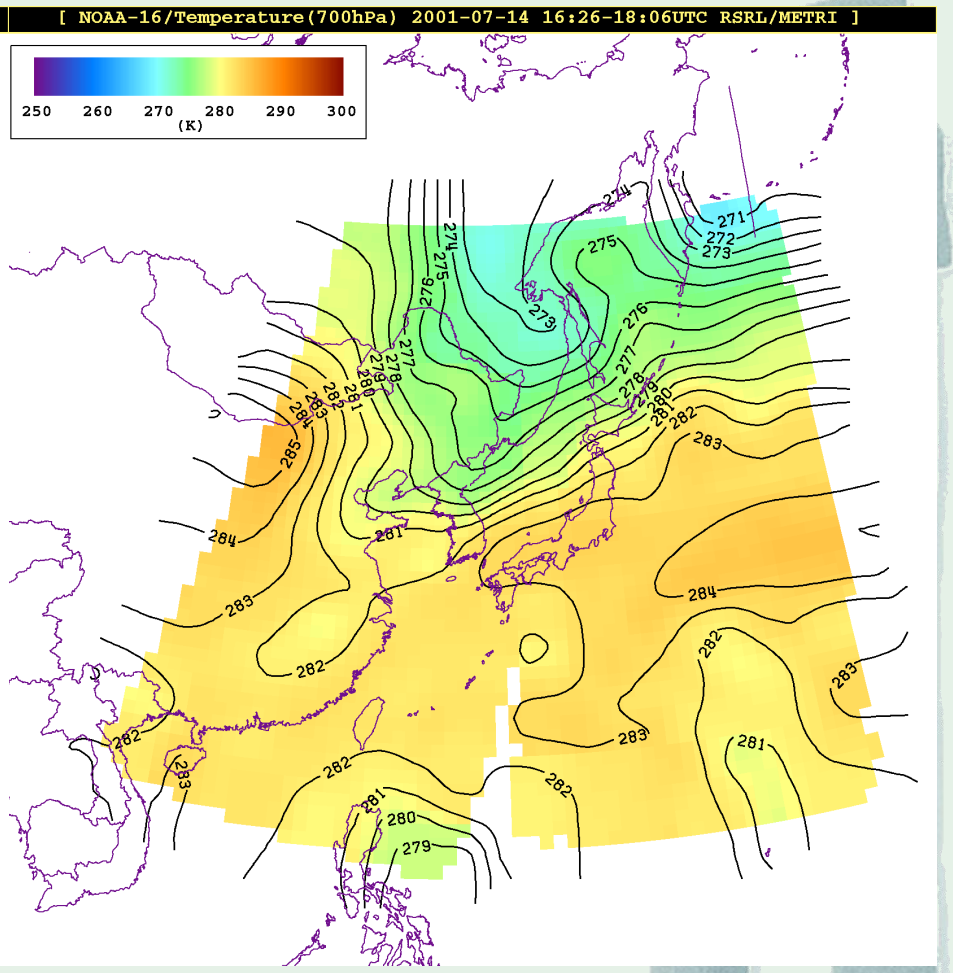


Example

2001.7.14 850 hpa-T

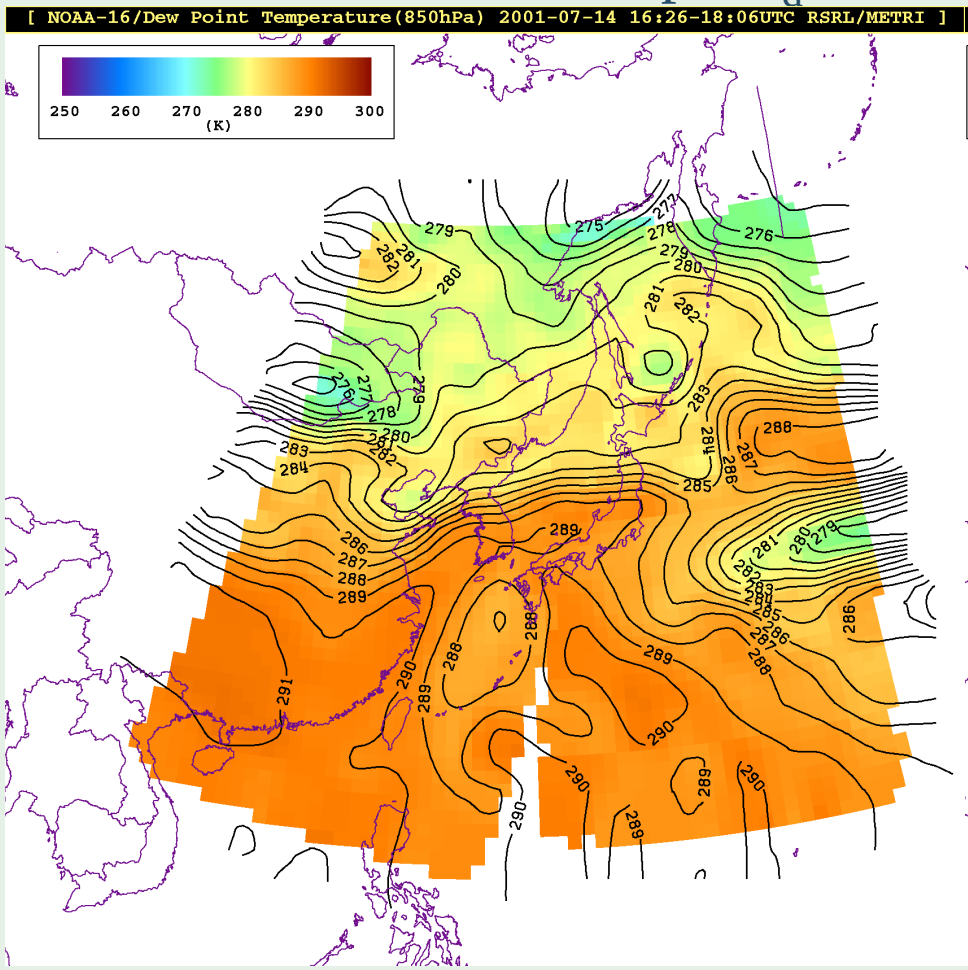


2001.7.14 700 hpa-T

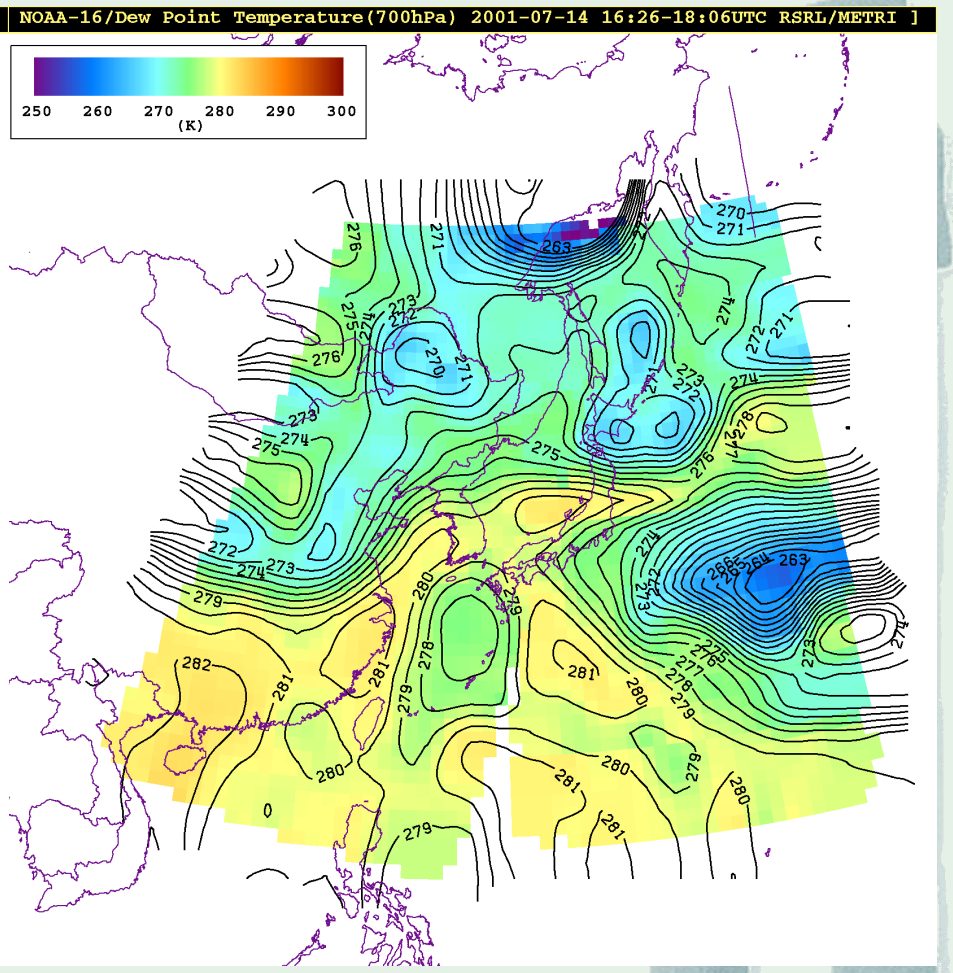


Example

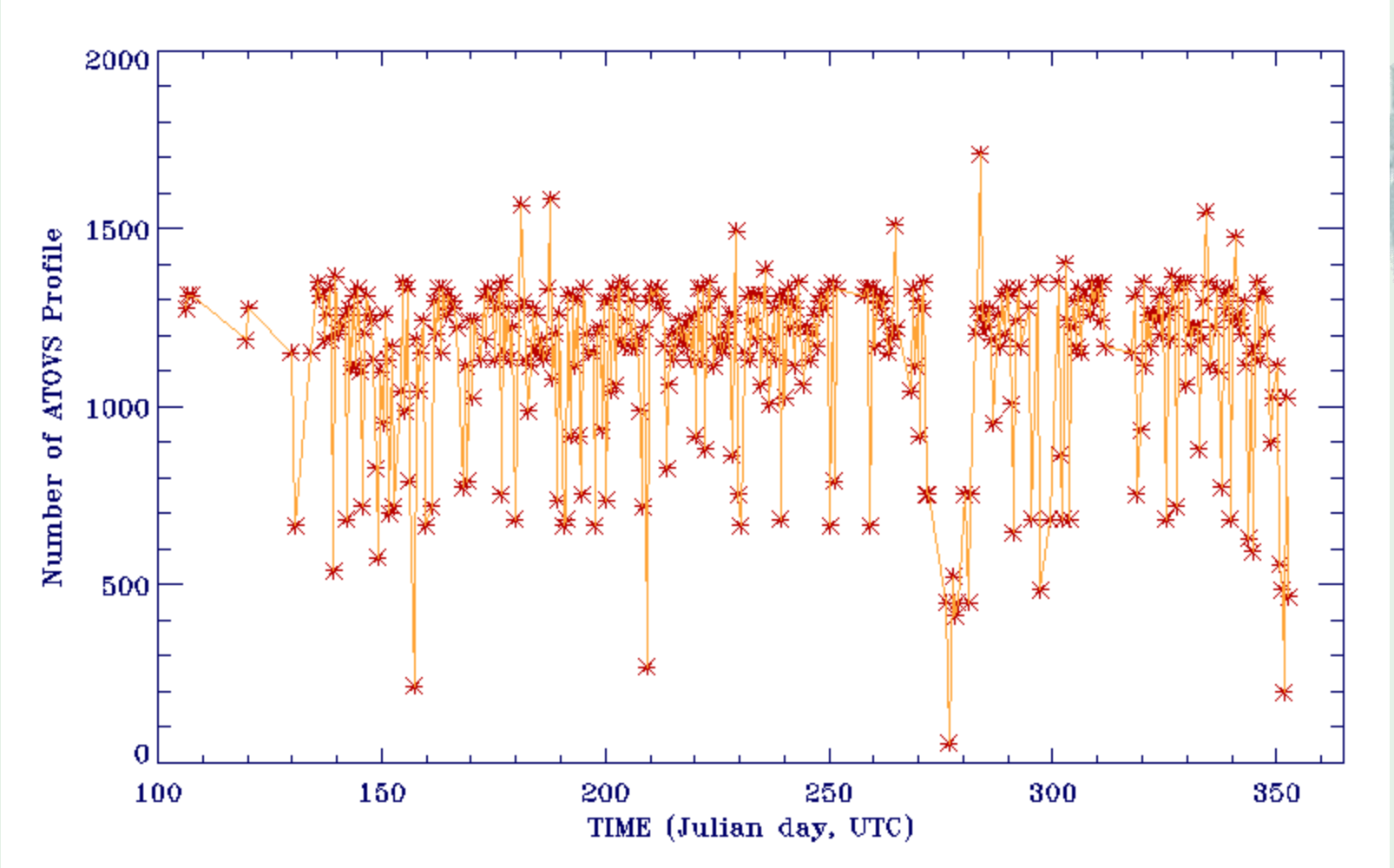
2001.7.14 18UTC 850 hpa-T_d



2001.7.14 18 UTC 700 hpa-T_d



Number of Retrieved Profiles



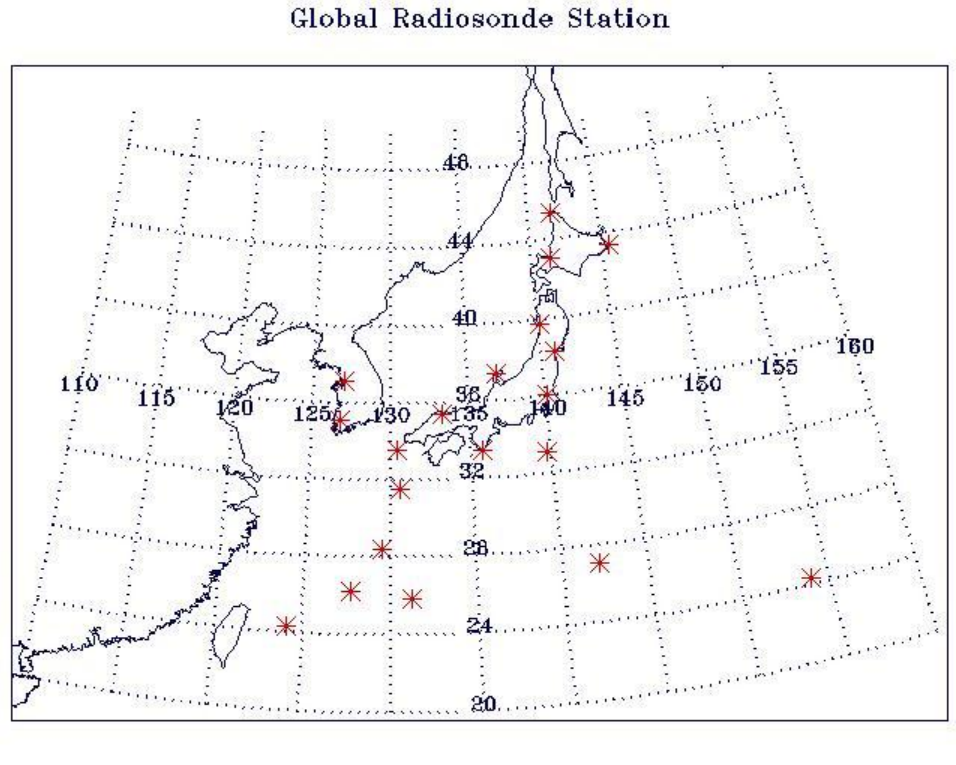
Validation

- Stations :
  Generally, 00 and 12 UTC observation
  A few stations take observation at 06 and 18 UTC, also
  Total of 20 stations data including Osan of Korea are used

- To match the ATOVS retrieval altitude, the radiosonde data is interpolated to the ATOVS altitude

- To avoid frequent missing points at higher altitude, the comparisons are made for altitudes below 100 hpa

Radiosonde Station (06, 18 UTC)



Validation

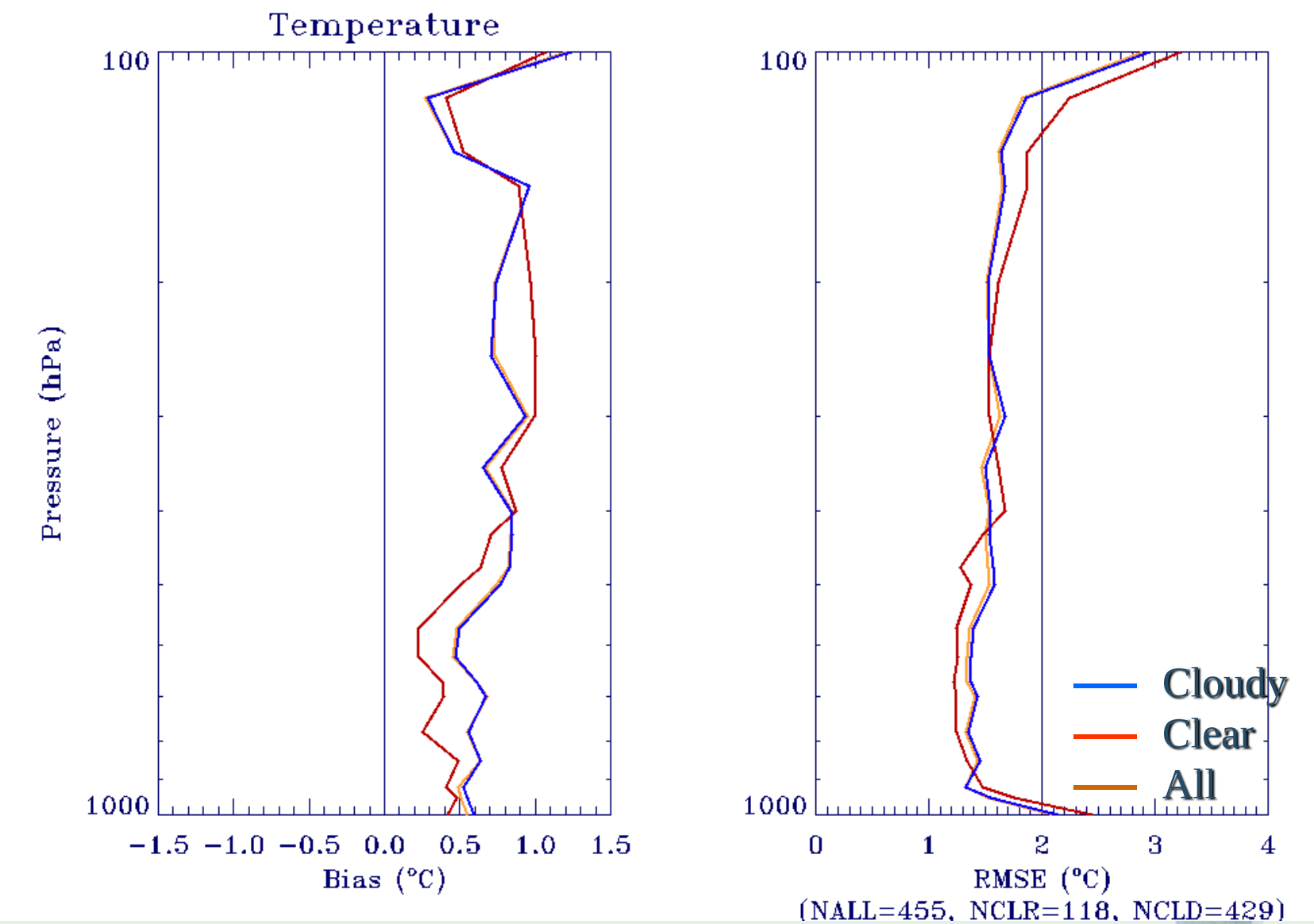
- **Estimate Bias and RMSE of ATOVS derived temperature and water vapor mixing ratio using the collocated radiosonde data**

- **Data**
  - **: Period: 2001. 5. 4 ~ 2001. 12. 31**
  - **: Number of NOAA-16 Orbits received at KMA: 950**
  - **: Number of Collocated data: 455**

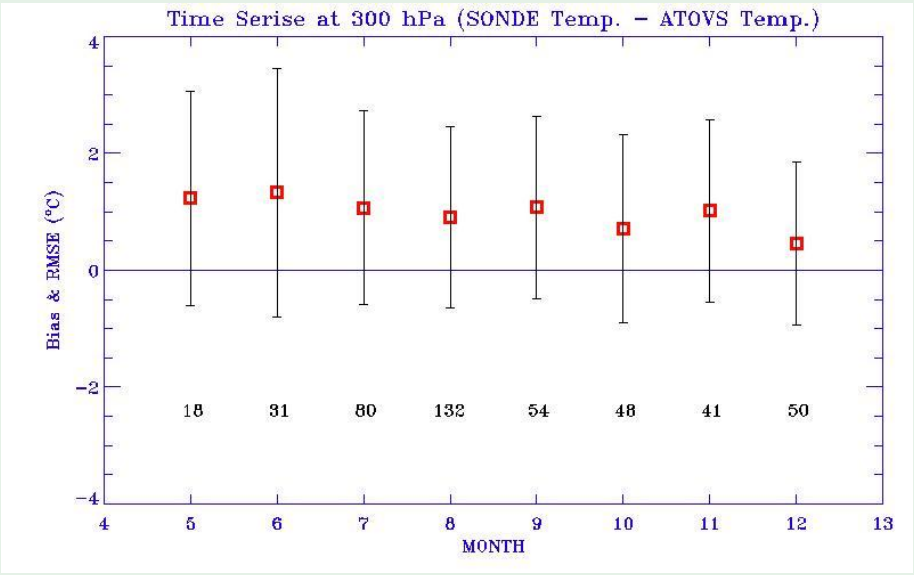
- **Products**
  - **: Temperature, dew point temperature, TPW, O_3**
  - **: CLW, IWP, Rain rate (Using NESDIS Algorithm)**

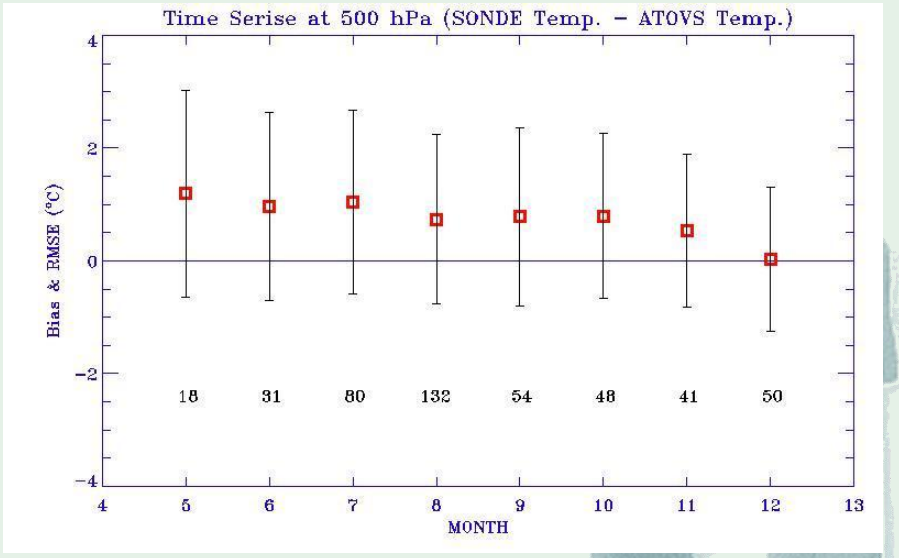
- **Temporal and Spatial Collocation**
  - **: ± 3 hours & 1.0^o**

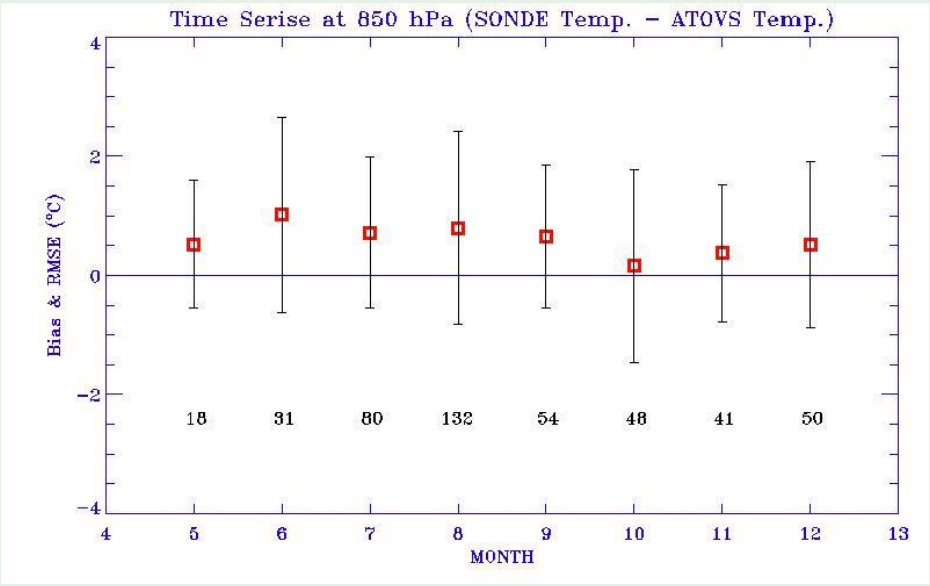
Bias & RMSE

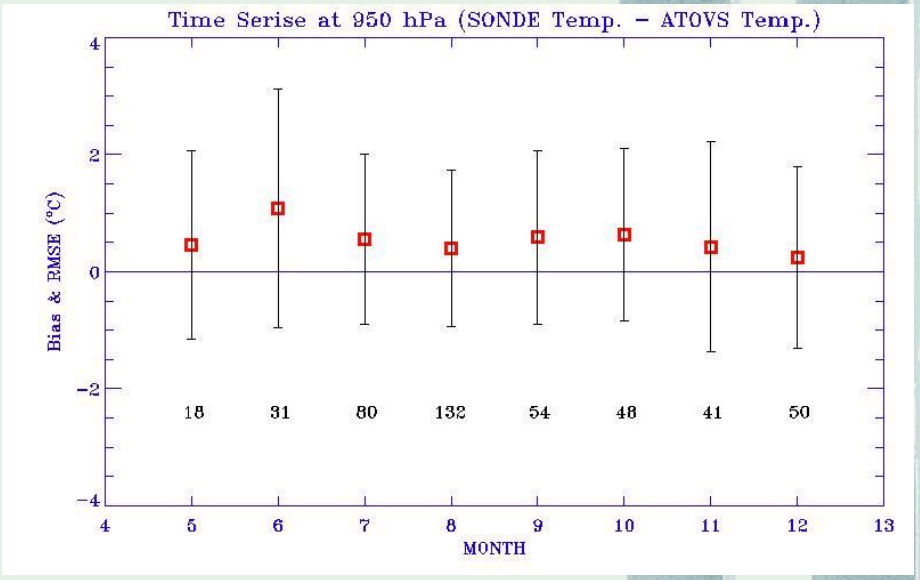

Temperature
100
1000
Pressure (hPa)
−1.5 −1.0 −0.5 0.0 0.5 1.0 1.5
Bias (°C)
100
1000
0 1 2 3 4
RMSE (°C)
(NALL=455, NCLR=118, NCLD=429)
Cloudy
Clear
All

Residual Time Series

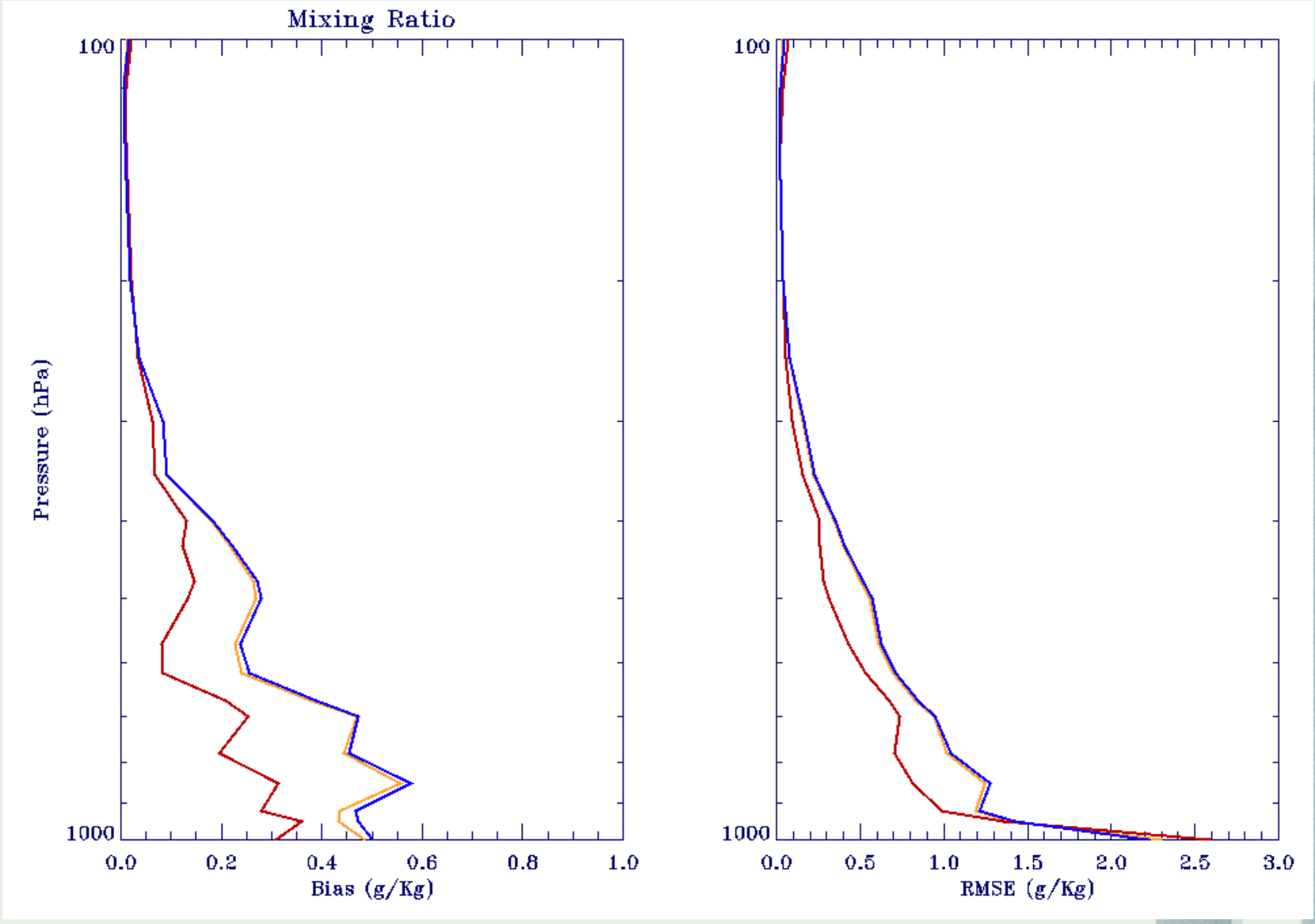




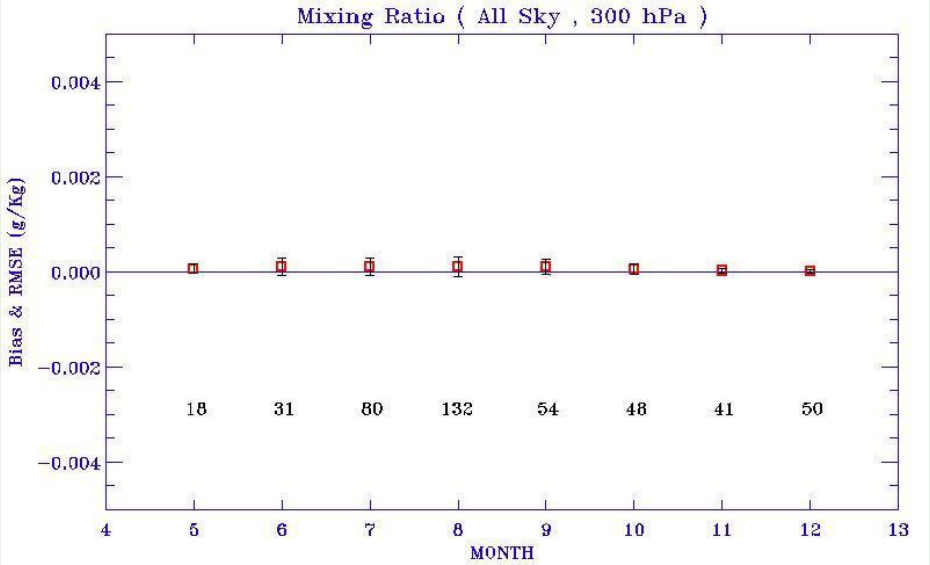


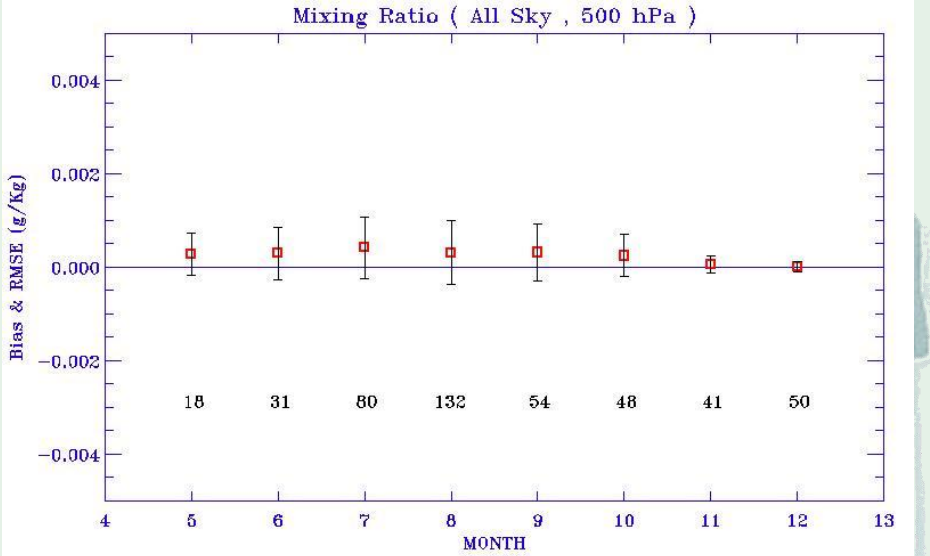


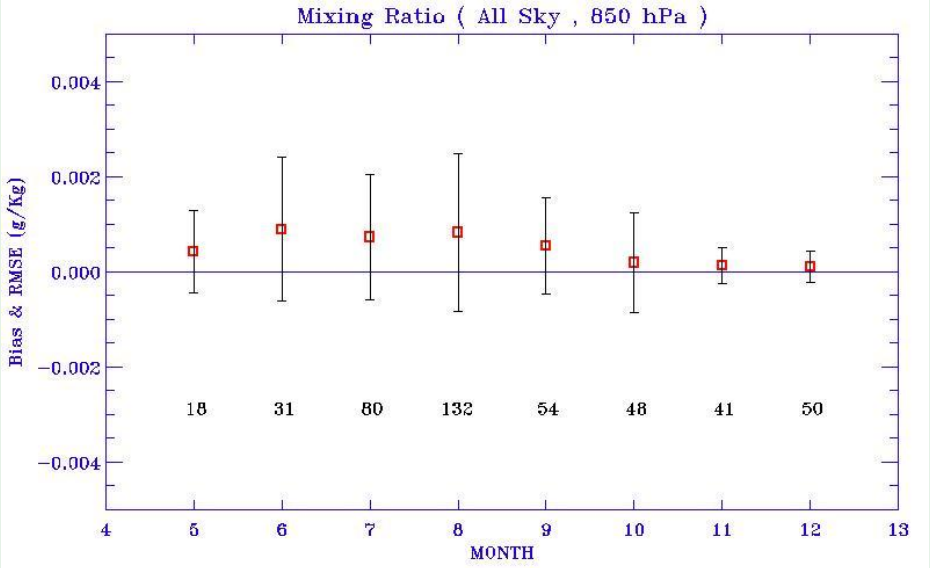
Mixing Ratio

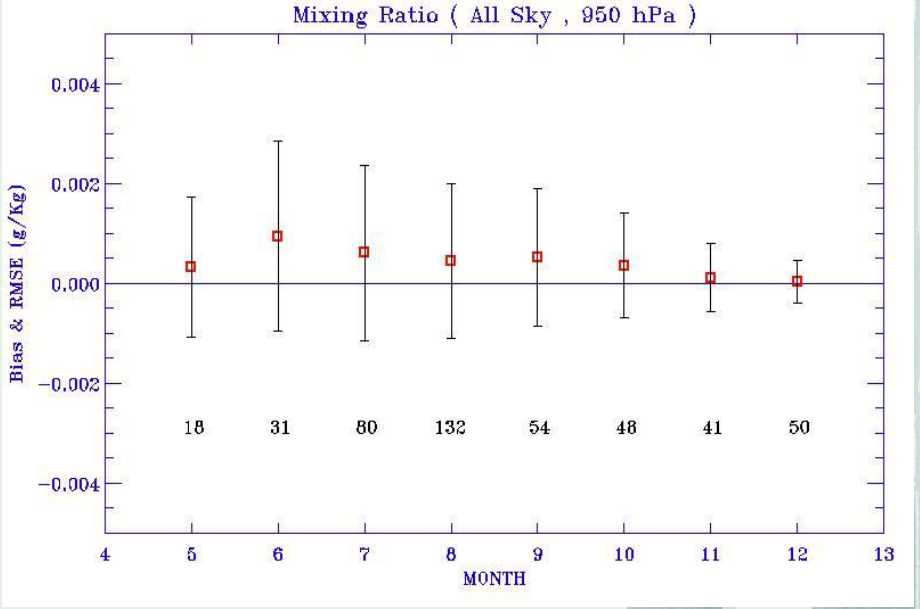


Mixing Ratio

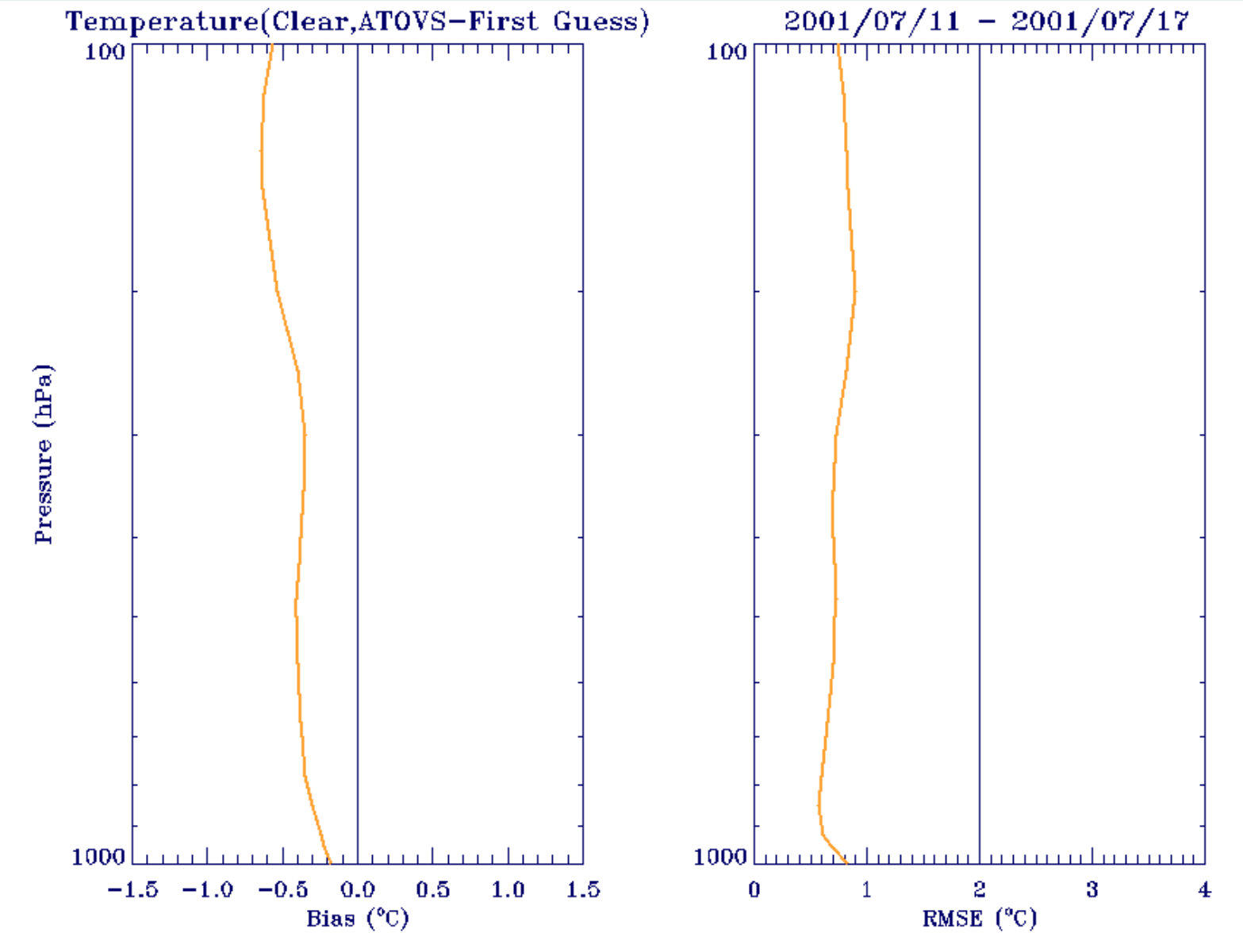




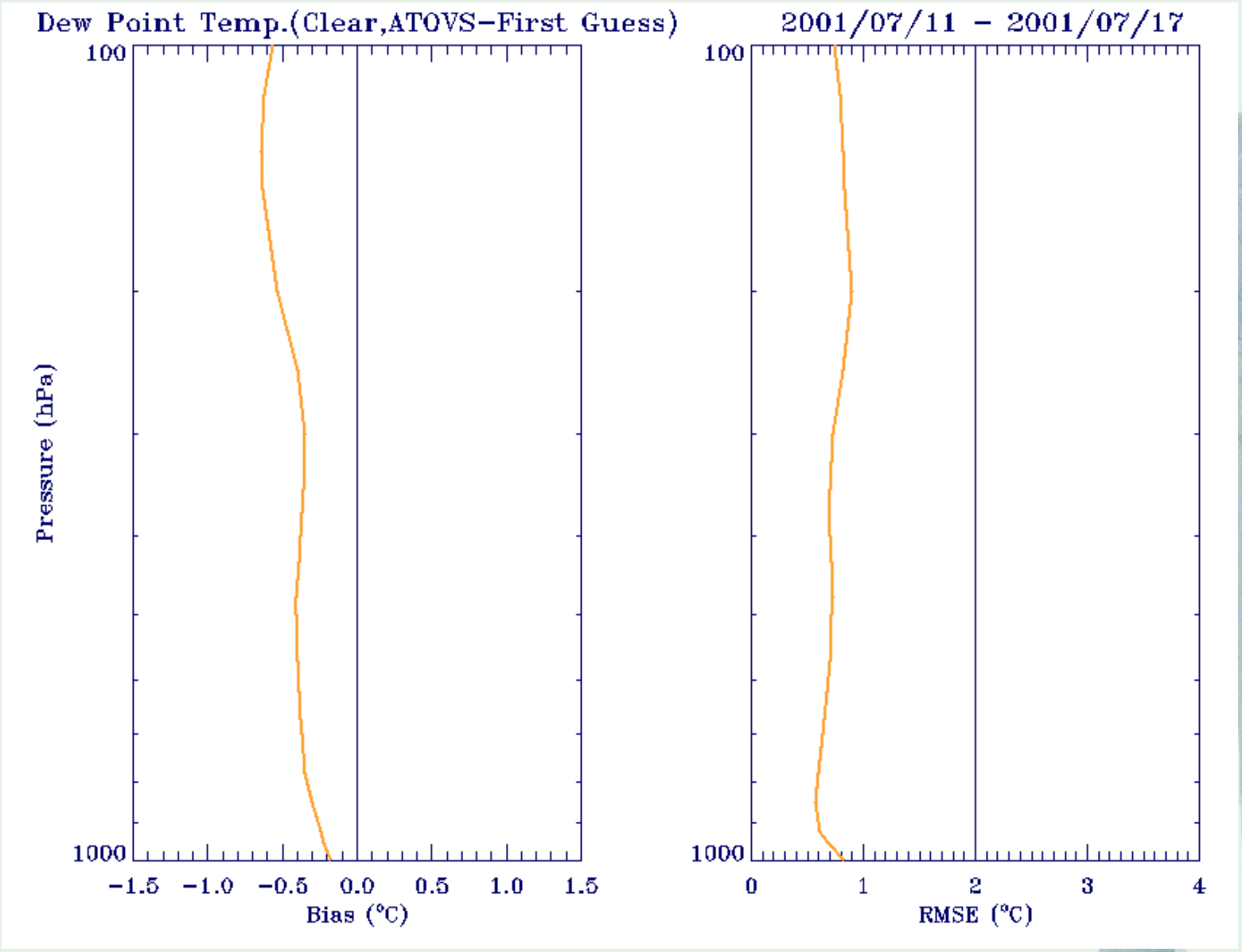




First Guess vs. ATOVS



First Guess vs. ATOVS



Summary

- NOAA-16/ATOVS data has been processed using the AAPP/IAPP packages since June, 2001 at KMA
- Comparison of temperature between ATOVS retrieved and radiosonde measured shows that bias is within $\pm 1.0^{o}$ C, better at the lower altitude and RMSE is less than 1.5^{o} C for most of altitudes.
- The retrieved water vapor mixing ratio shows bias is less than 0.5 g/kg with RMSE of about 1.5 g/kg at lower altitude.
- There is no significant dependence of the error statistics for both temperature and water vapor mixing ratio on time. No significant dependence of the error statistics with the location are shown either (not shown)

Plans

- More and better auxiliary data is going to be used.
  - Regional model products for the first guess
  - Use of land/sea surface temperature

- Update the bias correction for the regional optimization
  - Especially for the water vapor channels

International TOVS Study Conference, 12th, TOVS-12, Lorne, Australia, 27 February-5 March 2002. Madison, WI, University of Wisconsin-Madison, Space Science and Engineering Center, Cooperative Institute for Meteorological Satellite Studies, 2002.