



# INFLUENCE OF THE FIRST GUESS ON MESOSCALE IAPP RETRIEVALS



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## Description of the Project

The International ATOVS Processing Package (IAPP) has been run operationally since early 2002 for small areas (approximately ± 4 degrees of latitude and longitude) centered on the Atmospheric Radiation Measurement (ARM) program Clouds and Radiation Testbed (CART) sites at Lamont, Oklahoma (36.8N 97.5W); Barrow, Alaska (71.3N 156.8W); and Nauru (0.5S 166.9E). These sites are customarily denoted Southern Great Plains (SGP); North Slope of Alaska (NSA); and Tropical Western Pacific (TWP), respectively. The retrievals are done twice, using (1) the built-in regression guess, and (2) profile information obtained from the National Centers for Environmental Prediction (NCEP) Aviation Model global analysis-forecast system – usually referred to as “ancillary data” in the context of the IAPP.

This poster is the result of an effort to assess the impact of using, or not using, ancillary data in the retrieval process, employing the time-honored scheme of retrieval-radiosonde matchups. The data utilized in the study consist of both types of retrievals, from all three currently operation satellites (NOAA-15, -16, and -17), in the SGP and NSA “neighborhoods” for the 11-month period November 2002 – September 2003. The source and distribution of corresponding radiosonde reports are shown in the tables below.

Radiosonde coverage for NSA retrieval 67-75N 151-163W

NREP = number of reports from 2002110100 through 2003093012

BBNNN NREP NLAT WLON ELEV SITE

70026 636 71.30 156.78 12. Barrow, Alaska

Radiosonde coverage for SGP retrieval 32-40N 92-101W

NREP = number of reports from 2002110100 through 2003093012

BBNNN NREP NLAT WLON ELEV SITE

72248	595	32.44	93.82	84.	Shreveport, Louisiana
72249	620	32.78	97.29	196.	Carswell AFB, Texas
72340	640	34.83	92.25	172.	Little Rock, Arkansas
72357	618	35.23	97.47	358.	Norman, Oklahoma
72440	652	37.21	93.37	384.	Springfield, Missouri
72451	643	37.77	99.97	791.	Dodge City, Kansas
72456	614	39.07	95.63	268.	Topeka, Kansas

TOTAL 4382

The initial matching was performed with maximum space and time retrieval-radiosonde separations of 160 km (100 mi) and 6 hr, respectively. During subsequent statistical analysis of differences, the space- and time-separation criteria could be, and were, modified. For SGP in particular there is considerable variation in “matchup density” among the three satellites due to the timing of overpasses, with NOAA-15 having the most matchups; the other two satellites are similar to each other. The results presented here are based on those adjustments to the time separation that produced roughly the same sample size for each satellite. [NOTE: test runs with all available matchups produced similar results.]

The plots show the mean (BIAS) and root-mean-square (RMS) differences between retrievals and radiosondes for water-vapor mixing ratio (g/kg) and temperature (K) versus pressure (hPa). Results are presented for each satellite, and all three combined, for the two first-guess conditions, with and without ancillary data.

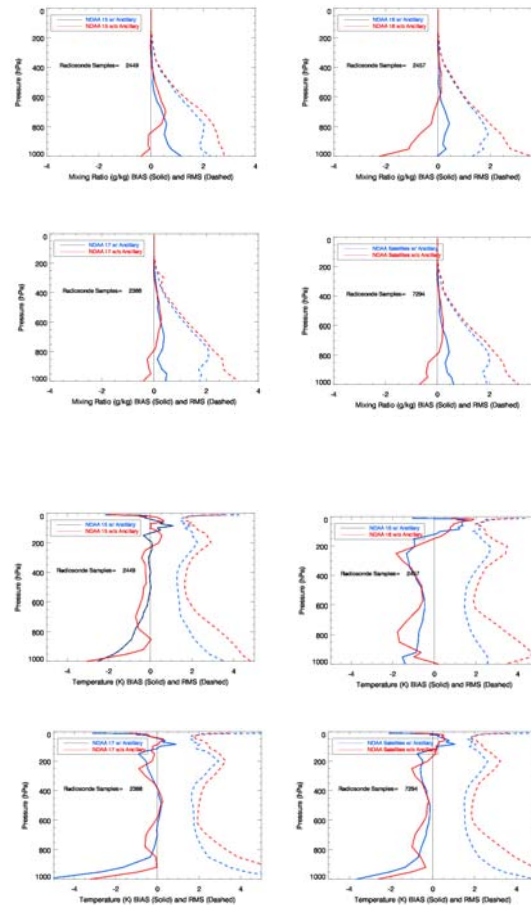
## Conclusions and Plans for Further Work

- The use of ancillary data in the retrieval produces small but generally positive changes.
- Results for NSA are somewhat more dramatic than for SGP.

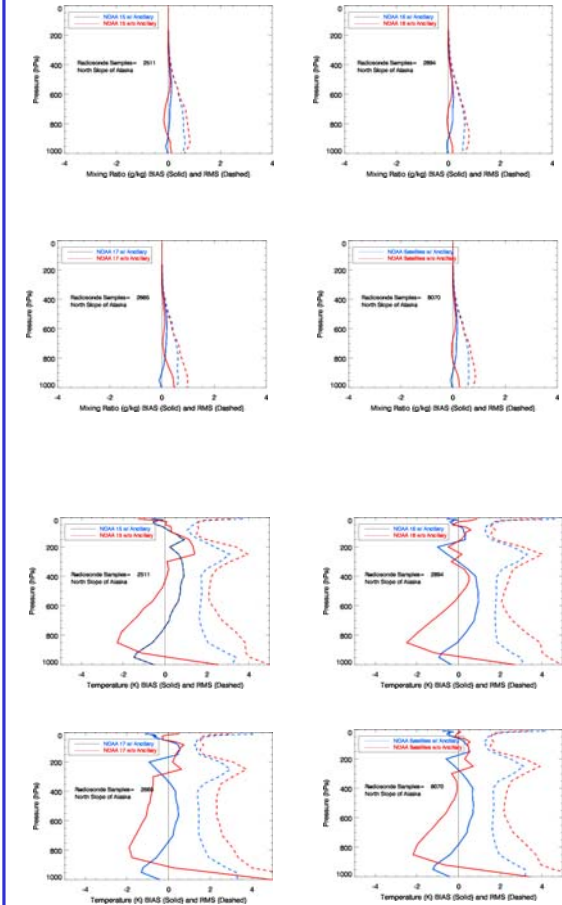
We plan to expand and refine the study as follows:

- Add October 2003 retrievals and radiosondes, filling out the dataset to a full year.
- Incorporate the special ARM program radiosonde data from the SGP area (primarily Oklahoma) and Nauru.
- Perform similar analyses for TWP once the Nauru radiosonde data have been added.
- Generate statistics for months and seasons to look for variations in performance on time scales other than a year.
- Consider implementing aspects of the procedure for monitoring and quality control of the operational realtime retrievals.

## SGP (Southern Great Plains)



## NSA (North Slope of Alaska)



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Engineering Center, Cooperative Institute for Meteorological Satellite Studies, 2003.