

Progress with provision of satellite based ancillary measurements to the RS92/RS41 colocation database (A2)

ICM -13 (Virtual)

Wednesday 17 November 2021

Session 3 - WMO intercomparison, dual soundings, collocations, R23
replacement



TT-SAT Status Update

- TT-SATellite has 10 new members (bolded in table)
- 1st TT telecon 9 November 2021

| | | |
|-----------------|------------------------|---|
| Lori | Borg (co-chair) | SSEC/CIMSS University of Wisconsin, Madison |
| Axel | Von Engel'n (co-chair) | EUMETSAT |
| Stephen | Leroy | AER |
| Tony | Reale | NOAA / NESDIS / STAR |
| Benjamin | Ruston | UCAR |
| Chi | Ao | Jet Propulsion Laboratory, California Inst. of Tech. |
| Johannes | Nielsen | Danish Meteorological Institute |
| Florian | Ladstädter | Wegener Center, University of Graz, Austria |
| Fabien | Carminati | Met Office |
| Jordis | Tradowsky | Bodeker Scientific |
| Bomin | Sun | NOAA |
| Thomas | August | EUMETSAT |

Progress with provision of satellite based ancillary measurements to RS92/RS41 colocation database (A2)

Description of Task:

- TT-SAT work to provide collocations with the historical RS92-RS41 payload ascents for a range of relevant polar orbiter and radio occultation measurements (geophysical and sensor)
- Data provided to LC by ICM-13

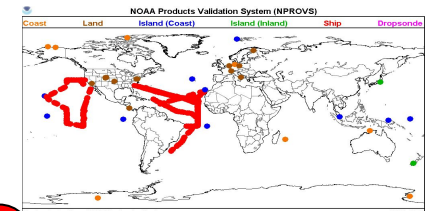
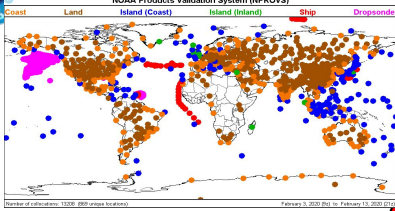
Update:

- This task has made little progress since ICM-12
- Progress will require further discussion to define the task

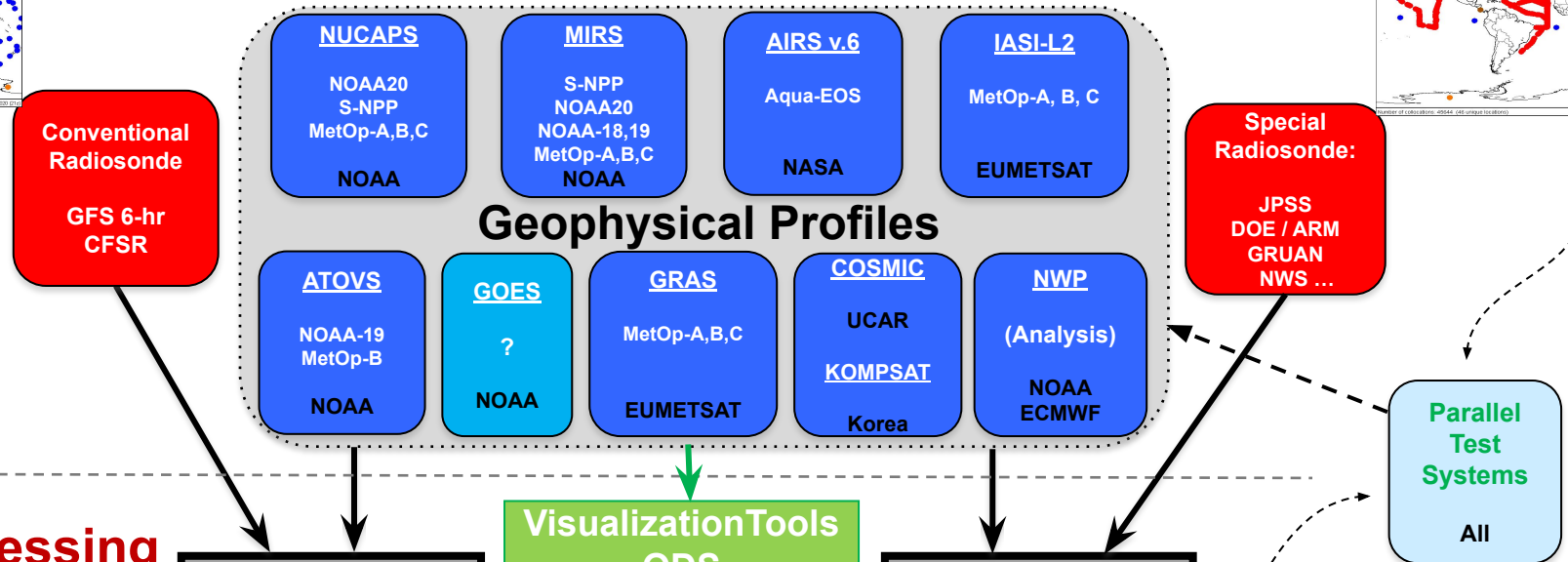
Issues for Discussion:

- **Which type of satellite data should be included?**
 - Radiances (infrared sounder, microwave sounder and cloud imagery data), retrievals (100 levels) of geophysical profiles
- **Which satellites should be included?**
 - JPSS (SNPP, NOAA20), MetOP(A/B/C), RO(COSMIC/GRAS), etc.
- **Should other ancillary data be included?**
 - ERA5, forecast product(s)
- **What are the temporal/spatial matching criteria?**
 - 2hours and 100km
 - Single closest FOV/retrieval or all matched FOVs/retrievals
- **Should system accommodate satellite data reprocessing?**

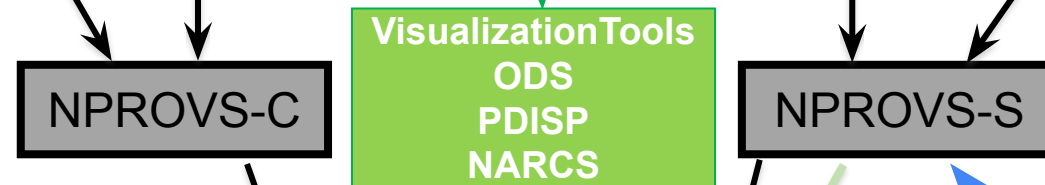
NOAA Products Validation System (NPROVS)



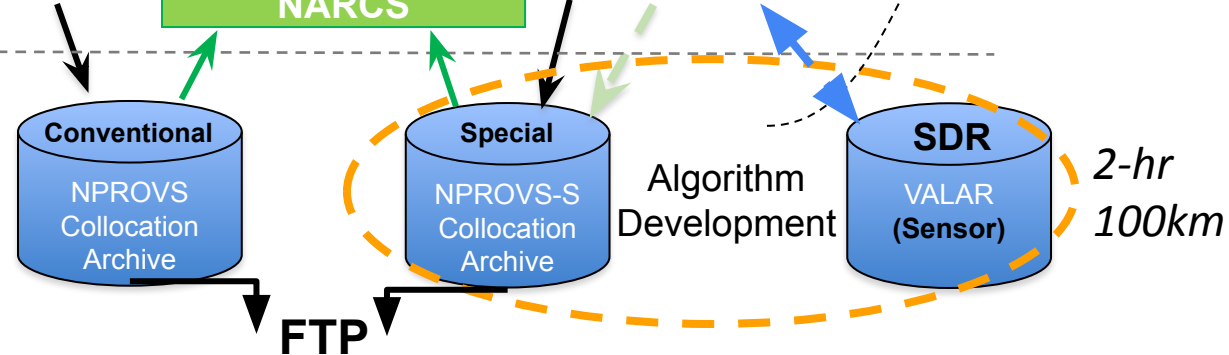
INPUTS

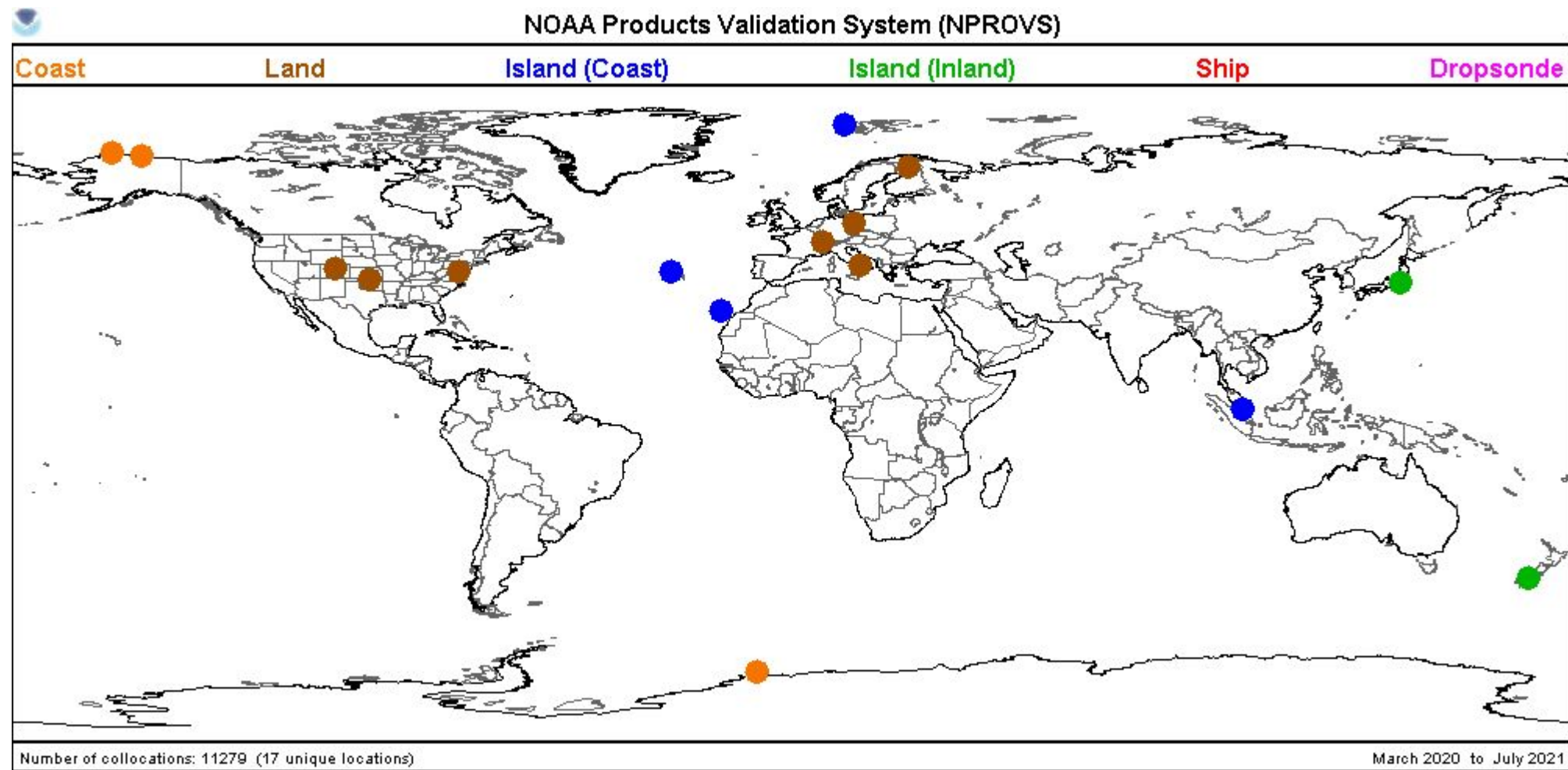


Collocation Processing (daily)



OUTPUT (Collocated Radiosonde and Satellite Observations)

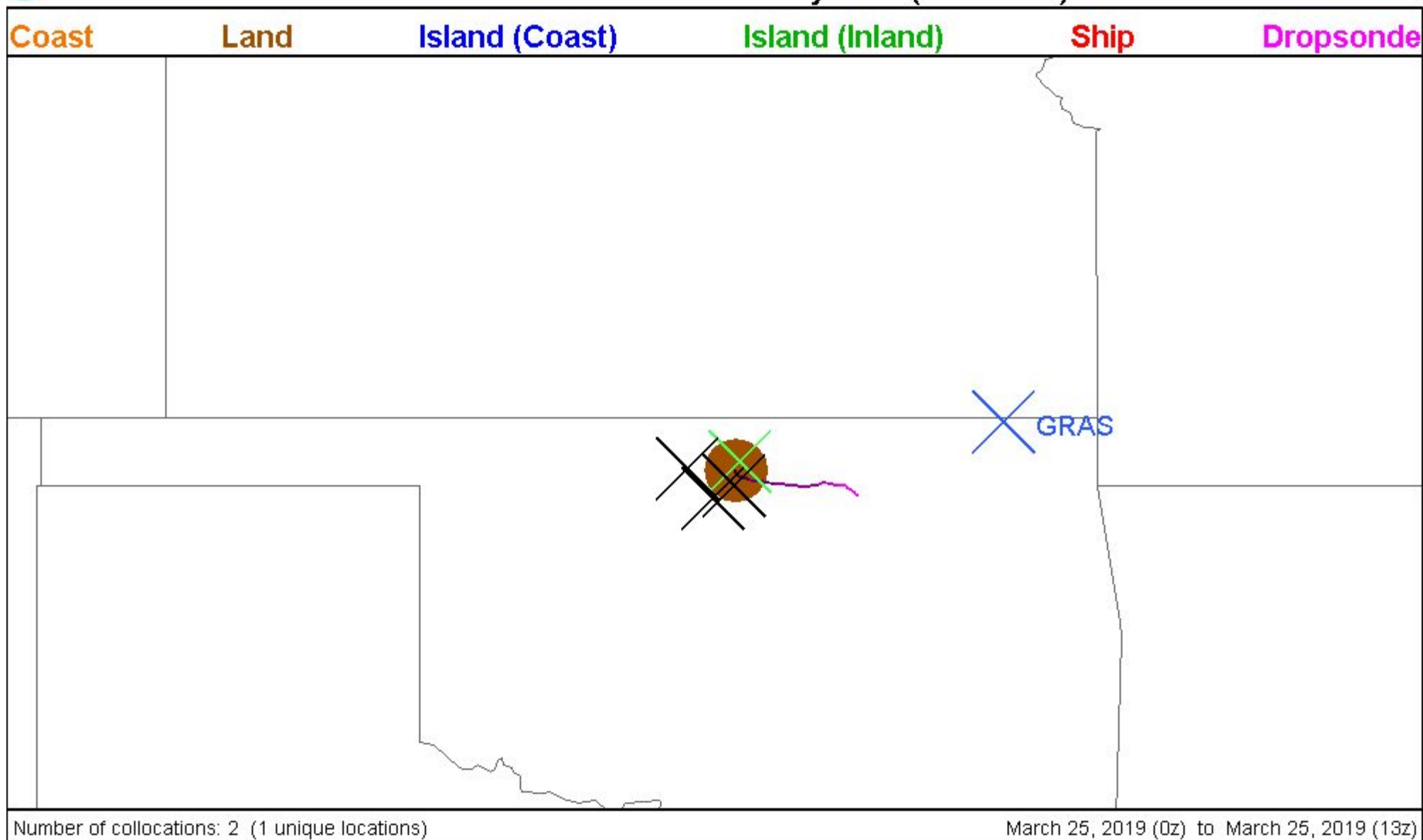




Collocated satellite and GRUAN observations ...



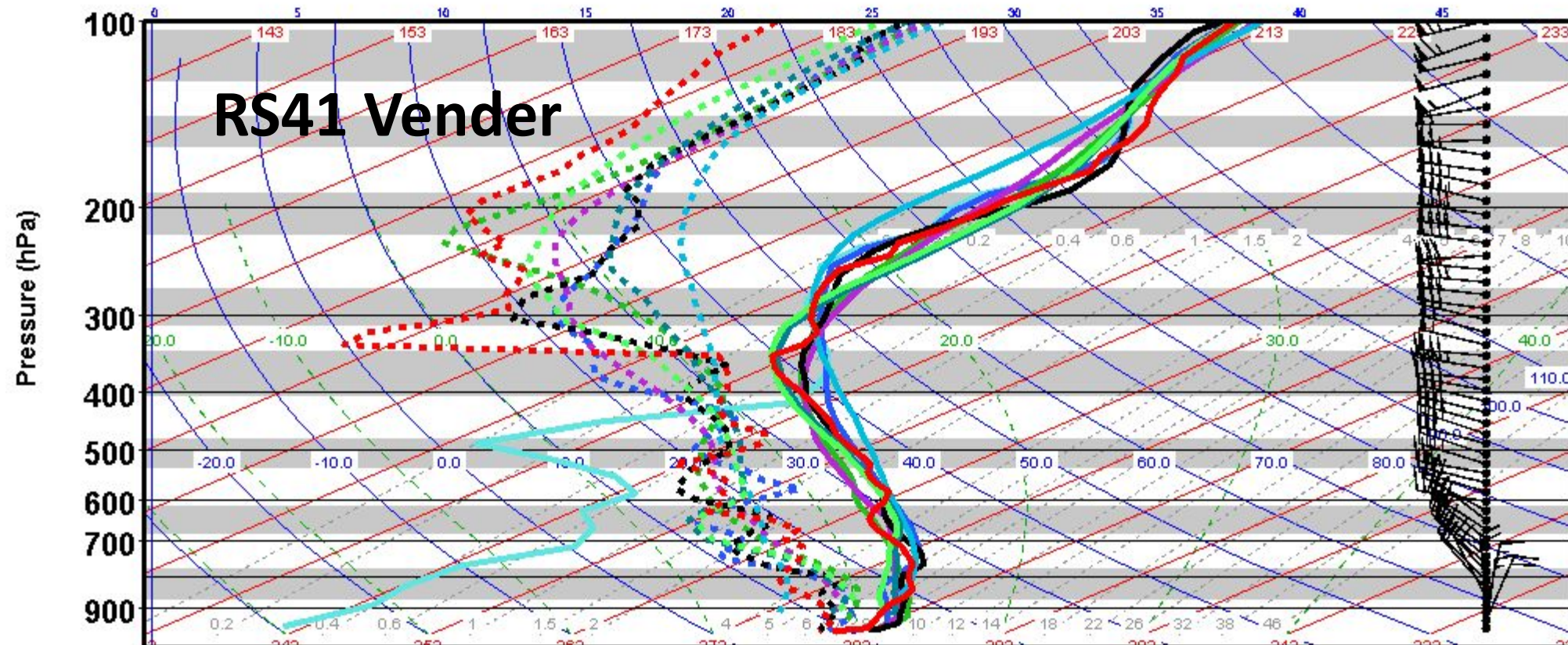
NOAA Products Validation System (NPROVS)



Raob (brown) w/drift and Collocated Satellite (GRAS, AIRS (green), NPP and N20) and ECMWF ... March 25 2019

NOAA Products Validation System (NPROVS)

Dewpoint / Temperature (deg K)



Radiosonde 74646 (141) Radiosonde

AIRS AQUA

AIRS AQUA First Guess

AIRS AQUA MW-Only

ECMWF

NUCAPS NPP

NUCAPS NOAA-20

GRAS

3/25/2019 7:54:00Z

3/25/2019 8:43:19Z (0.8 hours)

3/25/2019 8:43:19Z (0.8 hours)

3/25/2019 8:43:19Z (0.8 hours)

3/25/2019 6:00:00Z (-1.9 hours)

3/25/2019 8:58:32Z (1.1 hours)

3/25/2019 8:09:07Z (0.2 hours)

3/25/2019 3:55:02Z (-4 hours)

36.6 N / 97.5 W

36.7 N / 97.5 W (7.8 km)

36.7 N / 97.5 W (7.8 km)

36.7 N / 97.5 W (7.8 km)

36.5 N / 97.5 W (12.2 km)

36.6 N / 97.9 W (34.2 km)

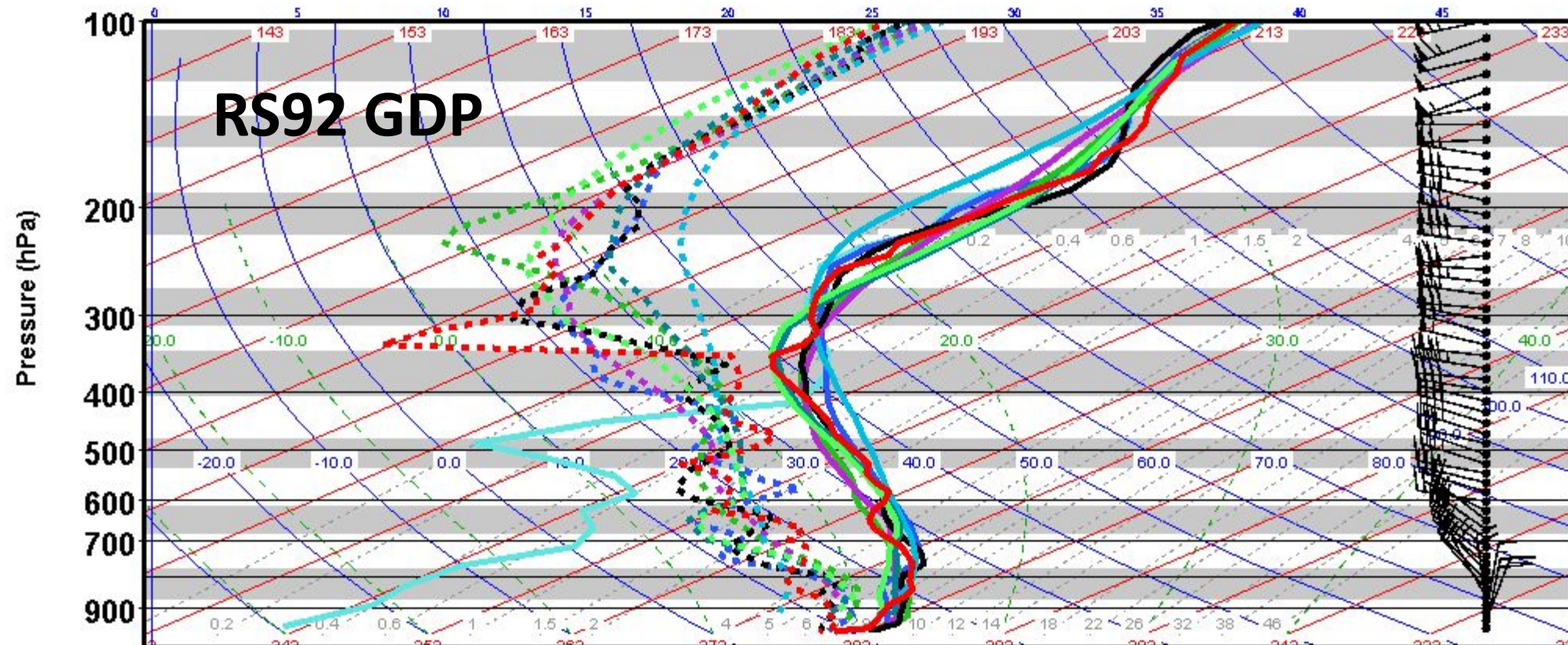
36.4 N / 97.7 W (28 km)

37 N / 95.4 W (193.4 km)

March 25, 2019

NOAA Products Validation System (NPROVS)

Dewpoint / Temperature (deg K)



Radiosonde 74646 (272) Radiosonde

AIRS AQUA

AIRS AQUA First Guess

AIRS AQUA MW-Only

ECMWF

NUCAPS NPP

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GRAS

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37 N / 95.4 W (193.4 km)

March 25, 2019

Options:

1. Metadata Approach (Least Effort)

- Provide location/time for sonde launch & location/time for single-closest collocated satellite retrieval(s) within 2hr/100km
- User must search/append satellite retrievals and/or radiances
- Stored at LC and possibly run at LC for all GRUAN sondes

2. Closest Retrieval Approach (Medium Effort)

- Provide sonde (100-levels) & single-closest collocated satellite retrievals(s)
- User must search/append high density sonde and radiances
- Stored at LC, NOAA STAR ...

3. The Everything Approach (Most Effort)

- Provide sonde (100-levels), single-closest collocated satellite retrieval(s) (100-levels), and radiances (SDRs) within 100 km of sonde launch
- Stored at LC(?), NOAA STAR, ...

4. Other Options?

Next Steps

- Further discussion between TTSAT & LC to define this task

Appendix

NPROVS Collocations

Yesterday at the meeting we touched a bit how our RAOB-satellite collocation is structured. Here are some key details:

- 1) For the collocation of RAOB-satellite sounding profile product (I name this as EDR in distinguishing it from satellite sensor data), **"single-closest" EDR is collocated to a RAOB.**
- 2) After that collocation is done, satellite sensor data is appended to that collocation. **The sensor data appended is NOT the "single-closest" pixel/field-of-view. Instead, 5 granules of sensor data** (I use the infrared sounder CrIS onboard NPP or NOAA20 as the example) are appended to that collocation. Those granules cover about 300 km centered over the RAOB site. One granule has 4 scan lines and each scan line has 30 Field-of-Regards (FORs), and one FOR has 3x3 Field-of-View (FOVs). so, there are $4 \times 30 \times 9 = 1080$ FOVs for each granule. I believe the same method is used to append IASI to the RAOB-EDR collocation.
- 3) The reason the sensor data is appended in that way is because our EDR retrieval algorithm software program operates on only granule input files. Also, the algorithm does not need cloud sensor data to do the EDR retrieval, VIIRS cloud sensor data is not appended.

So, we need to think about if we need to use and how we use this collocation data for GRUAN purposes.

-email from Bomin Sun, 10 November 2021