NOAA Products Validation System (NPROVS / NPROVS+)

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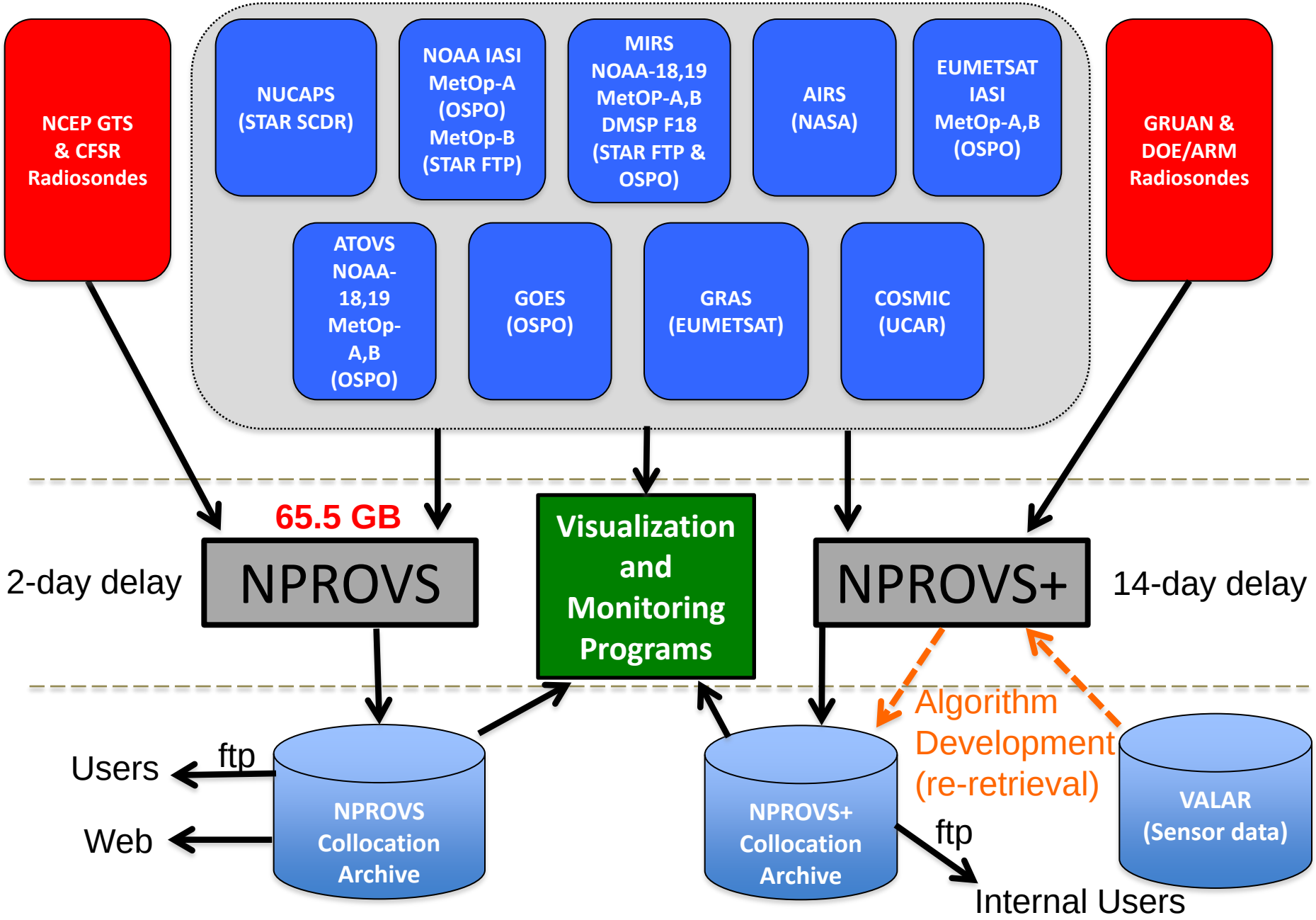
(IMSG)

NOAA / JPSS funded…

OUTLINE

- NPROVS / NPROVS+ Overview
- Timeliness of GRUAN
- Results
- Future


NCEP GTS & CFSR Radiosondes
NUCAPS (STAR SCDR)
NOAA IASI MetOp-A (OSPO) MetOp-B (STAR FTP)
MIRS NOAA-18,19 MetOP-A,B DMSP F18 (STAR FTP & OSPO)
AIRS (NASA)
EUMETSAT IASI MetOp-A,B (OSPO)
GRUAN & DOE/ARM Radiosondes
ATOVS NOAA-18,19 MetOp-A,B (OSPO)
GOES (OSPO)
GRAS (EUMETSAT)
COSMIC (UCAR)
65.5 GB
2-day delay
NPROVS
Visualization and Monitoring Programs
NPROVS+
14-day delay
Algorithm Development (re-retrieval)
Users
ftp
Web
NPROVS Collocation Archive
NPROVS+ Collocation Archive
ftp
VALAR (Sensor data)
Internal Users

NPROVS / NPROVS+ Collocation Strategy

Given the RAOB launch location/time

Identify all SAT soundings within +7 to - 6 hour and 150km (250km for GPSRO) of RAOB

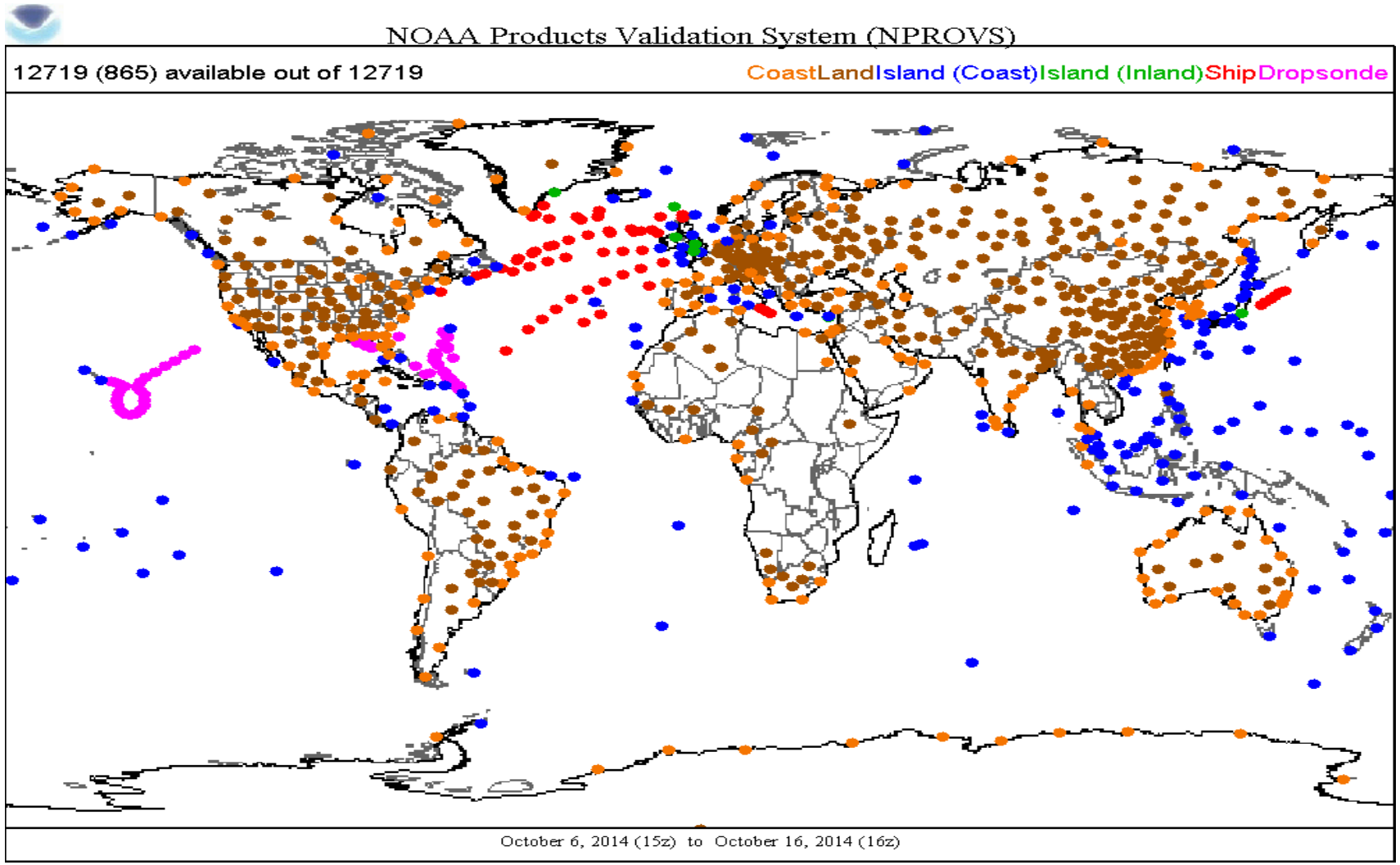
Select “single” closest SAT in time then space

- For NPROVS store single closest SAT
- ***for NPROVS+ store single closest plus all SAT sounding within +/- 250 km of RAOB***
- ***for NPROVS+ also append Sensor Data Records (for S-NPP)***

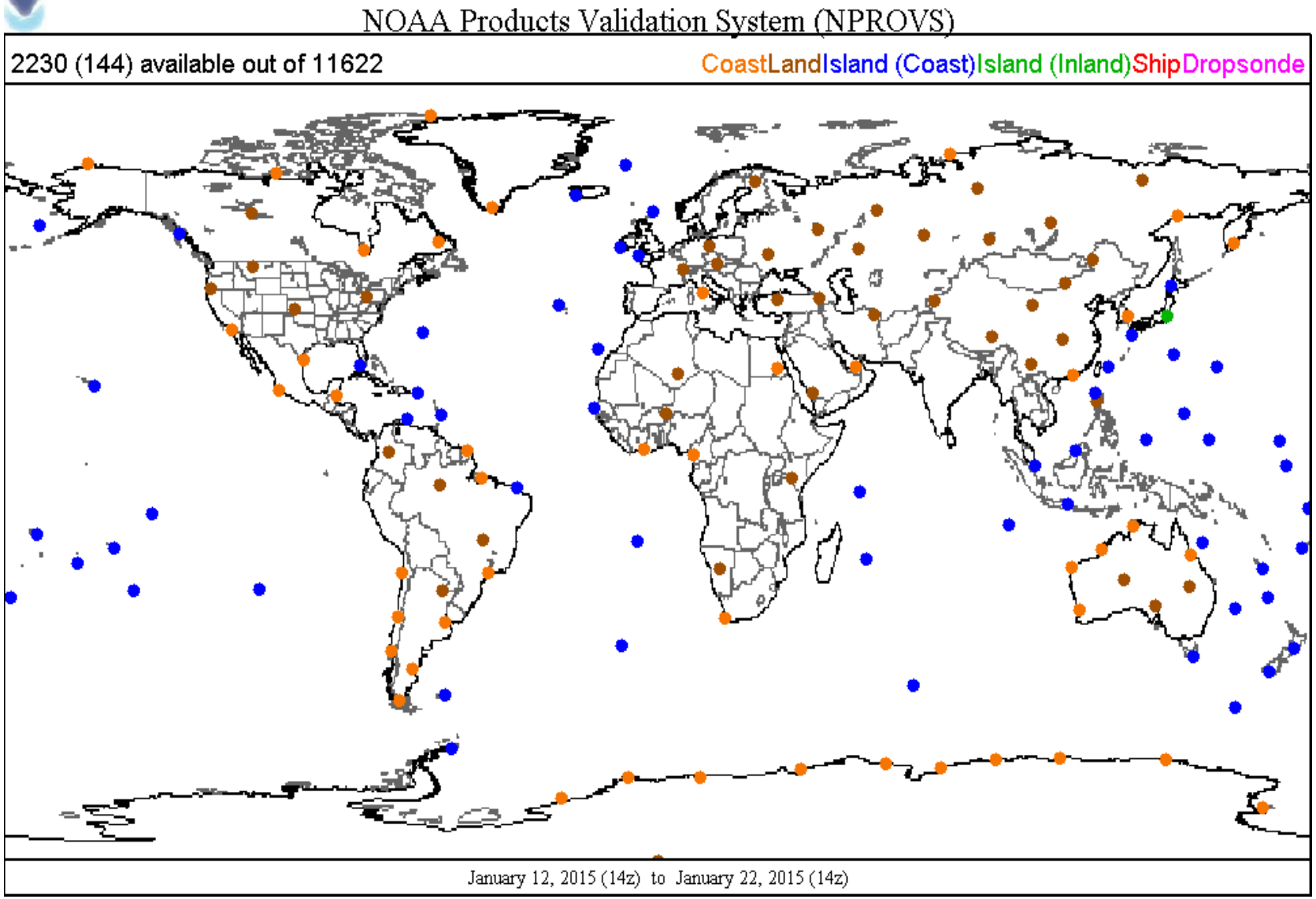
Do above for each SAT … collocation data record

Repeat for each RAOB

Compile daily; maintain long term collocation archives

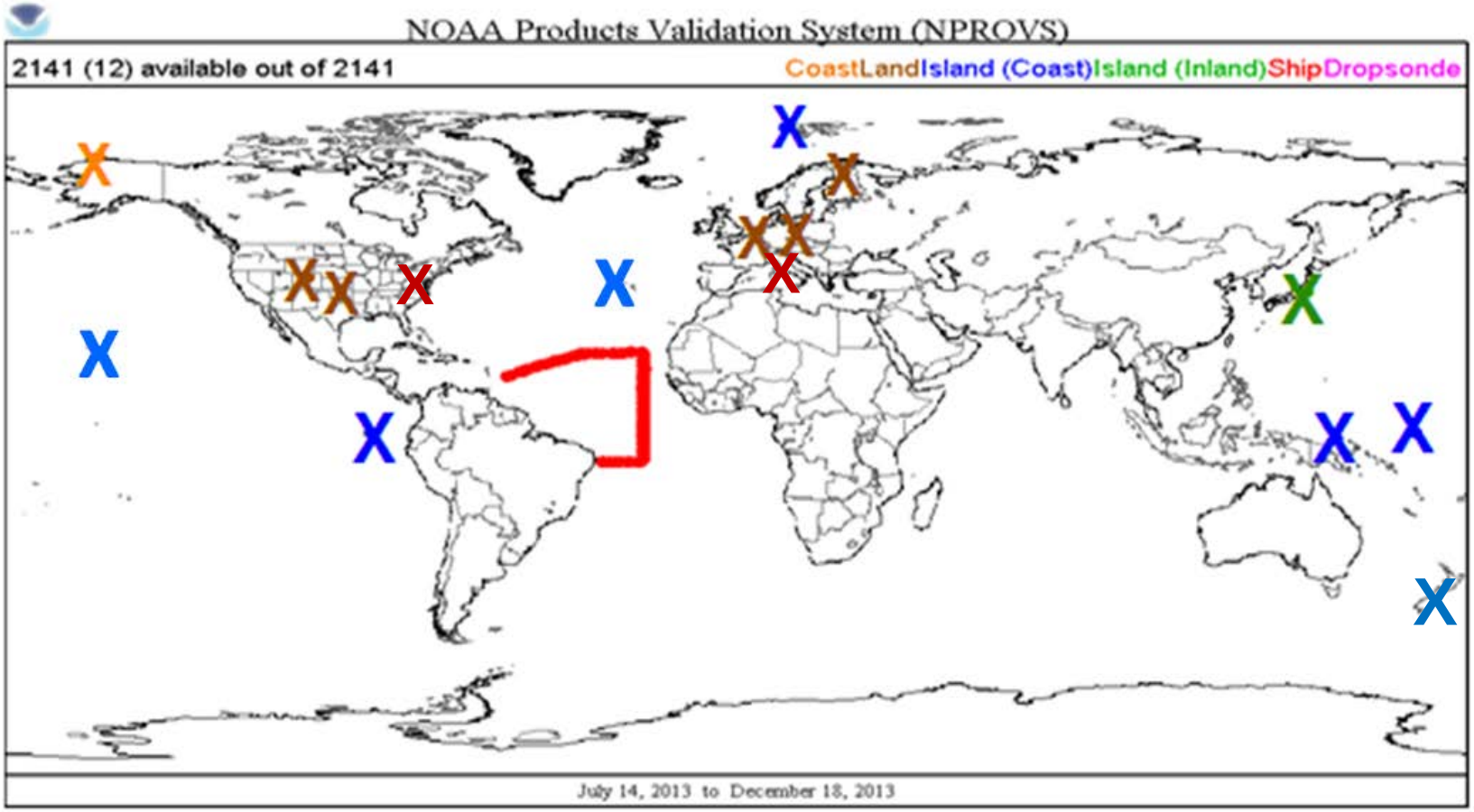


Typical NPROVS Global
(1000 collocations per day)


NOAA Products Validation System (NPROVS)
2230 (144) available out of 11622
Coast
Land
Island (Coast)
Island (Inland)
Ship
Dropsonde
January 12, 2015 (14z) to January 22, 2015 (14z)

GCOS

NPROVS+



GRUAN and **JPSS funded Dedicated (S-NPP)** RAOB Sites
Over 6000 RAOBS (500+ Dedicated) available since July 2013

NPROVS+Ground Data Acquisition

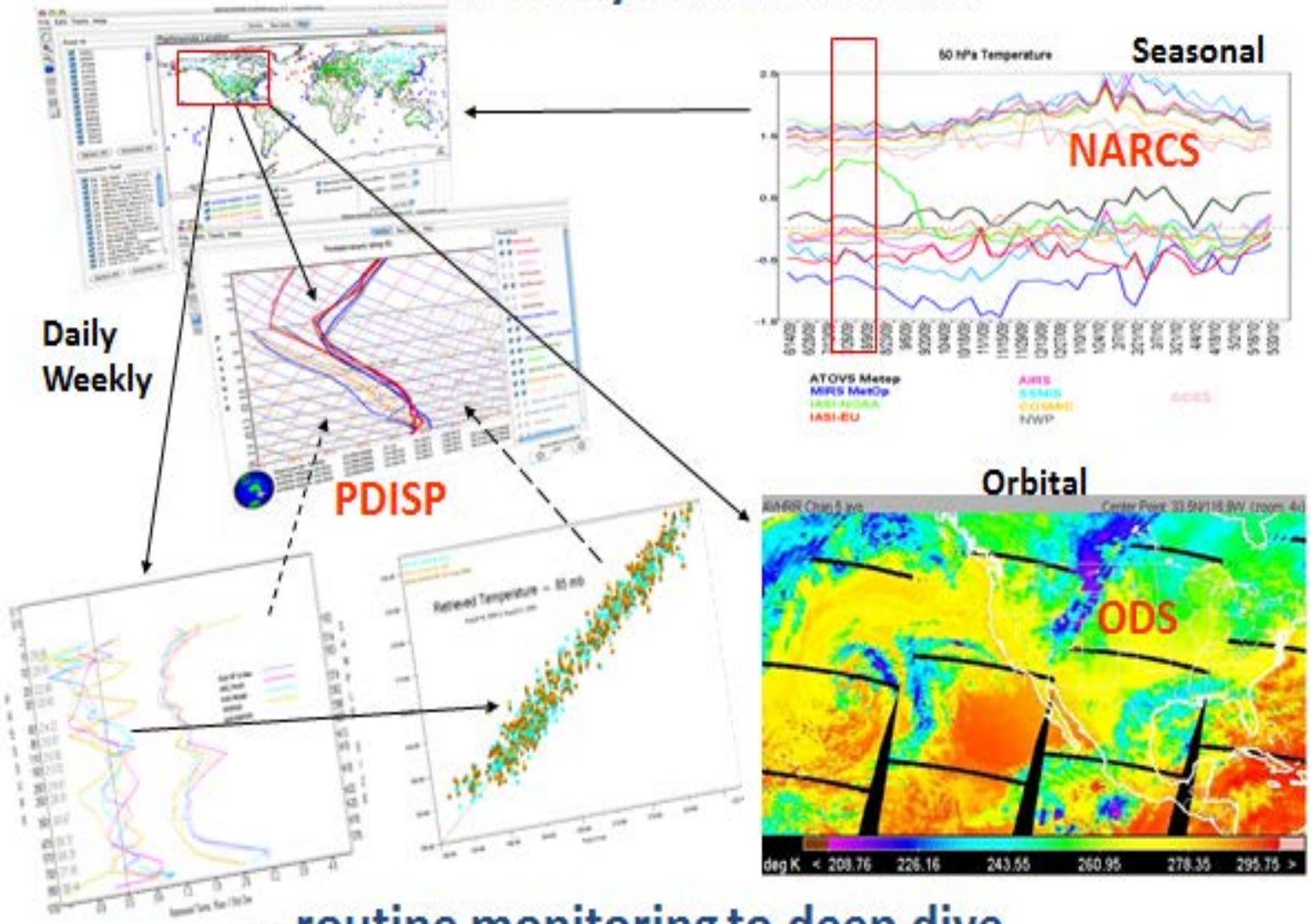
- GRUAN Data Products RAOB via FTP from GRUAN Lead Centre and NCDC …
- DOE/ARM RAOB (funded by JPSS) via Standing order FTP from DOE/ARM archive and ARM web site (different for each site)
- Others (AEROSE, PMRF, CALWATER2, etc)

N22

	A	B	C	D	E	F	G	H	I	J	K	L
1	ENA SNPP PHASE3			SATELLITE OVERPASS TIME			1ST SONDE LAUNCH TIME		TIME 1ST SONDE WAS LAUNCHED	NOTES (ascent rate m/s)	MIN. PRESSURE (hPa)	
2				DATE	TIME (GMT)		DATE	TIME (GMT)				
3	P	1	1	1-Feb-15	14:50:59		1-Feb-15	14:35	14:34	4.35	11.15	
4		2	2	2-Feb-15	14:32:09		2-Feb-15	14:17				
5		3	3	4-Feb-15	4:12:57		4-Feb-15	3:57				
6		4	4	5-Feb-15	3:54:07		5-Feb-15	3:39				
7		5	5	5-Feb-15	15:15:58		5-Feb-15	15:00				
8	P	6	6	6-Feb-15	3:35:13		6-Feb-15	3:20	3:20	4.20	14.67	
9		7	7	6-Feb-15	14:57:04		6-Feb-15	14:42				
10		8	8	7-Feb-15	14:38:13		7-Feb-15	14:23				
11		9	9	10-Feb-15	4:00:11		10-Feb-15	3:45				
12		10	10	11-Feb-15	3:41:19		11-Feb-15	3:26				
13	P	11	11	11-Feb-15	15:03:09		11-Feb-15	14:48	14:49	2.54	19.34	
14		12	12	12-Feb-15	14:44:17		12-Feb-15	14:29				
15		13	13	15-Feb-15	4:06:15		15-Feb-15	3:51				
16	P	14	14	16-Feb-15	3:47:24		16-Feb-15	3:32	3:32	4.72	29.06	
17		15	15	16-Feb-15	15:09:14		16-Feb-15	14:54				
18		16	16	17-Feb-15	14:50:20		17-Feb-15	14:35				
19		17	17	20-Feb-15	4:12:18		20-Feb-15	3:57				
20		18	18	21-Feb-15	3:53:27		21-Feb-15	3:38				
21	P	19	19	21-Feb-15	15:15:18		21-Feb-15	15:00	15:00	4.44	11.29	

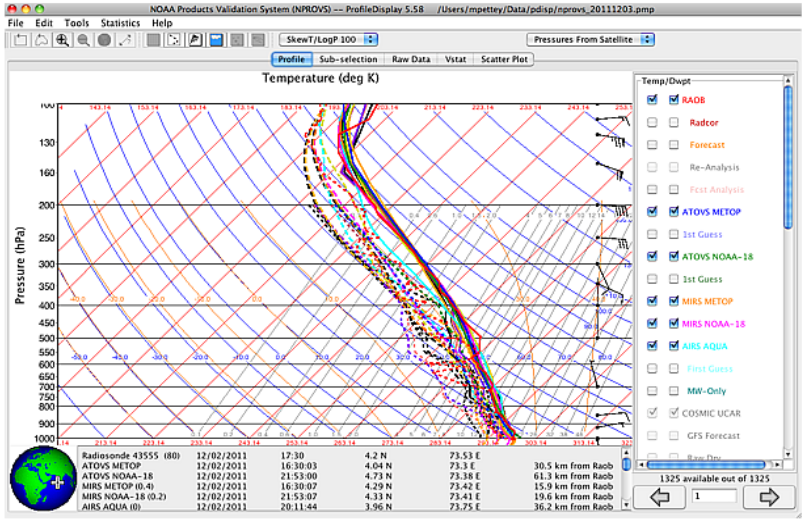
Example launch schedule / update for Dedicated ARM … ENA

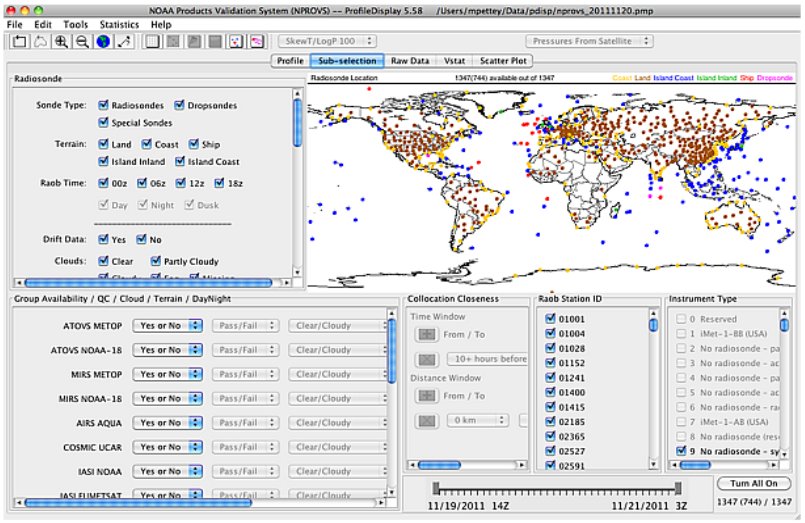
EDGE Analytical Interface …

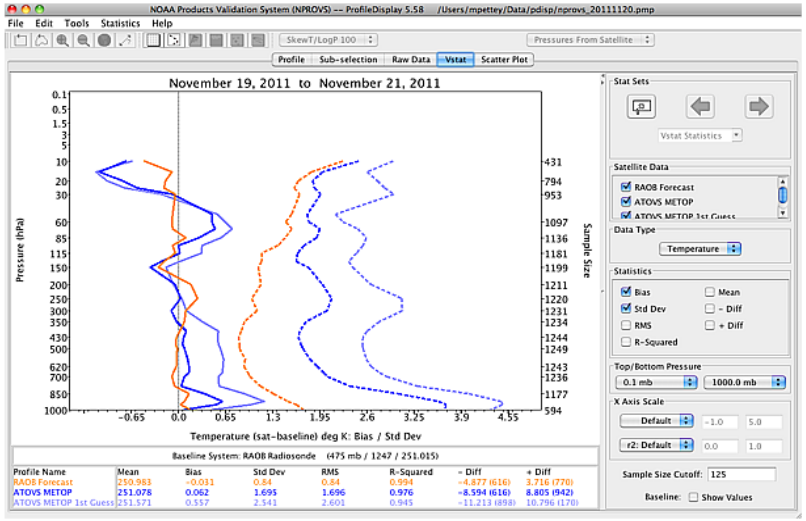


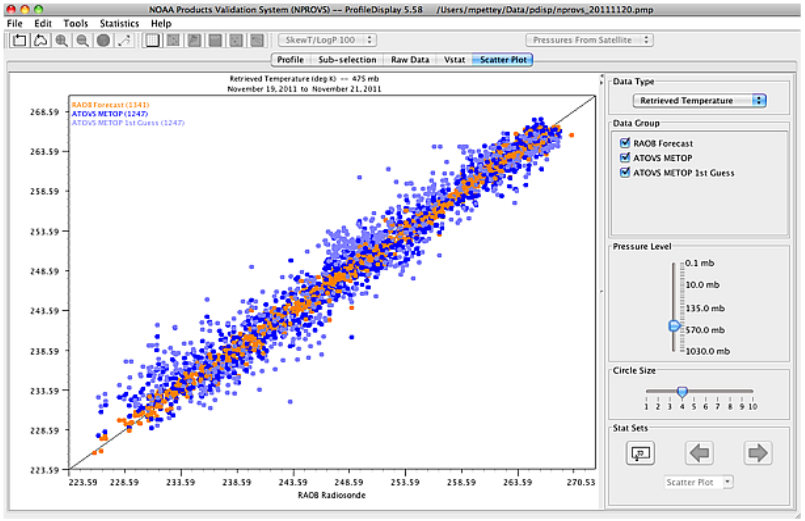
… routine monitoring to deep dive

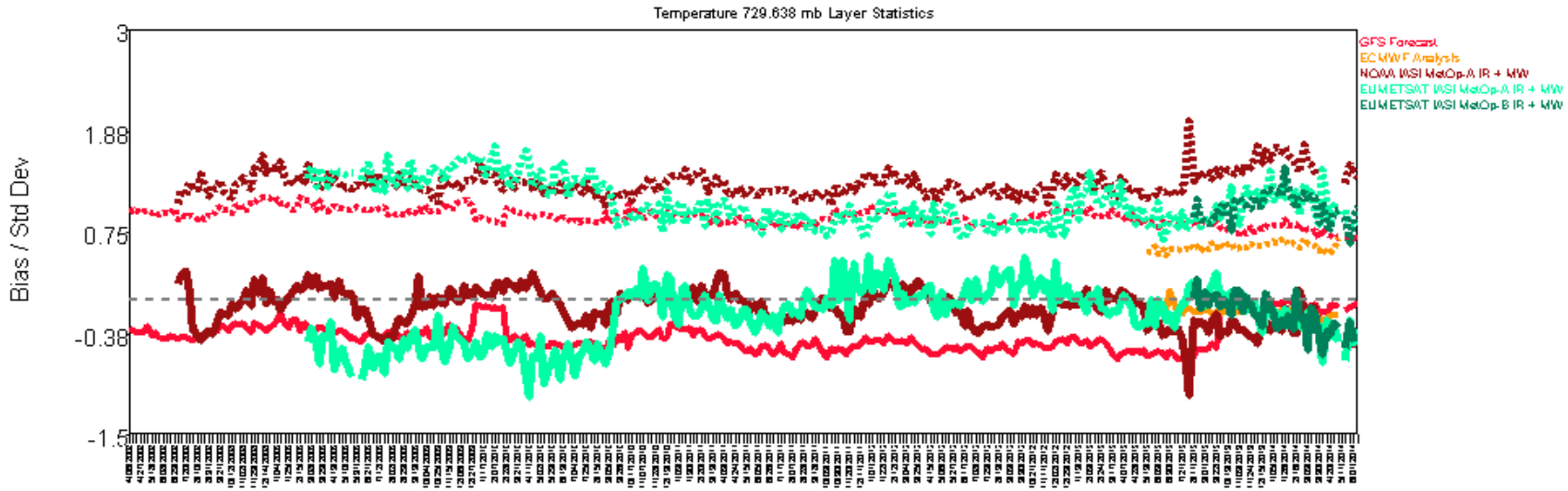
ProfileDisplay (PDISP)

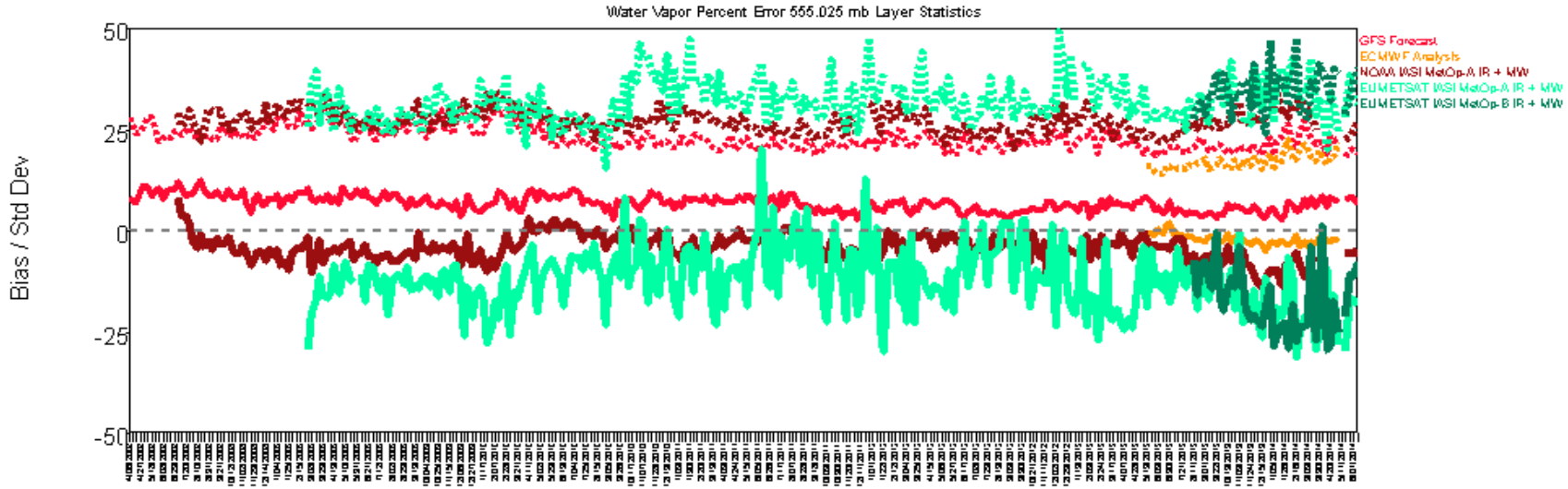












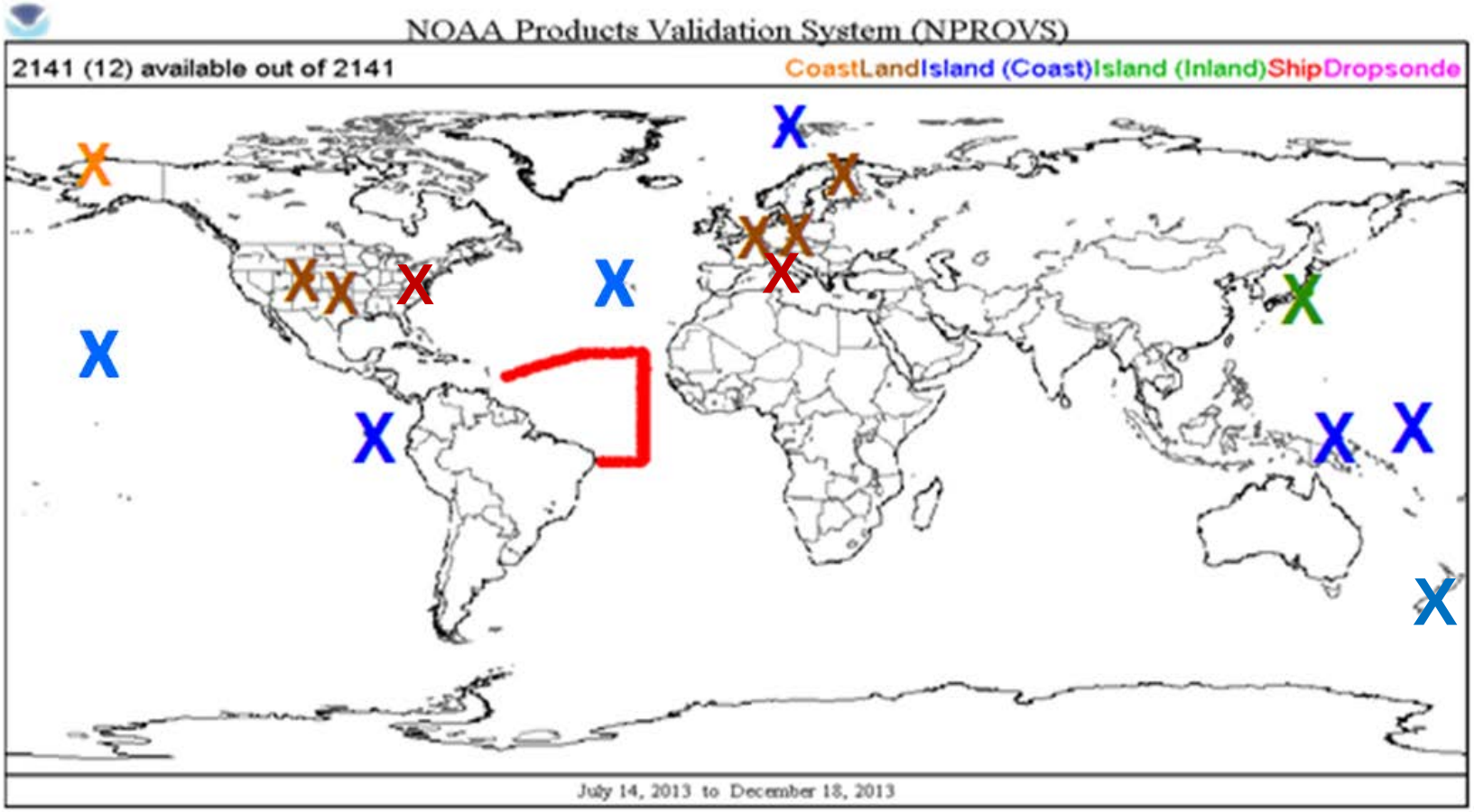
Maritime … 2008 to present (weekly values)

NPROVS Website

- *Download NPROVS collocation files*
- *Download the two (2) Java apps:*
  - *PDISP*
  - *NARCS*

www.star.nesdis.noaa.gov/smcd/opdb/nprovs

NPROVS+



GRUAN and **JPSS funded Dedicated (S-NPP)** RAOB Sites
Over 6000 RAOBS (500+ Dedicated) available since July 2013

Timeliness of GRUAN/Dedicated data is important to facilitate collocation with multiple satellite data systems …

NPROVS+ operates in a 7 day delay

GDP Dedicated/Reference radiosondes from ARM sites - 2014

	ARM site total	GDP total	ARM site dedicated	GDP dedicated	NPROVS+ 7-day delay matched
Manus	347	254	30	24	196
NSA/BAR	906	782	110	91	661
SGP	1463	1217	160	53	1057

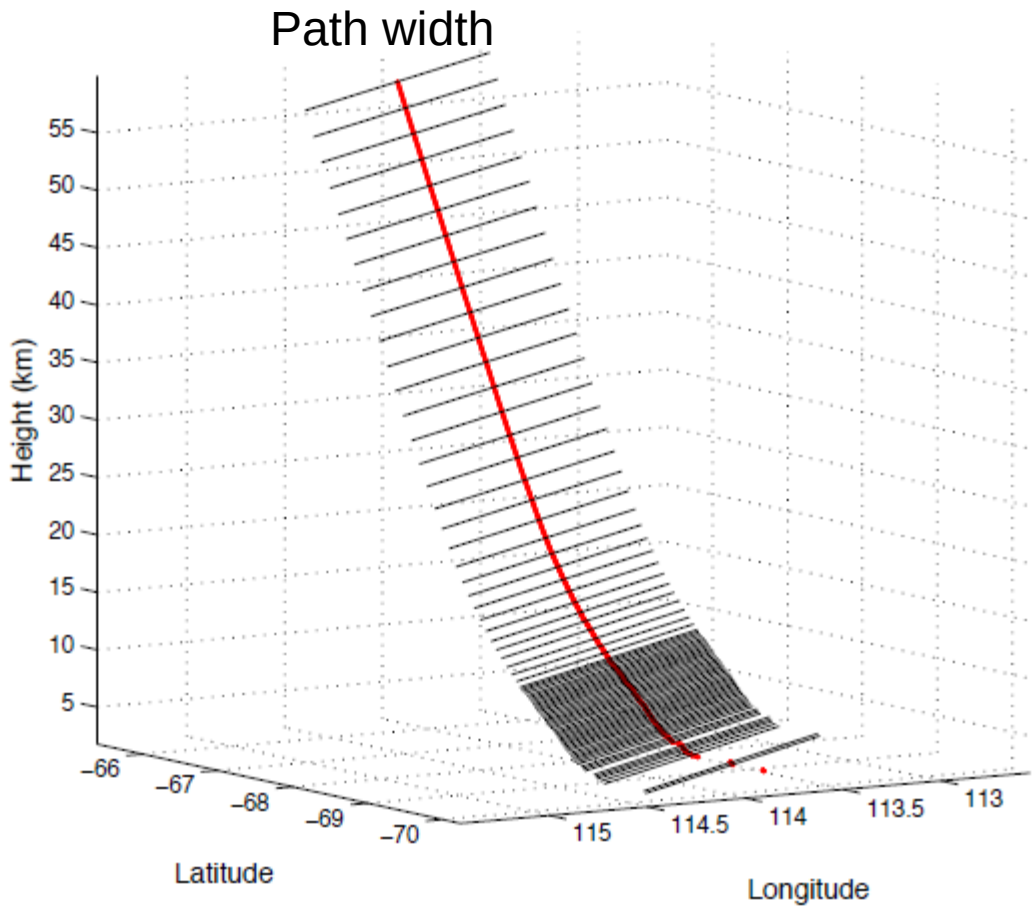
GDP Reference radiosondes from all GRUAN sites - 2014

	GDP processed	GDP processed after 7 days	GDP processed after 28 days	NPROVS+ GDP plus ARM 7-day delay matched
BAR	782	423		661
BOU	52	6	26	4
BEL	12	1	3	1
CAB	396	398		341
LAU	39	4	4	4
LIN	1449	1406		1207
MAN	254	94		196
NYA	425	425		369
PAY	20	3		2
POT	26	8		7
SCR	79	79		68
SGP	1217	668	[significant increase]	1057
SOD	720	35	56	33
TAT	136	43	49	37
TMF	19	1	1	0

Summary of GDP RAOB Timeliness

RESULTS

(all results “aligned” to 101 RT pressure layers)



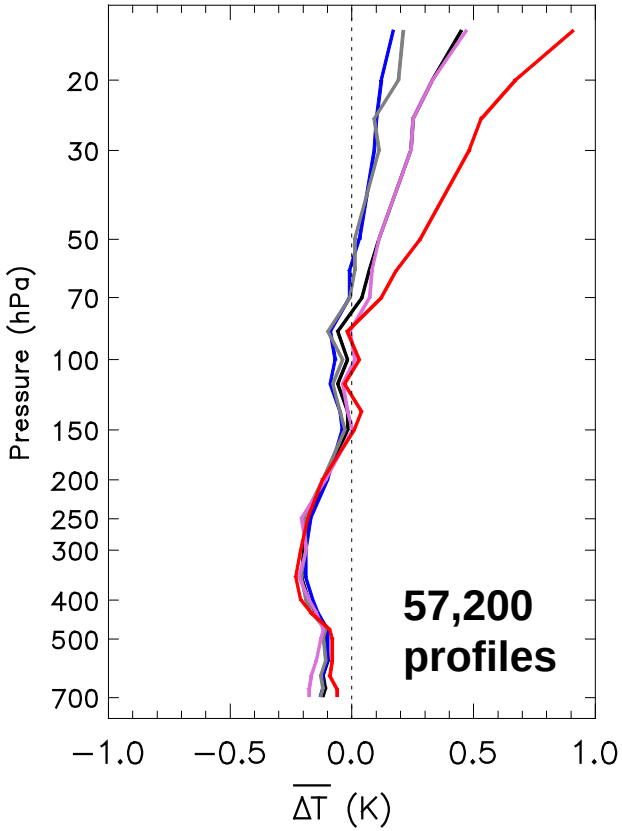
… COSMIC GPSRO Tdry as a reference UT/LS and Stratosphere (5 hPa) T

Vaisala RS92

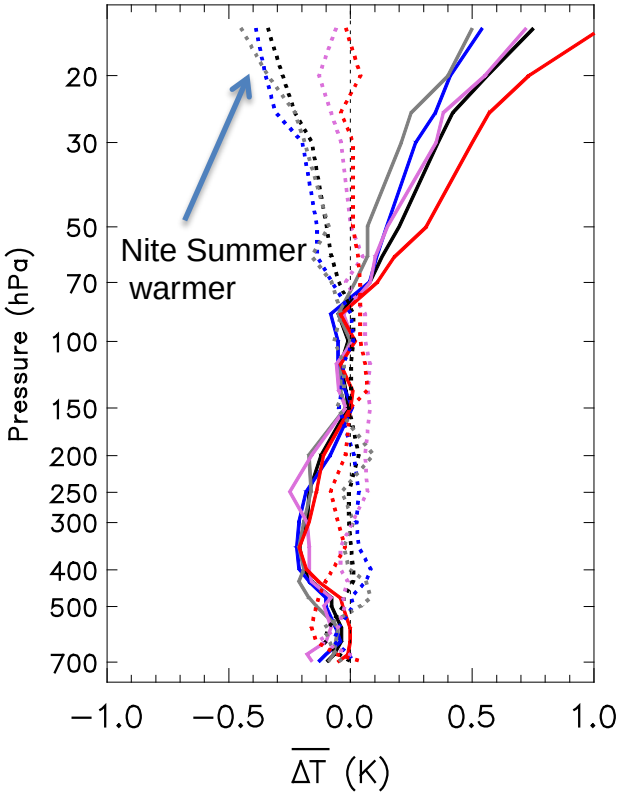
RAOB-minus-COSMIC Tdry

All
−7.5
−7.5 – 7.5
7.5 – 22.5
22.5

All sample

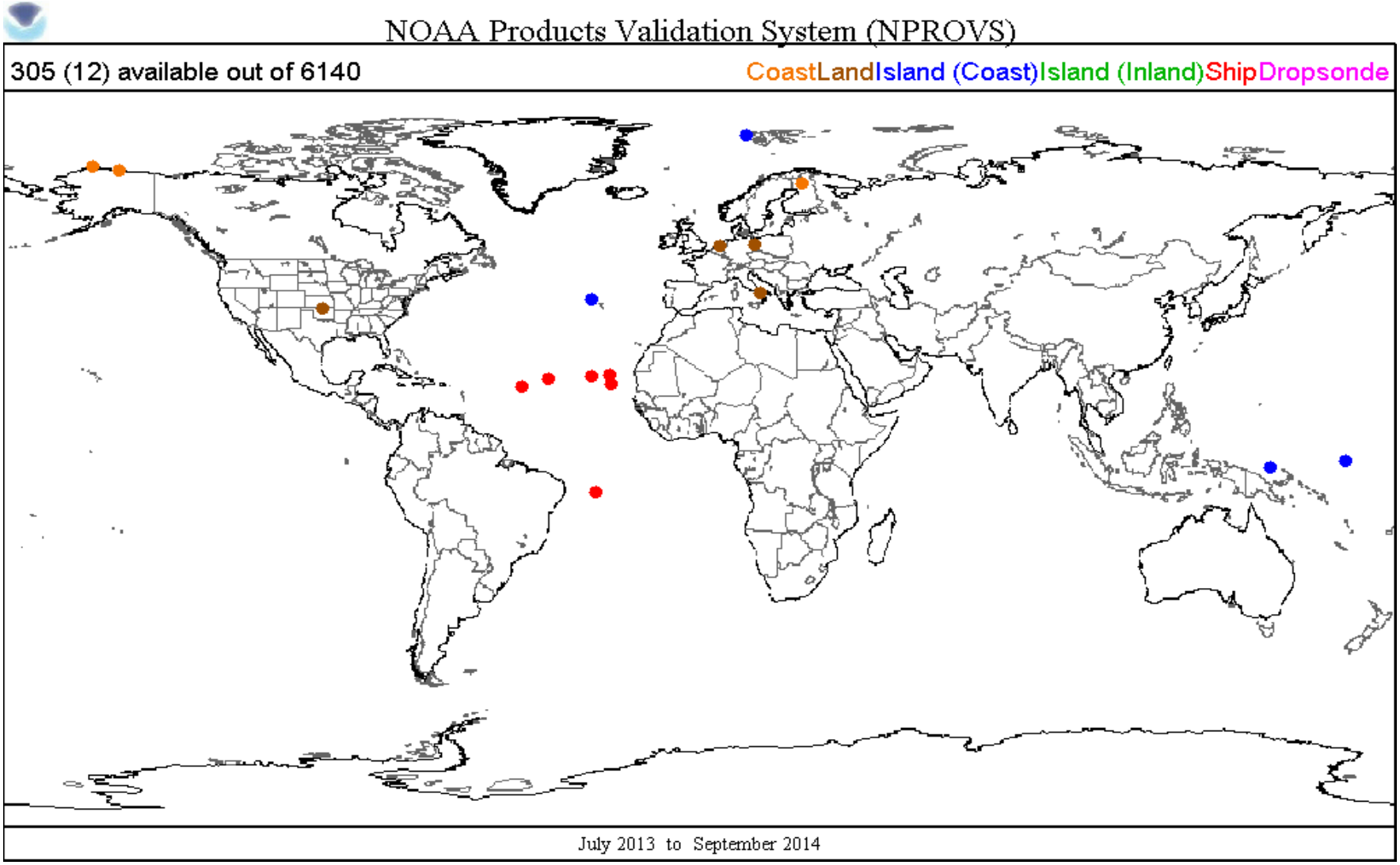


Summer (solid), winter-minus-summer (dashed)

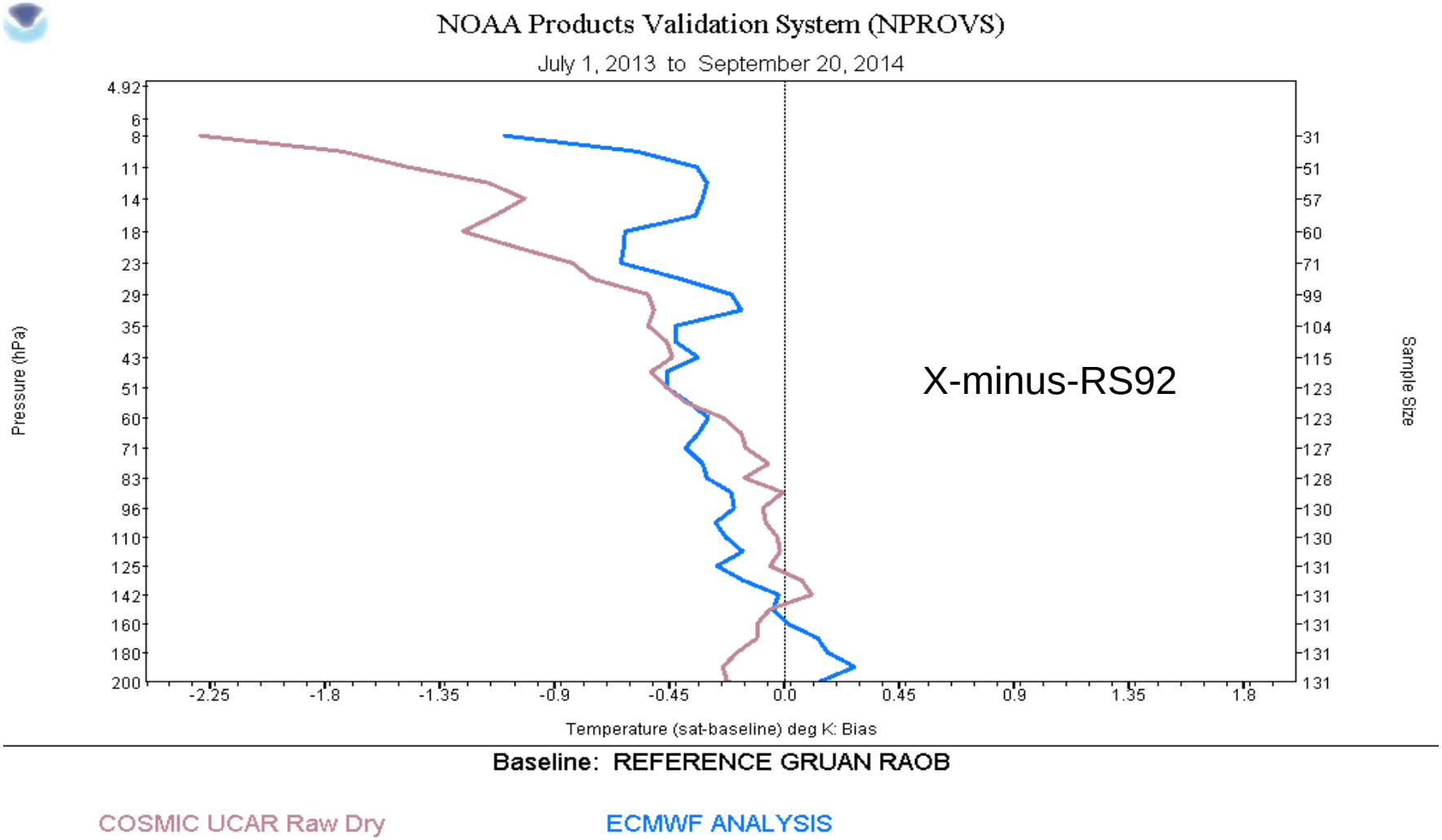


NPROVS … 2011, 2012 (Sun et.al JGR 2012, 2014)

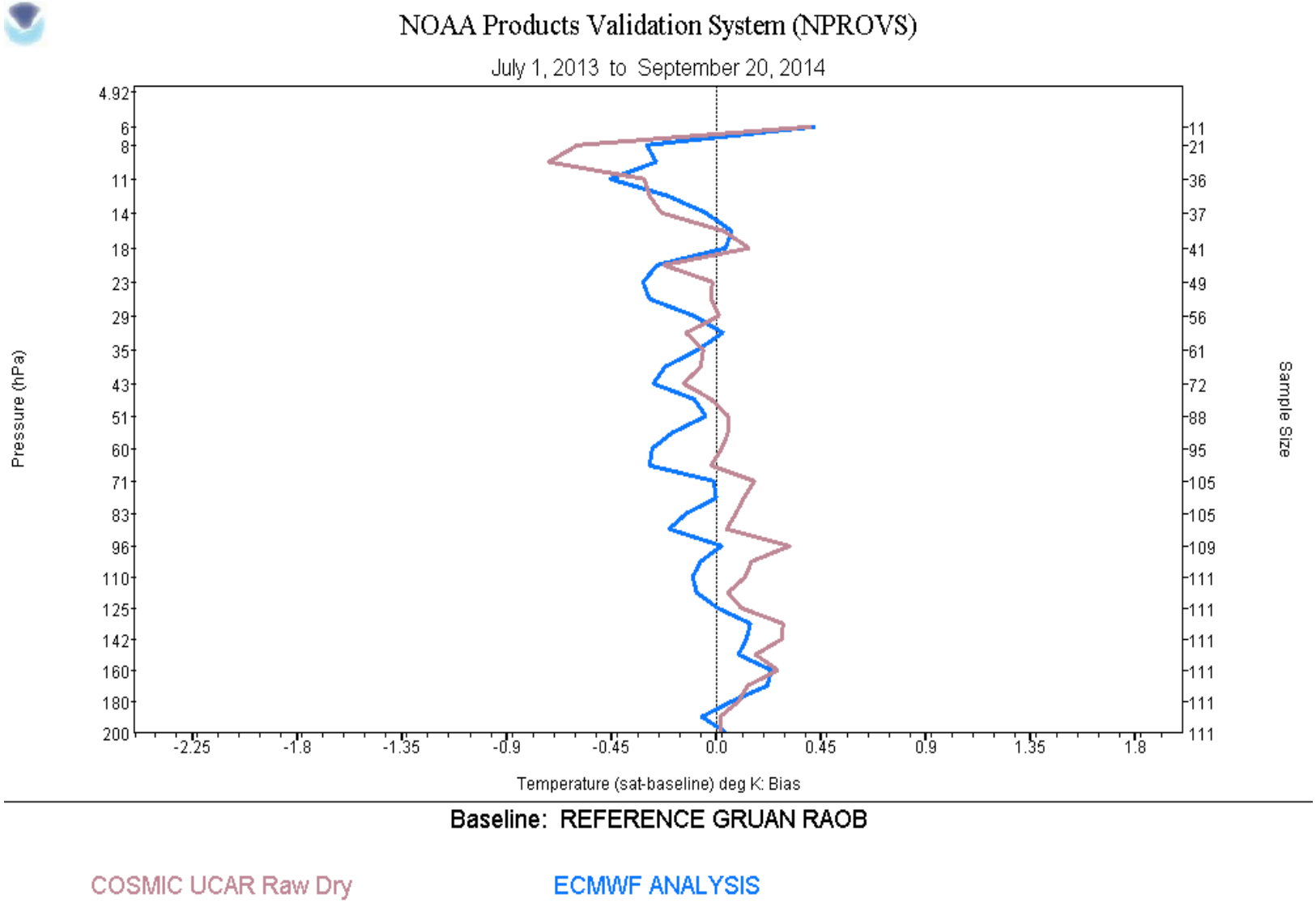
(SUNCOR to (?) Replace RADCOR at NOAA NWP)



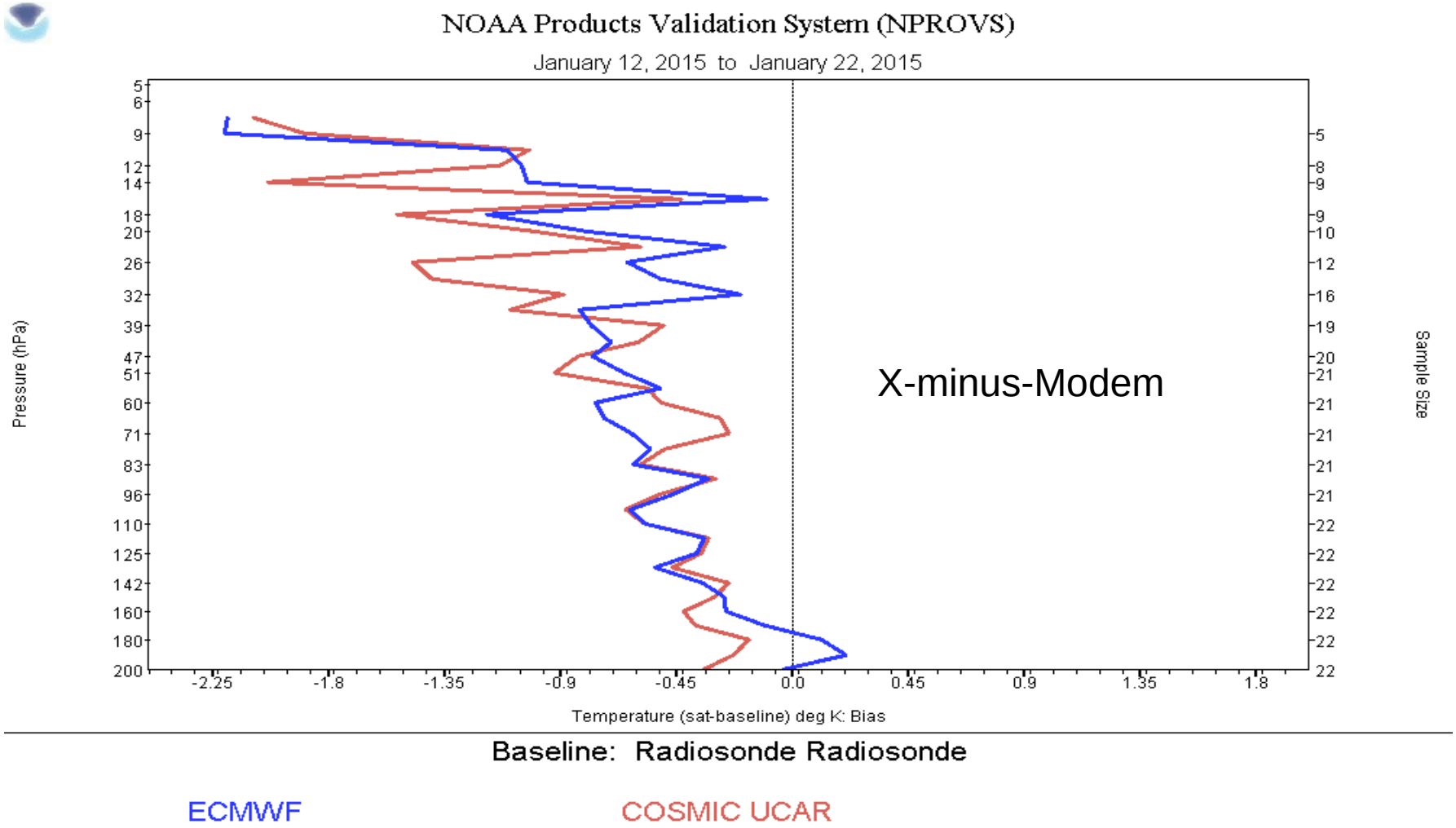
NPROVS+ : +/- 3hr and 250 km to COSMIC



NPROVS+ 2013-2014
Day

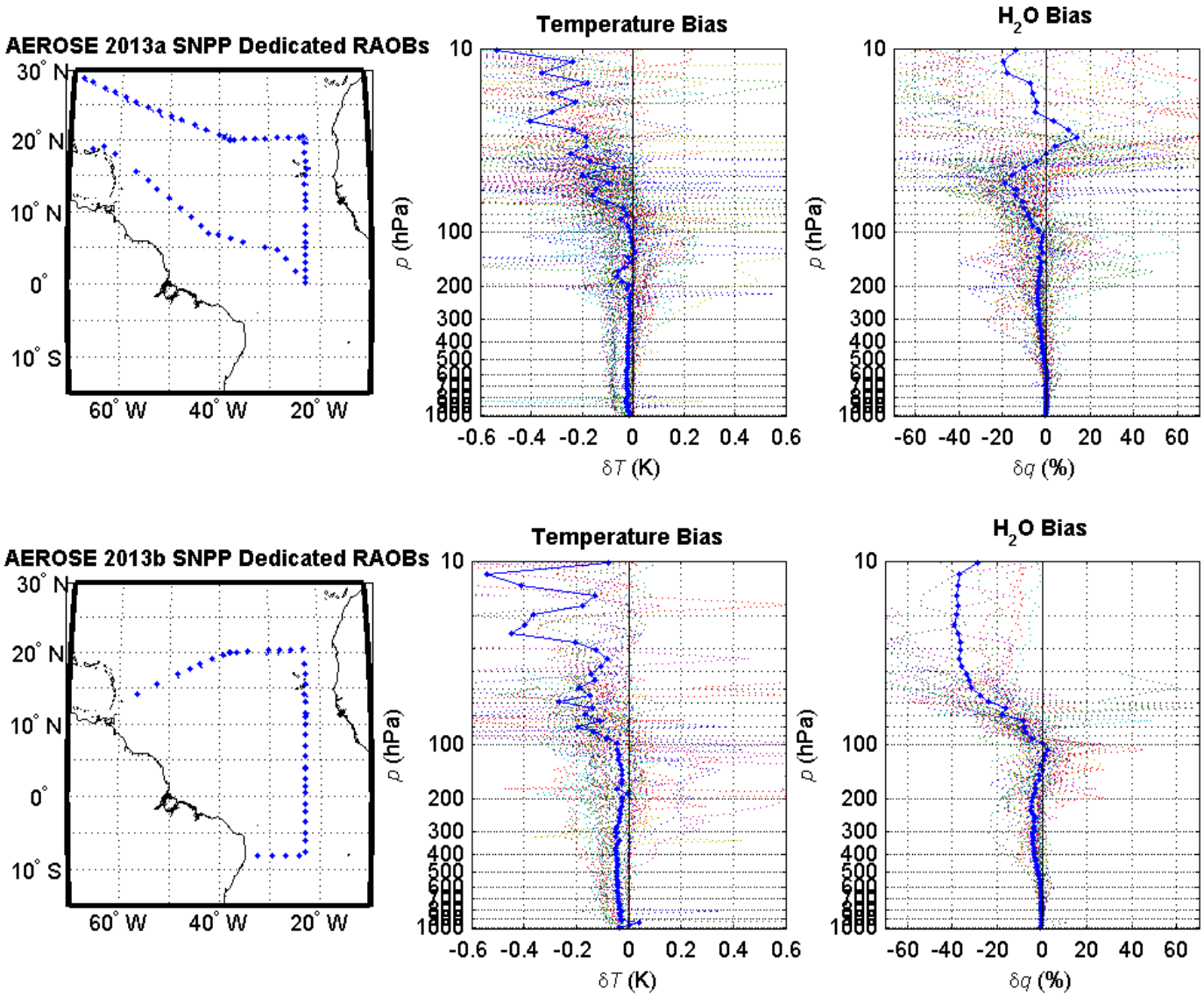


NPROVS+ 2013-2014
Nite

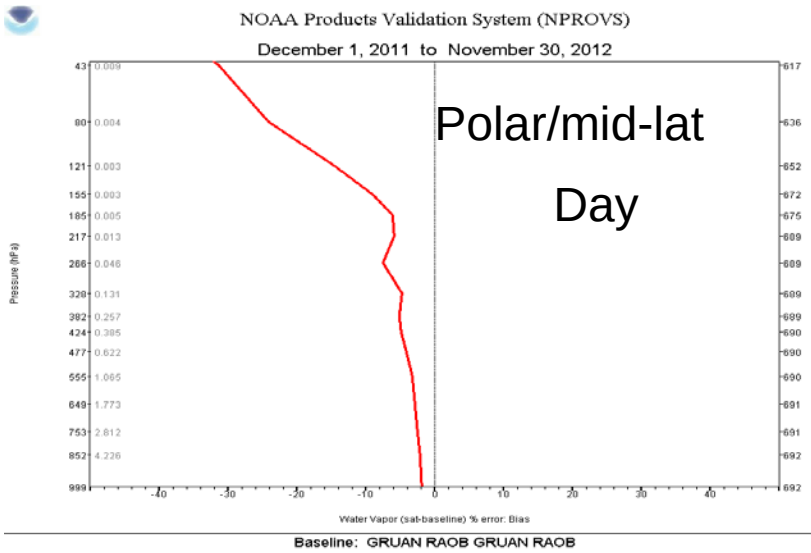


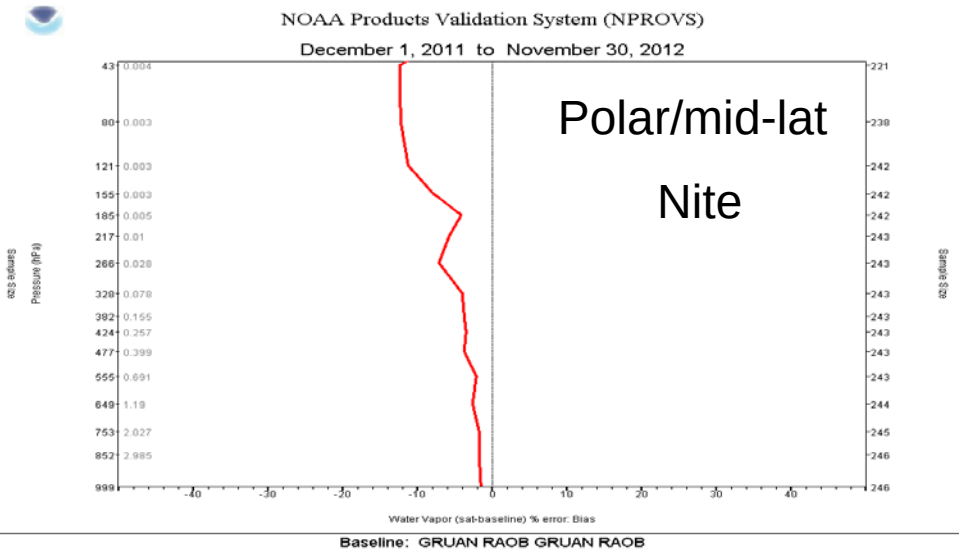
NPROVS Jan 2015
Day

AEROSE RAOB - GRUAN Correction (100 RTA layer)

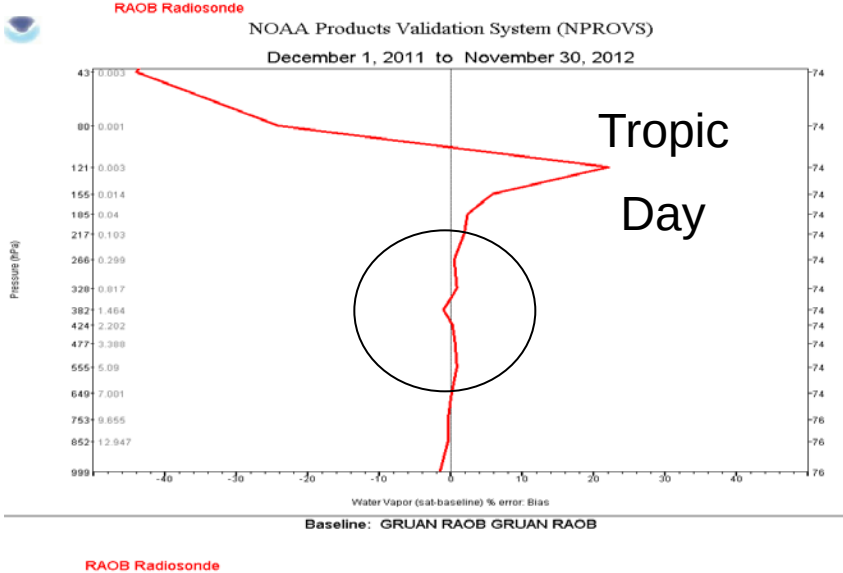


VAISALA-minus-GRUAN RS92

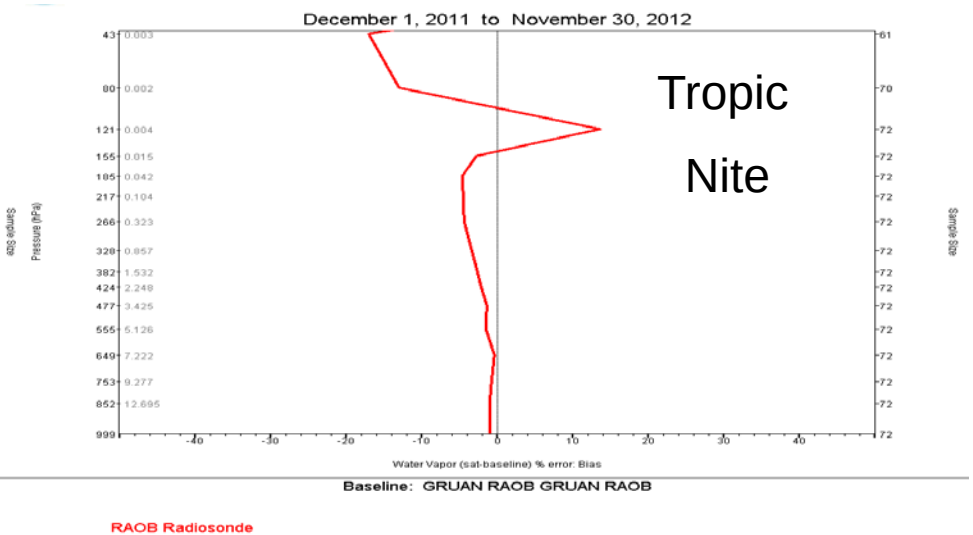




RAOB Radiosonde



RAOB Radiosonde



RAOB Radiosonde

VAISALA-minus-GRUAN RS92 (Dynamo)

H20 Vapor fraction (%)

GRUAN Reference Measurement Principles

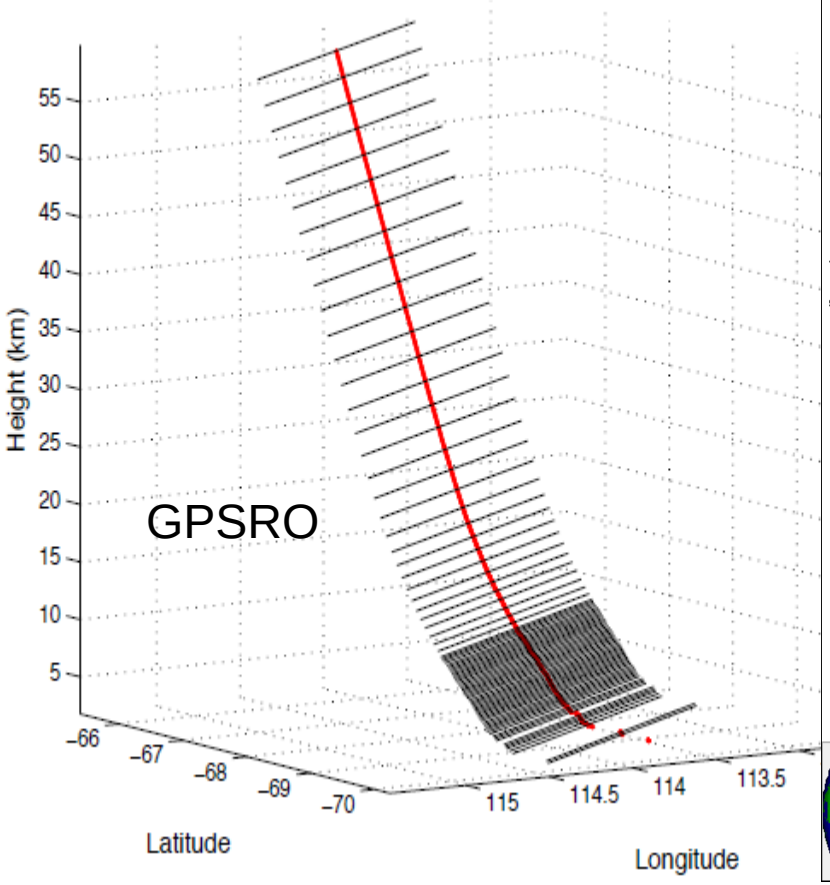
Two observations on different platforms are **consistent** if:

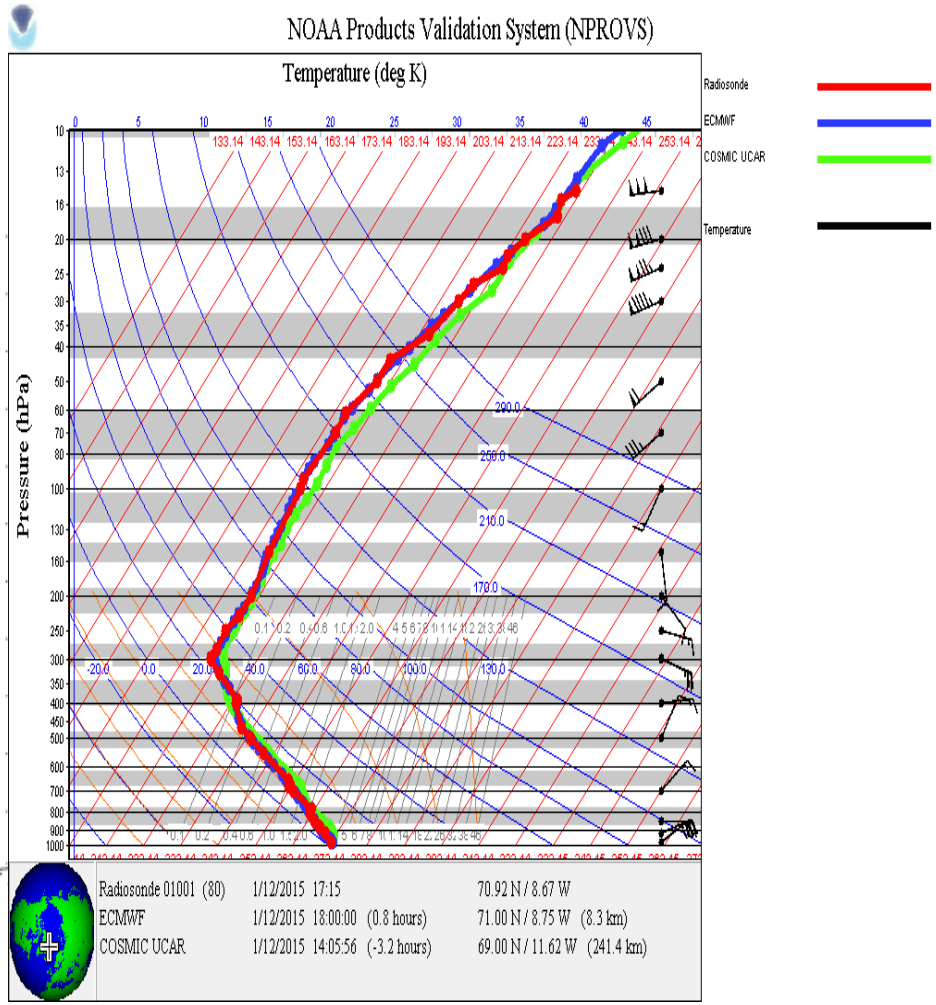
$$\left|m_1 - m_2\right| < k\sqrt{\sigma^2 + u_1^2 + u_2^2}$$

… at this preliminary stage:

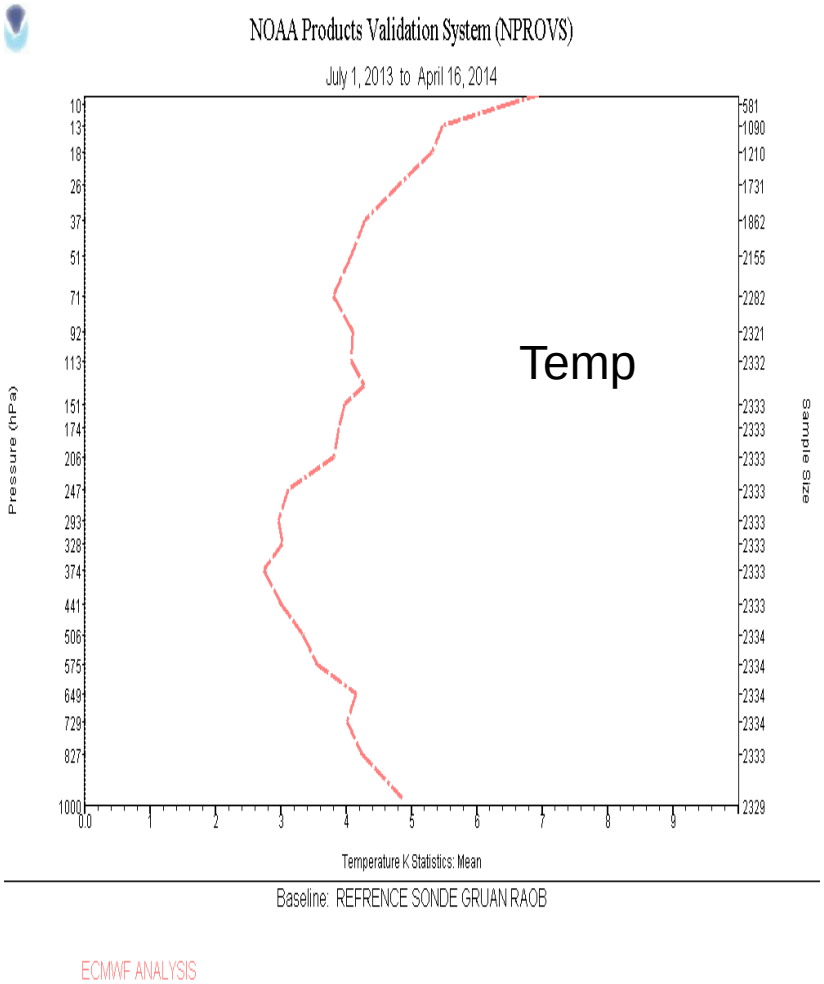
K = ABS(X – GRUAN) / u2

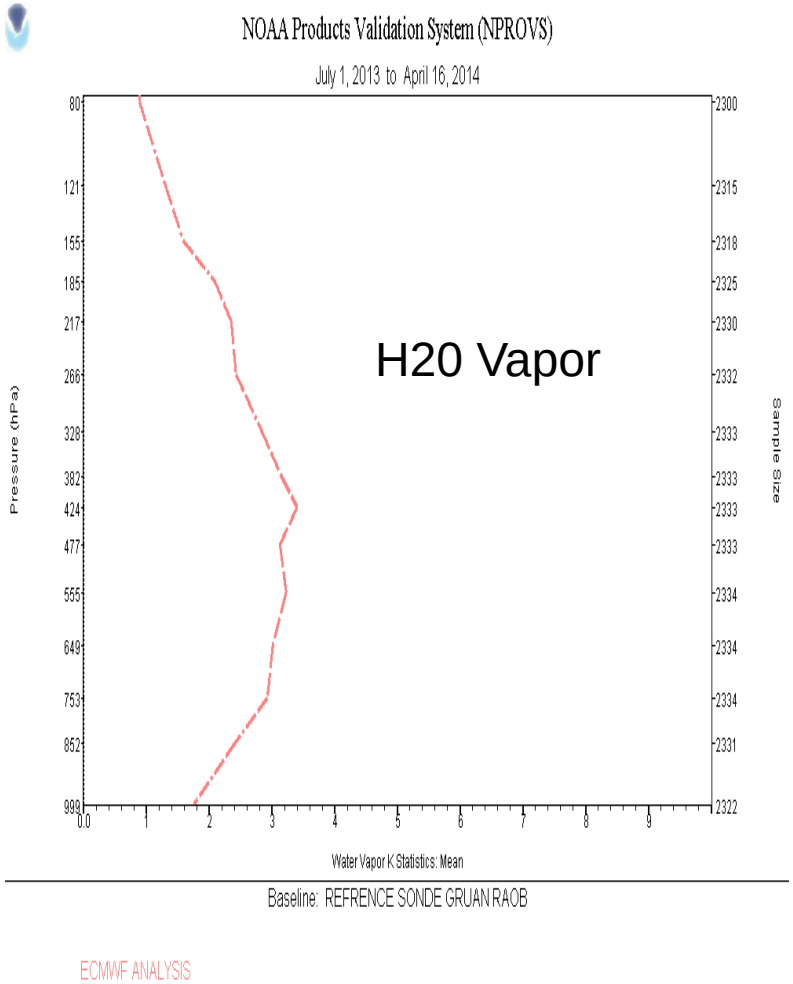
where “X” either SAT or NWP





… a question of SIGMA





Preliminary K analysis GRUAN RAOB vs NWP
RAOB better at measuring Temp than Moisture … ?

Future Expansions

New TTAM Action Item 92: Demonstrate NPROVS+ dataset management and graphical tool to merge/inter-compare respective GRUAN "atmospheric profiles" (RAOB, AM, SASBE … *for process studies*!) and associated satellite cal/val applications …

For Selected Sites:

Generate Respective AM T, H20 Profiles + Uncertainty … *Thierry / TTAM*
Generate Associated SIGMA(s) for "K" analysis … *GATNDOR / Gardiner*

Generate Associated SASBE, uncertainty and SIGMA and provide "K" analysis … *Dykema / Tobin / Reale*

…. Above done when RAOB in air
…. Above done when SAT (*GPSRO*) overhead … (*UT/LS and Strato T*)

Implies attention to target golden dataset of synchronized AM, RAOB and SAT (GPSRO) … **3G's**

SUMMARY

- **NPROVS/NPROVS+ leveraging at STAR for Satellite cal/val**
- **NPROVS+ Identified in NOAA/GRUAN Oversight Group**
- **Processing of GRUAN and Dedicated with Satellite facilitated by timeliness**
- **Feedback to LC**
- **Focus on GPSRO and Rad Correction of RAOB**
- **“K” Analysis integrates uncertainty**
- **Future Expansion to AM and SASBE “Profile” integration and support**