

Used and Blacklisted Data at GMAO

Will McCarty

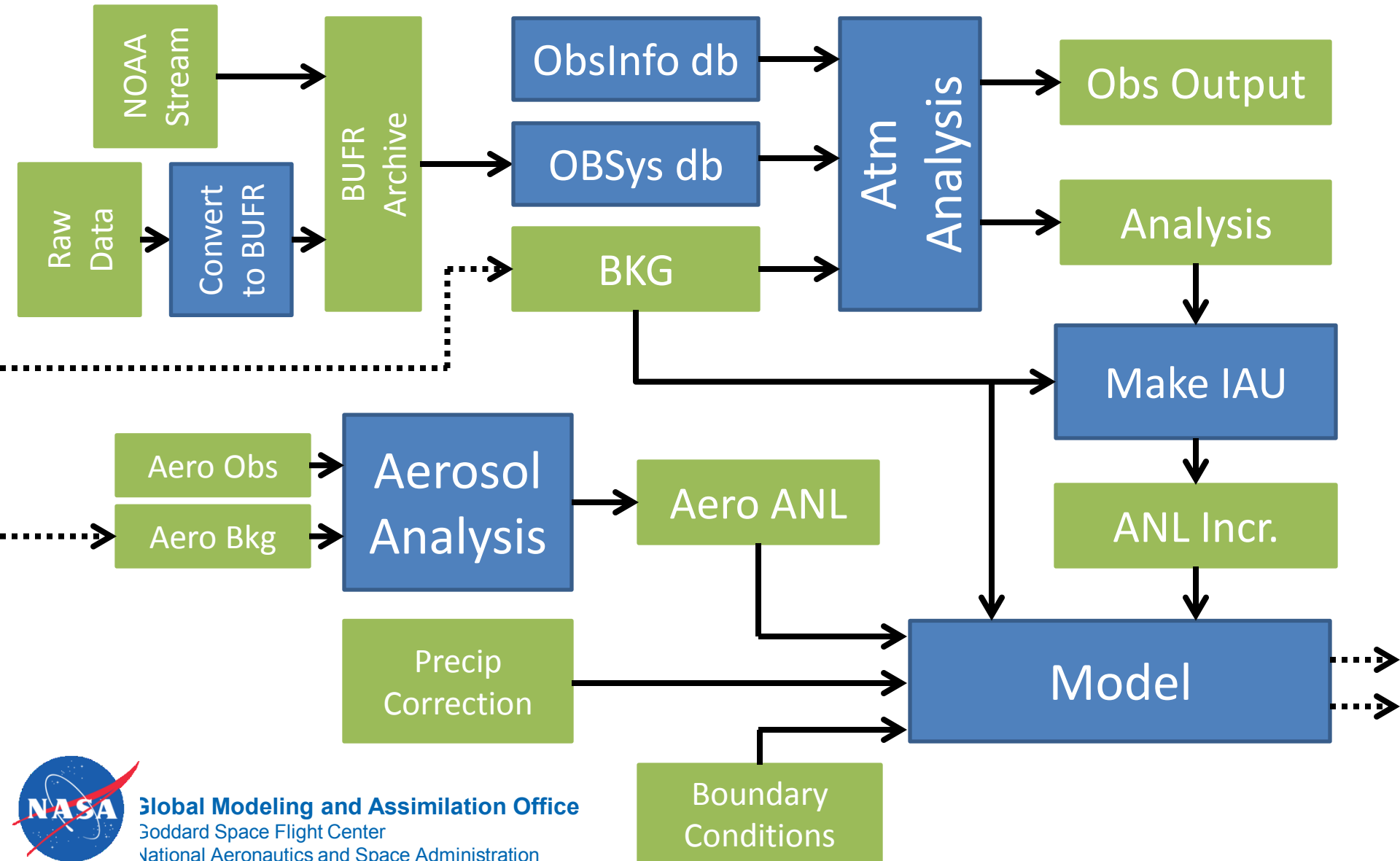
Nov 2014

Core-Climax Coordination Meeting Towards Exchanging
Reanalysis Observation Feedback and Blacklists

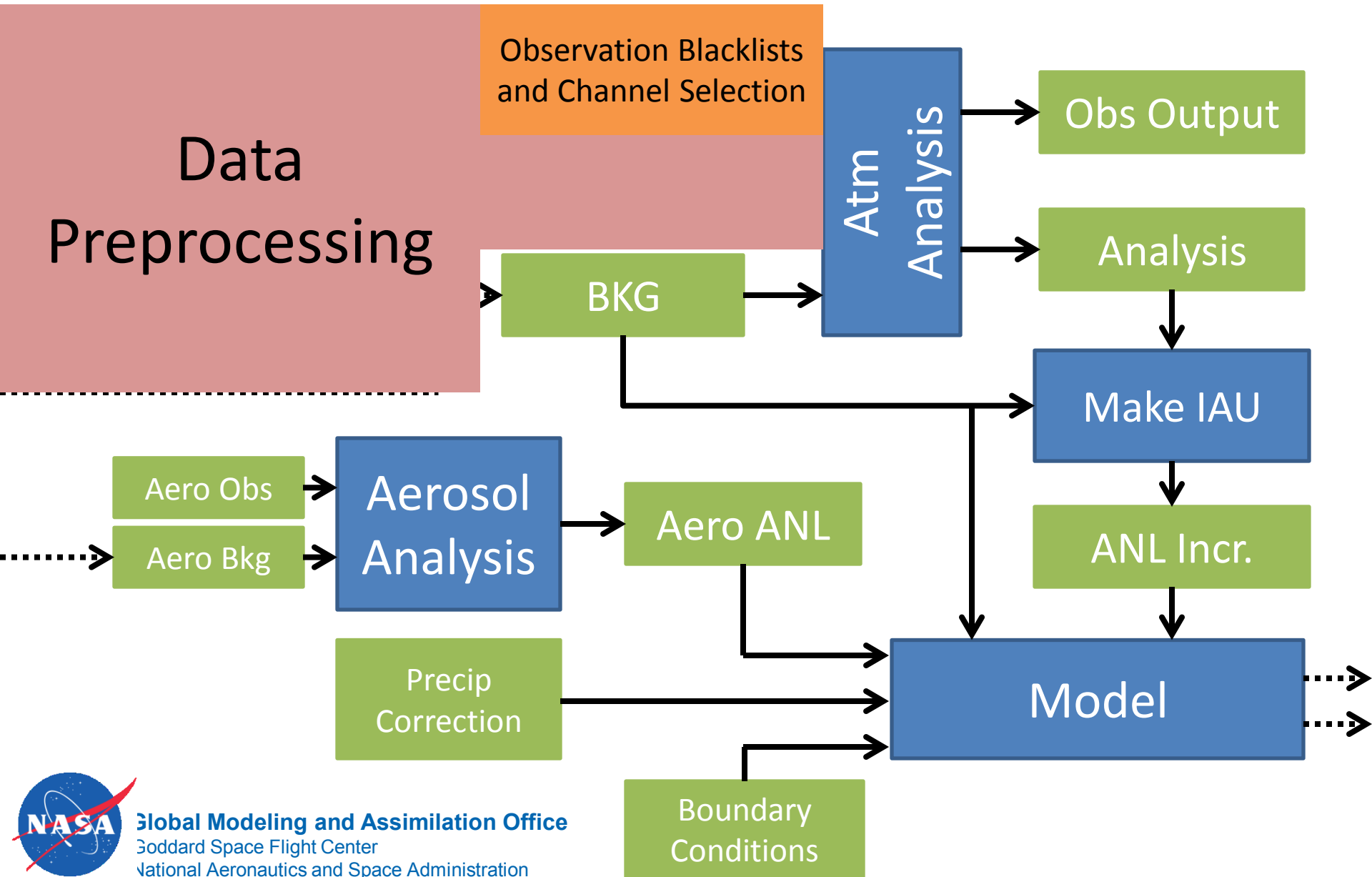
Blacklisted Data at GMAO

- How were the decisions made?
 - Some lessons learned from MERRA
 - Some lessons learned from monitoring FP system over the years
 - Basically, a lot of it had been around, not all of it was well documented, and many MERRA decisions predate me
- How are observations blacklisted/neglected?

Mechanics of System



Mechanics of System



Conventional

- Three methods
 - Blacklist input file to analysis
 - Relatively short list to reject input conventional obs by station identifier
 - Of ERA-40 origin, received in 2006
 - No time dependence wired in
 - Move data out of the way
 - Basically, remove the data so that it isn't assimilated
 - Modify the input data by hand



Blacklisted Stations

- Simple ASCII input file containing
 - Variable (T, q, uv, ps)
 - Variable Type ('kx' number at GMAO, all currently are 120/220, which are sondes)
 - Five number station ID
 - Name of station
- List as it exists:
 - 49 sondes blacklisting T, q, and ps
 - 2 additional ship-based sondes neglecting T, q, ps, and uv
- Additions to the ERA-40 list:
 - Bangui, Central African Republic (64650)
 - Weather Ship Lima (99012)
 - Weather Ship Quebec (99018)

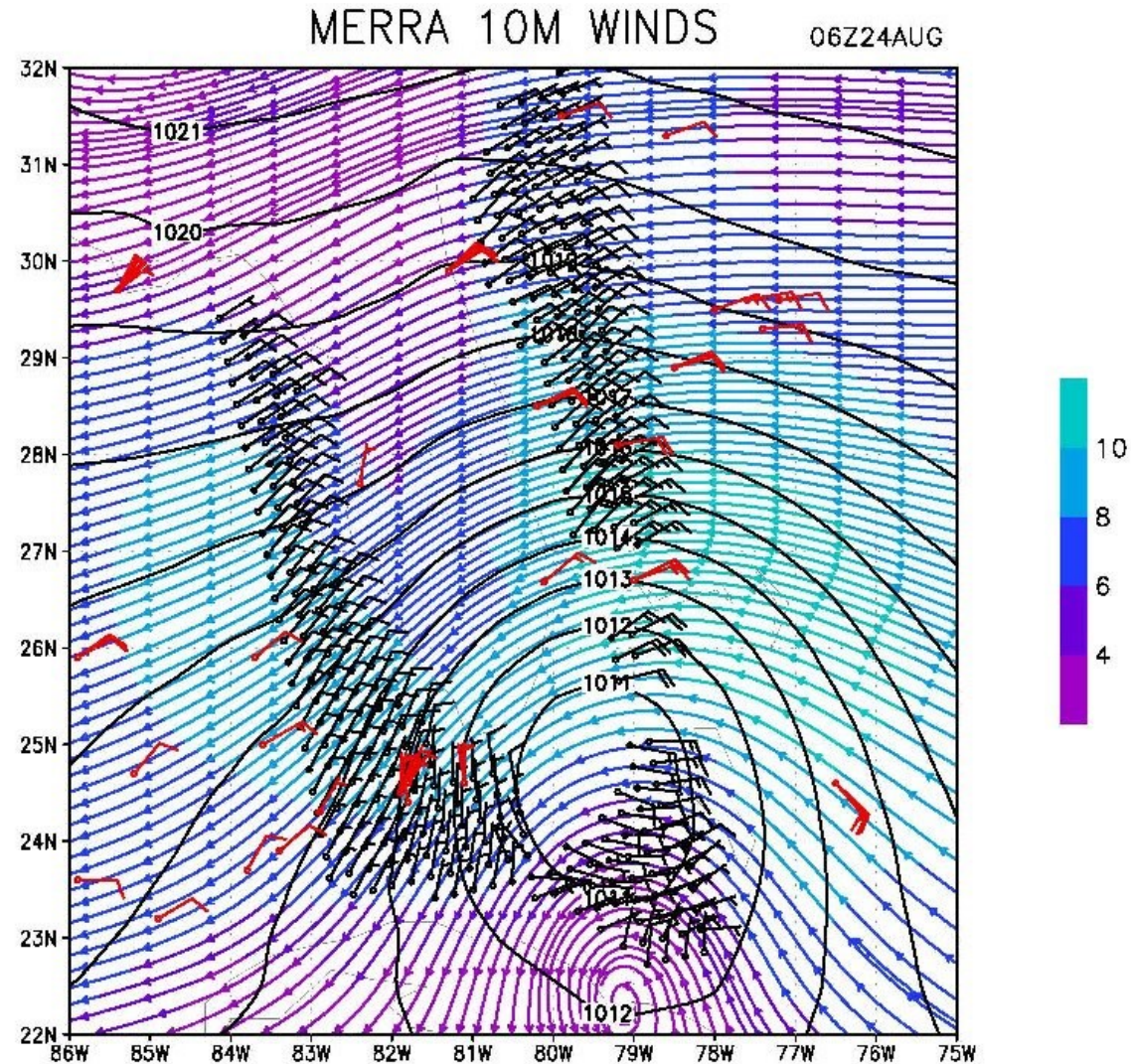


(Re)Move the Data

- Sometimes the easiest solution is to simply neglect an observation type for a given period
- There's no infrastructure in place to switch conventional obs on/off on the fly
- Solution: just remove the input file for a given cycle

(Re)Move the Data

- At 0600 UTC on 24 Aug 1992, ERS1 partially sampled Hurricane Andrew
- Since both sides of the circulation were not captured, the analysis increment was skewed
- Contaminated observations passing QC seemed to further deteriorate the wind fields
- The easiest solution was to simply not use ERS1 data for this analysis – the background was better than the analysis of this storm



Modify the Data by Hand

- With some effort, we could have salvaged some of that ERS data (but we didn't)
- Not necessarily an analysis observation, but our vortex relocation was found to fail (as in, segfault) under very rare tropical cyclone situations
 - Above 60°N, getting near the Prime Meridian
- Luckily, these files are simple ASCII 'tcvitals' files, so we simply removed the offenders over the data record



Satellite Channel Selection

- Mechanically, the satellites are controlled by the 'satinfo' file
 - Specifies instrument/platform, channel, use flag, observation error, and various qc parameters

```
amsua_n15 6 -2 0.230 2.000 10.00 0.000 0
```

- All parameters, except for the usage number, are fixed in time
- By default, all channels are -2, which is do not use

Satellite Blacklists, Channel Selection

- Mechanically, individual instrument channels can be turned on/off in the 'satinfo' resource file by what we dub 'satinfo_db'
 - The database contains three files, which determines if, in order:
 - The channel is **available** (passive, iuse = -1)
 - The channel should be **actively** assimilated (iuse = 1)
 - The channel should have a special switch set so that it is **not bias corrected** (only applicable to SSU ch 3 and AMSU-A ch 14, iuse = 4)
 - These files are a function of time, so changes can be made when channels degrade



Format of files

- Fairly simple...

```
n15 19990101 120000 20001029 240000  amsua 11      4 5 6 7 8 9 10 11 12 13 14
n15 20001030 000000 20020331 240000  amsua 10      4 5 6 7 8 9 10 11 12 13
n15 20020401 000000 20141017 240000  amsua  9      4 5 6 7 8 9 10      12 13
n15 20141018 000000 21001231 240000  amsua  8      4 5      7 8 9 10      12 13
```

- Gets a little messier for the hyperspectral, but it is doable (10 channels per line, multiple lines for the instrument)

Used Channels (High-Level)

Microwave

Instrument	Channels Used
MSU	2-4
SSU	1,2 ; 3 w/o BC pre-AMSUA
AMSU-A	4-13 ; 14 w/o BC
AMSU-B	1-5
MHS	1-5
SSMI	1-7

Infrared

Instrument	Channels Used
HIRS 2	2-8, 10-12
HIRS 3	2-8, 10-12
HIRS 4	2-8, 10-12
AIRS	15-10 μm (84 ch) 8-6 μm (20 ch) \sim 4.5 μm (14 ch)
IASI	15-10 μm (137 ch)
CrIS	15-10 μm (48 ch) 8-6 μm (42 ch)
GOES Sounder	1-8, 10-12
SEVIRI	2, 3



Neglected/Degraded Channels

- MSU
 - NOAA-6, ch 3 failure 19851101
 - NOAA-8, second coming not used
 - NOAA-9, ch 3 failure 19861025
 - NOAA-11, ch3 noisy, off from 19890316- 19890416
- SSU
 - TIROS-N, ch 3 never used
 - NOAA-7, ch 2 not used from 19830701 onward
 - NOAA-8, ch 3 not used from 19830914 onward
 - NOAA-9, ch 3 not used prior to 19850324
 - NOAA-11, 14 ch 3 turned off 19981101 with onset of AMSU-A ch 14
- HIRS
 - TIROS-N, no ch 4, 5
 - NOAA-6, not used in second coming
 - NOAA-9, ch 2, 3 striping issue after 19861001

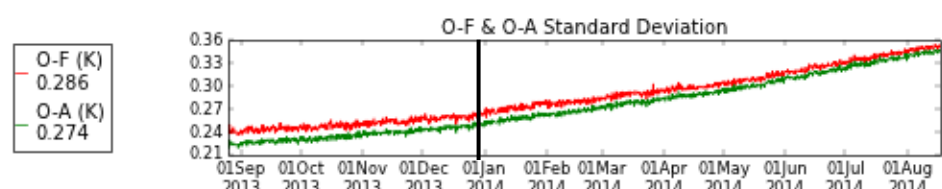
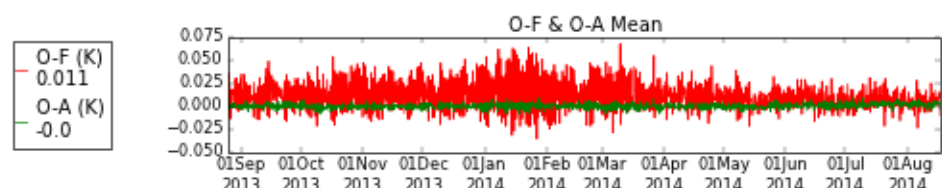
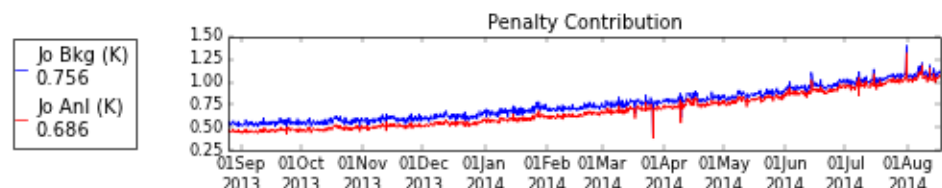
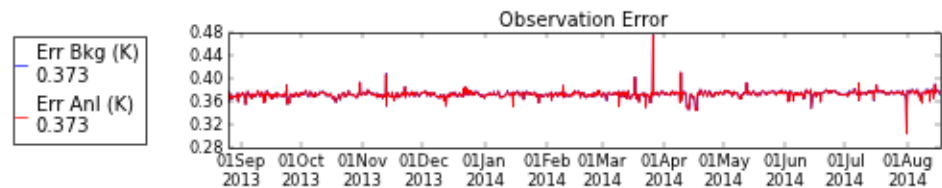
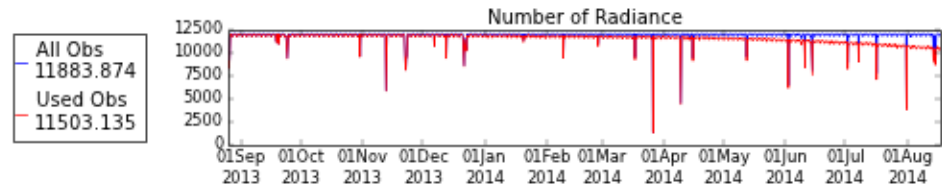


Neglected/Degraded Channels

- AMSU-A
 - NOAA-15, lost ch 14 (on 20001030), 11 (on 20020401), and 6 (on 20140901)
 - NOAA-16, lost ch 9 (on 20030512), 10-11 (on 20040617), and 12-14 (on 20050115)
 - NOAA-17, never had ch 7
 - NOAA-18, lost ch 9 on 20071116
 - NOAA-19, lost ch 8 (on 20091222), 7 (on 20140129)
 - Metop-A, lost ch 7 (on 20090115), 8 (on 20140101)
 - Aqua, never had ch 7, lost 4 & 5 on 20071102



- Metop-A ch 8 degradation over time never looked too bad over a given three month period
 - it was going, but how quick?
 - Arbitrary decision to turn passive on 1 Jan 2014



Neglected/Degraded Channels

- AMSU-B
 - NOAA-15, turned off 20060216 when ch 4 degraded
 - NOAA-16, turned off 20090416
 - NOAA-17, turned off 20091222
- MHS
 - NOAA-19, never used
- SSMI
 - F08, ch 6,7 turned off 19880208
- AIRS
 - 453(?) did degrade at some point, but it was switched off over the course of the whole record – never determined specific fail date
 - Aqua, ch 321 turned off 20130918

