Radio Occultation at EUMETSAT

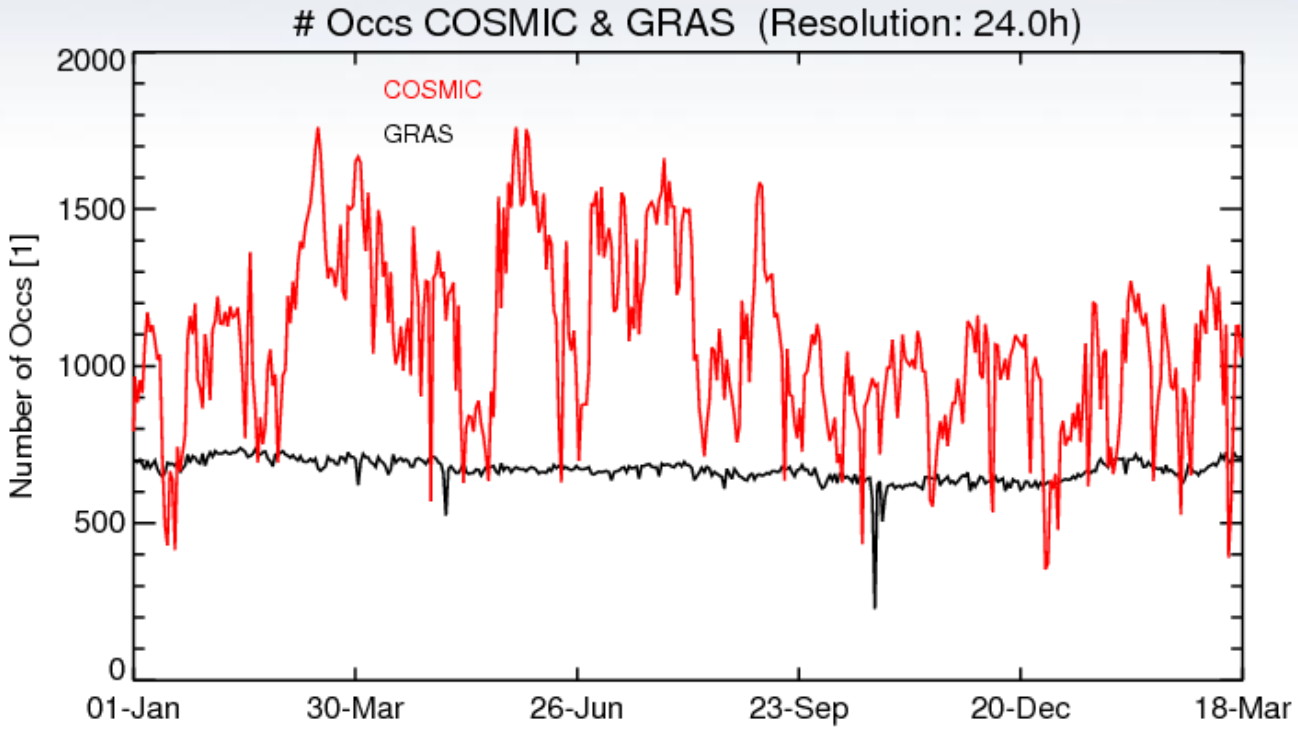
A. von Engeln, C. Marquardt, Y. Andres
(C. Accadia, S. Healy)

Content

- Metop-A GRAS Operational Processing
- Metop-B GRAS Launch and Orbit Setup
- EPS-SG Radio Occultation
- Radio Occultation Opportunities
- Conclusion / Outlook

GRAS Performance: # of Occultations

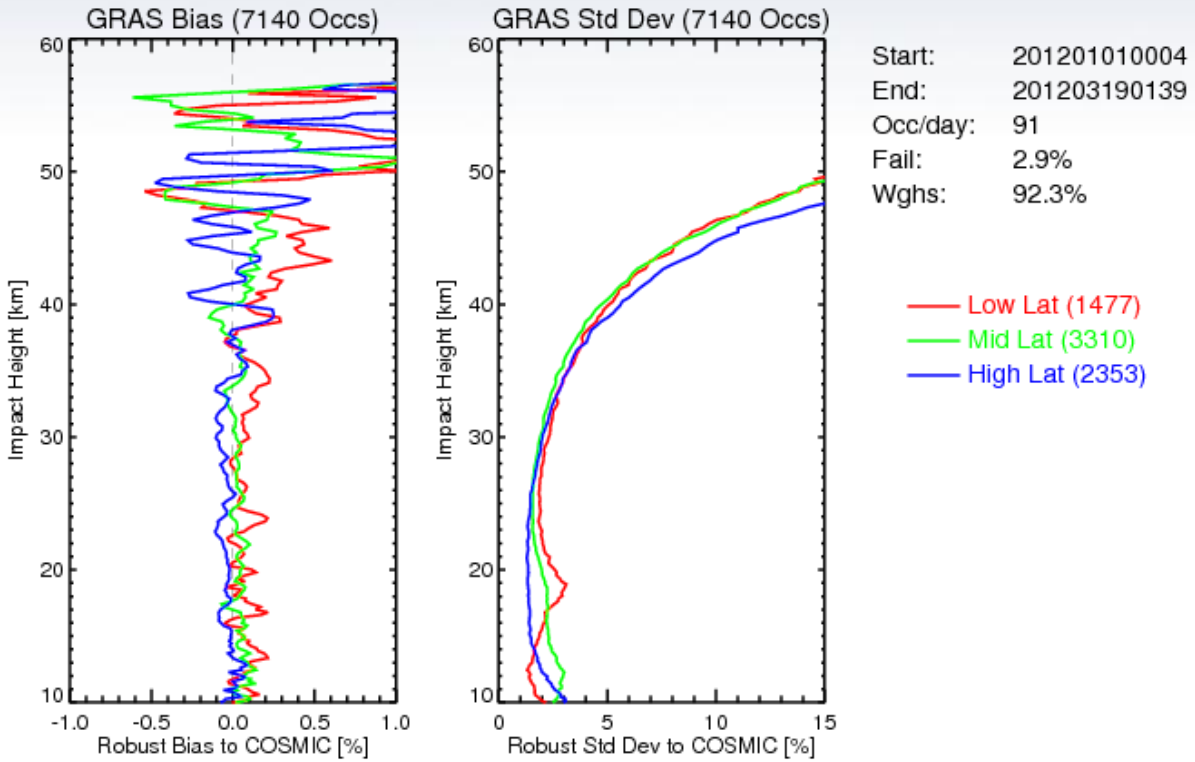
GRAS shows very solid performance, very few instrument issues detected and potential software updates are evaluated.



GRAS PPF (no QC) and COSMIC provided number of occultations / day over last year

Metop-A GRAS Operational Processing (2)

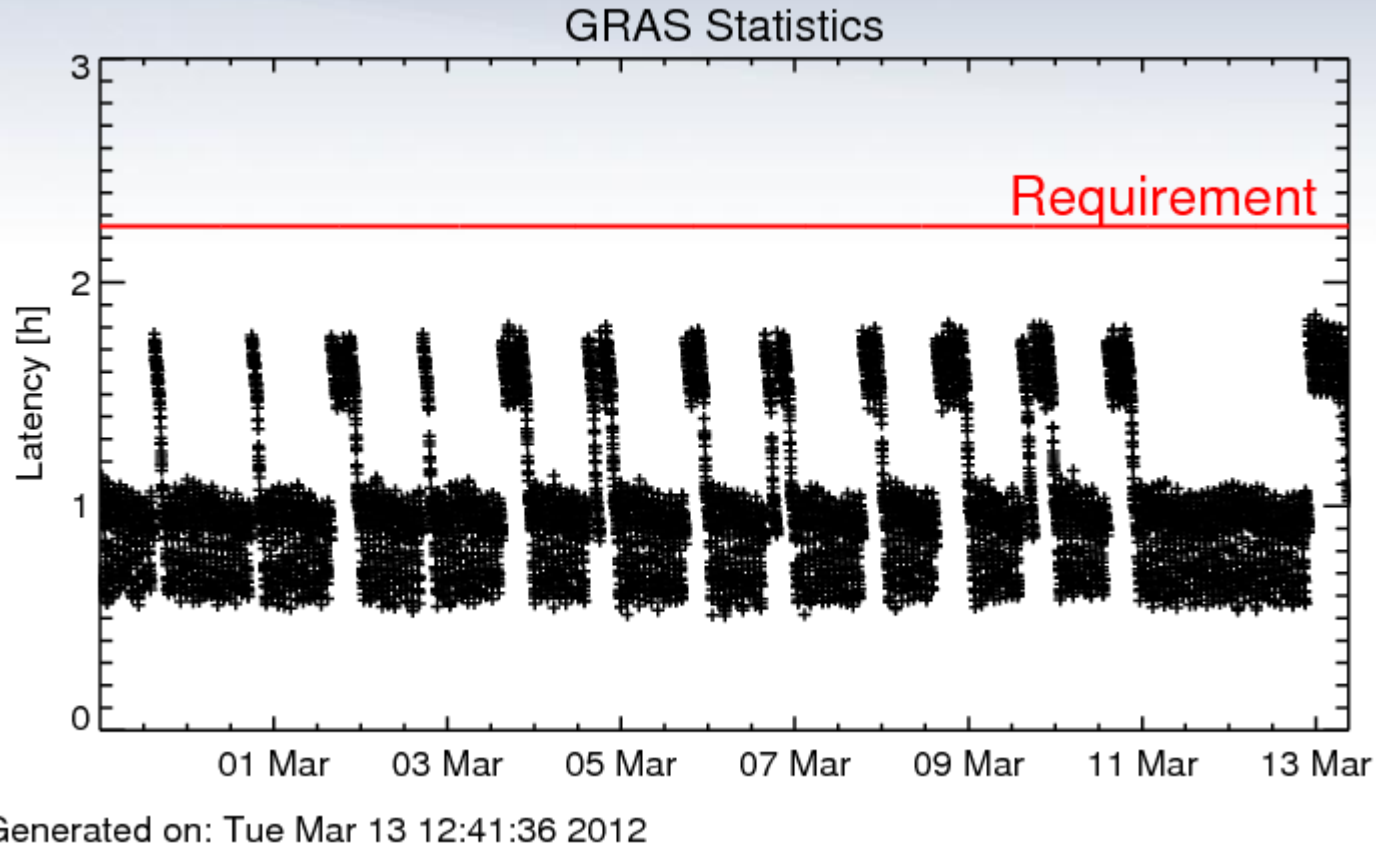
GRAS COSMIC global stats show very consistent results.



GRAS against COSMIC robust statistics for 2012. Note: Lower range excluded since GRAS uses geometrical optics.

Metop-A GRAS Operational Processing (3)

Timelines improvements with Antarctica Station

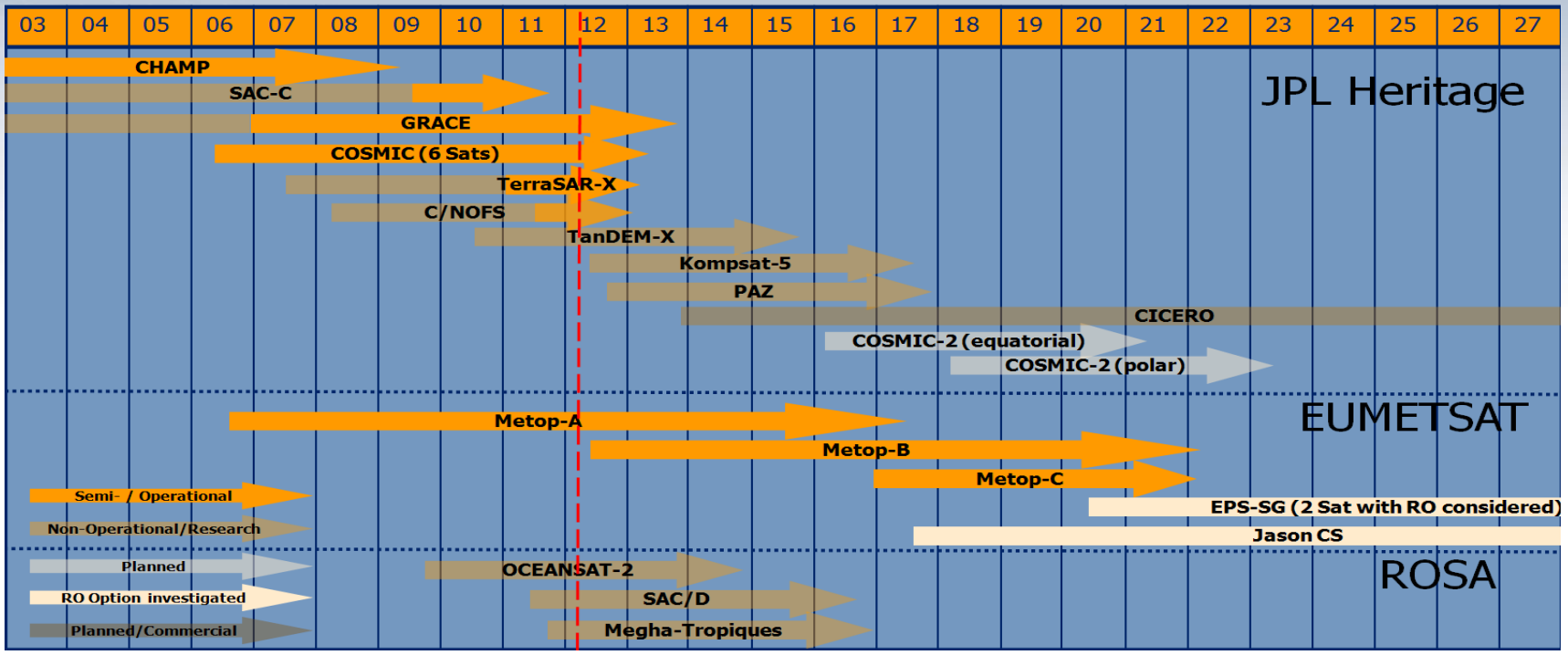


Metop-A GRAS Operational Processing (4)

- Current processor issues:
  - no raw sampling / open loop wave optics processing (test data / new formats (netCDF 4) are delivered)

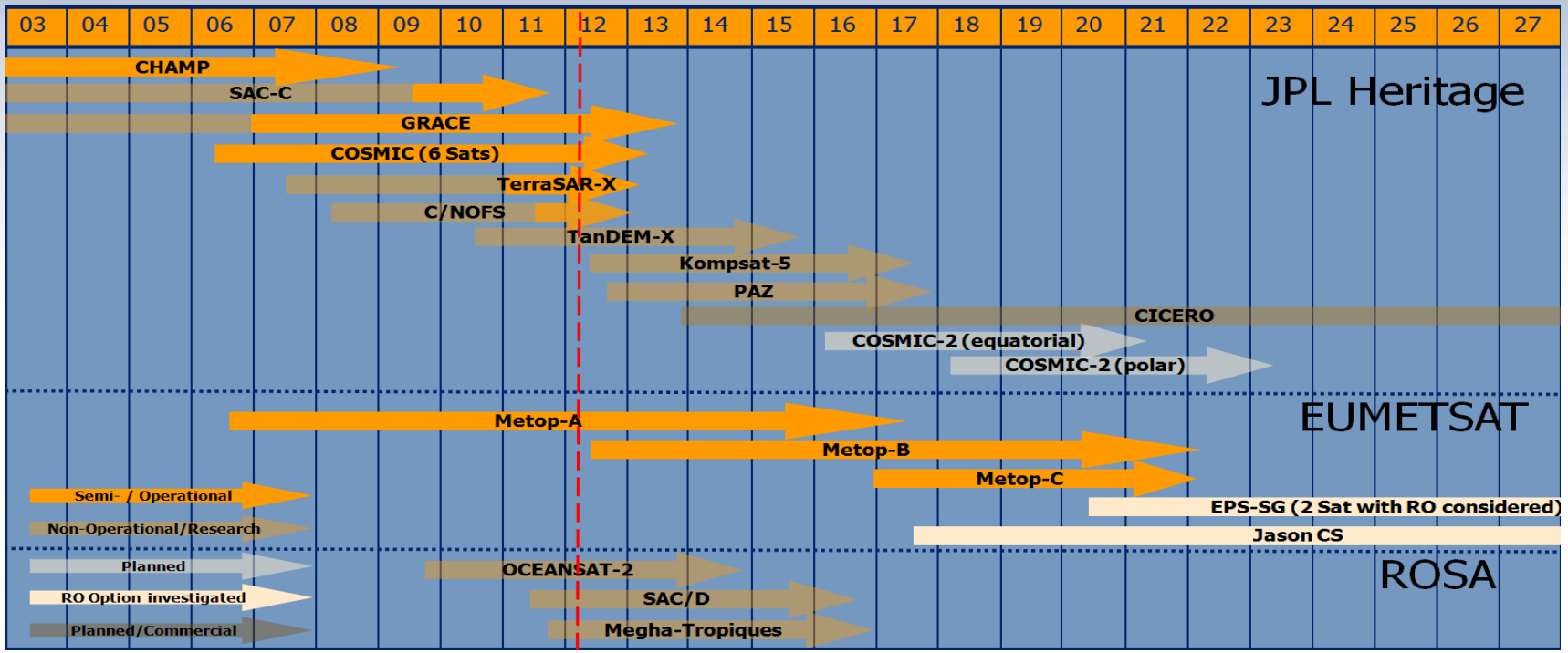
- Current instrument issues:
  - Loss of lock leads to data gaps, in particular in lower troposphere; incorrect tracking of L2 leads to low SNR on L2 data. Instrument software update currently being developed with instrument builder RUAG, possibly iterated during Metop-B commissioning.

Metop-B Launch and Orbit Setup



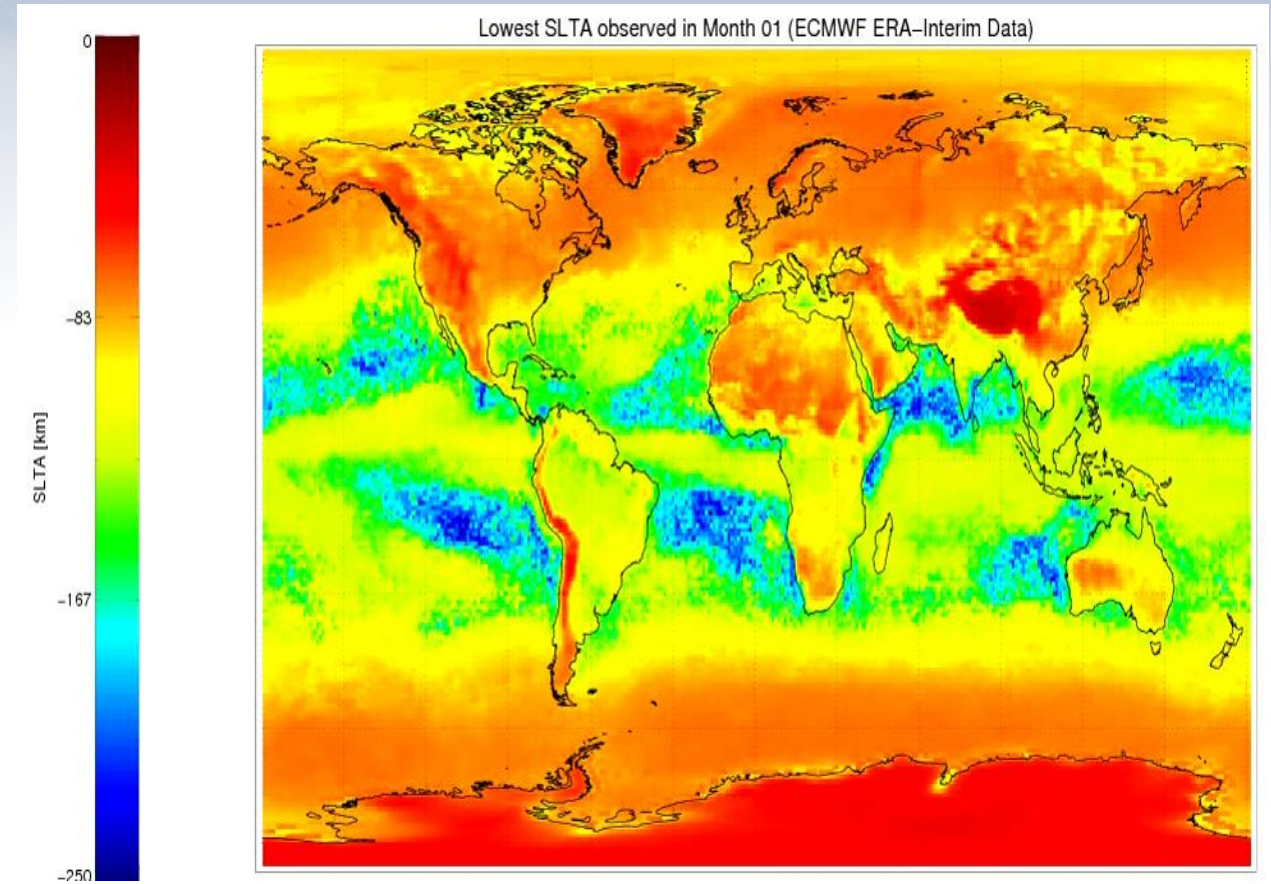
- Metop-B launch schedule for May 23, 2012
- Will fly about 50 min separated in the same local solar time orbit
- Plan to fly Metop-A and -B in tandem until -C launch (-A healthy) thus **doubling** occultations from Metop

EPS-SG Radio Occultation



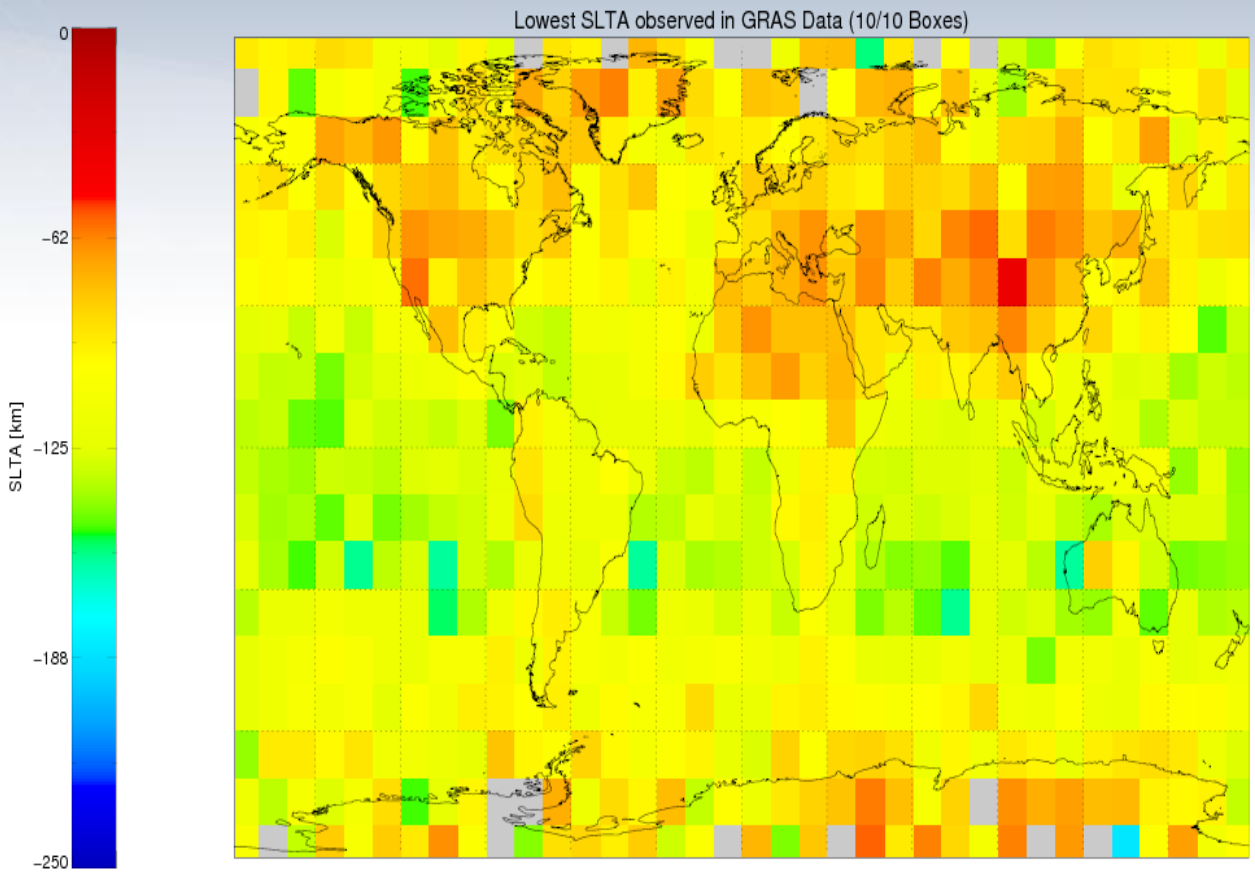
- ESA / EUMETSAT Development
- Currently in Phase A (EUMETSAT), Phase B 2012
- RO planned to be on both EPS-SG satellites

Lowest SLTA, Year 2007, ERA Interim Data



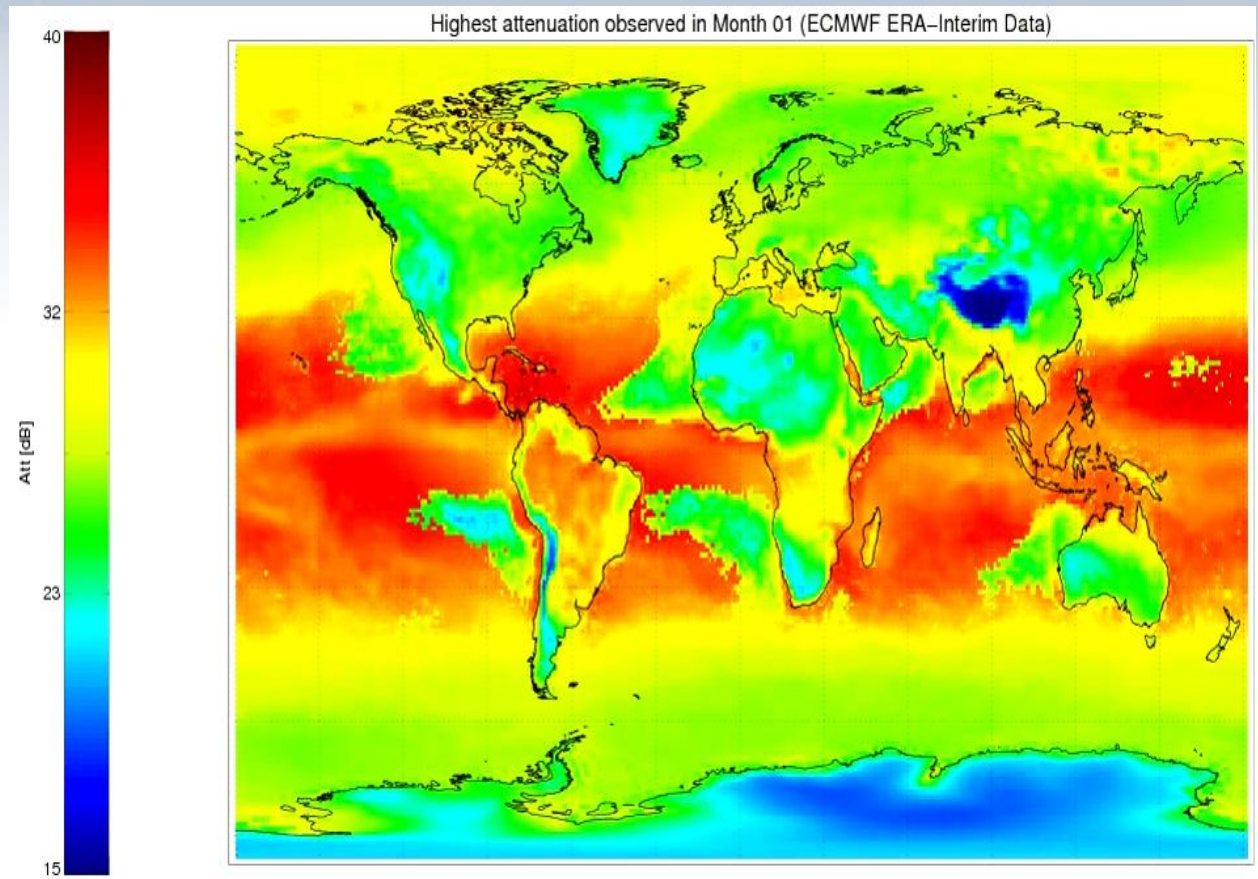
ROPP / ECMWF (ERA-Interim) simulation of lowest SLTA for different months

Lowest SLTA, GRAS, Feb 2012



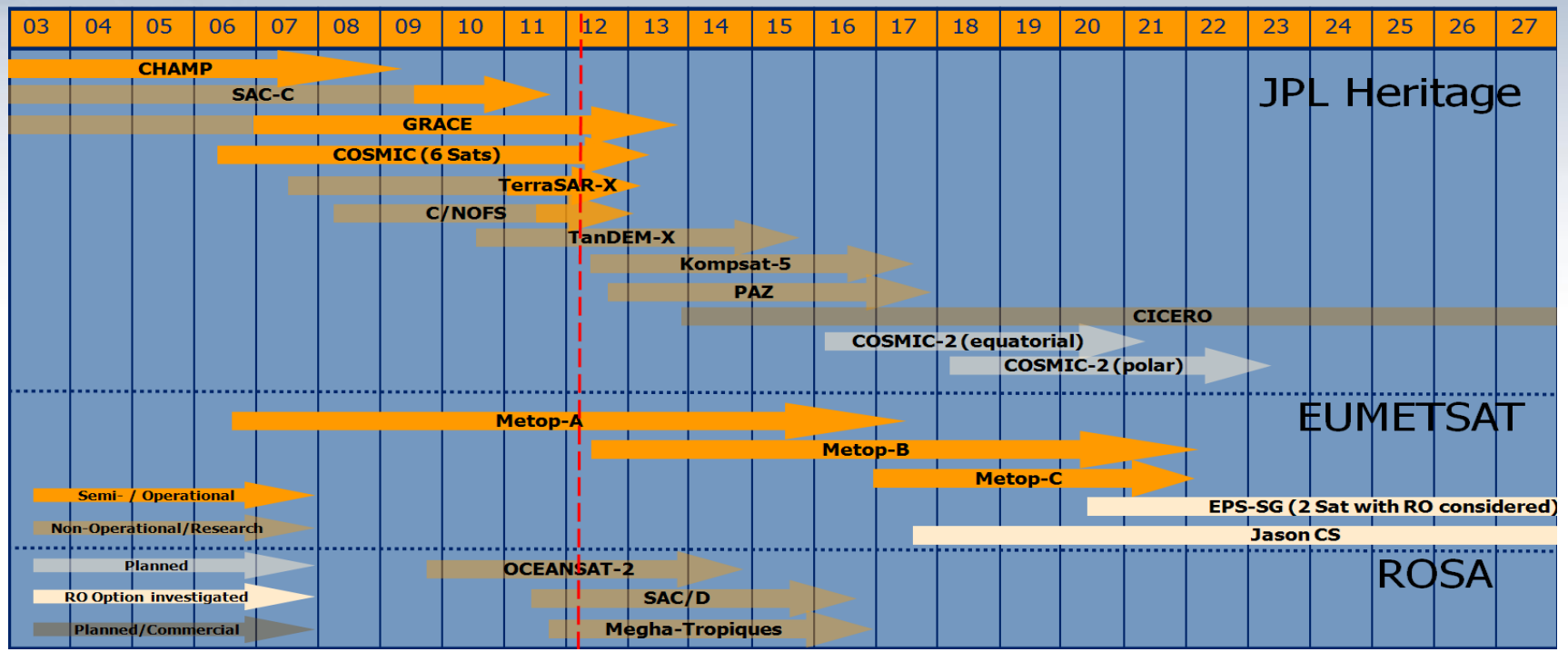
Lowest GRAS SLTA used for processing, 10 Degree Latitude, Longitude Boxes

Attenuation, Year 2007, ERA Interim Data



ROPP / ECMWF (ERA-Interim) simulation of highest attenuation for different months

Radio Occultation Opportunities (1)



EUMETSAT is currently evaluating several RO opportunities:

- ROSA data to fill the COSMIC gap (ROSA & GRAS share AGGA-2) – with NOAA
- Jason CS to host an RO and provide more data in the 2020 - 30

Radio Occultation Opportunities (2)

- Oceansat-2 (ISRO)
  - in space since Sep 2009; near-polar sun-synchronous orbit (720 km, noon)
  - ~ 250 rising occs/day, issues with antenna orientation, L2 tracking
- Megha-Tropiques (ISRO & CNES)
  - 2011, low inclination / equatorial orbit (866 km)
  - ~ 600 rising and setting occs/day between 40°S and 40°N
- Aquarius/SAC-D (CONAE & NASA)
  - June 2011; polar sun-synchronous orbit (657 km, 18:00)
  - ~ 600 rising and setting occs/day
- Jason CS (EUMETSAT/NOAA/CNES/NASA)
  - currently in Phase-B, launch ~ 2017 (66° inclination, 1336 km)
  - ~ 400 setting occs/day (GPS & Galileo), however rising might be feasible as well

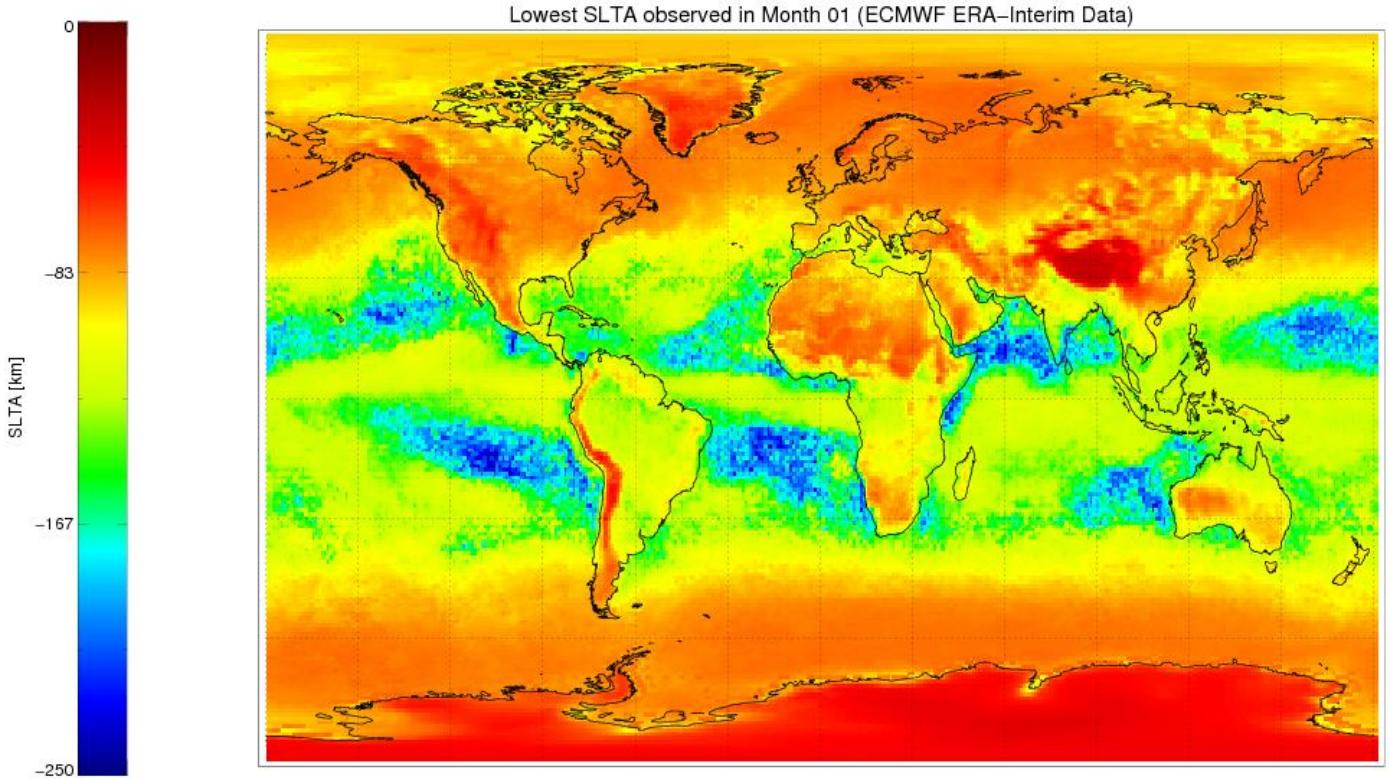
Conclusion

- Operational GRAS Processing:
  - very solid performance (GO only)
  - Timeliness improvements with Antarctica station for about 70% of data
  - Metop-B launch 2012 will double GRAS occultations (May '12)
  - Offline data in new format is available in semi-NRT mode (best effort)

- Future Radio Occultation Opportunities:
  - RO is considered for both EPS-SG satellites
  - EUMETSAT looking into cooperation on ROSA instrument
  - Jason CS is being evaluated for RO instrument

BACKUP

Lowest SLTA (Jan 2007, ERA Interim Data)



Attenuation (Jan 2007, ERA Interim Data)