

Subject	MSG 2.5min Rapid Scan Operational Constraints
Action proposed	Decision/ <u>Consideration</u> /Information/Recommendation
Abstract	-/-
Views of other EUMETSAT Bodies	-/-
Decision proposed	STG-OPSWG is invited to take note and to comment accordingly.
Cost implications	-/-
Reference documents	-/-



Meteosat-8 Super-RSS: context

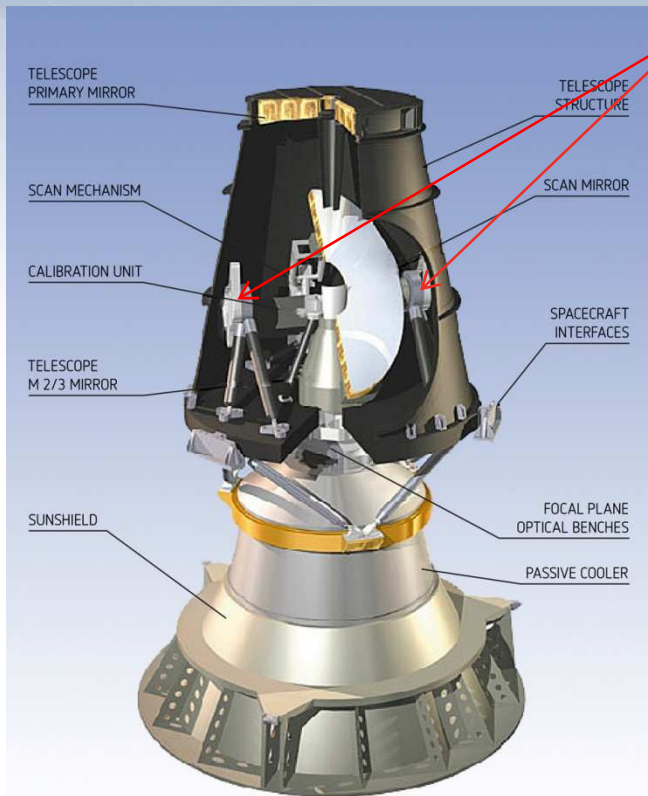
- STG-SWG and STG-OPS-WG expressed interest in having more cases of 2.5-minute scan and therefore the Secretariat was asked to perform a few additional experiments with Meteosat-8.
- Martin Setvak from the Czech Hydrometeorological Institute, who presented the results of the first 2.5-minute scan test (executed with MSG-3 in Sept 2012), coordinated with the SWG and OPS WG Members to determine the timing of these scans.
- Initially two tests of 24-hour period of 2.5-min “super rapid scans” were foreseen. The corresponding data were to be provided via FTP, as done for the previous 2.5-min scan test with MSG-3.
- As a reminder, the RSS parallel dissemination from Meteosat-8 ending on 7 May 2013, super rapid scan tests could not be performed before this date.
- EUMETSAT also needed to check with industry the potential risk that the 2.5-min “super rapid scans” might have on the instrument scan mechanism lifetime.



Background

- SEVIRI is designed and qualified to perform Full Earth Scans (FES) of 15 minutes.
- In view of establishing the Rapid Scanning Service (RSS), the SEVIRI design was revisited by industry to identify the critical areas which needed additional qualification to ensure that RSS was not damaging the instrument.
- As a result the ball bearings supporting the SEVIRI scan mirror were identified as critical elements needing a specific additional qualification.
- A ball bearings lifetime test at accelerated speed was performed and led to the conclusion that SEVIRI can safely perform **up to 5 years of RSS + 15 years of FES.**
- This is valid provided that **every 28 days of RSS there are 48 hours of FES and that every 11 months of RSS there is 1 month of FES.**
- Out of the available 5 years of RSS (qualification limit), only approximately 150 days of RSS were left for Meteosat-8 in May 2013. Additional RSS days beyond this limit may endanger the SEVIRI scan mechanism also for Full Earth Scanning.

SEVIRI design aspects



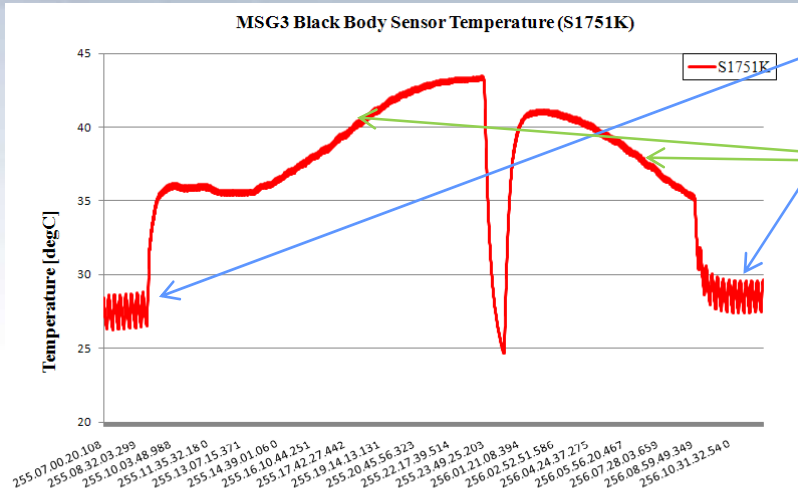
Ball bearings accommodation

Main Concerns:

- designed to operate in an angular range from $+4.5^\circ$ to -4.5° for 15-minute scans;
 - This angular range becomes from $+1.5^\circ$ to -1.5° for 5-minute RSS scans;
 - This angular range becomes from $+0.75^\circ$ to -0.75° for 2.5-minute Super-RSS scans.
- 6 times smaller angular range, no ground qualification available, satellite in use since 2002 (11 years old!).
- Possible lubricant wear (metal-to-metal contact) and/or deformation with potential degradation of pointing accuracy.
- Thermal effects to be monitored e.g. on mechanism motor, and avoid the sun shining into the optical path as no cooling down possible in Super-RSS.



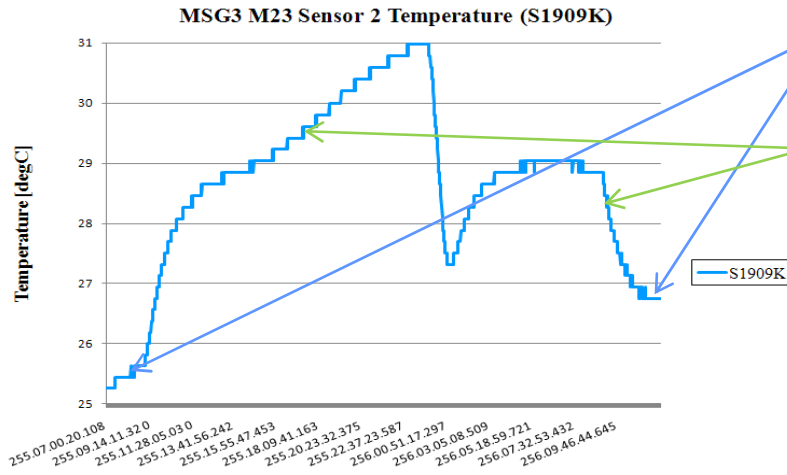
MSG-3 Super-RSS in Sept 2012: Some Observations



SEVIRI blackbody temperature during 15-min scans

SEVIRI blackbody temperature during 2.5-min scans

24h 2.5min scan test conducted from DOY255@09:00 to DOY256@09:00



SEVIRI M23 mirror temperature during 15-min scans

SEVIRI M23 mirror temperature during 2.5-min scans

24h 2.5min scan test conducted from DOY255@09:00 to DOY256@09:00

Some effects of sun shining directly into the MSG-3 SEVIRI optical path during the 2.5 - min Super-RSS in Sept 2012!



Industry support

As part of the support for the MSG Satellite Routine Operations, Thales Alenia Space (TAS) analysed the different aspects involved for the 2.5min Super-RSS tests with Meteosat-8 and provided their assessment by reviewing the SEVIRI design and the ball bearings additional qualification report.

After a few iterations and clarifications, TAS gave the “go ahead” for the Meteosat-8 Super-RSS with the following “hard” conditions:

- No more than 48 hours cumulative, split in 4 sessions of 12 hours each, interleaved with 48 hours of 15-min scans (to smooth again the lubricant);
- Special monitoring of the scan mechanism temperatures;
- Avoid seasons where the sun shines directly into the SEVIRI optical path (i.e. close to the equinox);
- In addition, EUMETSAT have prepared a dedicated monitoring of the mirror pointing information so that any outlier points can be better identified.

Super-RSS cannot become an operational service with MSG!



Operational process in EUMETSAT

- A list of coordinating people and interfaces was setup in EUMETSAT;
- A dedicated Special Operations Instruction was validated in a simulated environment;
- Training of the experts to start/stop “Super-RSS” was performed and was refreshed at regular intervals;
- Information about Meteosat-8 availability is provided weekly and the availability of experts is also confirmed on weekly basis;
- A “Super-RSS” Mission Planning Schedule is prepared and validated on a weekly basis;
- Upon reception of ESSL advance notification (at least 24h in advance), readiness is checked;
- Upon ESSL confirmation the Super-RSS is started manually at 09:00 UTC and ended again manually at 21:00 UTC. This is an engineering task and not a shift team task (this is the reason to limit the Super-RSS during regular working hours when the full EUMETSAT instrument engineering team is present).

This “interactive” operations has been a successful experience!



Conclusion

“STG-OPSWG is invited to take note and to comment accordingly”.