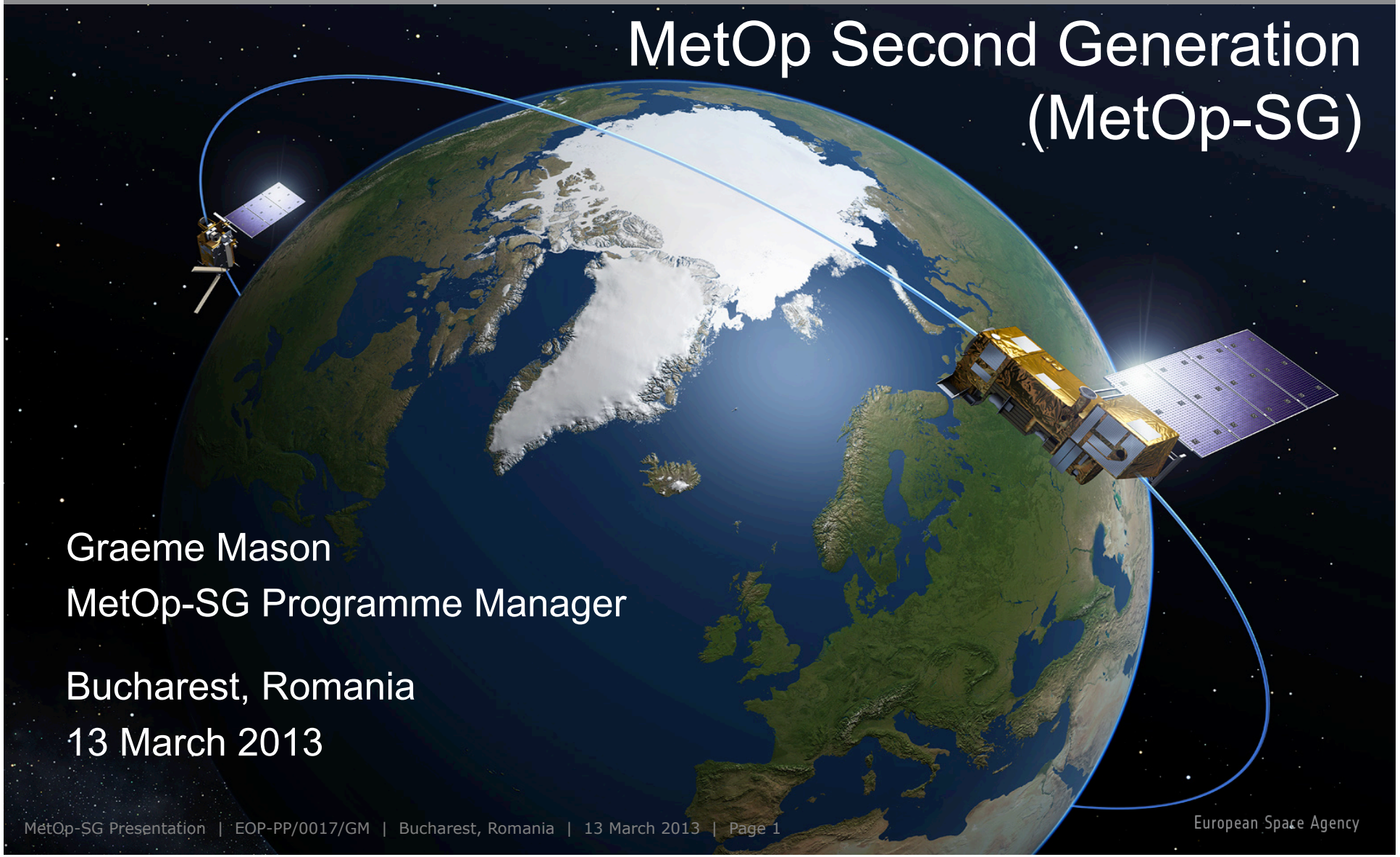
ESA Earth Observation Info Day



MetOp Second Generation (MetOp-SG)

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13 March 2013

MetOp-SG Introduction

- **Met**eorological **Op**erational **S**econd **G**eneration (MetOp-SG) is a follow-on system to the first generation series of MetOp satellites, which currently provide essential, operational meteorological observations from polar orbit (~25% of impact on numerical weather prediction is from MetOp alone).
- MetOp-SG is a collaborative programme between ESA & EUMETSAT.
- ESA is responsible for the development of the prototype satellites and, on behalf of EUMETSAT, for the procurement of the recurrent satellites.
- EUMETSAT is responsible for overall user and mission requirements, procurement of the launchers and LEOP services, development of the ground segment and also performs the operations.
- ESA funding comes from the ESA MetOp-SG Programme, which was approved at the ESA Council at Ministerial Level in November 2012.
- EUMETSAT funding will come from the EUMETSAT Polar System Second Generation (EPS-SG) Programme, which is expected to be approved by the end of 2014.

MetOp-SG Objectives

- To provide operational observations and measurements from polar orbit for numerical weather prediction and climate monitoring in the 2020 to 2040 timeframe.
- In addition, to provide services to atmospheric chemistry, operational oceanography and hydrology.
- With respect to the first generation of MetOp satellites:
  - to ensure continuity of essential operational meteorological observations from polar orbit, without a gap;
  - to improve the accuracy / resolution of the measurements;
  - to add new measurements / missions.

MetOp-SG Overview

- Preparatory studies for MetOp-SG have been on-going for several years, with competitive Phase A/B1 studies now nearing completion.
- MetOp-SG consists of two series of satellites (Satellite-A and Satellite-B), with **nominally 3 satellites in each series** (with the final number of recurrent satellites to be decided by EUMETSAT as part of the approval process for the EPS-SG Programme in 2014).
- The MetOp-SG satellites will fly in the same orbit as the first generation MetOp (sun-synchronous, polar orbit, altitude 817 km, mean local solar time 09:30 (descending node), repeat cycle 29 days).
- MetOp-SG will embark several different instruments providing:
  - continuity and improvements to those observations currently provided from the first generation MetOp satellites;
  - new additions for MetOp-SG, combining user experiences from other experimental or operational missions.
- Six instruments to be developed under MetOp-SG Programme, with four other instruments being provided by ESA GMES, CNES and DLR.

MetOp-SG Payload Complement

Satellite	Instruments	Instrument Provider
Sat-A	METimage	DLR via EUMETSAT
	IASI-NG	CNES via EUMETSAT
	MWS	ESA – MetOp-SG
	RO	ESA – MetOp-SG
	3MI	ESA – MetOp-SG
	Sentinel-5	ESA – GMES
Sat-B	SCA	ESA – MetOp-SG
	MWI	ESA – MetOp-SG
	RO	ESA – MetOp-SG
	ICI	ESA – MetOp-SG
	Argos-4	CNES via EUMETSAT

MetOp-SG Payload Complement

Instrument	Heritage	Spectral Bands/Channels & Performance
METimage	AVHRR	≥ 20 channels: 0.443 – 13.345 µm; spatial sampling 500 m; few solar channels sampled at 250 m.
IASI-NG	IASI	spectral range: 645 – 2760 cm-1; spectral resolution and radiometric accuracy with factor 2 improvement wrt IASI; pixel size 12 km, spatial sampling 25 km, swath 98° (same as IASI).
MWS	AMSU-A,MHS	24 channels: 23 – 229 GHz; horizontal resolution: 17 – 80 km.
SCA	ASCAT	5.3 GHz radar, 6 fixed fan shaped beams; spatial resolution 25 km; dynamic range 4 – 40 m/s.
RO	GRAS	GPS & Galileo signals tracked (Glonass & Compass options); 1575 MHz, 1176 MHz frequencies; goal of bending angle accuracy of 0.5 µrad and >1000 occultations / day (per instrument).
Sentinel-5	GOME-2	9 bands: 0.27 – 2.385 µm; spatial sampling of 5 - 10 km.
MWI	(SSM/I, MADRAS)	18 channels: 18.7 – 183 GHz; spatial resolution: 10 - 50 km.
ICI	-	11 channels: 183 – 664 GHz; spatial resolution: 15 km.
3MI	(POLDER)	12 channels: 0.410 – 2.13 µm; spatial resolution: 4 km.
Argos-4	A-DCS	400 MHz transponder.

MetOp-SG Phasing

- Phase B2 Preliminary definition

  During Phase B2, the full industrial consortium will be built-up.

  ITTs will be issued (by the Primes) for satellite and instrument equipments in accordance with ESA's "code of best practices" (50% of which, by value, will be reserved for non "Large System Integrators").

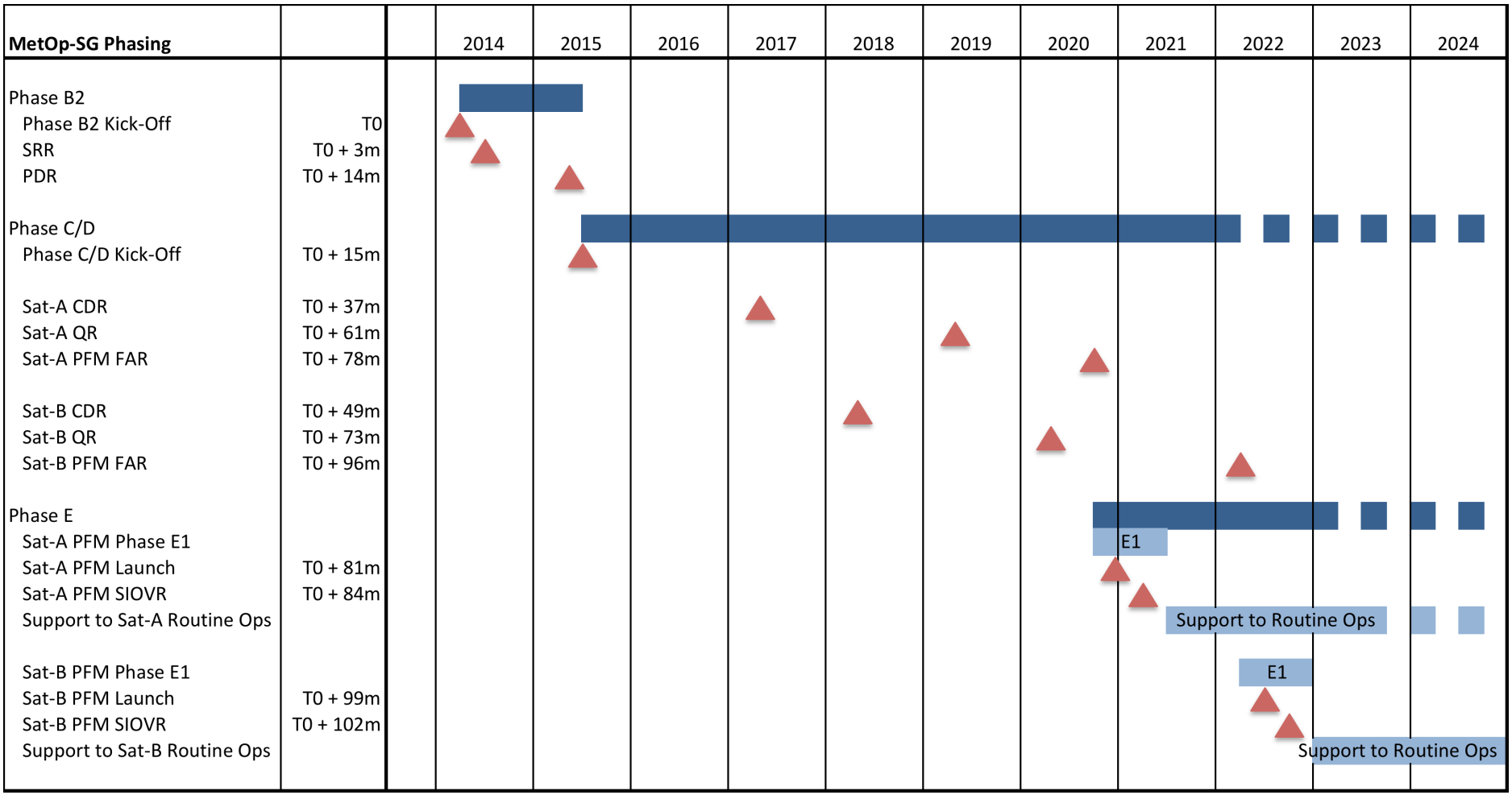
  Romanian industry will need to respond to such ITTs to win contracts.

  Timescale = mid-2014 to mid-2015.

- Phase C/D Detailed definition and manufacture
- Phase E1 Launch campaign and in-orbit commissioning
- Phase E2 Routine operations
- Recurrent units

  Recurrent units (up to four recurrent units plus flight spares) to be manufactured in series.

MetOp-SG Schedule



MetOp-SG Procurement Process (1)

- ESA is performing a pre-selection of the Prime contractors for the MWS, MWI, ICI, 3MI and RO instruments, who will then be identified as mandatory subcontractors for all potential satellite Primes.
- ITT for overall MetOp-SG Phase B2/C/D/E to be issued in June 2013.
- Two satellite Prime contractors (one for Sat-A and one for Sat-B) will be selected, together with associated Core Team contractors.
- At this stage the selection is only for the Core Teams, which are limited to 35% of the total activity for the satellites and 50% for the instruments (leaving approximately 55% of the total value of industrial contracts still to be allocated).
- The industrial offers will also include a consolidated Industrial Procurement Plan for the remainder of the items:
  - identifying potential bidders for major items;
  - indicating how the Primes will satisfy the ESA geographical return requirements.

MetOp-SG Procurement Process (2)

- Following the down-selection and final negotiation of the satellite Primes and associated Core Teams, industry shall then undertake selection of the remaining team members through the application of ESA's "Code of Best Practices" (http://emits.esa.int/emits/owa/emits.main).
- This process will take place in the mid-2014 to mid-2015 timeframe.
- Starting with the major subsystems and equipments and then working through to other support activities, the Primes will ensure a competitive procurement process is applied at all levels.
- To ensure fairness of competition, ESA will participate to this process and will chair the Tender Evaluation Boards where bidders include either affiliates of or directly the company running the competition.
- Throughout this process, industry will be required to ensure that the geographical return requirements are met, which may, in some cases, result in a competition restricted to potential under-returned countries.
- Final selection of subcontractors and major suppliers is subject to ESA formal agreement.

MetOp-SG Opportunities

- Due to the share of responsibilities between ESA and EUMETSAT regarding MetOp-SG, the opportunities for industry under the ESA Programme are focused entirely on the space segment (including platforms and instruments):
  - Structures
  - Harnesses
  - RF Equipment & Components
  - Electronics Units
  - Thermal Hardware
  - Independent Software Verification & Validation (ISVV)
  - Electrical Ground Support Equipment
  - Mechanical Ground Support Equipment
  - Engineering / AIT / Software Support
  - Mechanisms
  - Antennas
  - Sensors
  - EEE Components
  - On-Board Software
  - Ground Prototype Processors (for instruments)
  - EGSE Software
  - Optical / RF Ground Support Equipment

MetOp-SG And Romania

- Total MetOp-SG Programme financial envelope
  = 808.5 M€ (ESA Prog subscriptions) + 281 M€ (EUM contribution)
  = 1089.5 M€ (to cover both ESA costs and industrial contracts).
- Romania contributes 2.04 M€ to the ESA MetOp-SG Programme.
- In accordance with ESA's rules regarding geographical return, the total value of contracts awarded to Romanian industry for the MetOp-SG development will be in proportion to the Romanian contribution to the ESA MetOp-SG Programme.
- For the recurrent satellites, the industrial consortium (including Romanian industry) will be the same as for the development programme – the funding for which will be provided by EUMETSAT.
- Since November 2010, Romania is a full member of EUMETSAT and contributes to the mandatory EUMETSAT Programmes, which will include EPS-SG.
- Ground segment and operations contracts will be placed by EUMETSAT (note that EUMETSAT does not apply geographical return constraints).

Way Forward For Interested Companies

- ESA does not impose the selection of particular companies / nationalities within a consortium – but rather actively encourages industry to select a balanced consortium to meet the geographical return requirements (whilst ensuring cost effective and technically compliant solutions).
- Based on the level of contribution to MetOp-SG from Romania, the role of any Romanian company will necessarily be at a lower level within the consortia (i.e. not in the initial Core Team selection or first round of major subsystem / equipment suppliers).
- To position themselves for inclusion in the “Best Practices” selection process, Romanian companies should make the potential MetOp satellite Primes (and potential instrument, subsystem / equipment suppliers) aware of their capabilities and interests.
- ESA will actively support this process, but ultimately it is up to the respective companies to develop their involvement in any future team.

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Conclusions

- MetOp-SG offers a wide range of opportunities for Romanian industry involved in space segment activities, with a long-term perspective due to the recurrent units.
- Such opportunities will be through the “Best Practices” procurements to be issued by the satellite or instrument Primes (expected in the mid-2014 to mid-2015 timeframe).
- However, these opportunities need to be prepared, with the specific capabilities and interests of Romanian industry being identified at an early stage (including direct contacts with ESA and potential satellite Primes: Astrium, TAS and OHB).
- ESA looks forward to the involvement of Romanian industry in this highly important MetOp-SG programme.

METOP-SG

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