

STATUS OF METEOSAT THIRD GENERATION (MTG)

This paper presents the status of the activities for the Meteosat Third Generation (MTG) Programme. It addresses the progress achieved until early September 2011, and the short term objectives upon which EUMETSAT is concentrating efforts in the design and development of the system. The status of the MTG activities at ESA is also addressed.

The entry into force of the Council Resolution implementing the MTG Programme at EUMETSAT in February 2011 has enabled the work to progress in Phase B in all programme segments and the Phase C/D to commence at System level. After the System Preliminary Design Review (System PDR) took place at EUMETSAT between May and June 2011, the work is addressing consolidation and update of requirements and plans at system level in line with the established actions at PDR. Extensive effort continues in the scientific activities targeting the definition of the future mission products, involving internal and external experts, National Meteorological Services, scientific institutions and the international cooperation. Finally, Ground Segment (GS) activities at EUMETSAT have focussed at the consolidation of GS system requirements as part of the System PDR, and then at the preparation of the GS PDR (spring 2012) and of the future ground segment procurements.

At Satellite level, as part of the ESA MTG programme, activities have addressed the consolidation of requirements and design in line with the actions open from the Phase B2 Kick Off in November 2010 or specifically established at the satellite System Requirements Review (Satellite SRR) in spring 2011. Intensive work is also ongoing associated with the Procurements under Best Practices. A Satellite Baseline Definition Review (BDR) is planned in November 2011, before approaching the main elements (Instruments and Platform) PDRs and then the satellite PDR for both MTG-I and MTG-S, until late spring 2012.

Status of Meteosat Third Generation (MTG)

1 INTRODUCTION

This paper presents the status of the activities for the Meteosat Third Generation (MTG) Programme. It addresses the progress achieved in the period from May 2011 until end of August 2011, and the short term objectives upon which the Secretariat is concentrating efforts in the design and development of the system.

2 MTG PROGRAMME STATUS

2.1 Overall Status

The entry into force of the Council Resolution implementing the MTG Programme at EUMETSAT in February 2011 has enabled the work to progress in Phase B in all programme segments and Phase C/D to commence at System level, after the System Preliminary Design Review (System PDR) which took place at EUMETSAT between May and June 2011. Following System PDR, the work is addressing consolidation and update of requirements and plans at system level in line with the established actions at PDR. Extensive effort also continues in the scientific activities targeting the definition of the future mission products, involving internal and external experts, National Meteorological Services, scientific institutions and the international cooperation. At Ground Segment (GS) level, activities at EUMETSAT have focussed at the consolidation of GS system requirements as part of the System PDR, and then at the preparation of the GS PDR (spring 2012) and of the future ground segment procurements, for which ITT to industry will be released progressively per each GS Facility starting around mid 2012.

At satellite level activities have addressed the consolidation of requirements and design in line with the actions open from the Phase B2 Kick Off in November 2010 or specifically established at the satellite System Requirements Review (Satellite SRR) in spring 2011. A dedicated Review, the Satellite Baseline Definition Review, is going to take place late in autumn this year before approaching the satellite Preliminary Design Review. The introduction of BDR is essentially allowing a consolidation of satellite specifications at all levels and the satellite development/verification plans which could not be concluded at SRR. Following BDR, the PDR's of the Platform, Flexible Combined Imager (FCI) and InfraRed Sounder (IRS) and then the satellite PDR will all take place in the first half of 2012. Intensive work is associated with the Procurements under Best Practices at satellite level which have progressed throughout the summer period.

2.2 Space Segment

In the reporting period, much emphasis is being placed on reaching a coherent technical baseline across the industrial consortium. This in particular addressed convergence on common support specifications required for progressing with the procurements, on main element requirements including interface requirements, on design and development plans. The Best Practice procurement activities are in progress, establishing ITTs, evaluating the bidders' proposal, selecting and negotiating the offers.

On the engineering side, critical engineering issues are being addressed like consolidation of satellite mass budgets, microvibrations, thermoelastic distortions. Work on definition of Lightning Imager (LI) baseline and possible alternative concepts has progressed involving ESA/EUMETSAT and Industry at system level. The Instrument ITT should be released in early autumn this year. On Flexible Combined Imager (FCI) and Infrared Sounder (IRS), performance issues were open at SRR; the subsequent progress has enabled convergence to acceptable solutions overall compliant with the MTG End Users Requirements Document.

Concerning the satellites schedule status, currently short term schedule slippages are apparent but what these slippages mean in the medium and long term is not clear yet. Overall schedule situation will be re-assessed at the satellite PDR.

The MTG Agreement with ESA was updated following approval at ESA level of the Update of the Declaration on the Meteosat Third Generation in March at PB-EO level, to finalise the level of the financial contribution by EUMETSAT. It has been subsequently approved by the ESA Council and then by EUMETSAT Council 72, end of June 2011.

2.3 Overall System, Scientific activities and Ground Segment

2.3.1 System Engineering

The MTG System PDR for the overall MTG system took place in EUMETSAT until end of June. Main objectives of the PDR were to verify the system level preliminary design and the operations concept against system requirements, to assess the adequacy of management practices and engineering plans, and to baseline the Ground Segment Requirements Document in view of finalising the preliminary GS design for the GS PDR. It has included a science part associated with assessing the suitability of the Algorithm Theoretical Basis Documents (ATBDs) in view of the subsequent preparation of the Level-2 Product Generation Specifications for those meteorological products to be initially generated in the Level-2 Processing Facility (L2PF) in the EUMETSAT Headquarters.

The outcome of the Review has addressed, among others:

The uncertain status of the Space Segment schedule and the postponement of the satellite PDR, which affect the logic of the Programme Reviews at system and GS level;

The GS development approach and in particular the versioning approach for both development and operational GS versions, in view of further work to be done for the GS PDR in definition of scope and objectives for each version;

The scientific interactions between the Satellite Application Facility (SAF) network and the GS development for the relevant Level-2 algorithms, to be addressed in future Reviews;

The need to continue the coordination with ESA for progressing on the definition on how S4 UVN data products will be developed and made available for the EUMETSAT user communities and how potential synergies with the other MTG instruments will be exploited.

The work at system level has subsequently progressed in addressing the various issues in coordination with the GS team and with ESA, and preparing towards the satellite BDR/PDR and GS PDR.

2.3.2 Scientific Activities and Related Studies

The scientific development of the MTG Level-2 product generation chains, as a general principle, is based on theoretical considerations, exchange of scientific ideas with other scientists working in the same field, followed by software prototyping activities, using real and proxy data, but mostly confined to selected case studies. This scientific process pursued by scientists in EUMETSAT is supported by external studies, visiting scientists, guidance by Delegates of the EUMETSAT Member States who are part of the Science Working Group of STG, plus dedicated MTG-IRS (MIST) and MTG-LI (LIST) Science Teams.

Science activities pursued since the last reporting focussed on supporting the MTG System PDR. Version V1 of the Algorithm Theoretical Basis Documents (ATBDs) were delivered for the product generation chains becoming in the future the operational functionalities in the Level-2 Processing Facility (L2PF). Translation of the ATBDs into the Product Generation Specification (PGS) to be used for the development of the Level-2 Processing Facility of the MTG GS has started.

A number of scientific studies are being carried out in support to the MTG-IRS scientific development, addressing among others the potential of an ensemble forecast system to provide more flow dependent background information for improving atmospheric state retrievals, the Principal Component (PC) compression methods for being applied to MTG-IRS Level-1 data before dissemination such that the uncompressed data will have no negative impact on the MTG-IRS Level-2 product generation. Scientific studies in support to the MTG-LI scientific development included the EUMETSAT contribution to the GLM-CHUVA field campaign, the evaluation and enhancement of the proxy tools for generating MTG-LI proxy data and initial concept of use of ATDnet ground observation data for MTG LI processing.

Studies on the FCI applications are carried out derived from MSG current and future products, focussing at the enhanced capability of MTG.

2.3.3 Ground Segment

At Ground Segment level, activities initially focussed on the consolidation the Ground Segment (GS) requirements arriving at the release of the GS Requirements Document (GSRD). They subsequently progressed in addressing those system requirements still to be defined or to be confirmed, critically analysing the sizing constraints, and potential design and cost driving requirements.

The establishment of GS Facility requirements is being addressed as part of the GS architectural design activities together with the GS development and verification planning. This is done in preparation for the GS PDR and then for the Facility ITTs. It is currently expected to hold the GS PDR to end of 1st quarter 2012.

Facility contracts subject of ITT will be placed after the Satellite PDR, giving the opportunity to feed in updated information prior to Kick Off. The Instrument Data Processing Facility is currently being studied by TAS (F), together with Logica (UK) under a GS study of Phase B managed by EUMETSAT. This study will conclude in early October 2011. Other studies are being run in the period. Following acceptance of a SCOS demonstrator in early July, data processing aspects as well as familiarisation with SCOS 2000 are being analysed as a base for the Mission Control and the operations concept. Studies into modern computing technologies and KA band antenna technologies are also ongoing. Studies on use of Graphical Processing Units and Cloud Computing have concluded, giving useful information for the future GS design and procurements.

To recall the major foreseen GS Procurements are:

- Instrument Data Processing Facility (IDPF)
- Mission Operations Facility (MOF)
- Mission Data Acquisition (MDA) Ground Stations
- Telemetry, Tracking and Commanding (TTC) Ground Stations
- Level-2 Processing Facility (L2PF)

and GS Network

Following the Programme approval by Council, the need to progress with the GS team build up at EUMETSAT has been addressed in the period.

3 SENTINEL-4

At instrument level, activities are in Phase B since February 2011 when the Kick Off took place, following the Instrument ITT. The instrument level SRR took place between May and June 2011. The Instrument PDR is planned to take place between December 2011 and January 2012. Overall, there is a good progress in line with the needs of the MTG-S Satellite development and Programme.

In coordination between EUMETSAT MTG and ESA S4 project, work started on a GMES S4 Operation and Ground Segment requirements document, to define common assumptions associated with S4 operations and ground processing.

4 PLANS FOR IN ORBIT DEPLOYMENT OF THE MTG SYSTEM

As a basic approach, the deployment of the MTG system will be driven by an overall flexibility regarding the schedule of launches in order to maximise the duration of the operational service to the users between MSG and MTG.

The lifetime of MTG satellites has been specified to be at least 8.5 years per satellite. Based on this minimum life, twenty years of routine operations of the imagery mission are included, encompassing fifteen and a half years of routine operations of the sounding mission.

The resulting MTG satellite deployment scenario, developing from a baseline of earliest launch dates has been revisited, in consideration of the postponement of the launch of MSG-3 to mid 2012 and as result of the extended duration of the selection process of the industrial Prime on the MTG space segment.

A postponement of about one year of each of the above earliest launch dates for the MTG satellites has been considered with respect to the status presented to CGMS in 2010, leading to the following launch planning (*):

MTG-I1: Dec 2017
MTG-S1: June 2019
MTG-I2: Dec 2022
MTG-I3: Jan 2026
MTG-S2: June 2027
MTG-I4: Dec 2030

(*)

MTG-I : MTG Imaging satellite – MTG-I1 : first Imaging satellite

MTG-S : MTG Sounding Satellite – MTG-S1 : first Sounding satellite

5 CONCLUSIONS

CGMS Members are invited to take note.