

# THE USER INTERFACE OF THE ENMAP SATELLITE MISSION

*Uta Heiden<sup>1</sup>, Nicole Pinnel<sup>1</sup>, Jörg Gredel<sup>4</sup>, Helmut Mühle<sup>1</sup>, Isabelle Pengler<sup>1</sup>, Katja Reissig<sup>6</sup>, Daniele Dietrich<sup>1</sup>, Torsten Heinen<sup>1</sup>, Tobias Storch<sup>3</sup>, Sabrina Eberle<sup>2</sup>, Hermann Kaufmann<sup>5</sup>*

<sup>1</sup> German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Wessling, Germany, Helmut.Muehle@dlr.de; Uta.Heiden@dlr.de; Nicole.Pinnel@dlr.de; Isabelle.Pengler@dlr.de;

Daniele.Dietrich@dlr.de; Torsten.Heinen@dlr.de

<sup>2</sup> German Aerospace Center (DLR), German Space Operation Center (GSOC), Wessling, Germany, Sabrina.Eberle@dlr.de

<sup>3</sup> German Aerospace Center (DLR), Remote Sensing Technology Institute (IMF), Wessling, Germany, Tobias.Storch@dlr.de

<sup>4</sup> EOS-Consulting, Joerg.Gredel@dlr.de

<sup>5</sup> Deutsches GeoForschungsZentrum, Potsdam, Germany, charly@gfz-potsdam.de

<sup>6</sup> IB Reissig, Katja.Reissig@dlr.de

## 1. INTRODUCTION

EnMAP (Environmental Mapping and Analysis Program) is a German hyperspectral satellite mission providing high quality hyperspectral image data on a timely and frequent basis. Main objective is to investigate a wide range of ecosystem parameters encompassing agriculture, forestry, soil and geological environments, coastal zones and inland waters [1]. This will significantly increase our understanding of coupled biospheric and geospheric processes and thus, enable the management and ensure the sustainability of our vital resources.

## 2. ENMAP INSTRUMENT DETAILS

The EnMAP satellite will be operated on a sun-synchronous orbit at 643 km altitude. The local time of descending node is set to 11:00 h  $\pm$  18 minutes to observe any location on the globe under defined illumination conditions. It results in a global revisit capability of 21 days under a quasi-nadir observation and 4 days using the across-track tilt capability of  $\pm$  30°. This local time of descending node also allows for a maximum reflected solar input radiance at sensor with an acceptable risk for cloud coverage.

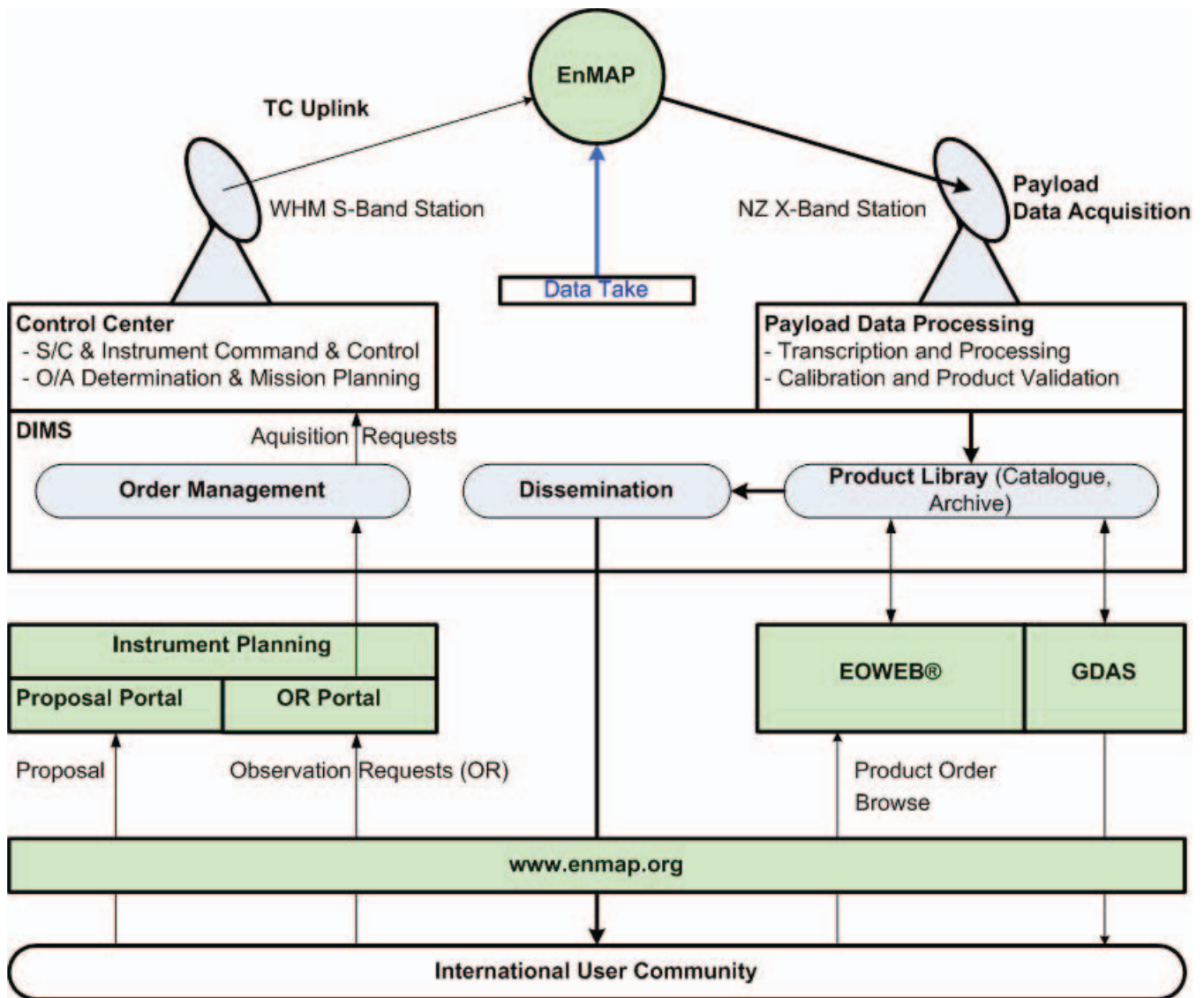
The hyperspectral instrument will be realized as a 2 pushbroom imaging spectrometer recording data over the wide spectral range from 420 nm to 2450 nm. Its data acquisition over the VNIR (visible and near infrared) wavelength range will be performed by a 2-dimensional CMOS (Complementary Metal Oxide Semiconductor) detector array with approximately 96 spectral channels. For SWIR (shortwave infrared) wavelength range, a 2-dimensional MCT (Mercury Cadmium Telluride) detector array with approximately 136 spectral channels will be

used. Each spectrometer performs with an analogue-to-digital converter resolution of 14 bits [2]. The ground pixel size will remain constant over the whole mission lifetime at certain latitude, e.g. 30 m × 30 m at nadir at 48° northern latitude. In this context a pointing accuracy of better than 500 m is expected, which will be improved to a pointing knowledge of better than 100 m by ground processing. The sensors' 1000 valid pixels in spatial direction result in a swath width of 30 km [3].

### **3. THE ENMAP GROUND SEGMENT**

The Applied Remote Sensing Cluster at the German Aerospace Center is responsible for the establishment of the ground segment for the future German hyperspectral satellite mission EnMAP (Environmental Mapping and Analysis Program). This presentation briefly describes the design of the ground segment and addresses its organisation. Main emphasis is put on the user interface providing details on the design and the functionality which will support the international EnMAP user community.

The EnMAP ground segment is organized in three systems covering all aspects relevant to assure successful mission operations. The Mission Operation System (MOS), responsible for controlling and commanding satellite and instrument, is operated by the German Space Operations Center (GSOC) with its multi-mission control center in Oberpfaffenhofen, Germany, and its main S-band telemetry- and telecommand ground station in Weilheim, Germany. The Payload Ground System (PGS), responsible for data reception, data processing, and data archiving, as well as providing a web-interface to the EnMAP user community, is operated by the German Remote Sensing Data Center (DFD) with its multi-mission infrastructures located in Oberpfaffenhofen and Neustrelitz, Germany, where also the main X-band payload data ground station is located. The Processor, Calibration, and Validation System (PCV), responsible for developing the hyperspectral processing system capable of generating high quality calibrated EnMAP data products at several processing levels, calibrating the sensor and validating the products [4], is operated by the Remote Sensing Technology Institute (MF) supporting the mission with its expertise and dedicated elements located in Oberpfaffenhofen and Berlin, Germany. These three systems are further separated into 15 subsystems. The ground segment management part contains the ground segment manager, product assurance, system engineer and application support responsible for the conceptual design of the user interface [5].



#### 4. THE ENMAP USER INTERFACE

The user interface consists of a set of hierarchically structured online portals interfaced with several subsystems of the EnMAP ground segment (Figure 1). The EnMAP portal is the central entry point for all international users interested to learn about the EnMAP mission, its objectives, status, applications and scientific activities. The EnMAP portal links to further online portals which require an online registration procedure. EnMap data can be received via a reviewed scientific proposal or without a proposal procedure.

- The proposal portal enables the submission of proposals for review in response to Announcements of Opportunities. Observation requests which are related to accepted proposals will get a high priority in scheduling of acquisition request by mission planning.

- The Observation Request Portal enables the submission of planned data requests. The user will be able to plan his special data take with a wide range of parameters such as time specification, nadir options and sunglint parameters. For the acceptance of observation requests rules on priority and restrictions on quota apply.
- The EOWEB® portal allows browsing and ordering of EnMAP data products that have previously been acquired, processed, and archived in the product library. GDAS is a new User Service extending the EOWEB® functionality. It provides standardized web services (OGC) for accessing geospatial datasets, enables interoperable data access with software tools and web portals and additionally provides geospatial core datasets (boundaries, land / watermask, infrastructure).

The proposals and the associated results will be presented in a map tool enabling the establishment of a world-wide network for the highest transparency. The operational services offered through the EnMAP portal will be complemented by a service team, EnMAP Application Support, offering expert advice on the exploitation of EnMAP data.

## 11. REFERENCES

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