GMES Space Component: Status and Prospects

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Abstract

Based on observation needs expressed by user communities in the environment and security domain, ESA member states have, in 2005, decided to invest in the build-up of the necessary space infrastructure as a complementary capacity to those available in its member states.

The GMES Space Component programme provides the initial space capacity needed to deliver an effective global monitoring system by accessing two types of Earth observation missions; those held at national and EUMETSAT level, called Contributing Missions, and those developed by ESA as GMES dedicated missions, called Sentinels. Integration of these into a harmonious data stream to users is a major challenge and is carried out as part of a distributed ground segment design allowing interoperability with these missions.

The Sentinels will be the first series of dedicated operational satellites to meet the Earth observation needs of GMES users.

The Sentinel-1 constellation is a pair of synthetic aperture radar (SAR) imaging satellites. It ensures continuity of C-band SAR data and builds upon heritage and experience with the ERS and ENVISAT satellites but with improved resolution (up to 5 m) and swath (up to 400 km). It maintains key characteristics such as stability and accuracy of data products and also improves significantly revisit frequency and coverage.
A pair of Sentinel-2 satellites will routinely provide high resolution (10-20 m) optical images globally with revisits of 5 days at Equator tailored to the needs of GMES land and emergency services. Sentinel-2 aims at ensuring continuity of SPOT and LANDSAT type data, with improvements to allow service evolution.
A pair of Sentinel-3 satellites will provide daily global near real time ocean, ice and land monitoring. It continues observations of ERS, ENVISAT and SPOT/Vegetation. It also contains a radar altimeter for ocean services.
Sentinel 4 and 5 will be dedicated to monitor atmospheric trace gases from geostationary and low Earth orbit respectively.

ESA has been mandated as the development and procurement agency for the family of Sentinel satellites and the related Ground Segment. ESA is also responsible for coordinating the overall GMES Space Component including access to data from the GMES Contributing Missions from ESA's Member States and EUMETSAT.

The European Commission is in charge of the overall political leadership as well as for implementing the services component of GMES.

The acquisition of reliable information and the provision of services form the backbone of Europe’s GMES initiative. Services will be based on data from a host of existing and planned Earth observation satellites from European and national missions, as well as a wealth of measurements taken *in situ* from instruments carried on aircraft, in the oceans or positioned on ground.

Both ESA and the European Commission worked together on building the GMES services, through which pre-operational services and products for users were developed and validated.

Most of the GMES services are now becoming operational, focused on five main domains: services for the marine environment (focused on marine safety and transport, oil spill monitoring, water quality, etc.), services for the land environment (focused on agriculture and food security, land-use change, forest monitoring, etc.), atmospheric services (focused on air quality forecasting and climate change studies), emergency response services (providing help to mitigate the effects of natural and manmade disasters, flood, earthquakes, etc) and security services (providing support for peace-keeping efforts, maritime surveillance and border control).

The EC is preparing the operational programme which ensures long term sustainability of the infrastructure being built. By mid 2009, the development of a detailed action plan for the further implementation of GMES, including relevant decision milestones and EU future funding approach are foreseen.

The data policy for access to data from Sentinel missions has yet to be defined, but some principles are already stated in key programmatic documents. Free and open access to GMES and European national users is identified as a key element of this policy, obviously within any identifiable restrictions that might emerge from, for example, security considerations. Data policy will also be defined in the wider context of establishing an appropriate governance scheme for GMES which is planned for the 2009-2010 timeframe.