

CEOS SENSOR WEB COLLABORATIONS SUPPORTING GEOSS

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ABSTRACT

Recent activities within the international Committee for Earth Observation Satellites (CEOS) has lead to the establishment of an interest group focusing on Sensor Webs within the Working Group on Information Systems and Services. One of the major drivers for establishing the interest group was the re-purposing of the CEOS as the space arm of the Group on Earth Observation (GEO), which is building a Global Earth Observing System of Systems (GEOSS). The main purpose of the interest group is to explore the emerging technology relating to Sensor Webs in the context of earth observation satellites. The paper outlines current and past activities and the lessons learned in exploring these activities and how they will benefit the Global Earth Observing System of Systems.

1. INTRODUCTION

The view of Sensor Web technology is that of a coordinated infrastructure comprised of a distributed collection of resources that can collectively behave as a single, autonomous, task-able, dynamically adaptive and reconfigurable observing system [ESTO 2007]. Under the guidance of the WGISS sensor web interest group, who's main function is to explore sensor web technology and make recommendations in terms of standards and practices, a project that demonstrates sensor web capability has been created. The nature of the project is such that it not only provides a technical demonstrator of sensor web capability in the context of inter-organizational collaboration but also speaks to the GEO societal benefit areas.

The goal of the WGISS activity is to define and conduct Earth Observation scenario demonstrations to show utilization of one or more of the CEOS virtual constellations in concert with Sensor Web services to bring those capabilities to bear upon GEOSS societal benefit areas. Sensor Webs provide standard interfaces for asset tasking, data processing, data delivery, and publication/notification services that are common across all GEOSS-compatible components, including the CEOS constellations. Models that provide simulations or predictions of EO events (such as floods, smoke plumes, volcanic lava flows, etc.) will be made available to GEOSS users via standard Sensor Web service interfaces, thus allowing for seamless interaction between modeled data views and observed sensor data product views of evolving EO phenomena. Historical archive data and other discipline-specific data sets are also being served to the GEOSS community via standard web service interfaces that optimize interoperability across user areas and support cross-discipline analysis and response actions.

A number of Use Case scenarios were proposed. However, supporting a full Use Case is a longer-term activity requiring access to significant resources. Initially the Sensor Web interest group should tackle a slightly easier activity that can demonstrate a “quick win” and at the same time form the foundation for longer-term Use Case development. Parallel activities can proceed but the goal is to progressively iterate demonstrations in phases that build on initial capabilities and involve components contributed by various WGISS members, i.e., an international collaboration.

The WGISS sensor web interest group evaluated application systems, models, sensors and software infrastructure (based largely on the Open Geospatial Consortium (OGC) Sensor Web Enablement protocols [Botts, 2006]). For example, Figure 1 shows the model and grid infrastructure contributed by the National Academy of Science of Ukraine. These were the capabilities that different WGISS members could contribute towards a progressively evolving sensor web capability. The paper describes the process and tradeoffs made in order to demonstrate the applicability of sensor webs to GEOSS.

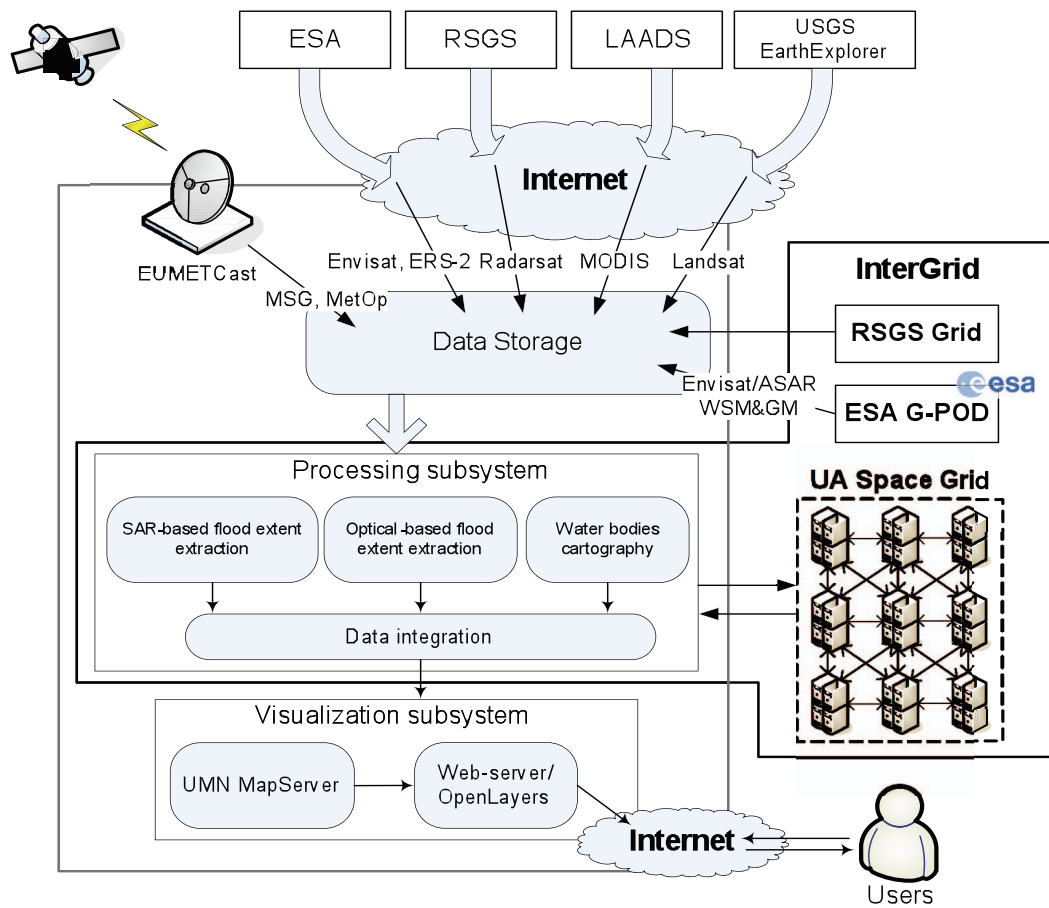


Figure 1. Ukrainian Space GRID Flood Monitoring Data Flow

[1] Various, "ESTO/AIST sensor web pi meeting," The NASA Earth Science Technology Office, 2007.

[2] M. Botts, et al., OpenGIS sensor web enablement architecture document. Technical report, Open Geospatial Consortium Inc. 2006.