PERSISTENT WCS AND CSW SERVICES OF GOES DATA FOR GEOSS

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1. INTRODUCTION

Global Earth Observation System of Systems (GEOSS) is a world-wide emerging public cyberinfrastructure of interconnected, diverse and growing array of instruments and systems for monitoring and forecasting changes in the global environment [1]. GEOSS provides data and information to support policymakers, resource managers, science researchers and many other experts and decision-makers. The Group on Earth Observations (GEO) is coordinating international efforts to build GEOSS. The implementation of GEOSS is through the contributions of country and organizational members of GEO. The GEOSS core capabilities were implemented through the GEOSS Architecture Implementation Pilots (AIP) [2]. So far, two AIPs have been finished. AIP 1 established the Initial Operating Capability (IOC) of GEOSS by setting up the GEOSS Common Infrastructure (GCI) [3], which includes three portals, a component and service registry, a standards and interoperability registry, and a clearinghouse. AIP 2 augments IOC with additional persistent exemplars in GEOSS Common Infrastructure, Client, Business Process, and Access Tiers [4]. The persistent exemplars in the access tier provides persistent machine-to-machine access to Earth observation data and systems through GEOSS-endorsed standard protocols, such as Web Coverage Service (WCS)[5] and Catalog Service for Web (CSW) [6] of the Open Geospatial Consortium (OGC) [7]. The persistent exemplars criteria are defined in [8]. This paper describes the development of a persistent access service of data collected by the Geostationary Operational Environment Satellites (GOES) as National Oceanic and Atmospheric Administration (NOAA)'s contribution to GEOSS AIP 2.

2. NOAA GOES DATA

GOES satellites are geostationary satellites, which stay above a fixed spot on the Earth surface to provide a constant vigil for monitoring and tracking weather events [9]. The main instruments on GOES satellites include GOES Imager [10] and GOES Sounder[11]. Currently, NOAA is preparing the future

mission of the Geostationary Operational Environmental Satellite-R Series (GOES-R) [12], which will carry much improved instruments for better monitoring of Earth's atmosphere and weather. The GOES data and derived high-level products are stored and distributed by NOAA's Data Centers using the Comprehensive Large Array-data Stewardship System (CLASS) [13]. Users can order the GOES data through CLASS's data ordering user interface. No standard-compliant machine-to-machine data access service is available currently for GOES data in CLASS. For this specific project, only GOES Imager products are considered.

3. THE PROJECT OBJECTIVES

The objective of this project is to implement a persistent OGC Web Coverage Service (WCS) and Catalog Service for Web (CSW) to serve GOES data to various GOESS user communities. The services should be able to deliver the GOES data timely under the standard-compliant, distributed service framework of GEOSS. Because of the standard interface and data format, the data products served from the services can reach a wide range of users in communities much wider than current NOAA direct user communities. The services will be registered in the GEOSS Registry so that they will become a part of GEOSS, accessible by worldwide users. The services will provide a proof of concept for contributing data from the future GOES-R satellite series to GEOSS.

4. IMPLEMENTATION OF THE PERSISTANT SERVICES

Currently, GOES data are searchable and orderable through NOAA's Comprehensive Large Array-data Stewardship System (CLASS). However, there is no WCS or CSW interface available. Therefore, the implementation objective is to enable discovery and serving of GOES and related data through CSW and WCS. The implemented services are called GOES CSW (G-CSW) and GOES WCS (G-WCS) respectively in this project. The first approach is to implement the services on top of CLASS so that the services will communicate with clients at the front end using the OGC protocols and with CLASS at the backend through the CLASS search and order interfaces. Such an implementation will allow the services to serve all data, not just GOES at CLASS. However, because CLASS data access uses the access pattern of search, ordering, staging, notification, and downloading, such implementation only can provide asynchronous and no real-time access to the data. An alternative approach is to add the CSW and WCS interfaces on top of the Simple NOAA Archive Access Protocol (SNAAP) API [14]. SNAAP API provides machine-to-machine interfaces of OGSA-DAI [15] to access data not only in CLASS but also other NOAA data systems. This approach is better than the first one because the implementation can provide real-time access to all data accessible through SNAAP. Because of this advantage, we selected the second approach for implementation. Figure 1 shows the existing architecture and the additions (yellow blocks) developed on top of the architecture in order to offer persistence data services for GOES data. CSW 2.0.2 ebRIM profile is implemented in G-CSW and WCS 1.1.0 in G-WCS. Since most of NOAA data are

in netCDF format, G-WCS has been optimized for handling netCDF format for the improvement of subsetting performance.

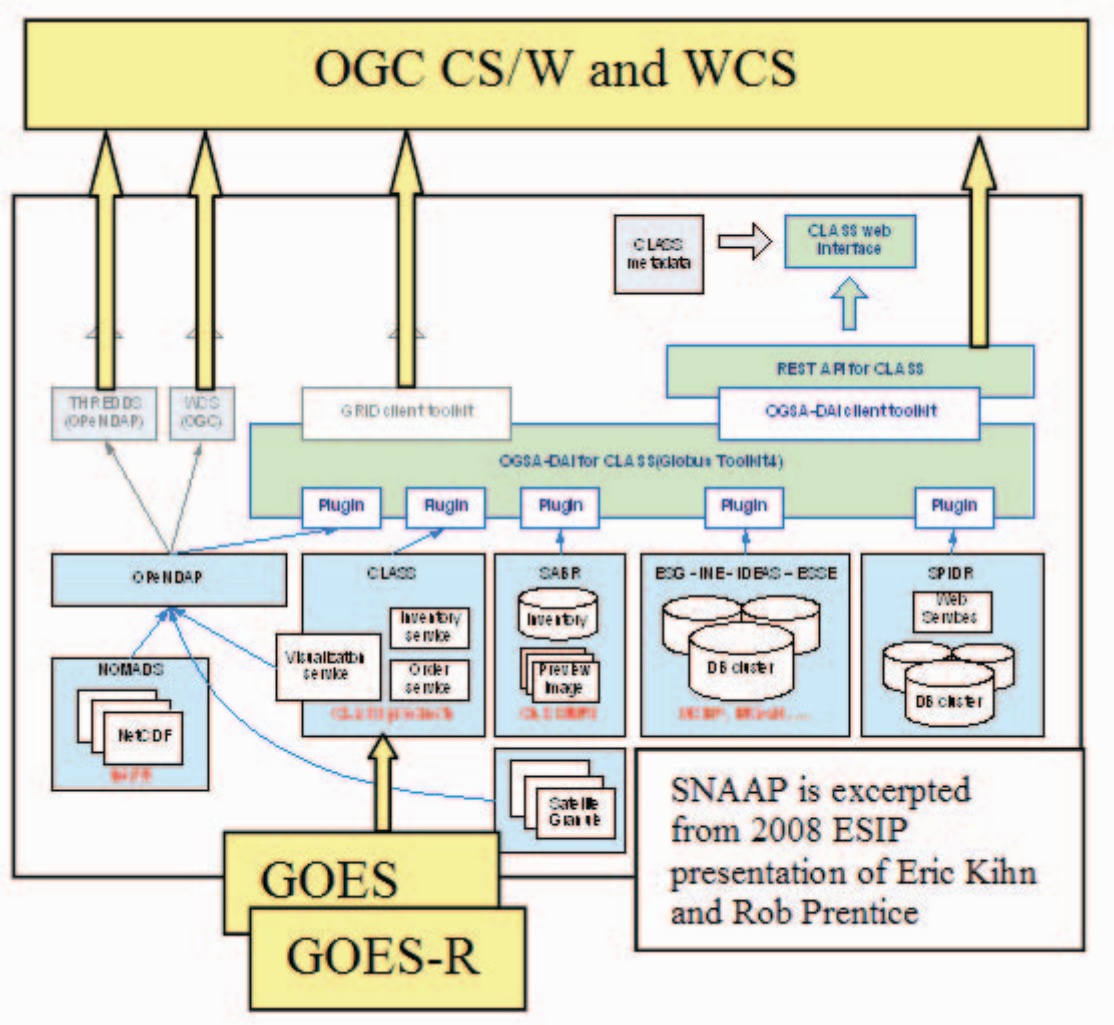

Figure 1. GOES/GOES-R OGC-compliant WCS services

5. CONCLUSIONS

The development effort has resulted in the following services.

- Standard-compliant prototype persistent data service, GOES Web Coverage Service (G-WCS), that is able to not only serve the imagery data accessible through SNAAP but also be extended to serve GOES-R data in the future;
- Standard-compliant prototype persistent catalogue service, GOES Catalogue Service for Web (G-CSW), that can be further extended to register and publish GOES-R data in the future to support GEOSS and other national and international initiatives.

6. REFERENCES

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