CyberConnector: Bridging the Earth Observations and Earth Science Models

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ABSTRACT
CyberConnector is to be developed and implemented as a system of services for facilitating the automatic preparation and feeding of both historic and near-real time Earth Observation customized data and on-demand derived products into Earth science models. The service system is designed to extensively adopt open geospatial standards and specifications, including the IS0/TC 211 geospatial data and metadata standards, and standards and specifications of the web services, workflows, and sensor web technologies. It includes a service-oriented architecture that uses Web Processing Services, Catalogue Services for Web (CSW), and geospatial web services. The service system is to be demonstrated in actual Earth science models: the Cloud-Resolving Model (CRM), the Community Multi-scale Air Quality Model (CMAQ), and the Finite Volume Coastal Ocean Model (FVCOM). The final platform will be deployed and maintained for operational ingestion, discovery, access, and present geospatial data, data, and information.

OBJECTIVES
Earth observations (EO) through sensors is the most important way to collect Earth science data. It is very common that scientists who conduct data-intensive Earth science research need to integrate and analyze multi-source (EO) datasets, which are typically very diverse in themselves, i.e., the dataset is data from different sensors, data from different regions, data from different providers, data from different time/space resolutions. The objective is to develop a service-oriented architecture that uses Web Processing Services, Catalogue Services for Web (CSW), and geo-spatial web services. The service system is to be demonstrated in actual Earth science models: the Cloud-Resolving Model (CRM), the Community Multi-scale Air Quality Model (CMAQ), and the Finite Volume Coastal Ocean Model (FVCOM). The final platform will be deployed and maintained for operational ingestion, discovery, access, and present geospatial data, data, and information.

ADPTION OF CONSERNS-BASED, OPEN SPECIFICATIONS
ISO/TC 211 standards - geographic information, methods, tools, and services
- OGC specifications - geospatial Web services
- IS0/TC 211 geospatial data and metadata standards - standard geospatial data web services, workflows, and sensor web technologies
- Service-oriented architecture
- SGC-O-Service-oriented architecture
- ISO/TC 211 geospatial Web services
- Discovery of geospatial data and services
- Catalogue Services for Web (CSW) provides data service and accessing Web Coverage Service (WCS) and Web Feature Service (WFS)
- Geospatial processing algorithms - Geospatial Web Processing Service (GWPS)
- Discovery, accessing, processing, and accessing Sensor observations - OGC Sensor Web Enablement (SWE)

ARCHITECTURE

CONCLUSIONS
The standard-based architecture design demonstrates advantages: (1) Standard geospatial web services as the foundation of components support interoperability. Plug-in-and-play are made possible as long as the new components follow the supported open specifications or standards. (2) Reusability: Common interfaces ensure reusability. Both existing Web services and newly developed Web services can be reused as long as they are under the same geospatial Web services common specification. (3) Scalability: Web-based service-oriented architecture enables scalability. A Web service can be re-deployed onto many servers. Many services can be used simultaneously if a portion of tasks is properly done. For example, large processing tools can be partitioned into small tasks in terms of spatial regions and time periods. They can be processed by multiple services and then combined by an aggregator service. This would enable the processing of large datasets in a timely fashion if we can find enough computing resources.

This further development will complete the implementation and integration of the framework. The demonstrations: Cloud-Resolving Model (CRM), Community Multi-scale Air Quality Model (CMAQ), and Finite Volume Coastal Ocean Model (FVCOM), will be developed as an example to show how models can leverage the functionalities of the framework and facilitate the management of geospatial Web service execution and processes.

REFERENCES

Acknowledgements
This project is funded by the National Science Foundation under the EarthCube initiative through grant CCF-1462694. The PI is Professor Kang Li (George Mason University). Co-PIs are Dr. Tom Dominico (UCAR), Dr. Xiaozhu Li (Louisiana State University), Dr. Dianming Tong (George Mason University), and Dr. Xiaoming Wu (Down State University).