Earth Science Data Records Sharing Supported by the Spatial Web Portal

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1. INTRODUCTION

In past few decades NASA has launched many satellites and deployed many sensors to provide three-dimensional profiles of Earth's atmosphere and surface. These are part of sophisticated observation systems that incorporate in-situ, satellite, model output, and other technologies, that have resulted in high quality, long-term earth science data records. However, there currently exists no systematic effort to make these integrated datasets usable in earth science research environments[1].

2. COMPONENTS

As an emerging concept and application, Spatial Web Portal (SWP) which is a product of combination between portals and geospatial interoperability[2] is a good solution to address the challenges for sharing, exchanging and interoperating the Earth Science Data Records (ESDRs). It was adopted by many successful instances in geospatial communities. For example, the Geospatial One-Stop (GOS)[3], a project sponsored by the U.S. Federal Government to provide a single portal to geographic information collected for SWPs to serve different user communities.

2.1 Discovery component: multi-catalog query based on AJAX and CSW

This component is an AJAX-based CSW client which allows users to discover multiple CSW services from geographically distributed servers simultaneously. Through this component, users can find their required geospatial datasets published on the web, which are provided by different owners.

2.2 Interoperability component: OPeNDAP-based distributed data sharing

As a protocol for requesting and transporting data across the web[4], OPeNDAP is a de facto standard in Earth Science community. Based on it, the SWP provides distributed data access, distributed data analysis and a robust end-user workflow environment that integrates data access, analysis and display. Multi- interval (including time and spatial intervals), multi-servers and multi-parameters was enabled in our prototype system.

2.3 Visualization component: WMS 2D and 3D visualization

In this section, 2D and 3D visualization techniques, such as that provided by Google Earth and World Wind were utilized to make instant and interactive visualization of ESDRs available for dynamic simulation and decision making.

3.ARCHITECTURE

For addressing the challenges we are facing in making the Earth Science Data Records (ESDRs) for use, we leverage our extensive experience with emerging technologies to propose a specialized SWP architecture (Figure 1) to integrate and share the ESDRs. The architecture is based on the development around AJAX (Asynchronous JavaScript and XML), web portals, spatial web services, GrADS (Grid Analysis and Display System),GDS (GrADS Data Server) and OPeNDAP (The Open-source Project for a Network Data Access Protocol) to develop a SWP for the terrestrial water cycle

MEaSUREs (Making Earth Science Data Records for Use in Research Environments) project to provide distributed data access, distributed data analysis and integrated data display

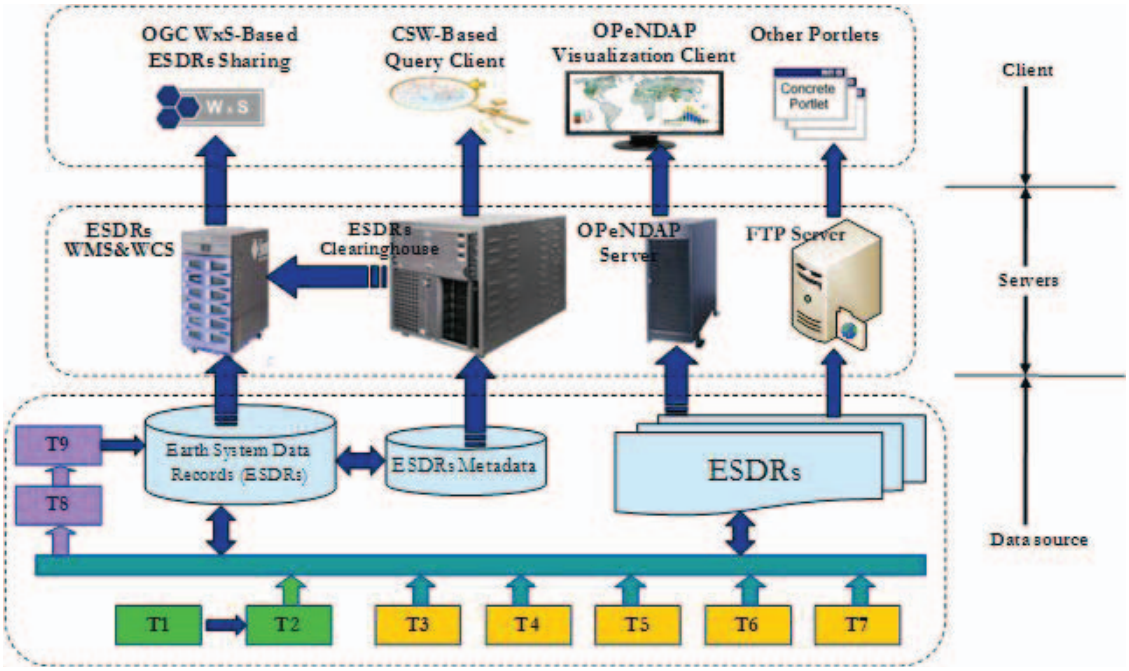

Figure 1. The System Architecture of MEaSUREs Spatial Web Portal ("T" represents "Task")

4. CONCLUSIONS

In this study, three parts are investigated on how to share ESDRs by MEaSUREs SWP including a) establishing a publicly-accessible ESDR data portal, b) developing an on-line meta-database to enable quick discovery of relevant ESDR resources based on CSW 2.0.2 (Catalog Service for the Web), c) using intelligent, web-enabled services that simplifies data access, processing and exchange to distribute ESDRs by handling HDF, netCDF, GRIB or binary data formats.

5. REFERENCES

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