Developing packages and integrating ontologies for Volcanoes, Plate Tectonics and Atmospheric Science Data Integration (IN53B-1204) (sesdi.hao.ucar.edu)

Krishna Sinha1, Robert Raskin2, Deborah McGuinness3,4,5,6,7 (dmciiics.rpi.edu), Peter Fox (pfox@ucar.edu), (Virginia Polytechnic University) (JPL/NASA) (McGuinness Associates) (Rensselaer Polytechnic Inst.) (Stanford University, Knowledge Systems, AI Lab), (NASA/ESAIR/ACCESS).

In support of a NASA-funded scientific application (SESDI; Semantically Enabled Science Data Integration Project, that neens to share volcano and climate data to investigate relationships between volcanism and global climate, we have generated a volcano and plate tectonic ontologies and leveraged and augmented the existing SWEET (Semantic Web for Earth and Environmental Terminology) ontology. Our goal is to create a package for integrating the relevant ontologies (meant to be shared and reused by a broad community of users) to provide access to the key volcanology, plate tectonic and atmospheric related databases. We present how we have put ontologies to work in this science application setting, and the methodologies employed to create the ontologies, map them to the underlying data and implement them for use by scientists. SESDI is an NASA/ESAIR/ACCESS-funded project involving the High Altitude Observatory at the National Center for Atmospheric Research (NCAR), McGuinness Associates Consulting, NASA/JPL and Virginia Polytechnic University.

Abstract
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Use of VSTO Instrument Ontology

VSTOConcepts

Leads to further population of VSTO instruments:
- Add the sets of instruments specific to volcano and atmospheric measuring/monitoring
- Specific modularization requirements are still evolving, e.g. all instruments in one ontology packages but no instances, or separate instruments and instances into distinct modules.

Data Registration Framework

Earth Sciences Virtual Database
A Data Warehouse "Free" Schema heterogeneity problem is solved: schema-based integration

Discussion and Present Lessons Learned: Future Directions

- Initial development of distinct ontology efforts - SWEET, GEON, and VSTO used groupings of concepts in files for developing the ontologies
- SWEET used realm, physical phenomenon, units, etc.
- GEON used rocks, chemical species, etc.
- VSTO used core and community imports, e.g. instruments were in two files, for one solar physics, one for aeronomy
- When used for discipline oriented applications, like search, access and use, these forms were adequate
- When the application - data integration - required broad concept and relation integration, drawing on a variety of component concepts, and thus, the creation of a package - SWEET, GEON and VSTO needed to reform and modularize their ontologies in a more compatible and re-useable form
- Future: further modularization and refinement of an overall framework for ontology package population based on components