OntoSoft: Software Stewardship for Geosciences

Yolanda Gil (USC), Chris Duffy (PSU), Chris Mattmann (NASA/JPL), Scott Peckham (CU), Daniel Garijo (USC)

The goal of the EarthCube OntoSoft project is to create a germinal ecosystem for software stewardship in geosciences that will empower scientists to manage their software as valuable scientific assets in an open transparent mode that enables broader access to that software by other scientists, students, and decision makers.

Our research to date includes:

1) the OntoSoft ontology for describing scientific software metadata, which is being used in APIs and mapped to popular software repositories such as GitHub and Zenodo
2) the OntoSoft distributed scientific software registry that contains more than 600 entries operated by several communities, and allows searching and comparing software entries across metadata fields
3) the Geoscience Standard Names (GSN) ontology, which provides over 13,000 variable names from across the geosciences to enable interoperability of software and models

We also created the OntoSoft Geoscience Papers of the Future initiative to disseminate best practices of software scholarship and reproducible research, which includes training sessions attended by hundreds of scientists in major geosciences conferences and institutions and a special of the AGU Earth and Space Science Journal with exemplar articles written by early career scientists in different disciplines.

The impact to date of the OntoSoft project in geosciences is in the development of best practices for software development and dissemination. In particular, we have worked with hydrology models and developed a methodology for guided design of models and best practices. The necessity of ingesting a diversity of high-resolution spatial data in terrestrial hydrologic models such as the Penn State Integrated Hydrologic Model (PIHM) is forcing rapid community development of standards in software and data and the design of submodels.