



Brokering technologies to realize the hydrology scenario in NSF BCube

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In the National Science Foundation (NSF) BCube project an international team composed of cyber infrastructure experts, geoscientists, social scientists and educators are working together to explore the use of brokering technologies, initially focusing on four domains: hydrology, oceans, polar, and weather.

In the hydrology domain, environmental models are fundamental to understand the behaviour of hydrological systems. A specific model usually requires datasets coming from different disciplines for its initialization (e.g. elevation models from Earth observation, weather data from Atmospheric sciences, etc.).

Scientific datasets are usually available on heterogeneous publishing services, such as inventory and access services (e.g. OGC Web Coverage Service, THREDDS Data Server, etc.).

Indeed, datasets are published according to different protocols, moreover they usually come in different formats, resolutions, Coordinate Reference Systems (CRSs): in short different grid environments depending on the original data and the publishing service processing capabilities.

Scientists can thus be impeded by the burden of discovery, access and normalize the desired datasets to the grid environment required by the model. These technological tasks of course divert scientists from their main, scientific goals.

The use of GI-axe brokering framework has been experimented in a hydrology scenario where scientists needed to compare a particular hydrological model with two different input datasets (digital elevation models):

- the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) dataset, v.2.
- the Shuttle Radar Topography Mission (SRTM) dataset, v.3.

These datasets were published by means of Hyrax Server technology, which can provide NetCDF files at their original resolution and CRS.

Scientists had their model running on ArcGIS, so the main goal was to import the datasets using the available ArcPy library and have EPSG:4326 with the same resolution grid as the reference system, so that model outputs could be compared. ArcPy however is able to access only GeoTiff datasets that are published by a OGC Web Coverage Service (WCS).

The GI-axe broker has then been deployed between the client application and the data providers. It has been configured to broker the two different Hyrax service endpoints and republish the data content through a WCS interface for the use of the ArcPy library.

Finally, scientists were able to easily run the model, and to concentrate on the comparison of the different results obtained according to the selected input dataset.

The use of a third party broker to perform such technological tasks has also shown to have the potential advantage of increasing the repeatability of a study among different researchers.