



Sharing environmental models: An Approach using GitHub repositories and Web Processing Services

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The GLUES (Global Assessment of Land Use Dynamics, Greenhouse Gas Emissions and Ecosystem Services) project established a spatial data infrastructure for scientific geospatial data and metadata (<http://geoportal-glues.ufz.de>), where different regional collaborative projects researching the impacts of climate and socio-economic changes on sustainable land management can share their underlying base scenarios and datasets. One goal of the project is to ease the sharing of computational models between institutions and to make them easily executable in Web-based infrastructures. In this work, we present such an approach for sharing computational models relying on GitHub repositories (<http://github.com>) and Web Processing Services.

At first, model providers upload their model implementations to GitHub repositories in order to share them with others. The GitHub platform allows users to submit changes to the model code. The changes can be discussed and reviewed before merging them. However, while GitHub allows sharing and collaborating of model source code, it does not actually allow running these models, which requires efforts to transfer the implementation to a model execution framework. We thus have extended an existing implementation of the OGC Web Processing Service standard (<http://www.opengeospatial.org/standards/wps>), the 52°North Web Processing Service (<http://52north.org/wps>) platform to retrieve all model implementations from a git (<http://git-scm.com>) repository and add them to the collection of published geoprocesses.

The current implementation is restricted to models implemented as R scripts using WPS4R annotations (Hinz et al.) and to Java algorithms using the 52°North WPS Java API. The models hence become executable through a standardized Web API by multiple clients such as desktop or browser GIS and modelling frameworks. If the model code is changed on the GitHub platform, the changes are retrieved by the service and the processes will be updated accordingly. The admin tool of the 52°North WPS was extended to support automated retrieval and deployment of computational models from GitHub repositories. Once the R code is available in the GitHub repo, the contained process can be easily deployed and executed by simply defining the GitHub repository URL in the WPS admin tool.

We illustrate the usage of the approach by sharing and running a model for land use system archetypes developed by the Helmholtz Centre for Environmental Research (UFZ, see Vaclavik et al.). The original R code was extended and published in the 52°North WPS using both, public and non-public datasets (Nüst et al., see also <https://github.com/52North/glues-wps>). Hosting the analysis in a Git repository now allows WPS administrators, client developers, and modelers to easily work together on new versions or completely new web processes using the powerful GitHub collaboration platform.

References:

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