
V-FOR-WaTer – the virtual research environment to discover and analyse environmental data

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1. Introduction

The extent and diversity of environmental data continuously increase due to more and new sensors with higher spatial and temporal resolution and due to the growth and automation of observational networks. The observed data form the basis for a better understanding of ecological systems either by data driven methods or by comparisons of the data with model predictions. However, a considerable amount of these data are difficult to access or even still stored on local data storage devices making it difficult or even impossible to find, access and re-use the data. In addition the data lack a proper metadata description required for an interoperable analysis. This results in very time consuming preparation and pre-processing of data, especially when datasets from different sources are combined.

2. Objectives

The main objectives of V-FOR-WaTer are to simplify data access for environmental sciences, foster data publications, and facilitate preparations of data and their analyses with a comprehensive toolbox allowing pre-processing of data from diverse sources. Also, bringing data and tools together in a single shared environment maximises the reproducibility of analyses and models. V-FOR-WaTer evolves towards a community data repository obeying the FAIR principles. Data owners may grant individual access with the fine-grained access management.

3. Web Portal

The web portal is still under development. The open source project written in the Python web framework Django is published at [1]. The main tool to browse and select data is the map which integrates features known from geographic information systems (GIS). In addition a filter menu allows to refine the selection based on various metadata fields

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and to add the data to the *datastore* for further processing. Users lacking access rights for certain datasets may send a request to the data owner. The identity management is delegated to the external tool B2ACCESS [2], i.e. the V-FOR-WaTer web portal reuses existing federated accounts of researchers.

4. Data and Tools

The incorporated datasets include heterogeneous data from the Catchments as Organized Systems (CAOS) project [3] that has not yet been publicly available, data from university projects, and from state offices. The metadata scheme of V-FOR-WaTer was designed to describe the heterogeneous datasets. The focus of the schema is flexibility and compatibility with existing international standards (INSPIRE, ISO19115). V-FOR-WaTer realizes online tools as Web Processing Services (WPS) [4] – a standard of the Open Geospatial Consortium. A WPS server provides a RESTful interface to query the description of a WPS and to trigger the execution of a WPS. Users interact with the WPS server only indirectly via the V-FOR-WaTer web portal. With the already implemented toolbox users may run first steps of a geostatistical analysis. An example is a simple variogram analysis to determine the spatial dependencies of distributed measurements. Another example is the visualization of a flow duration curve. In order to run complex workflows consisting of several WPS a graphical workflow editor will be integrated in the portal.

5. Conclusion

The virtual research environment V-FOR-WaTer addresses challenges of environmental scientists in terms of data discovery, data management, and data analysis. The V-FOR-WaTer portal offers features of a data repository, a geographic information system, and online tools for reproducible data analysis.

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