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Adding Processing Functionality to the Sensor Web

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The Sensor Web allows discovering, accessing and tasking different kinds of environmental sensors in the Web, ranging from simple in-situ sensors to remote sensing systems. However, (geo-)processing functionality needs to be applied to integrate data from different sensor sources and to generate higher level information products. Yet, a common standardized approach for processing sensor data in the Sensor Web is still missing and the integration differs from application to application. Standardizing not only the provision of sensor data, but also the processing facilitates sharing and re-use of processing modules, enables reproducibility of processing results, and provides a common way to integrate external scalable processing facilities or legacy software.

In this presentation, we provide an overview on on-going research projects that develop concepts for coupling standardized geoprocessing technologies with Sensor Web technologies. At first, different architectures for coupling sensor data services with geoprocessing services are presented. Afterwards, profiles for linear regression and spatio-temporal interpolation of the OGC Web Processing Services that allow consuming sensor data coming from and uploading predictions to Sensor Observation Services are introduced. The profiles are implemented in processing services for the hydrological domain. Finally, we illustrate how the R software can be coupled with existing OGC Sensor Web and Geoprocessing Services and present an example, how a Web app can be built that allows exploring the results of environmental models in an interactive way using the R Shiny framework. All of the software presented is available as Open Source Software.