Geophysical Research Abstracts
Vol. 16, EGU2014-4948, 2014
EGU General Assembly 2014

Annotating spatio-temporal datasets for meaningful analysis in the Web

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More and more environmental datasets that vary in space and time are available in the Web. This comes along with an advantage of using the data for other purposes than originally foreseen, but also with the danger that users may apply inappropriate analysis procedures due to lack of important assumptions made during the data collection process. In order to guide towards a meaningful (statistical) analysis of spatio-temporal datasets available in the Web, we have developed a Higher-Order-Logic formalism that captures some relevant assumptions in our previous work [1]. It allows to proof on meaningful spatial prediction and aggregation in a semi-automated fashion.

In this poster presentation, we will present a concept for annotating spatio-temporal datasets available in the Web with concepts defined in our formalism. Therefore, we have defined a subset of the formalism as a Web Ontology Language (OWL) pattern. It allows capturing the distinction between the different spatio-temporal variable types, i.e. point patterns, fields, lattices and trajectories, that in turn determine whether a particular dataset can be interpolated or aggregated in a meaningful way using a certain procedure.

The actual annotations that link spatio-temporal datasets with the concepts in the ontology pattern are provided as Linked Data. In order to allow data producers to add the annotations to their datasets, we have implemented a Web portal that uses a triple store at the backend to store the annotations and to make them available in the Linked Data cloud. Furthermore, we have implemented functions in the statistical environment R to retrieve the RDF annotations and, based on these annotations, to support a stronger typing of spatio-temporal datatypes guiding towards a meaningful analysis in R.

[1] Stasch, C., Scheider, S., Pebesma, E., Kuhn, W. (2014): “Meaningful spatial prediction and aggregation“, Environmental Modelling & Software, 51, 149-165.