



UncertWeb: chaining web services accounting for uncertainty

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The development of interoperable services that permit access to data and processes, typically using web service based standards opens up the possibility for increasingly complex chains of data and processes, which might be discovered and composed in increasingly automatic ways. This concept, sometimes referred to as the “Model Web”, offers the promise of integrated (Earth) system models, with pluggable web service based components which can be discovered, composed and evaluated dynamically. A significant issue with such service chains, indeed in any composite model composed of coupled components, is that in all interesting (non-linear) cases the effect of uncertainties on inputs, or components within the chain will have complex, potentially unexpected effects on the outputs.

Within the FP7 UncertWeb project we will be developing a mechanism and an accompanying set of tools to enable rigorous uncertainty management in web based service chains involving both data and processes. The project will exploit and extend the UncertML candidate standard to flexibly propagate uncertainty through service chains, including looking at mechanisms to develop uncertainty enabled profiles of existing Open Geospatial Consortium services. To facilitate the use of such services we will develop tools to address the definition of the input uncertainties (elicitation), manage the uncertainty propagation (emulation), undertake uncertainty and sensitivity analysis and visualise the output uncertainty.

In this talk we will outline the challenges of the UncertWeb project, illustrating this with a prototype service chain we have created for correcting station level pressure to sea-level pressure, which accounts for the various uncertainties involved. In particular we will discuss some of the challenges of chaining Open Geospatial Consortium services using the Business Process Execution Language. We will also address the issue of computational cost and communication bandwidth requirements for such systems. While the cost of obtaining an rigorous uncertainty analysis can be high, we would argue that without such quantified uncertainty estimates the output of a chain is almost useless, particularly in the case that the chain has been discovered and composed (semi) automatically.