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Communicating and visualizing data quality through Web Map Services

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The sharing and visualization of environmental data through OGC Web Map Services is becoming increasingly common. However, information about the quality of data is rarely presented. (In this presentation we consider mostly data uncertainty as a measure of quality, although we acknowledge that many other quality measures are relevant to the geoscience community.) In the context of the GeoViQua project (http://www.geoviqua.org) we have developed conventions and tools for using WMS to deliver data quality information.

The "WMS-Q" convention describes how the WMS specification can be used to publish quality information at the level of datasets, variables and individual pixels (samples). WMS-Q requires no extensions to the WMS 1.3.0 specification, being entirely backward-compatible. (An earlier version of WMS-Q was published as OGC Engineering Report 12-160.) To complement the WMS-Q convention, we have also developed extensions to the OGC Symbology Encoding (SE) specification, enabling uncertain geoscience data to be portrayed using a variety of visualization techniques. These include contours, stippling, blackening, whitening, opacity, bivariate colour maps, confidence interval triangles and glyphs. There may also be more extensive applications of these methods beyond the visual representation of uncertainty.

In this presentation we will briefly describe the scope of the WMS-Q and "extended SE" specifications and then demonstrate the innovations using open-source software based upon ncWMS (http://ncwms.sf.net). We apply the tools to a variety of datasets including Earth Observation data from the European Space Agency's Climate Change Initiative. The software allows uncertain raster data to be shared through Web Map Services, giving the user fine control over data visualization.