



## The EarthServer Geology Service: web coverage services for geosciences

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The EarthServer FP7 project is implementing web coverage services using the OGC WCS and WCPS standards for a range of earth science domains: cryospheric; atmospheric; oceanographic; planetary; and geological. BGS is providing the geological service (<http://earthserver.bgs.ac.uk/>). Geoscience has used remote sensed data from satellites and planes for some considerable time, but other areas of geosciences are less familiar with the use of coverage data. This is rapidly changing with the development of new sensor networks and the move from geological maps to geological spatial models. The BGS geology service is designed initially to address two coverage data use cases and three levels of data access restriction.

Databases of remote sensed data are typically very large and commonly held offline, making it time-consuming for users to assess and then download data. The service is designed to allow the spatial selection, editing and display of Landsat and aerial photographic imagery, including band selection and contrast stretching. This enables users to rapidly view data, assess its usefulness for their purposes, and then enhance and download it if it is suitable. At present the service contains six band Landsat 7 (Blue, Green, Red, NIR 1, NIR 2, MIR) and three band false colour aerial photography (NIR, green, blue), totalling around 1Tb.

Increasingly 3D spatial models are being produced in place of traditional geological maps. Models make explicit spatial information implicit on maps and thus are seen as a better way of delivering geosciences information to non-geoscientists. However web delivery of models, including the provision of suitable visualisation clients, has proved more challenging than delivering maps. The EarthServer geology service is delivering 35 surfaces as coverages, comprising the modelled superficial deposits of the Glasgow area. These can be viewed using a 3D web client developed in the EarthServer project by Fraunhofer.

As well as remote sensed imagery and 3D models, the geology service is also delivering DTM coverages which can be viewed in the 3D client in conjunction with both imagery and models.

The service is accessible through a web GUI which allows the imagery to be viewed against a range of background maps and DTMs, and in the 3D client; spatial selection to be carried out graphically; the results of image enhancement to be displayed; and selected data to be downloaded. The GUI also provides access to the Glasgow model in the 3D client, as well as tutorial material.

In the final year of the project it is intended to increase the volume of data to 20Tb and enhance the WCPS processing, including depth and thickness querying of 3D models. We have also investigated the use of GeoSciML, developed to describe and interchange the information on geological maps, to describe model surface coverages. EarthServer is developing a combined WCPS and xQuery query language, and we will investigate applying this to the GeoSciML described surfaces to answer questions such as 'find all units with a predominant sand lithology within 25m of the surface'.