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Brandenburg 3D – a comprehensive 3D Subsurface Model, Conception of an Infrastructure Node and a Web Application

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The Energiewende and the increasing scarcity of raw materials will lead to an intensified utilization of the subsurface in Germany. Within this context, geological 3D modeling is a fundamental approach for integrated decision and planning processes. Initiated by the development of the European Geospatial Infrastructure INSPIRE, the German State Geological Offices started digitizing their predominantly analog archive inventory. Until now, a comprehensive 3D subsurface model of Brandenburg did not exist. Therefore the project B3D strived to develop a new 3D model as well as a subsequent infrastructure node to integrate all geological and spatial data within the Geodaten-Infrastruktur Brandenburg (Geospatial Infrastructure, GDI-BB) and provide it to the public through an interactive 2D/3D web application.

The functionality of the web application is based on a client-server architecture. Server-sided, all available spatial data is published through GeoServer. GeoServer is designed for interoperability and acts as the reference implementation of the Open Geospatial Consortium (OGC) Web Feature Service (WFS) standard that provides the interface that allows requests for geographical features. In addition, GeoServer implements, among others, the high performance certified compliant Web Map Service (WMS) that serves geo-referenced map images. For publishing 3D data, the OGC Web 3D Service (W3DS), a portrayal service for three-dimensional geo-data, is used. The W3DS displays elements representing the geometry, appearance, and behavior of geographic objects.

On the client side, the web application is solely based on Free and Open Source Software and leans on the JavaScript API WebGL that allows the interactive rendering of 2D and 3D graphics by means of GPU accelerated usage of physics and image processing as part of the web page canvas without the use of plug-ins. WebGL is supported by most web browsers (e.g., Google Chrome, Mozilla Firefox, Safari, and Opera). The web application enables an intuitive navigation through all available information and allows the visualization of geological maps (2D), seismic transects (2D/3D), wells (2D/3D), and the 3D-model.

These achievements will alleviate spatial and geological data management within the German State Geological Offices and foster the interoperability of heterogeneous systems. It will provide guidance to a systematic subsurface management across system, domain and administrative boundaries on the basis of a federated spatial data infrastructure, and include the public in the decision processes (e-Governance). Yet, the interoperability of the systems has to be strongly propelled forward through agreements on standards that need to be decided upon in responsible committees.

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