

3D voxel modelling of the marine subsurface: the Belgian Continental Shelf case

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The need for marine space grows bigger by the year. Dredging, wind farms, aggregate extraction and many other activities take up more space than ever before. As a result, the need for an accurate model that describes the properties of the areas in use is a priority. To address this need a 3D voxel model of the subsurface of the Belgian part of the North Sea has been created in the scope of the Belgian Science Policy project TILES ('Transnational and Integrated Long-term Marine Exploitation Strategies'). Since borehole data in the marine environment are a costly endeavour and therefore relatively scarce, seismic data have been incorporated in order to improve the data coverage. Lithostratigraphic units have been defined and lithoclasses are attributed to the voxels using a stochastic interpolation. As a result each voxel contains a unique value of one of 7 lithological classes (spanning in grain size from clay to gravel) in association with the geological layer it belongs to. In addition other forms of interpolation like sequential indicator simulation have allowed us to calculate the probability occurrence of each lithoclass, thus providing additional info from which the uncertainty of the model can be derived. The resulting 3D voxel model gives a detailed image of the distribution of different sediment types and provides valuable insight on the different geological settings. The voxel model also allows to estimate resource volumes (e.g. the availability of particular sand classes), enabling a more targeted exploitation. The primary information of the model is related to geology, but the model can additionally host any type of information.