MODELLING, FAST AND SLOW: HOW TO COMPLETE A LONG-TERM MODELLING PROGRAM

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In 2006, TNO – Geological Survey of the Netherlands initiated the GeoTOP modelling program, aimed at constructing a detailed, national 3D voxel model of the near-surface. GeoTOP schematizes the near-surface in millions of voxels of 100 x 100 x 0.5 m up to a depth of 50 m below sea level. Each voxel contains multiple properties that describe the geometry of stratigraphical units (layers), the spatial variation of lithology within these units as well as measures of model uncertainty. The addition of physical properties to the voxels enables the deployment of the model for a wide range of applications that benefit society.

GeoTOP currently covers about 70% of the total land surface area. In 2020, GeoTOP became part of the Key Registry of the Subsurface (BRO), which led to an increase in the use of the model. In addition, there is a strong demand for GeoTOP in the areas that still have to be modelled. In this presentation, we will look at different strategies to reach national coverage as early as possible while maintaining the quality required by the BRO.

Modelling, Slow – In the last 16 years, modelling was carried out in twelve large model areas, roughly corresponding to the Dutch provinces. Following the completion of the seventh model area in the south of the country (we presented this model at the Bern 2019 meeting), we re-modelled the existing model of Zeeland in order to meet the new quality requirements of the BRO. It takes about three years to build or rebuild a single, province-scale model area.

With five more model areas to go, we may expect to reach national coverage not much earlier than in 2036. This is considered far too late by many stakeholders.

Modelling, Fast – Last year, we took a different tack and created a relatively small GeoTOP model of the municipality of Almere. This city is currently planning the development of some 30,000 new homes as well as a new road and rail connection to Amsterdam. GeoTOP is key to successfully address Almere's subsurface challenges such as soft soils and land subsidence, water management, and thermal storage systems. Because of the smaller area, we were able to build the model in a single year, responding much faster to the needs of the municipality.

Modelling, Fast and Furious – However, modelling the remaining 30% of the country in many small areas does not bring national coverage any closer. We have therefore designed a plan to model the remaining part in a single, large model area in only three years' time. We can do this by focusing on the modelling of those stratigraphic units that are most important for the application of the model in the built environment. In addition, we have set up a permanent team dedicated to the modelling.

After national coverage is reached, the lessons learned from Almere will be applied to update small areas incorporating new data and insights. These local updates may also have a higher resolution and additional properties to meet specific user requirements.