

Geological 3D modelling for urban planning in southwest Scania

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The purpose of SGU's 3D models for urban areas is to better provide society with geological data and a better geological understanding for improving the planning of infrastructure projects, especially underground.

Herein, we present a geological 3D model from southwest Scania, comprising an area from Malmö to southern Lund. The visualization and modelling strategy has been adapted to the regional geological conditions and available data. It is based on the collection, digitalization, harmonization and interpretation of external data which, together with SGU's existing data, is integrated into a 3D model. The external data has been collected from Trafikverket, the Citytunnel project, Malmö GeoAtlas (through Tyréns), Statens geotekniska institut (SGI) and VA Syd.

Existing data from SGU includes geological map databases, geological logs (bedrock and soil) from the well archive, airborne TEM measurements and SGU's national soil depth model. Borehole geophysics and seismics have also been an integral part of the bedrock model interpretation.

The 3D model includes both the quaternary soil cover and the bedrock to a depth of approximately -170 m asl. The model is interpolated using 25 interpreted geological cross sections that are based on a conceptual regional geological model of the area and verified based on borehole information 150-100 m from the cross section.

The geological 3D model shows that the soil depth varies from a few meters in central Malmö to up to 100 m in the so called Alnarpsdalen. The soil cover is dominated by tills and clayey tills with interbedded layers of sand and silt. Glaciofluvial deposits are sparse at the ground surface and are often composed of sand. In parts of Malmö, several meters of landfills occur on top of the quaternary soil layers. Allochthonous nappes of Cretaceous limestone within the till occur to the east of Malmö. In Alnarpsdalen, there are thick layers of sand and gravel that constitutes important groundwater reservoirs.

The bedrock in the model area is divided by the Romeleåsen deformation zone. Southwest of the deformation zone, the bedrock is dominated by Palaeocene and Cretaceous limestones (Copenhagen member, Limhamn member and Kruseberg member) with a few areas of Palaeocene sandstone (Lellinge greensand) in the southwest. Two deformation zones in the Malmö area are associated with a minor uplift. The Copenhagen member is missing in certain areas in Malmö.

Northeast of the Romeleåsen deformation zone, the bedrock is more complex with fault related tilted blocks of Cretaceous, Jurassic and Triassic strata. Ordovician and Silurian shales, penetrated by Permian dolerite dykes, dominate in the most northeastern part of the of the model area.

The model and accompanying report will be available via the 3D viewer on the SGU website (apps.sgu.se/sgu3d).

References

Erlström, M., Ising, J., Wickström, L., Wiberg, B., Curtis, P., 2023: Beskrivning till geologisk 3D-modell över Malmöområdet. SGU-rapport 2023:09.