

3D Ground Model of Vienna: from geological concept to geotechnical application

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The City of Vienna Administration has the largest collection of geodata in Austria, the so called „Wiener Baugrundkataster“. It contains more than 66.000 borehole logs, lots of them including various field and laboratory test results. This archive is mainly used for geological and geotechnical consulting in context with public and private building projects. The development of geological and geotechnical 3D models based on this geodata collection became a significant tool for design, construction and maintenance of public infrastructure projects such as metro lines. After local applications (metro line U1 since 2012), a first larger scale model was established for the metro lines U2 & U5, which cross the city of Vienna (starting 2015). Based on an initial geological model, a geotechnical model was established following the standard “ÖGG-Guideline for the Geotechnical Design of Underground Structures with Conventional Excavation”, which leads to the definition of “geotechnical ground types”. To represent the new classification system describing the specific mechanical properties, the geometry of the geological model had to be adjusted by combining and further subdividing existing geological units. The geological model was subsequently extended in several phases so that it covers at the moment half of the city surface and of the available boreholes of at least 10 meters depth (referred to as the “city model”). Especially the quaternary sediments were differentiated and classified according to lithological and (litho)stratigrafical criteria. Additionally, the basement surface of the anthropogenic layer of the city center, which has been modelled within the project “The Anthropocene Surge”, has been implemented. In this contribution, the geological 3D model will be presented with the focus on quaternary sediments as well as the derived geotechnical model of the metro lines in Vienna’s city center. Beginning with the collection of factual data like borehole logs, their interpretation and definition of modelled layers and volumes will be presented, including the base surface of the Anthropocene. Finally, the derived geotechnical model of the subway project and its application for planning and prognosis during tunnelling works will be shown in 3D views and sections.