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Three-dimensional, geological representation of Quaternary deposits, Goettingen, Germany

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The Quaternary unconsolidated rock in north-eastern Goettingen was newly interpreted according to current scientific expertise. Especially the deposits of the Lutter River, a tributary to the Leine River, were examined using 253 drillings previously undertaken to create 24 two-dimensional cross-sections and a three-dimensional model of the geologic underground in the study area. The interpretation of the included data (drillings, previous studies, two-dimensional cross-sections) resulted in a stratigraphic sequence with 17 Quaternary model units, which was depicted three-dimensionally.
During the investigation period, open pits were limited in the entire working area. Natural outcrops of Quaternary subsurfaces are absent. For the creation of a two-dimensional and three-dimensional representation of the geologic structure, it was necessary to fall back on available information of drillings. The spatial distribution of the drilling information in the scope of work is very heterogeneous. In addition, numerous engineer-geologic surveys were used for the interpretation and interpolation within areas where no other information could be obtained by drilling within this study.
The production of a three-dimensional illustration of the unconsolidated rock first required an exact investigation and homogenisation of all available information. The choice of the drillings used in the scope of work were chosen with priority according to their depth with the aid of ArcMap. Two-dimensional cross-sections of the profiles of these drillings were produced with the help of the computer program GeoDin. Using the two-dimensional cross sections, the drillings were correlated with each other and compared and discussed extensively. The sequence of the geologic unities thereby presented itself more clearly and more exactly than in linear consideration. A geologic unity could be assigned to every examined layer of each drilling. Additionally, a top and a base were assigned to each geologic layer as a limitation of the layers, which were documented in Access-Database. The base of a younger layer corresponds directly to the top of the following older layer beneath. The creation of the three-dimensional underground model was undertaken using the licensed software goCad® („Geological Objects computer Aided Design“). The provided markers of the geologic layer borders were saved in the ASCII-format intersystem within the MS Access data base and were imported in the programme goCad®. Using this information, 17 geologic layers were constructed three-dimensionally.
The geologic sequence of the investigation area includes glacial deposits. The loess clays (three sequences) and the three fluvial debris series were emphasised in the results. After detailed examination, the fluvial debris could be divided into Elster, Saale and Weichsel Gilbert-type delta deposits of a glacial lake of the Leine River, respectively. The loess clays are interglacial deposits following the named glacial periods.