gewonnenen Erfahrungen und begründet einige Thesen zur verstärkten Einbindung geologischer Themen in den Unterricht der beiden genannten Schulfächer. Im Biologie und Umweltkunde-Unterricht bietet sich hierfür der zentrale Inhaltsbereich „Ökologie und Umwelt“ an, in den Geographie und Wirtschaftskunde-Lehrplänen finden sich geologische Bezüge an mehreren Stellen und können darin als Mosaiksteine beim Erwerb von Umweltkompetenz aufgefasst werden.

Terrestrial laser scanning, digital photogrammetry and RTK-GPS surveying in engineering geology: data acquisition, processing and application examples

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In practices the results of engineering analysis and design depend on the quality of the input data. Over the last years, we have devoted research efforts to the acquisition and the generation of adequate and accurate spatial data based on remote sensing approaches. Our synergistic combination of terrestrial laser scanning (TLS), digital photogrammetry and the real time kinematic (RTK) global positioning system (GPS) surveying greatly facilitates the collection on the size, spatial position and orientation of engineering geological information. The results are geo-referenced virtual outcrop models (VOM), which are three-dimensional computer based representations of engineering rock mass characteristics with unprecedented accuracy and resolution. The direct applications of a VOM include: (1) spatial and temporal mapping of the geomorphologic features relevant to the stability of natural or excavated slope; (2) mapping of actual fracture network characteristics (fracture orientation, size, and topology); (3) mapping of block shape and size distribution on the natural and excavation surface; (4) documentation of an underground excavation (actual profile, lining evaluation, quality control of bolts etc.). The applications of virtual outcrop models to our actual engineering geological projects will be presented.

Synthetic Parameter Tests for Ambient Noise Tomography in the Vienna Basin

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Ambient noise tomography has been applied worldwide to study the crust and uppermost mantle of the Earth. Phase velocities along the path connecting two stations are obtained from crosscorrelating the signals recorded at these stations at different periods. These periods typically lie within the second microseismic band between about 4 and 10 seconds, because a lot of noise is generated from ocean waves hitting the coast or interacting with the ocean floor at these periods. However, while it is preferable to work with these periods it is not always possible when interstation distances are too small (less than ~100 km). In such settings shorter periods need to be used for processing. Moreover, targeting shallow crustal structure also requires using periods shorter than 4 seconds, as longer period waves are not very sensitive to these depth ranges. We study the resolvability of crustal structure in the Vienna Basin area using ambient noise tomography. To that end we investigate the effects of crustal velocities on phase velocity sensitivity kernels and synthetic waveforms using crustal models and station distances which are representative of the Vienna Basin. Due to the lateral extent of the basin area as well as the currently available data from seismic stations we use distances ranging from 20 to 100 km, and periods from 0.3 to 3 seconds for our synthetic tests. Our aim is to establish what periods can be used for particular velocity structures and station distances, and later apply these to real data recorded at stations in or around the Vienna Basin.