**Optimal geostatistical interpolation of complete grain-size distributions for estimation of sand resources**

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The purpose of this project is to build a 3-D model of the spatial distribution of grain size in the subsurface of the Maasmechelen area. Sedimentological fieldwork in the Mechelse Heide Zuid (MHZ) quarry (operated by Sibelco) will be carried out to interpret the depositional environments of the Bolderberg Sands and the spatial distribution of lithofacies units. Sibelco will provide a digital terrain model (DTM) of the Maasmechelen area, as well as a series of descriptions of cores with their spatial coordinates, and the corresponding sets of grain-size distributions measured downcore. If needed, additional grain-size measurements will be carried out on samples taken in the MHZ quarry to achieve better spatial coverage. All data will be combined in a 3-D model of the subsurface with geostatistical software (Surfer) and a pre- and post-processing (PPP) module. The PPP module applies two data transformations to reduce the problem of modelling complete grain-size distributions to a standard geostatistical problem which may be solved by Ordinary Kriging (OK). After the geostatistical modelling, the PPP module carries out the inverse transformations to obtain model output in the same units as the input data. The mathematical transformation is not only meant to simplify the geostatistical modelling, but it also serves another important purpose: achieving consistency between the physics of size-sorting phenomena and the statistical assumptions underlying conventional geostatistical methods such as Ordinary Kriging. Therefore, the 3-D model of grain-size distributions which results from the above analysis is expected to be superior to a conventional OK model, i.e. one without PPP. Hence, two models (one with and one without PPP) will be constructed and compared to decide which approach yields the best results. The final outcome of this project should be cast into the form of a workflow for building reliable subsurface grain-size models.