Abstract

The current market environment and the energy and resource politics forces mining companies towards a continuous process improvement in regards of efficiency and environmental protection while mining and processing lignite. Innovative concepts, such as modern power plant technologies or the beneficiation of lignite in terms of gasification, call for sophisticated solutions in the mining and coal handling process. These requirements and the increasing geological complexity of deposits to be mined call for new approaches in modelling, evaluating and planning of deposits. Especially aspects of geological uncertainty and in-situ variability of important parameters are key drivers in determining the possibility of recovering lignite efficiently and delivering in-spec products.

Traditionally used interpolation methods for modelling deposits are by construction limited in the ability to capture in-situ variability and geological uncertainty. Alternatively, the so far mostly in ore deposits applied methods of geostatistical simulation provide an efficient tool to generate such models. This contribution investigates the transferability of methods of geostatistical simulation to questions of modelling, evaluating as well as optimizing decisions under geological uncertainty in the lignite mining industry.

For modelling large deposits a new and efficient simulation algorithm is presented and applied to a lignite deposit in central Germany. Practical aspects are evaluated and documented.

An analysis in terms of evaluating resources and reserves, the ability of forecasting coal quality parameters and financial indicators shows the extended possibilities of the uncertainty driven simulation approach compared to the interpolation approach. The ability to quantify geological risk leads to a more informed decision making process in different stages of a mining project.

The presented applications of integrating the modelled geological uncertainty in the process of optimizing decisions illustrates the added monetary value of the uncertainty based view compared to the traditional interpolated approach.