# A Geostatistical Approach to Real-Time Reconciliation of the Grade Control Model – A Study regarding the Influence of Measurement Volume, Update Interval, Sensor Precision and Blending Ratios

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**Abstract** One of the main challenges of the mining industry is to ensure that produced tonnages and grades are aligned with targets derived from model-based expectations. Unexpected deviations, resulting from large uncertainties in the grade control model, often occur and strongly impact resource recovery and process efficiency. During operation, local predictions can be significantly improved when deviations are monitored and integrated back into the grade control model.

This contribution introduces a novel realization based approach to real-time updating of the grade control model by utilizing online data from a production monitoring network. A new algorithm is presented that specifically deals with the problems of an operational mining environment. Due to the complexity of the material handling process, it is very challenging to formulate an analytical approximation linking each sensor observation to the grade control model. Instead an application specific forward simulator is build translating resource realizations into observation realizations. The updating algorithm utilizes a Kalman-Filter based approach to link forward propagated realizations with real process observations to locally improve the grade control model. Differences in scale of support are automatically dealt with.

This contribution further analyses the impact of the characteristics of production data on the overall performance of the updating algorithm. A series of experiments is conducted to investigate the influence of sensor precision, measurement volume,

update interval and blending ratios. The paper concludes with some recommendations for constructing an optimal monitoring network.