The Ventersdorp Contact Reef model in the Kloof Gold Mine as derived from 3D seismics, geological mapping and exploration borehole datasets

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Abstract
A model of the Ventersdorp Contact Reef (VCR) orebody at Kloof Gold Mine was derived by integrating 3D reflection seismic data with information derived from underground mine mapping and exploration drilling. The study incorporated the depth-converted prestack time migrated (PSTM) seismic cube, the mine geomodel, faults and dikes mapped in excavations, mine development infrastructure, and intersections of the VCR by surface and underground exploration drilling. The 3D seismic data provide an accurate geometric model of the VCR orebody and its offsets. The underground mapping datasets help to define minor faults and dikes that are below seismic resolution limits. The integration of the these datasets allowed (1) for better mapping of fault architectures and distributions within the lease area, (2) definition of the likely zones of difficult ground conditions around seismically imaged dikes and faults, and (3) better predictions of the number and spacing of faults that offset the VCR within minable blocks. The model is useful in mitigating both economic and safety risks of deep mining.