Reflection seismics as a framework for 3D/4D geologic modeling of the Skellefte district, northern Sweden

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The Skellefte ore district is one of the three major mining districts in Sweden and is well known for its volcanogenic massive sulphide and gold deposits. Starting with a pilot 3D geologic model in the western part of the district, the Kristineberg mining area, reflection seismic data together with other geophysical and geological data proved to be crucial in constraining a geological model of the area, especially at depth. Following the pilot project, in order to improve the model and to provide more information in the shallow parts, but also to develop it in the central parts of the district, a 3D/4D-modeling of mineral belts project was launched. More than 100 km of new reflection seismic data with varying resolution and research objectives were acquired in the western and central parts of the district during 2008-2010. Magnetotelluric data, as well as potential field and deep IP measurements, accompanied the reflection seismic data to facilitate the interpretations. Integration of these data with mine observations allowed an improved geologic model of the Kristineberg mining area and the construction of a 3D geologic model of the central Skellefte district. The results and observations obtained allow a better understanding of the overall structures and their relationship with major mineralization zones.