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High-resolution reflection seismic imaging in the Skellefte Ore District: A contribution to 4D geologic modeling

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The Kristineberg VHMS (volcanic-hosted massive sulfide) mining area is located in the western part of the Skellefte Ore District, the most important metallogenic zone in northern Sweden. The area has been the subject of several geological and geophysical studies with the aim of understanding the contact relationships between the ore bearing volcanic and volcano-sedimentary formations and the surrounding rocks. To establish the structural geologic framework at depth, two new reflection seismic profiles, a N-S directed high-resolution one with a length of about 6.3 km and an E-W directed one perpendicular to the high-resolution profile with a length of about 13 km were acquired in 2008. Although the structural geology is complex, a preliminary stacked section of the high-resolution profile reveals a series of steeply dipping to sub-horizontal reflections in the southern and northern parts of the profile, many of which can be traced to the surface for correlation with surface geology. Several reflections appear to be consistent with reflections observed in two previously acquired profiles in the study area. The new reflection seismic results will be integrated with the previous reflection seismic results, potential field modeling, magnetotelluric data and geological observations to improve earlier geological interpretations that led to a pilot 3D geologic model of the study area.