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# 3D seismic imaging around the 2.5 km deep COSC-1 scientific borehole, central Sweden

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Following the successful completion of the COSC-1 drilling campaign, a number of geophysical investigations have been performed in and around the 2.5 km deep borehole. Three different seismic experiments were conducted simultaneously in the fall of 2014 to take advantage of the same source points; 1) a Vertical Seismic Profile (VSP) in the borehole, 2) three 2D seismic profiles across the borehole, and 3) a limited 3D seismic survey (presented here). The latter is the first 3D seismic survey on land in Scandinavia to target the Caledonian Nappes and will allow mapping a small part of the Seve Nappe Complex (SNC) in 3D. Furthermore, it will allow extrapolation of results from downhole logging, core analysis and other seismic surveys to structures surrounding the borehole.

A total number of 429 receivers (10 Hz single component geophones) were planted with 20 m separation along 7 lines spaced 200 m apart. The total area with receivers covered approximately 1.5 $km^2$ and was centered on the drill site. A combination of a mechanical source (a rock breaking hydraulic hammer, near offsets) and explosive charges (0.5 kg fired at 3.5 - 5 m depth, far offsets) were used. The source points were activated along roads radiating outwards from the COSC-1 drill site in a star pattern. The nominal shot spacing was 20 m (vibrating source) or 80 m (explosives) and maximum horizontal offset was about 5.75 km.

The high-grade metamorphic SNC is well known from previous 2D seismic studies to be a highly reflective unit. However, due to the complex 3D geometry and lithological variation within the unit, it has not been clearly imaged. The new 3D data provide a means to image these structures in more detail and to follow the lithological and structural interfaces observed in the core into the surrounding unit. Preliminary results from the 3D processing and correlation with borehole data will be presented.