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Imaging fractures by using 3 Components VSP Data

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A three component 3D VSP experiment was carried out in two wells (V01 and S01), at the limit between Styldrift 2001 and Styldfrif 2005 3D seismic surveys in the western limb of the Bushveld Complex in South Africa, in order to obtain information where structural geometries are poorly imaged on surface seismic leading to a more robust understanding of how to better delineate features in mines. The 3D surface path consists of 1967 receiver groups and 1957 VPs . The VPs were recorded by 80 channels from V-Tool in borehole S01 synchronized with the Sercel Wavelab and its 3x12 Slimwave channels in borehole V01 in their corresponding string receiver with 80 and 34 levels, respectively. The V-Tool array consists of 2 receiver; in each level (one geopohone and one hydrophone). The receiver depth interval was 10 m for the V-Tool, 5m and 10m for the Slimwave, resulting in a receiver depth range of 365 to 635 m. The processing procedures of VSP data acquired with both near offset (65 m) and two far offset (470 m and 476 m), include some key techniques like geometry, rotation of the horizontal components data, velocity analysis, wave field separation and depth imaging depending on the angle, preliminary analysis shear wave data, VSP-CDP transform, among others, were applied on the multicomponent data in terms of the ability to construct interpretable full wavefield subsurface imaging. We consider this strong support for the characterization of fracturing or/and faulting in which, the study of particular splitting of shear waves and anisotropy constitute a key information.