SEISDIP: Dip and Azimuths from 3 Component Vertical Seismic Profiles (3C -VSP).

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Abstract : SEISDIP TM : Dip and Azimuths from 3 Component Vertical Seismic Profiles (3C -VSP). 3C (3 components) oriented with a hardwave device and 3C isotropic recording of the VSP tool (named " vector fidelity"). 3C isotropic processing resulting in P-wave polarization measurement of reflected events, P-P or P-S. Improved VSP interpretation from oriented 3C in comparison with standard 1C VSP processing. Applications: Rig-source VSP, all borehole seismic surveys recorded with geophones, especially in complex structural context; O-VSP, VI-VSP, 2D walkaways;3D-VSP. SEISDIP TM : IFP trademark. Rig source VSP surveys are commercially recorded with a single zero-offset source position and with a downhole tool including 3 orthogonal seismic sensors. For VSP acquisition in vertical wells, at least a magnetometer needs to be combined with the VSP tool. "Isotropic" processing of the oriented 3 Components (3C) VSP data means that all the processing operations are identically applied on the 3 components at any seismic time, ensuring the following benefits: the illumination of seismic reflectors is achieved in 3 Dimensions, so that dip and azimuth of reflectors can be derived. 3C VSP yields the structural dip of seismic interfaces from the borehole up to distances of several hundred meters away from the well, even if the reflectors do not intersect the well, or are located below the well. A 3C VSP can be recorded in any well, cased or open hole. In contrast, dip/azimuth from borehole wall imaging tools relate to sedimentary dips with an investigation range of a few centimeters away from the well bore, and can be recorded in open hole only. An early example of a complex VSP case study, entitled "**Pre-seisdip case-study**" processed in 1989, shows the unique structural solution of a 3C VSP seismic response after difficult orientation: **3C processing was successfully attempted in order to restitute reliable dipping structures**, and the corresponding VSPCDP image (Model 4); the O-VSP imaging process was initially achieved with the single vertical component, and performed according to several dip hypotheses (Models 1,2,3), as the interpreter was uncertain about the actual dipping trends of the overburden and of the deep reservoir interval from the available surface seismic images and other borehole data…

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