Multicomponent seismic imaging using ocean-bottom seismometers over the White Rose oilfield, offshore Newfoundland

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ABSTRACT

In the summer of 2002, the CREWES Project, in conjunction with Husky Energy and Dalhousie University, acquired a 4-C seismic survey over the White Rose oilfield, offshore Newfoundland. Twenty-one ocean bottom seismometers (OBS) were deployed in about 100m of water, at a fifty-metre receiver spacing, to form a 2-D receiver line of one kilometre length. Twelve 8km-long swath shot lines, at 50m-200m line spacings, were recorded by the OBS instruments from an airgun array deployed behind the CCGS Hudson vessel. When binned (at 25m x 25m), twelve CMP stacked sections were obtained, with a maximum fold of twenty-six. Asymptotic binning for the converted-wave, assuming a Vp/Vs value of 3.1, resulted in eleven stacks with a maximum fold of sixty-eight. There were numerous problems with the OBS recordings, but with persistent processing, we have achieved some compelling PP and PS images. To our knowledge, this is the first 4-C seismic reflection survey acquired in Canada. We have correlated the sections using elastic-wave synthetic seismograms, a multi-offset VSP dataset, and previous streamer surveys. We find a surprisingly good PS section above the base of the Tertiary unconformity with a noisy, but promising, section below. The P-wave geophone data are also bandlimited, but reasonably good throughout the section.