

A sub-salt image of the Angola margin from wide-angle reflection / refraction seismic data

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Long offset wide angle reflection and refraction seismics using OBS/OBH are a powerful tool for imaging deep structures located beneath salt or basalt often observed on continental margins. We present here new results obtained using these techniques to investigate sub-salt structures of the continental margin off Angola. The data were collected in April 2000, during a cruise of the ZaïAngo project, a scientific collaborative programme led by IFREMER and Total-Fina-Elf. A 4.5 km long streamer was used with low frequency air gun array and 75 OBS were deployed. The OBS wide-angle reflection / refraction data were interpreted using a ray tracing program to model the first time arrivals and wide-angle reflection events. The shallow part of the model was built using the geometric constraints of MCS lines. The deep part of the model was constrained by OBS data and gravity modelling.

On the eastern part of the margin, a deep sub-salt basin (about 12 km depth) is filled by sediments with velocities ranging from 4.7 to 5.8 km/s. This basin is underlain by a crust with 6 to 6.8 km/s velocities. Over

a distance of about 30 km from the shore, the continental crust thins from 30 km to 4 km beneath the basin. At the base of the crust, where the crust is highly thinned, a high velocity (7.2 to 7.4 km/s) body was evidenced. We detect an abnormal oceanic domain, where the crust is 5 to 6 km thick and formed by 2 layers. The upper layer is characterized by velocities varying from 6 to 6.8 km/s and important lateral velocity gradients. The lower layer shows velocities of 7.4 km/s to 7.6 km/s. No Moho arrivals having a velocity of 8 km/s are observed. There is a basement high, located between the transitional domain and the abnormal oceanic domain. This structure is characterized by crustal asymmetric arrivals on the OBS seismic data. Despite the disturbance and complexity brought by salt tectonics, the combined use of MCS profiles, OBS and gravity data help constrain crustal velocity models of the Angola margin. This velocity model is used to perform a pre-stack depth migration of the MCS line located along the OBS/OBH.