

Comparison of improved 3D seismic image with borehole information around IODP C0002 site in Nankai Trough off Kumano

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We introduce a preliminary investigation of geological structures around the IODP C0002 site by integration analysis of new 3D seismic image with existing borehole information obtained in scientific drilling expeditions. The 3D seismic survey data was acquired in 2006 as a site survey of IODP NanTroSEIZE project in Nankai Trough off Kumano. The 3D seismic data was reprocessed by applying new technologies advanced in a decade after the initial processing, such as broadband processing, multiple and noise attenuation, and pre-stack depth migration with TTI anisotropy. The improved depth image shows clearer three-dimensional structures than the previous depth image in the old accretionary sediments beneath the Kumano basin, such as folds, dipping reflectors, and discontinuities of reflectors. In the deeper part after multiple reflections were better attenuated, some dipping reflectors can be clearly observed just above the megasplay faults. The mega-splay fault is imaged at the depth about 5,200 - 5,400 mbsf, and a high velocity zone was estimated above the mega splay fault with 1.5 - 2.0 km thickness and the maximum value more than 5,000 m/s. On the other hand, a lot of geological information are available obtained from downhole logging, core samples, and drill cuttings down to 3,059 mbsf of drilled holes in the C0002 site. The data integration of different scale information between seismic and borehole is necessary for better understanding of geology and geophysics in the complex structures. We can observe well correspondence between regional deformation structures estimated from seismic image and structural information from the borehole measurement. From the viewpoint of seismic data analysis for further investigation, quantitative investigation through attribute analysis or seismic inversion will be useful to understand the dynamic deformation in the seismogenic zone with some physical properties by regional estimation from the seismic data and the local measurement along the boreholes.

Keywords: Nankai Trough seismogenic zone, 3D seismic survey, Core-Log-Seismic integration