

Refinement of scientific objectives, drill sites, and strategies for CHIKYU IODP proposal aimed at Bend-Fault Hydrology in the Old Incoming Plate (H-ODIN): Input from the London workshop

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Hydration due to plate bending-induced normal faults (bend-faults) in the region between the trench axis and outer rise (outer rise) has also drawn considerable attention (e.g., Grevenmeyer et al., 2007; Fujie et al., 2013). Ideally, comparing subduction zones in several contrasting geodynamic states (e.g. Old plate vs Young plate, bend-faults being reactivated abyssal hill faults vs. newly formed horst-and-graben faults, etc.) is likely to be the most promising exploration approach to expand our knowledge of bend-fault hydration processes. In order to deepen our understanding of bend-fault hydration, an IODP pre-proposal: Bending fault hydrology of the Old Incoming Plate (H-ODIN) was developed. The IODP workshop, Bend-Fault Serpentinization, was held in London, 2016, sponsored by CHIKYU IODP Board, the UK-IODP, and ECORD. Horst-and-graben bend-fault structures are well developed in the northwestern Pacific subduction system. The V_p/V_s ratio is high at the outer rise area where bend-faults start to be developed (Fujie et al., 2013). Anomalously high heat flow values are found to be pervasively distributed in the off-Tohoku outer rise region (Yamano et al., 2014). The off-Tohoku region also provides a rare opportunity to study a place where the local stress state is likely to have changed significantly since the 2011 Tohoku Earthquake (Obana et al., 2011). Microseismic activity detected by OBS is considered to be related to actively deforming bend-faults (Obana et al., 2012, 2014). The questions on the nature of bend-fault hydration are classified into (1) Bend-fault material and structure, and (2) Bend-Fault Stress State and monitoring stress-state and fluid flow. The Japan Trench site seems best for understanding links between bend-induced hydration and the outer rise seismic cycle. (especially optimal now as we are in a rare phase between a giant megathrust event and its potential outer-rise doublet.). We will present more details in the presentation.

Keywords: Plate bending induced normal fault, Ocean Drilling Project, Earthquake, Water-carbon circulation