

ポスター会場（1日目） | 一般セッション：S06. 地殻構造

2025年10月20日(月) 17:15 ~ 19:00 P06会場 (502+503)(502+503)

[P06] 地殻構造**[P06-02] Distribution of the disturbed incoming sediments of the Japan Trench and its potential relation to the outer rise faulting**

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To investigate the crustal structure of the outer-rise region of the Japan Trench, numerous seismic reflection surveys and deep-sea drilling projects have been conducted. These studies revealed that, on the oceanward side of the trench, Paleogene and Cretaceous siliceous sediments underlie pelagic sediments and have undergone chertification, forming chert layers. However, seismic profiles show that the chert layers are locally disturbed or indistinct, and anomalously high-amplitude reflectors occur both at the chert–pelagic sediment boundary and within the chert itself. Such anomalous reflectors imply the presence of materials with acoustic impedances distinct from the surrounding sediments. These anomalous materials may affect the generation of outer-rise earthquakes and, once subducted, could also influence décollement formation and seismic activity in the subduction zone. Therefore, clarifying the nature of these anomalies within the chert layer is necessary.

This study classified sedimentary sequences into three types (A, B, and C) and mapped their distribution based on multichannel seismic reflection profiles. Type A represents the typical stratigraphic sequence, consisting of three layers: pelagic sediments, the chert layer, and the oceanic crust from top to bottom. Type B is characterized by high-amplitude reflective surfaces within or at the boundary of the chert layer. Type C exhibits severely disturbed chert sequences, where the original chert is replaced by a complex, multilayered acoustic basement accompanied by reflection blanking in the surrounding pelagic sediments. Detailed seismic profile analysis further indicates that both Type B and Type C anomalies are generally associated with faulting. Type B anomalies are frequently located adjacent to fault structures distal to the trench, while Type C anomalies become increasingly common closer to the trench, particularly around petit-spot volcanoes. At this stage, particular attention is focused on the origin of Type B anomalies. These anomalous reflective surfaces suggest material transformations within the siliceous sediments, potentially caused by varying degrees of the opal-CT to quartz transition. One hypothesis proposes that, in the distal oceanic regions away from the trench axis, high-temperature fluids and/or Mg²-rich fluids pass through faults and infiltrate the upper or fractured portions of the siliceous sediment, creating thermal and/or geochemical conditions that enhance the opal-CT to quartz transformation. As a result, the local quartz content increased, resulting in the formation of high-velocity layers. Closer to the trench axis or in proximity to volcanic areas, more intense faulting and magmatic activity may have caused severe disturbance and alteration of the sedimentary layers, resulting in complex structures similar to Type C anomalies.

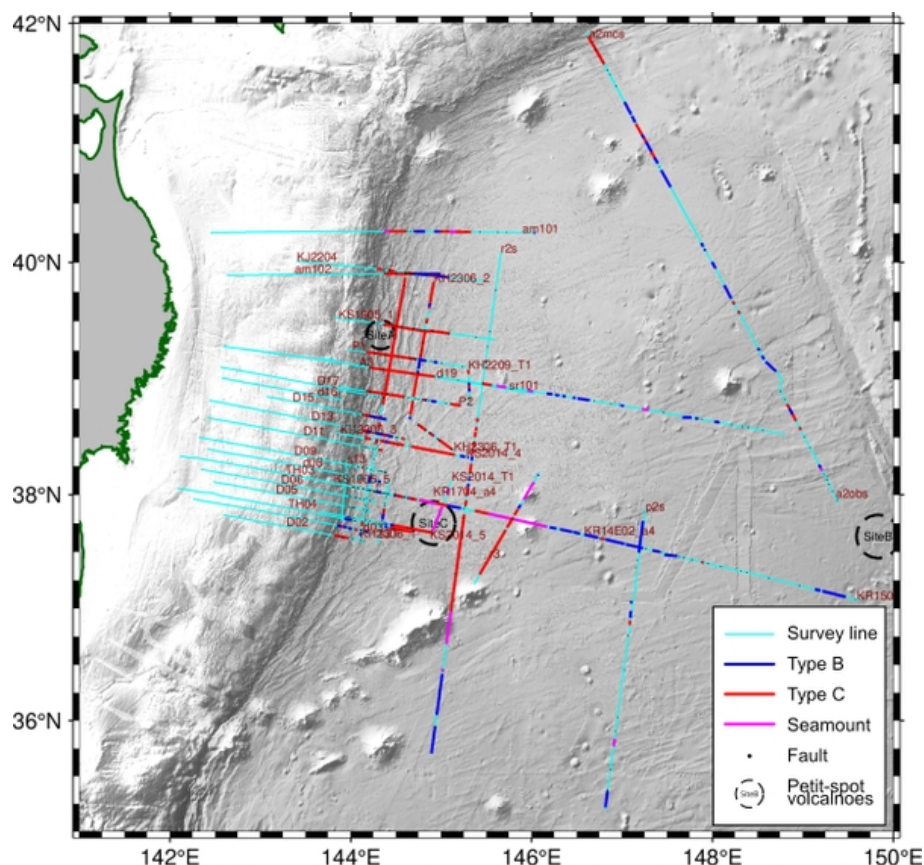


Figure 1. Locations of multichannel seismic (MCS) profiles used in this study and distribution of anomalous sedimentary structures (Types B and C) in the outer-rise region of the Japan Trench. Type B: high-amplitude reflectors within or at the boundary of the chert layer. Type C: severely disturbed chert sequences replaced by complex acoustic basement with reflection blanking in pelagic sediments. Areas without Type B/C anomalies correspond to normal stratigraphy (pelagic sediments overlying chert and oceanic crust).