Spacial relation between earthquakes and seismic reflector at Boso peninsula indicated by converted wave

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Introduction

We analyzed seismic reflection record to reveal plate structure around Boso peninsula. As a result, it is revealed that there exists north dipping conspicuous reflector (Kimura and Kasahara, 2001). We reported that on the basis of similarity of dipping angle and two way travel time between this reflector and the major reflector of line 96-C, which is considered as a material boundary between the Philippine Sea slab and overlyng plate and this reflector can also be considered as the same boundary. In this region, there exists earthquake cluster at depths of 25 - 30km. Most of P-axes of the events in this cluster are aligned in NNW-SSE direction. They are considered as interplate seismic activity between overlyng plate and Philippine Sea slab. This region is suitable for research of relation between plate structure and seismic activity because there exists plate boundary at shallower depth than other region, just beneath observation stations. In this research, we analyzed observed seismic waveform in detail, and investigated the relation between them.

Later phase observed at Boso peninsula

Around Kuju-kuri coast, it is expected that acoustic impedance contrast exists at the depth of major reflector. And so, if earthquakes occur above the reflector, it is expected that some reflected wave would be observed, and if earthquakes occure below the reflector, some converted wave would be observed. To detect these phases, we investigated seismic waves of earthquakes occurring between those plates. As a result, prominent later phase can be detected after the arrival of direct P, at Katsu'ura station(KTU). Characteristics of this phase is as follows. 1) This phase can be detected with hypocentral distance larger than 23km. 2) Apparent velocity is almost same as that of P, and X-P time is almost constant. 3) Vertical component is dominant 4) Amplitude ratio to direct P increases from 0 at 23km to 2.0 at 40km, monotonically. To detect the origin of this phase, we calculate synthetic travel time and wave amplitude using velocity structure revealed from seismic reflection survey and characteristic mechanism solution. As a result, it is revealed that ps converted wave at 10 km depth is most suitable for travel time and amplitude dependency. According to the depth of conversion plane, ps or sp converted wave is possible, but amplitude dependency is realized only in the case of ps converted wave. Inconsistency in direction of wave oscillation may due to complicated structure under station, which is revealed by seismic reflection survey offshore. From this result, we conclude that the later pahse ps converted wave, in this research.

Results and discussion

From this research, it is showed that interplate earthquakes occur below the reflector which corresponds to material boundary. It is indicated that some portion of displacement of plate motion is consumed inside Philippine Sea slab. Because there is no seismic activity in overlyng crust, accumulation of stress in that region is considered to be relative low. From the fact that in southern part of Kanto region, seismic activity in crust is inactive, it is indicated that such characteristics of plate boundary is popular at that region.