Reflection character of locked-sliding transition and aseismic slip zone on the subduction interface beneath the SW Japan arc

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The Nankai trough region, where the Philippine Sea Plate is subducted beneath the southwestern Japan arc, is a well-known seismogenic zone of interplate earthquakes (e.g. the 1944 Tonankai Earthquake (M=7.9) and the 1946 Nankai Earthquake (M=8.0)). Detailed crustal and upper mantle structure of the subducting Philippine Sea Plate and the overlying SW Japan arc are important to constrain the process of earthquake occurrence as well as the evolution process of this margin. A series of onshore - offshore seismic refraction/wide-angle reflection studies were undertaken in 1999 and 2002 to obtain the crustal section from the Nankai trough to back-arc basin of the Japan sea crossing SW Japan arc. The 1999 experiment was focused to mapping a detailed crustal structure of a Nankai trough, rupture zone of the 1946 Nankaido earthquake and subducting Philippine Sea Plate [Kodaira et al., 2002]. The 2002 experiment was intended to reveal more detailed subduction structure from Shikoku to Honshu and structural variation from Honshu to the Japan Sea [Kurashimo et al., 2004, Sato et al., 2006]. The most remarkable feature of the record sections is extremely high amplitude phases. The phases were interpreted as reflected waves from the top of the subducting Philippine Sea plate [Kurashimo et al., 2004; Kodaira et al., 2002].The seismic reflection method was applied to these data to obtain a detailed and clear image of deeper structure. The imaging was preformed using conventional common-mid-point processing steps, including post-stack migration and depth conversion. The normal moveout velocity and depth conversion velocity were based on the 2-D velocity structure derived by the refraction method. The reflection image shows that the lateral variation of the reflectivity along the top of the subducting Philippine Sea plate. A broad reflection zone is located in the aseismic slip zone. A thin sharp reflection zone with large reflection coefficient is located in the landward edge of the locked zone. These results are important to identify the extent of the asperity of megathrust earthquakes, especially its landward limit.