



Velocities of seismogenic structures in the outer wedge, northern Manila trench area

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Seismogenic structures, megathrust slip behavior and frontal accretionary prism geometry are highly correlated with physical properties of under-thrusting sediments in accretionary convergent margins. In addition, under-consolidated under-thrusting sediments has higher porosity and are probably associated with elevated pore fluid pressure in the outer wedge where may be reduced locking. In contrast, consolidated under-thrusting sediments may infer much more difficult subduction process, which could incorporate with the strong frontal section of accretionary prism and cause strain accumulation. Previous seismic structural analyses show that a clear decollement could be well imaged in the frontal accretionary prism north of 20 degree N latitude. On the contrary, thrust faulting can penetrate the whole sediment column and connects with the subducting South China Sea basement south of 20 degree N latitude (i.e. no decollement observed). That implies a relatively weak outer wedge to the north of 20 degree N latitude, but the outer wedge is strong to the south. However, only three wide-angle refraction seismic profiles were conducted in the study area, the sediment velocities along the strike of the seismogenic region of the northern Manila Trench are poorly understood. In this study, to better understand P-wave velocity structures of under-thrusting sediments, we performed a pre-stack depth migration (i.e. PSDM) technique on six large-offset multi-channel seismic profiles collected in the northern Manila trench by R/V Marcus G. Langseth in 2009. The physical properties of the subducting sediments are adapted by the results from IODP expeditions 349, 367 and 368. Based on detailed sedimentary P-wave velocity and high-resolution deep sea drilling data, we could further derive physical properties such as porosities and examine the consolidation degree of the sediments in the frontal accretionary prism along the northern Manila trench area.