



Accretionary wedge growth, seismogenic zone updip limit and stress variations in Nankai subduction

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Earth scientists have wondered for some time whether the updip limit of the seismogenic zone in subduction zones were primarily controlled by present day conditions on the interplate, such as temperature (Hyndmann et al., 1997), or by a discontinuity of hanging wall mechanical properties (Byrne et al., 1988), which could result from geological history. Studies of Nankai margin concluded that the seaward extend of coseismic and tsunamigenic slip coincides with a system of out of sequence thrusts named splay faults, also following the limit between a critically tapered accretionary wedge and the forearc basin. A transect was selected for the Nantroseize IODP project where such splay faults are well imaged by seismics and the main seismogenic interplate could be reached in the future by riser drilling. At this site, the seaward edge of the forearc basin is affected by trench parallel normal faults, which were interpreted as the consequence of stress cycling, but could also be the consequence of subduction fault geometry and/or underplating. Preliminary results obtained at drill sites C0001 and C0002 during Logging While Drilling expedition 314 and coring expedition 315 have immediate implications on these representations. First of all, the age of the accreted material is Latest Miocene below the forearc basin and no important discontinuity of the accretion history is found in the splay fault area. Comparison with the adjacent

Tokai segment, where the age of the accreted sediment beneath the forearc basin is latest Oligocene suggests that present day conditions, rather than geological history, controls splay fault location. Borehole breakouts as well as structural observations on cores indicate spatial and temporal variations of stress axes, from trench orthogonal compression in the wedge, to trench parallel extension above the splay faults, to nearly trench orthogonal extension in the forearc and below. Cross cutting relationships observed on cores on board also suggest this variation in stress axes is recorded over the geological time scale as the material migrates from the wedge to the forearc domain. The development of a seemingly permanent extensional stress is a puzzling result, not fully explained by dynamic Coulomb wedge models (e.g. Wang et al., 2006).