Inhomogeneous conduit across slab controlled by intraslab stress heterogeneity in the Nankai subduction zone

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Non volcanic deep low-frequency tremors and slow slip events occur simultaneously in the transition zone from locked to continuously creeping fault at the down dip portion of the Nankai Trough subduction zone, southwestern Japan. The occurrence of these slow earthquakes is attributed to the effect of high pore pressures on the plate boundaries. The Nankai Trough subduction zone has a discontinuous band of occurrence of these slow earthquakes along the trench. Here we show that spatial variation of intraslab stress can control fluid migration through the subducted Philippine Sea slab to the plate boundary. The tri-axial normal faulting stress detected by the stress tensor inversion by using focal mechanisms in the slab controls anisotropies of permeability trending NNW–SSE sub-horizontal orientation from the subducted Philippine Sea slab to the plate boundary. The inhomogeneous condition controlled by the spatial stress heterogeneities in the subducted Philippine Sea slab represents the intraslab fluid pathway. The hypothesis is consistent with spatial heterogeneity of slow earthquake activities and $^{3}He/^{4}He$ ratio distributions.

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