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Conditions for the activation of splay faults in accretionary prisms: application to Nankai

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One key issue to predict the activation of splay faults such as in Nankai, is to understand the role of the distribution in pressure and frictional properties, within the weak décollement and in the inherited faults, on the stability of the prism.

To this end, a general procedure is proposed to extend classical Dahlen's theory to wedges of arbitrary topography and composed of heterogeneous rocks. Our approach relies on the kinematic approach of limit analysis (e.g. *Cubas et al.*, 2008) extended here for fluid-saturared rocks. The procedure is validated by comparing our stability predictions for a triangular wedge with Dahlen's criterion. Stable wedges correspond to the complete activation of the décollement, so that deformation is towards the external region. This failure mode corresponds to super-critical conditions. For sub-critical conditions, the failure mode is composed of the partial activation of the décollement in the internal region to the point where the ramp and the back-thrust are taking their common root.

The application to the Kumano transect of Nankai is based on a prototype with a topography inspired by the observations of *Park et al.*, 2002. The décollement is partionned into an internal and an external section where the friction angles and the pressure ratios differ, as proposed by *Kimura* (2007). The first failure mechanism is one where the décollement is activated over its entire length. The second failure mechanism sees slip on a partial of the décollement only and activation of the splay fault. The fluid pressure ratios in the internal and the external part of the décollement (λ_I and λ_E) which warrant the dominance of the first or second mechanism are then presented. The sensitivity of these predictions to the frictional properties and pressure ratio of the splay fault is finally explored.