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Approximate General Coulomb Model for Accretionary Prisms: An Integrated Study of the Kumano Transect, Nankai Subduction Zone, Southwest Japan

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In accretionary wedges, the mechanical and hydrologic properties along splay faults and the plate boundary fault at the base of the wedge are intimately related to properties within the wedge itself, as well as to sedimentation and/or mass wasting at the wedge surface, and accretionary flux at the wedge toe; Coulomb wedge theories tie these processes together and have been successful in their application to convergent margins. Most such theories assume for the sake of simplicity that mechanical parameters (e.g. bulk density, compressibility, frictional strength) and pore pressure are constant throughout the overlying wedge. However, the values of these parameters must necessarily change with depth and distance from the trench. Here, we derive a model for a fully general Coulomb wedge, parameterized using data specific to the Kumano transect at Nankai, to better understand the location of the basal plate interface and the properties of material composing an actively accretionary prism. We use shear strength data collected for incoming sediments at Integrated Ocean Drilling Program Site C0011 of the NanTroSEIZE project to parameterize the wedge's coefficient of friction. Preliminary results of models where the friction coefficient of the wedge decreases with depth, with other parameters constant and zero cohesion, indicate that including depth dependent frictional strength in the wedge decreases the taper angle of the wedge, with the effect becoming more pronounced with distance from the trench. This model will be further refined by including seismically and numerically determined spatial variations in fluid pressure within the wedge, as well as detailed locations of the upper and basal wedge surfaces along the Kumano transect determined from 3-D seismic data.