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3D Modeling of the transition from oblique lateral to normal convergence at the plate corner of Southeast Alaska

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Plate boundary corners generate a complex architecture to accommodate the transition from oblique lateral accretion to normal convergence. Geologically recent (5-10 Ma) convergence of the Pacific-Yakutat-North America system has created an early-stage analog to corner convergence characteristic of other corner systems (i.e. Himalayan Eastern Syntaxis). Numerical and analog models have been developed to simulate the early stages of oblique terrane collision in a convergent corner environment. Preliminary 3D numerical models show corner convergence partitioned into a steep, narrow two-sided mountain wedge along the lateral accretion zone that changes to a wider zone of shortening bounded by inboard and outboard directed thrusts at the frontal accretion boundary. Contraction rates through the frontal accretion zone lessen grading into the strike slip lateral boundary where shear strain rate is intensified. Clockwise rotation of structures also occurs at the transition from shortening to oblique slip. This transition is a localized strain triplet which reflects the changing boundary conditions of the corner. Slickenside analysis yields strain information for multiple faults in the Samovar Hills region of SE Alaska. Sandbox analog model results show predominant clockwise rotation along the lateral accretion zone indicating dextral displacement and a larger zone of shortening along the convergent frontal accretion zone. Deformation across the frontal accretion zone wedge shifts from dextral convergence near the corner to the east, normal convergence in the middle, and sinistral convergence to the west. Spatial and temporal localization of deformation into the strain triplet at the corner is shown to be a function of changing rheological conditions such as changing base strength or inclusion of strain softening behavior. Further strain concentration along with thermal weakening of the brittle crust occurs with focused erosion leading to aneurysm behavior.