SEISMICITY PATTERNS AND HIGH RESOLUTION BATHYMETRY DEFINE ACTIVE STRUCTURES ON THE YAKUTAT MICROPLATE SHELF AND SLOPE, ALASKA

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Tectonics in the Gulf of Alaska margin is controlled by subduction of the Pacific plate beneath North America along the Aleutian trench to the west and translation along the Queen Charlotte-Fairweather transform fault system to the east. The margin is complicated by the oblique collision and flat-slab subduction of the Yakutat microplate beneath the North American continent, resulting in the Chugach-St Elias orogenic system. Resistance of the Yakutat block to subduction causes geodetically observed differential motion between the Pacific and Yakutat plates. Comparisons of seismicity patterns with faulting observed on high resolution bathymetric and seismic reflection data are employed to constrain the mechanism by which this differential motion is accommodated. Recent earthquakes correlate with surface deformation possibly related to active faulting in the western third of the Transition fault observed on high resolution (100 m2) UNCLOS bathymetric data. Concentration of seismicity in this area and on the slope supports the suggestion that these structures are active. Seismic activity is also concentrated on the southeast slope of the microplate and on the shelf offshore Cross Sound where a strike-slip fault is visible on high-resolution seismic reflection profiles. These structures may be the surface expression of a Fairweather fault step-over. Elsewhere on the Yakutat shelf, seismicity is relatively sparse, with the conspicuous exception of events concentrated along the eastern extent of the Pamplona Zone fold and thrust belt, continuing onshore north of Icy Bay. These patterns in seismicity corroborate previous assertions that the Yakutat block is a deformation-resistant oceanic plateau; thus, relative plate motion is primarily accommodated on the plate margins with some internal deformation near the leading edge. Limited seismicity is present along the Kayak Island fault zone previously suspected to be the northeast extension of the Aleutian trench. Instantaneous GPS vectors along with slip vectors extracted from earthquake data are compared to the observed surface deformation and seismicity to clarify how differential Pacific and Yakutat plate motions are accommodated and how deformation in the region is partitioned between Yakutat plate margins and within the microplate itself.