SIGNIFICANT TECTONIC AND CLIMATIC EVENTS FOR THE YAKUTAT BLOCK COLLISION, GULF OF ALASKA: PLEISTOCENE GLACIAL INTENSIFICATION IN THE ST. ELIAS MOUNTAINS AND THE RELATIONSHIP BETWEEN THE FAIRWEATHER AND TRANSITION FAULTS

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An interdisciplinary examination is underway of the ~10 Ma history of the Yakutat block-North American plate collision in the northernmost Gulf of Alaska. This natural laboratory of tectonic-climatic interaction may be punctuated by distinct tectonic and climatic events that combined to create the Chugach-St. Elias mountain range. Resistance to subduction of this potential oceanic plateau results in flat-slab subduction at the eastern terminus of the Aleutian trench and a mismatch between GPS recorded motion and plate slip vectors; the latter may be accommodated in part by oblique-slip motion at the base of the slope between the Yakutat block and the Pacific plate, the Transition fault. Interpretations of this structure have ranged from estimates of 20mm/yr convergence to inference that the structure is inactive. New UNCLOS bathymetric data suggest that the Transition fault is currently active and propagating from the southeastern extent of the Yakutat block. A previously unknown strike-slip fault in the southernmost Yakutat block imaged on high-resolution seismic data suggest that the Transition fault is caused by an incipient step-over of the Fairweather fault system to outboard of the Yakutat collision. The incipient nature of this tectonic event is supported by a transition from a single strand to more complicated geometries from SE to NW along this Transition fault culminating in a transpressional escape-tectonics structure near the Aleutian trench. Climatically, the mountain building provided the seed ground for two phases of glaciation since ~6 Ma that has deposited ~5 km of sediment in the tectonically induced accommodation space on the shelf and ~2 km of sediment within the Surveyor abyssal fan. The 2nd episode of glaciation (2.5

Ma to the present) is marked by the advance-retreat cycles of the largest temperate glaciers in the world, which apparently intensified within the upper few 100 meters of the sedimentary record. An intensification that is perhaps stimulated by climate change during the mid-Pleistocene transition, ~0.75 Ma, in the dominant periodicity of high-latitude climate oscillations from 41 ky to 100 ky. High-resolution seismic images show that since this climatic event, shelf building and sediment accumulation have been dominated by glacial-interglacial cycles as opposed to tectonic exhumation.