Our working hypothesis is that the Eocene (?) - Pliocene strata record distinct stages of basin formation, sediment provenance, and deformation along the DFS and related structures. In addition, low-temperature thermochronology on basement rock along the DFS indicate that stages of basin formation are correlative with periods of rapid cooling (Fitzgerald et al. 2019). We present reconstructions of each stage of basin development and use provenance data to interpret the locations of the strata prior to displacement on these major strike-slip faults. Our findings suggest large-scale, strike-slip displacement since the Eocene (?) with potential unique sediment sources identified at ~250 km and ~400 km to the east of the present location of the exposed strata.

Preliminary bedrock geology of the Rackla River area, Wernecke Mountains, Yukon.

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The Rackla River area is underlain by normal faulted and gently folded sedimentary strata of the Paleoproterozoic Wernecke Supergroup, Mesoproterozoic Pinguicula Group, Neoproterozoic Hematite Creek Group and Windermere Supergroup, and Paleozoic Bouvette Formation. Gabbro dikes and sills that are likely age equivalent to the ca. 1380 Ma Hart River Sills cut the Wernecke Supergroup rocks. The presence of a mafic volcaniclastic horizon within the Bouvette allows its informal subdivision into a lower and upper member. These volcaniclastic rocks may the distal equivalent to volcanic rocks near the Tiger deposit, located ~20 km to the southwest. Three major angular unconformities are documented in the map area: at the base of the Rapitan Group, the base of the lower Bouvette, and the base of the upper Bouvette Formation.

Late-Cenozoic Yukon River capture, climate change, and consequences on the Yukon-Tanana upland landscape (Alaska and Yukon, Canada)

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New mapping shows three distinct river terrace levels along the Fortymile River that may correlate with three well-documented Klondike River terrace levels. A Pliocene Yukon River drainage divide is hypothesized to have separated the Fortymile and Klondike Rivers into paleo-drainages that previously flowed to the Bering Sea and the Gulf of Alaska, respectively. The Klondike terraces represent a primary line of evidence for Plio-Pleistocene divide capture, re-routing the Yukon River in totality to the Bering Sea, and have long been interpreted to reflect (a) early-Pliocene (~5.3 Ma) bedrock erosion and late-Pliocene gravel deposition terminated abruptly by rapid, Yukon River capture-triggered incision at ~2.6 Ma, (b) a terrace-forming incisional hiatus ending with incision at the mid-Pleistocene climate transition at ~1 Ma, and (c) Holocene alluvium deposition on a low-level terrace within 20 m of the active channel elevation across the region.

Here, new cosmogenic $^{26}Al/^{10}Be$ and luminescence depositional ages of Fortymile River deposits on three terrace levels track development of the ancient Fortymile River concurrent with the paleo-drainage network preserved in the Klondike terraces. Cosmogenic ages of the base (~4.8 Ma) and top (~2.4 Ma) of a thick (~25 m) gravel on the deeply incised (≤260 m) high terrace near the Fortymile River outlet date the early Pliocene onset of aggradation and subsequent early Pleistocene terrace abandonment via Yukon River capture. Ages of the top 2-3 m of high terrace gravel decrease upstream to ~2.1 Ma at the river midpoint and ~1.8 Ma in the North and West Fork Fortymile River headwaters, demonstrating progressive terrace abandonment by channel incision that propagated headward at a rate of ~270 m/ka. Isochron ages of the uniformly-incised (30-40 m) intermediate terrace gravel (≤8 m thick) are ~0.8 Ma near the outlet, ~1.1 Ma at the midpoint, and ~1.0 Ma in the West Fork headwaters. We interpret these ages to represent the end of a depositional interval from ~1.8 Ma until terrace abandonment during the ~1.2-0.8 Ma mid-Pleistocene global climate transition. Luminescence ages of sand on the minimally incised (<5 m) floodplain terrace range from ~5.0 to 2.4 ka and document late Holocene terrace formation. Our results show Pliocene accumulation of the Fortymile River high terrace gravel coeval with deposition of the White Channel Gravel in the Klondike basin. Plio-Pleistocene Yukon River capture lowered tributary base-levels and triggered the abandonment of high terraces in both the Fortymile and Klondike River basins; subsequent incision (≤200 m into bedrock) appears paced by changes in the amplitude and period of global climate cycles.

These observations are consistent with hypotheses of climate-forced changes in rates of global erosion and are corroborated by offshore records of sediment accumulation and provenance downstream in the Bering Sea. Ongoing fieldwork and remote mapping identify similar terraces in Yukon River tributaries draining the Yukon-Tanana upland over 300 km west of the Fortymile River, and imply widespread landscape reconfiguration triggered by Yukon River capture and modulated by late-Cenozoic climate change.

***P–T–t* conditions of high-temperature metamorphism and deformation in the Shuswap Metamorphic Complex, British Columbia**

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The Shuswap Metamorphic Complex (SMC) in south-central British Columbia is a domal structure that exposes high-grade metamorphic rocks. It is flanked by two extensional shear zones – the west dipping Okanagan Valley fault system and the east dipping Columbia River fault. Previous work suggests that the SMC may have been confined beneath a Cretaceous plateau for up to 100 Myr before exhumation during extensional collapse across the southern Canadian Cordillera in the Eocene. However, ambiguity remains concerning the pressure, temperature, and timing of metamorphism, deformation and exhumation in the SMC.
This project aims to use state-of-the-art techniques to define a series of *Pressure–Temperature–time–deformation* paths across the SMC from Revelstoke to Sicamous, British Columbia (50° 50' N. Lat.), which provides a complete cross-strike transect of the SMC from east (lowest structural level) to west (highest structural level). Key questions to be addressed include: 1) what were the peak metamorphic conditions reached within the SMC and were they uniform across the complex; 2) what is the relationship between metamorphic recrystallization and deformation;