Mid-Cretaceous metamorphic and plutonic stitching of Yukon-Tanana and Cassiar terranes in southern central Yukon Territory

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Paleomagnetic studies of Late Cretaceous layered rocks of the northern Cordillera imply that much of the hinterland of the orogen lay 3000 km south relative to North America as recently as 85 Ma. The Carmacks Group is a 70 Ma flood basalt which erupted across Yukon-Tanana terrane (YTT) in Yukon. The Carmacks Group extends east to the Tummel fault zone, along which YTT is juxtaposed against Cassiar terrane to the east. Cassiar Terrane is a miogeoclinal platform that shales out to the east into Selwyn Basin. Paleomagnetic studies of Carmacks Group, including flows from immediately adjacent to Tummel fault zone, imply that Yukon-Tanana terrane was 2000 km south at 70 Ma. The Eocene dextral Tintina fault has displaced Cassiar terrane 425 km north, leaving some 1500 km of displacement unaccounted for. Could the Tummel fault zone have accommodated this missing displacement? The 2-3 km wide Tummel fault zone consists of a northwest-trending Permian oceanic assemblage with greenstone, serpentinite and chert, intruded by mid-Cretaceous leucogabbro. Yukon-Tanana Terrane rocks to the southwest consist of a Devonian to Mississippian siliciclastic assemblage structurally overlain by a Mississippian arc volcanic assemblage of arc affinity and intruded by 348-350 Ma granodiorite / diorite of the Telegraph Plutonic Suite. Cassiar Terrane rocks to the northeast consist of pelite and semipelite with rare amphibolite (Kechika Group). These are overlain by a platform carbonate sequence (Askin Group). The 105 Ma Glenlyon Batholith is a sill-like body that intrudes Cassiar Terrane, with coeval plutons intruding the Tummel fault zone. A contact metamorphic aureole characterized by andalusite + cordierite is developed adjacent to the intrusions in Cassiar Terrane and the Tummel fault zone into YTT. This relationship pins YTT to Cassiar Terrane by 105 Ma, and limits post-mid-Cretaceous displacement across the Tummel fault zone to <5 km. Therefore, either the paleomagnetic data is not providing an accurate assessment of the paleolatitude of Carmacks Group, or the boundary between the far-traveled terranes and North America lies east of Tintina fault. This latter explanation implies that the Cassiar terrane and at least parts of the more easterly Selwyn Basin are far-travelled, and is consistent with a recently proposed paleogeographic model that interprets the displaced blocks as a ribbon continent that has been oroclinally buckled into its present distribution since Cretaceous time.