OCGC Seminar

Segmentation of the Western Laurentian Continental Margin: Evidence for Active Tectonism in the Neoproterozoic-Cambrian 'Miogeocline'

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Major variations in Neoproterozoic to Cambrian stratigraphy along the western Laurentian continental margin require along-strike structural inhomogeneties during Neoproterozoic extension. Thick miogeoclinal Neoproterozoic and Cambrian strata in southern Idaho and Utah are abruptly truncated along the present Snake River Plain and do not extend into central Idaho and Montana. Similarly, coeval miogeoclinal strata in British Columbia do not extend south into Idaho and Montana. Neoproterozoic to Cambrian stratigraphic and structural relationships in western Montana and central Idaho require the continental margin was tectonically active.

The highly variable nature of the basal Cambrian contact (locally an angular unconformity, a disconformity above crystalline basement, and an apparent conformable contract), the coarse grained nature of basal Cambrian strata, evidence for uplift of both Belt Supergroup strata (>5 km) and the existence of rapidly exhumed Neoproterozoic plutonic rocks suggests the continental margin was tectonically active in Neoproterozoic to Cambrian time. These structural and stratigraphic relationships suggest the northern Rocky Mountains north of the modern Snake River Plain acted as an independent structural domain distinct from subsiding areas to the south and north during Neoproterozoic rifting, and was characterized by episodic uplift, intermittent sedimentation and sporadic magmatism. These features are quite distinct from the classic miogeoclinal successions in southern Alberta and British Columbia and southern Idaho and Utah. This geometry is consistent with the asymmetric extension of the continental margin postulated by Lund et al (2010).

Biography:

Brian specializes in sedimentology and stratigraphy, with a primary emphasis on sedimentation and tectonics and the use of radiogenic isotopes (U/Pb, (U-Th)/He, Nd and Sr) in basin analysis. His research focuses on sedimentology and stratigraphy, geochemistry, field geology, economic mineral deposits and petroleum geology. His research is heavily field-based, and has extensive experience (32+ years) in stratigraphic, structural and economic geology field investigations in British Columbia, Washington, Idaho, Montana, New Mexico, Nevada, Wisconsin, Baja Mexico, Ethiopia, Honduras and Argentina.

The main focus of his current research is basin reconstruction and orogenic exhumation patterns in the south-central Andes Mountains of Argentina. His current research program involves a systematic integration of multidisciplinary analytical methods with complementary strengths (detrital zircon U/Pb geochronology, whole-rock neodymium analyses, and detrital thermochronology (apatite, K-feldspar, muscovite) designed to constrain source area heterogeneity, exhumation patterns and rates, sediment dispersal characteristics, and basin subsidence mechanisms. The primary objective is to establish a methodology that permits development of a detailed record of the spatial and temporal evolution of orogenic systems along continental margins, in order to constrain the dynamic linkage between orogenic exhumation and basin evolution. Brian is actively involved in a variety of projects involving geologic mapping and field relations, basin analysis, economic mineral deposits, resource evaluation, environmental contamination and associated issues.

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