Late Paleozoic Chronostratigraphy and Tectonostratigraphy of Pericratonic Terranes near Barkerville, British Columbia

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Introduction

The geology of the Barkerville, B.C. area consists of three pericratonic terranes: the Barkerville, Slide Mountain and Cariboo, which are fault bounded and located adjacent to one another. The main terrane investigated in the summer 2011 research season was the Barkerville terrane. The Barkerville terrane has a Lower Permian limestone referred to the Sugar limestone unit, which is exposed on the northwest slope of Mount Tom. The Sugar limestone is the only Lower Permian limestone within the Barkerville, Slide Mountain and Cariboo terranes. Chert and pillow basalts of largely Mississippian to Late Pennsylvanian and possibly Early Permian age occur within the Antler Formation in the Slide Mountain terrane (Struik and Orchard, 1985). The Cariboo terrane contains carbonate rocks including the Mississippian Greenberry Formation and the Upper Mississippian to Pennsylvanian (Orchard and Struik, 1984) Alex Alan Formation as well as unnamed Permo-Triassic greywacke and slate (Struik, 1988). Understanding the age relationship of the Sugar limestone with the surrounding lithostratigraphic units is fundamental for reconstructing the late Paleozoic environments and relationships between the Barkerville, Slide Mountain and Cariboo terranes.

Theory and Methods

Low-grade metamorphism has extensively recrystallized the Sugar limestone; therefore calcareous micro and macrofossils are rare to non-existent. Conodonts were used as biostratigraphic tools because of their ability to withstand low-grade metamorphism. Three conodont species were found after processing the Sugar limestone samples: *Sweetognathus behnkeni, Mesogondolella striata* and *Mesogondolella dentiseparata*. A relative age of Lower Permian (middle to late Asselian: 295-297 Ma) was determined largely on the basis of *Mesogondolella* spp. The relative proportions of the conodont genera and lithologic differences on Mount Tom indicate the higher elevation samples were more proximal and the lower elevations were more distal, implying the section is in a normal stratigraphic and structural orientation (Figure 1). The occurrence of *Sweetognathus behnkeni* links the Sugar limestone to rocks in Nevada and Bolivia, which could have important paleobiogeographic implications for the Barkerville terrane. The Sugar limestone was found to be interbedded with a phyllite, and siltstone unit in a section measured on Mount Tom; previously only three spot locations of Sugar limestone had been recognized. These lithologies are comparable to the Hardscrabble Mountain facies, which has previously been interpreted as Lower Paleozoic.

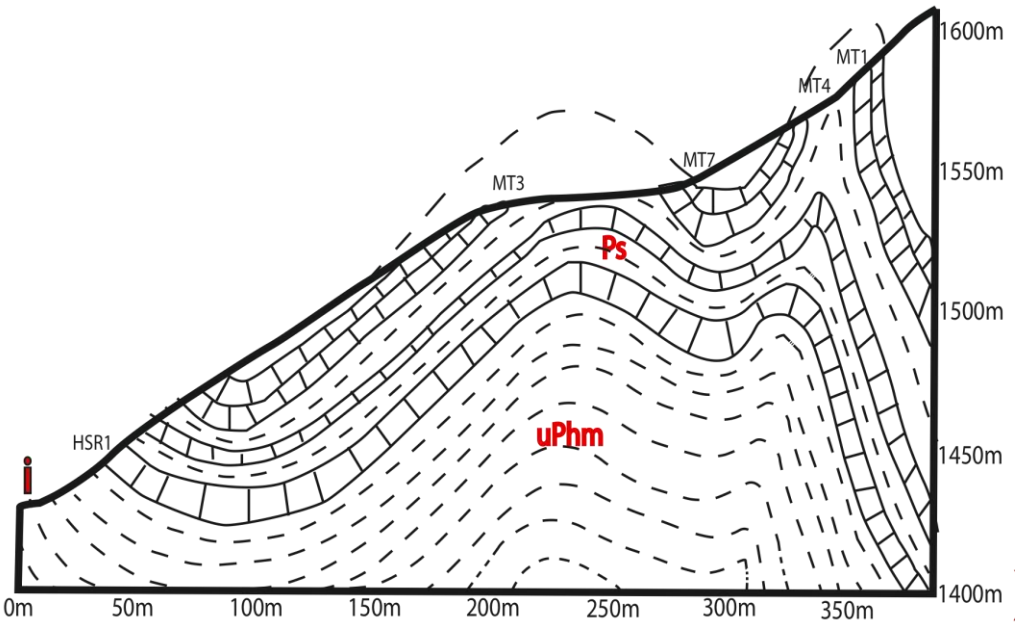

Figure 1: Cross section depicting sample locations, lithology and orientation of the Sugar limestone and interbedded phyllite on Mount Tom.

Conclusions

This discovery has important implications for the tectonostratigraphic interpretations of the area (Nelson et al., 2006; Ferri and Schiarizza, 2006). The interpretation of the Sugar limestone as conformable with the Hardscrabble facies is difficult to explain using the proposed structural model (Ferri and Schiarizza, 2006) and the ages of the Harvey's Ridge and Hardscrabble Mountain facies must be reinvestigated. Alternatively, an extensive unconformity may exist between the Sugar limestone and Hardscrabble facies. This could be explained if the Hardscrabble Ridge succession represented a Paleozoic high, possibly associated with the Late Devonian Antler orogeny, prior to amalgamation of the Barkerville terrane during the Permian and Triassic (Struik, 1988). The Hardscrabble high could have been structurally inverted in the Early Permian allowing the deposition of the Sugar limestone. This interpretation is consistent with the paleogeographic model proposed by Nelson et al. (2006), where extension during the Mississippian to Early Permian is thought to have formed the Slide Mountain Ocean and possibly caused some continental fragments to move away from the ancestral North American margin. The lithologic succession in the area and the timing of tectonically controlled unconformities can be linked to new results in east-central BC on the Hanington, Belcourt, Fantasque, and Montney formations, which were deposited on the continental margin of North America during the Pennsylvanian, Permian and Lower Triassic. By comparing the results from these two studies a more thorough understanding of the relationship between North America and pericratonic terranes will be generated, especially regarding the proximity of these terranes to the northwest Pangea (North America) margin.

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