

The Upper Triassic at Williston Lake, Northeastern British Columbia, Canada: Constraints on physical boundaries at a classic biochronology locale

Zonneveld, J-P., Geological Survey of Canada, Calgary, AB, T2L 2A7, jzonneve@nrcan.gc.ca, Orchard, M.J., Tozer, E.T., Geological Survey of Canada, Vancouver, BC, Atudorei, V.N., The University of New Mexico, Albuquerque, New Mexico, McRoberts, C.A., State University of New York, Cortland, New York, Henderson, C.M., University of Calgary, Calgary, AB, and Gingras, M.K., University of New Brunswick, Fredericton, NB

Upper Triassic strata at Williston Lake (preeminent North American biochronology locale), consists of a westward thickening succession of siliciclastic and carbonate sediment deposited on the western margin of Pangea. These strata consist of, from oldest to youngest, the Charlie Lake, Baldonnel and Pardonet Formations. The Ludington Formation comprises the western equivalent of the Charlie Lake and Baldonnel Formations. Conodont and ammonoid biostratigraphy has shown that these units are diachronous and, in part, comprise lateral facies equivalents to each other.

The Charlie Lake Formation (latest Ladinian to earliest Upper Carnian) consists of interstratified dolomite, limestone, cross-stratified sandstone and lesser evaporites deposited in an arid marginal marine setting. Its presence in the study area represents a significant sea level lowstand in western Canada and demarcates the westernmost (basinward) Triassic migration of the west Pangea shoreline. The Baldonnel Formation (Lower Carnian to earliest Lower Norian) consists of calcareous sandstone, sandy limestone, crinoidal packstone to grainstone (encrinite), sandy dolomite and lesser calcareous siltstone and shale deposited in a shallow subtidal setting, and is the proximal offshore to shoreface equivalent of the Charlie Lake Formation.

The Ludington Formation (earliest Lower Carnian to late Upper Carnian) consists of a thick succession of dolomitic and calcareous siltstone, bioclastic limestone deposited in a deep water setting (distal offshore) west of the Baldonnel shoreline. The presence of large angular olistoliths and intraclasts as well as thick successions of convolute and oversteepened to overturned strata at several localities provides evidence of an exceptionally steep shelf-slope break. The Pardonet Formation (late Upper Carnian to end-Rhaetian) consists of carbonaceous silty limestone, calcareous and dolomitic siltstone and shale and numerous, densely packed, bivalve-dominated bioclastic packstone/grainstone beds deposited primarily in a deep water setting.

The study interval has been subdivided into five sequences (two Carnian and three Norian). Each of these sequences has proven highly variable (both in thickness and in sediment composition) throughout the study area but are correlatable using detailed biostratigraphy, geochemical, and outcrop gamma analysis. Abrupt unit thickness changes and facies contacts as well as the nature and distribution of sediment in the study interval provides evidence that Triassic deposition in the Williston Lake area was strongly influenced by structural controls. This is particularly evident in Triassic-Jurassic boundary sections which exhibit evidence of subaerial exposure (erosional surfaces, phosphate pebble lags and low-diversity Glossifungites assemblages) in what is otherwise a succession deposited in a dysoxic to anoxic deep-water setting.