

Structural characterization of the Nemiscau subprovince, Superior Province, Canada: tectonic implications for the development of Archean sedimentary basins

Rocío Pedreira Pérez (1), Alain Tremblay (1), Yannick Daoudene (2), and Daniel Bandyayera (2)

(1) Département des Sciences de la Terre et de l'atmosphère, Université du Québec à Montréal, Montréal, Canada (pedreira_perez.ocio@courrier.uqam.ca), (2) Ministère de l'Énergie et des Ressources naturelles, Québec, Canada

The Archean Nemiscau subprovince is dominated by high-grade metasedimentary rocks that crop out in the central part of the Superior Province in Quebec (Canada). To the north and the south, it is bounded by the La Grande and the Opatica subprovinces, which are mainly made up of mafic metavolcanic rocks and intermediate-felsic orthogneiss and plutonic rocks. Heterogeneously deformed and partially migmatized metasedimentary rocks and felsic intrusives (belonging to the Rupert and Champion complexes) form the innermost part of the Nemiscau subprovince in the study area whereas mafic-to-ultramafic volcanic and intrusive rocks predominate along its northern and southern borders, forming the lac des Montagnes and Colomb-Chaboullié belts, respectively.

E-W-trending strike-slip zones and E-W to NE-SW-trending strike-slip to oblique shear zones separate the Nemiscau subprovince from adjacent plutonic rocks along both margins. Several phases of deformation have been recognized in the study area, but their relative succession differs from one sector to another: 1) in the northern (lac Champion and lac des Montagnes) and the southern (lac Rodayer) areas the structural grain shows a NE-SW trend. Two deformational events have been locally identified, and their superposition generates regional-scale fold interference patterns; 2) the lac Nemiscau area is characterized by a dome-and-basin fold geometry. Two deformation phases are also observed, both E-W-trending. E-W structures cross-cut NE-SW structures from the first sector; 3) a later N-S-trending crenulation cleavage is observed throughout the study area. Regional metamorphism decreases, from granulite to amphibolite, from the inner to the outermost parts of the Nemiscau subprovince in the study area.

The Nemiscau subprovince has been recently interpreted as the vestiges of a back-arc basin or of an accretionary prism. The strike-slip kinematics of contacts between the Nemiscau and adjacent subprovinces can be explained by various models of orogenic evolution (e.g. for instance, to a transform plate boundary). However, shear-sense indicators and the distribution of metamorphic isograds suggest that the Nemiscau subprovince should be rather attributed to crustal sinking with regards to neighbouring subprovinces, followed by the uplift of its innermost part which preserves granulite facies metamorphic conditions. Such geometry indicates that gravitationally-driven tectonic processes, such as sagduction and diapirism, cannot be excluded. Nonetheless, any tectonic model that would be proposed must explain how the Nemiscau rocks were buried down to the granulite facies conditions, their subsequent exhumation, and a regional deformation dominated by a strike-slip deformational regime.