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Assessing the regional thermal overprint of the Grenville Front Tectonic Zone by multiple *in-situ* geochronometers

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Dating of metamorphism in ancient rocks through high closure temperature (T_c) geochronometers does not resolve low-T thermal overprinting, that may have reworked the chemistry but not the metamorphic texture. To investigate this overprint, we focus on the Grenville Front Tectonic Zone (GFTZ), located in the northwestern part of the Grenvillian Parautochthonous Belt, that exposes Archean and Paleoproterozoic rocks of the Laurentian craton that were variably reworked during the Grenvillian Orogeny (1.1-0.95 Ga). Recent studies, however, have suggested that the rock fabrics and mineral assemblages in the exposed GFTZ rocks near Val-d'Or (Québec, Canada) are entirely Neoarchean with no evidence for such reworking. We utilize *in-situ* geochronometers *via* laser ablation tandem inductively coupled plasma mass spectrometry with different T_c: Rb-Sr in biotite (T_c=300-400ºC) and K-feldspar (T_c= >500 ºC) and Lu-Hf in garnets (T_c= >700 ºC) and apply these to a sample suite that follows an orogenic strike-perpendicular trend. This starts in the footwall of the GFTZ, the Neoarchean Pontiac subprovince (Superior Craton), crossing the GTFZ and ends in the hanging wall of the Dorval detachment, in the Reservoir Dozois terrane. Biotite Rb-Sr dates from across the transect are dominantly ~910 to 980 Ma consistent with a Grenvillian overprint. Pre-Grenvillian biotite Rb-Sr dates are only preserved in samples collected 10 km below the footwall of the GFTZ, in the Pontiac subprovince (>~2.25 Ga). In contrast, Rb-Sr in K-feldspar and Lu-Hf in garnet yield pre-Grenvillian ages across the transect. These results suggest a Grenvillian thermal overprint that reached between ~300 and ~500 °C in the GFTZ. Hance, this multi-geochronometer approach can be applied to a single sample to test for low-temperature re-equilibration and thermal overprint in orogenic front zones. Hence, we suggest chemical reworking to be carefully considered when performing pressure and temperature modelling of garnet as intracrystalline diffusion of fast-moving cations that may have resulted in decoupling of major and trace elements. In addition, our geochronometric data is consistent with a model where Grenvillian tectonometamorphism in the parautochtonous domain of the GFTZ was localized at fault zones and individual crustal units were only moderately heated while their fabrics are preserved.