Tectonic history of the Superior Province

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The Superior Province was assembled *ca.* 2.7 Ga from fragments of Mesoarchean crust with sporadic cratonal cover (Fig. 1; Thurston and Chivers 1990) and continental margin deposits (Sanborn-Barrie and Skulski 1999), separated by juvenile Neoarchean sequences (Williams *et al.* 1992; Stott 1997; Card and Poulsen 1998). Scattered remnants of pre-2.8 Ga crust and isotopic inheritance in younger volcanic and plutonic units (Henry *et al.* 1998) permit reconstruction of a *ca.* 3.0 Ga Uchi-Sachigo-Goudalie protocraton (Stott 1997) that had rifted by ca. 2.92 Ga (Davis in Poulsen et al. 1996; Sasseville and Tomlinson 2000) and collided with juvenile terranes by 2.81 Ga (Thurston *et al.* 1991; Percival and Skulski 2000).

The minor rock record that exists for the 2.79-2.75 Ga interval, as for example in the Goudalie domain of the Minto block (Percival *et al.* 1994; Skulski and Percival 1996), includes oceanic plateau magmatism, possibly representing widespread production of ocean crust that was mostly consumed during subsequent convergence. Island arc-like sequences began developing *ca.* 2.75 Ga in southern oceanic regimes such as the Abitibi (Corfu 1993) and western Wabigoon subprovinces (Davis *et al.* 1988), as Andean magmatism started to cannibalize the northern protocraton, best documented in the Uchi (Stott and Corfu 1991; Corfu and Stott, 1993; 1996) and Berens River (Corfu and Stone 1998) subprovinces and Minto block (Stern *et al.* 1994). Arc magmatism persisted in both continental and oceanic regimes until a few million years prior to subprovince-scale deformation, attributed to discrete collisional events with outboard terranes (Stott 1997). Arc terranes docked along the southern transpressional margin between ca. 2.71 and 2.69 Ga, along with continental blocks that may have rifted apart earlier. For example, the Steep Rock ("1", Fig. 1) and Wallace Lake ("2", Fig. 1) sequences, separated across strike by 300 km of mainly younger terranes, have similarities including 3.00 Ga basement, and sandstone - carbonate - iron formation - komatiite cover (Sasseville and Tomlinson 2000). Two major foredeep clastic wedges, the English River and Quetico subprovinces, were deposited respectively *ca.* 2.70 and 2.695 Ga in response to uplift associated with terrane collisions (Corfu et al. 1995; Davis, 1996). Seismic reflection profiles across these steeply dipping schist - migmatite belts are consistent with thick wedge geometry (White *et al.* 2000).

At the northern margin of the Uchi-Sachigo-Goudalie protocraton, the older Mesoarchean (3.7-3.3 Ga) Northern Superior superterrane (Skulski *et al.* 1999; Bohm *et al.* 2000) was juxtaposed with juvenile terranes by *ca.* 2.70 Ga. The appearance of the older continental crust is reflected in the presence of detrital zircons of this vintage in clastic sediments younger than *ca.* 2.70 Ga (*e.g.* Corkery *et al.* 1992), which have not been documented in older sediments of either continental or oceanic affinity.

A terminal collision occurred *ca.* 2.69 Ga between the amalgamated Superior Province and Paleoarchean (3.6-3.4 Ga) Minnesota River Valley gneiss terrane in the south. Although the crust may have been transiently as thick as *ca.* 70 km, ductile collapse by *ca.* 2.65 Ga (Moser 1994) arrested erosion at 10-15 km levels. Pan-Superior granite magmatism, thermal resetting and deep-crustal extension at this time may reflect sub-cratonal lithosphere delamination (Moser *et al.* 1996; Percival and Skulski 2000). Similar processes have been postulated to account for late to post-tectonic magmatic suites such as sanukitoids (Stern and Hanson 1991; Stevenson *et al.* 1999), rare alkaline rocks and carbonatites. Where traced to surface in Proterozoic uplifts such as the Kapuskasing zone, deep crustal subhorizontal seismic reflectors correspond to late extensional structures rather than early accretionary boundaries (Percival and West 1994; Calvert and Ludden 1999). Mantle reflectors interpreted as subduction scars (Calvert *et al.* 1995) probably represent crustal slabs protected from subsequent deformation by stiff mantle.

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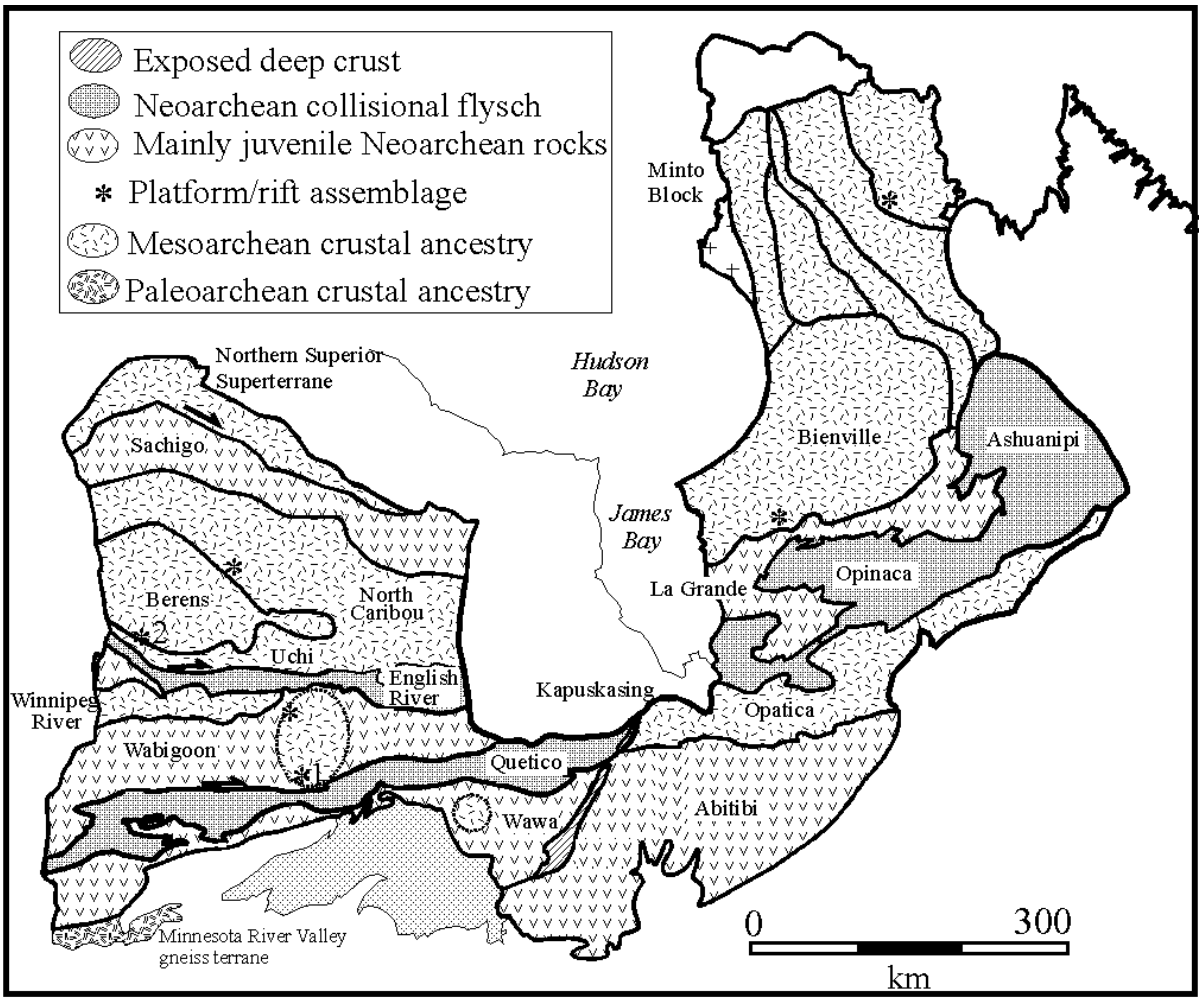

Figure 1: Simplified tectonic map of the Superior Province.