

**SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> VARIATIONS AND CROSS-CUTTING RELATIONSHIPS IN THE SUDBURY IGNEOUS COMPLEX: EVIDENCE FOR MIXING OF MULTIPLE ENDOGENIC MAGMAS.** A. E. Beswick, Center for Excellence in Mining Innovation, Laurentian University, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 2C6, Canada. [tonybeswick@sympatico.ca](mailto:tonybeswick@sympatico.ca)

**Abstract:** The genesis of the Sudbury Igneous Complex (SIC) has been controversial for most of the past century. Historically, debate focused on whether or not the norites and the more voluminous granophyres originated by fractionation of a single parent magma [1], [2], [3], [4], [5] and more recently on whether that magma was a meteorite impact melt sheet [6], [7], [8].

Major support for the impact melt sheet hypothesis was afforded by Therriault et al., [9] who purported to show that, on a diagram of Al<sub>2</sub>O<sub>3</sub>/Zr versus SiO<sub>2</sub>/Zr, all rocks from across the North and South Ranges of the SIC fell along a single fractionation trend, interpreted as evidence for their co-magmatic origin.

This communication examines SiO<sub>2</sub>:Al<sub>2</sub>O<sub>3</sub> variations across the North and South Ranges of the SIC and, using simple component ratio diagrams such as Al<sub>2</sub>O<sub>3</sub>/Zr versus SiO<sub>2</sub>/Zr, demonstrates that Therriault et al., [9] misinterpreted their data. Logarithmic scaled versions of these diagrams indicate that granophyres and norites lie along distinctly separate fractionation trends and that the transitional quartz gabbros lie along hybridization lines between them.

Similar examinations of Sublayer, Offset dikes, and 'melt rocks' in the Onaping Formation, suggest that many of these rocks are also of hybrid origin.

It is further noted that the granophyre compositions cluster around the minimum melting composition in the experimental system Quartz-Albite-Orthoclase [10] at water vapor pressures < 2 Kbars suggesting that they represent endogenic partial melts of the continental crust.

Additionally, a number of researchers have described cross-cutting relationships within the SIC, in the Upper Zone [11], the Middle Zone [5], and the Lower Zone [12], [13], [14], and based on high precision U-Pb age dating it has been claimed that the South Range norite is 400,000 yrs younger than the felsic norite on the North Range [15].

Finally, it should be noted that computer modeling attempts [16], [17] have proved incapable of matching the compositional profiles for either the North or South Ranges of the SIC or of explaining their differences, despite claims to the contrary [17].

Taken together with the SiO<sub>2</sub>:Al<sub>2</sub>O<sub>3</sub> variations presented above, these observations represent overwhelming and irrefutable evidence that multiple endogenic magmas and hybridization were involved in the genesis of the SIC and that it was not produced by differentiation of a single parent magma whether endogenic or exogenic in origin.

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