Deformation of the Onaping Formation in the NE-lobe of the Sudbury Igneous Complex, Canada: Evidence for fold adjustment flow in the core of a km-scale fold *Poster*

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The synformal geometry of the 1.85 Ga Sudbury Igneous Complex (SIC), an impact melt sheet resulting from large-magnitude meteorite impact, attests to post-impact deformation. However, in contrast to the overlying Onaping Formation, a heterolithic impact melt breccia, the SIC shows little evidence for pervasive ductile strain. This pertains in particular to its NE-lobe characterized by a curvature of about 100° in plain view. This curvature has been interpreted either as a fold or as a primary feature. In order to test these scenarios, a detailed structural analysis was conducted in the core of the NE-lobe, which consists of rocks of the Onaping Formation.

Structural measurements and lithological observations made at a total of 700 stations collectively led to the construction of a detailed structural map of the Onaping Formation in the NE-lobe. The map displays a non-systematic fold pattern evident by individual units of the Onaping Formation, which from bottom to top are known as the Basal, the Grey, the Green and the Black Members. The fold pattern of these units is characterized by elongate domes and basins, the axes of which trend approximately NE–SW. These axes are collinear to the uniformly SW-dipping planar mineral shape fabrics suggesting that the formation of these fabrics is genetically related to that of the domes and the basins. Near km-scale structural discontinuities, which in the field and digital elevation models are evident by their strong gradients in topography, the strike of the mineral fabrics generally matches that of the discontinuities. In terms of scale and structures developed, deformation of the Onaping Formation in the core of the NE-lobe is, therefore, highly heterogeneous.

Based chiefly on the shape-preferred alignment of metamorphic minerals, the intensity of shape fabrics was visually estimated. Fabric intensity is strongest at the top of the Onaping Formation but decreases dramatically towards its contact with the SIC. This intensity gradient corresponds well with the size of matrix minerals as well as with granitoid and metasedimentary fragments, which increases toward the base of the Onaping Formation. Apart from this lithologically controlled correspondence, shape fabric intensity is maximal in the central portion of the NE-lobe and, along with the axial-planar geometry of the planar mineral fabrics, attest to generation of the NE-lobe be folding of the SIC around a south-westerly plunging axis. During such folding, deformation of the mechanically less competent Onaping Formation was accomplished heterogeneously, evident by the highly variable fold geometry and shape fabric intensity. Such heterogeneous deformation is typical for fold-adjustment rock flow in fold hinge zones of mechanically more competent rocks, i.e., the SIC.

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