

## The importance of lithological heterogeneity of the Onaping Formation for understanding post-impact deformation of the Sudbury Impact Structure, Canada

### Poster

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The suevitic Onaping Formation overlies the layered Main Mass of the 1.85 Ga Sudbury Igneous Complex (SIC) of the Sudbury Impact Structure, Ontario. The Formation consists of four Members, namely from top to bottom, the Black, the Green, the Gray and the Basal. Post-impact NW-SE shortening during the Penokean Orogeny (ca. 1.9–1.75 Ga) affected the Onaping Formation and led to the lobate shape of the SIC in plan view. In order to investigate the possible fold origin of the NE-lobe of the SIC, a field-based structural analysis of the Onaping Formation was conducted in the Frenchman Lake area. The analysis is based on structural measurements at 580 stations and encompasses the orientation of mineral shape fabrics as well as their intensity. In addition to these quantities, lithological variation and metamorphic overprint of the Onaping Formation was examined. Special attention was paid thereby to the Green Member since previous workers stated that it forms a continuous unit at the base of the Black Member.

Individual Members of the Onaping For-

mation differ in mineral composition, size and abundance of clasts as well as in color and texture of the matrix, the latter one of which ranges from cryptocrystalline to coarse-grained as well as in the content of felsic minerals. Overall, grain size of the matrix as well as size and content of clasts increase from the top of the Onaping Formation towards its base. The Green Member is well apparent by the presence of angular mineral aggregates, composed chiefly of chlorite. Therefore, these aggregates became known as ‘chloritic shards’ and possibly represent original fragments of melt particles. In the Frenchman Lake area, the Green Member forms a 70–100 m thick, discontinuous band, whereby the strike of its contacts at surface varies highly. By contrast, intra-formational lithological contacts of the lower units of the Onaping Formation are rather straight.

Microscopic inspection of samples from the Black, Green and Gray Members shows that mineral shape fabrics are chiefly defined by chlorite and epidote. This points to post-impact deformation under lower greenschist-facies metamorphic conditions. Deformation of the Onaping Formation varies greatly with position. This is indicated by the orientation and intensity of planar mineral shape fabrics. Fabric intensity was visually estimated and is based on the shape-preferred alignment of matrix minerals and clasts. It varies as a function of the mineralogical composition and grain size of the matrix, as well as in distance to the NE-lobe. More specifically, fabric intensity increases towards the top of the Onaping Formation suggesting that mechanical strength during deformation of the Formation increased toward its lower contact. This is corrob-

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orated by the variation in strike of intraformational lithological contacts, which are straight at the base but highly irregular towards the top of the Formation, and may well account for the discontinuous nature of the Green Member.

An increase in shape fabric intensity is also apparent towards the east. Similarly, the strike of planar shape fabrics becomes more uniform in this direction, i.e., NE-SW, which is axial-planar to the acute bisectrix of the NE-lobe. This may indicate that the effect of folding of the SIC on the fabric development in the Onaping Formation decreases towards the west. The planar shape fabrics also display a progressive change in their overall strike from NE-SW in the NE-lobe to ENE-WSW towards the west of the lobe. This change in strike can be explained by the curvature of the fold axis of the NE-lobe. Despite the strong heterogeneity of deformation in the Frenchman lake area, the orientation in, and gradients in intensity of, planar shape fabrics in the Onaping Formation are consistent with a fold origin of the NE-lobe, which formed under lower greenschist-metamorphic conditions.