Mistassini-Otish Impact Structure III: First report of a huge dolomitic melt sheet as the uppermost units of the Albanel Formation, Mistassini Group.

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Regional surveys done in 2015, 2016 and 2017 in the study area revealed the existence of two strongly different dolomite types. The first one, observed in the southern third of the basin, is obviously of sedimentary origin. It displays intense fracturing usually filled with pyrobitumen, anthraxolite and a very hard carbon allotrope (lonsdaleite?). The second one characterizes the two northern thirds of the basin and is totally different in its habit. It is made of very thick beds of aphanitic dolomite showing vertical jointing and nearly devoid of horizontal ones. Locally, the vertical fracture sets define columnar jointing when the dolomite outcrops in cliffs as can be seen at Lake Cleary. Weathering favoured these fractures sets in the dolomite units, therefore enhancing the vertical fracturing pattern. One observation argues against their tectonic origin, i.e undisturbed black cherty nodules seen bridging over weathered open fractures in thick dolomite bed.

The most enigmatic features are probably the scarcity of bedding joints, the exceptional thickness of the beds (up to 6 m), and the banded appearance of some beds which, like some iron formations, exhibit alternating greyish and blackish hues without any textural changes. These observations are not coherent features for a basin involving such a chemical sedimentation. The most significant observation is probably a 465 m thick finely crystallized grey dolomite sequence without any jointing or bedding which has been described in a drill hole. Moreover, the only siliciclastic materials observed within that thick unit are rounded quartz grains averaging 1 mm in size, now recognized as immiscibility globules. As observed from HCl insoluble residues, some globules bear undetermined black inclusions likely incorporated while crystallizing. Given the density differential, their buoyancy could explain the distribution of the siliceous globules which can be scarce but homogeneously distributed in the mass, and evenly closer and nearly stratified at different levels throughout the carbonate sequences. The first case is a characteristic feature of many outcrops seen along the road 167, and for which well developed decimeter-scale hackle marks are commonly observed. It is noticeable that those finely crystallized dolomites bearing immiscible siliceous globules react as porcelain when broken and emit a phonolite-like ringing sound when struck with a hammer.