IMPACT BRECCIA CLAST FROM THE COROSSOL CRATER, CANADA.

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The 4 km diameter Corossol Crater lies just south of Sept Iles, Canada (50°3'N, 66°23'W) in 40-150 metres of water [1,2]. Dredging in 2010 and 2011 on the central uplift of the crater recovered many angular clasts of hard grey limestone, which forms the bedrock in much of this area. A few angular clasts of the gabbros that underlie the limestones were also encountered. One 4 cm clast of limestone breccia is somewhat different from the other blocks and has characteristics that suggest that it is an impact breccia.

The block comprises fragments of calcite limestone up to 2 mm long. In many parts of the block these fragments have thin black rims. At the edges of the block these rims are brown, presumably reflecting aqueous alteration. Mineral grains in the rims are too small to characterize, but the fact that the ensemble can be oxidized suggests that it contains sulfides. In places the block is cut by veins of fine-grained calcite with euhedral dolomite crystals.

The most unusual component is rare droplets up to 1 mm long, commonly fragmented. The droplets comprise a glassy matrix with a composition very close to fluorapatite and opaque crystals that have a composition close to pyrite. A few droplets have up to 5% vesicles. Fluorapatite requires fusion temperatures of about 1600C [3], which cannot be achieved at the surface of the Earth by endogenous processes.

A single fragmented quartz crystal with planar features was found close to one droplet. Universal stage measurements of the orientation of the planar features give an angle of 42 degrees which is close to that of {10-13} planes. This is the most common set of deformation planes produced during shock metamorphism of quartz [4]. Unfortunately no other grains were found with similar planes.

The glassy droplets and shocked quartz together suggest that the clast was produced by an impact, and hence that it is very likely that the Corossol Crater in which the clast was found is an astrobleme.

[1] M. D. Higgins et al, 2011. 27th Lunar and Planetary Science Conference. p. 1504.; [2] P. Lajeunesse, et al, in preparation. [3] P. K. Zeitler, et al, 1987. Geochimica et Cosmochimica Acta 51, 2865-2868. [4] D. Stoffler, and F. Langenhorst, 1994. Meteoritics vol. 29, 155-181.