Understanding Lunar Granulites through a terrestrial analogue study

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Lunar granulites are believed to be metamorphosed polymict impact breccias that have the potential to yield new information on the origin and evolution of the lunar crust and its impact history [1]. A main challenge is to elucidate the metamorphic environment and processes that gave rise to the enigmatic granulitic textures. In this light we present a first comparison of the metamorphic characteristics of lunar meteorite NWA 3163 [2] with shock-metamorphosed and heated anorthosites at the Mistastin impact structure of northern Labrador. The Mistastin Lake impact structure is a 36 ± 4 Ma, 28 km diameter feature [3] lying at the northeastern end of the Mesoproterozoic Mistastin Batholith composed of anorthosites, granites and lesser gabbroic rock [4]. Fieldwork was conducted in August/September 2009. We present optical and electron beam characterizations of textures of NWA 3163 and 12 samples from the Mistastin crater from locations ranging from the central uplift to anorthositic clasts enclosed in impact melt within the crater rim region. Initial petrographic observations suggest that the majority of the feldspar within samples from the central uplift has been transformed to diaplectic glass (maskelynite). Samples from clasts within impact melt appear to have undergone some degree of crystallization and devitrification, most likely because of thermal metamorphism due to the heat of the impact melt. Ballen silica, another diagnostic shock feature, is also present in these samples. A comparison of these features, maskelynite distribution and grain boundary characteristics with those of NWA 3163 may help resolve to what extent contact melt heating alone can play a role in lunar granulite texture development.

[1] Cushing *et al*. (1999) *Meteoritics & Planetary Science* **34**, 185–195.[2] Irving *et al*. (2006) LPS XXXVII.[3] Marion & Sylvestor (2010) *Planet. Space Sci*. **58**, 552–573[4] Emslie *et al*. (1980) *Geol. Survey of Canada* **80**–1A, 95–100.

Clay mineral grain coating quantification and investigation, Ravenglass estuary, UK

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Effects of clay mineral diagenesis on sandstone reservoir quality are well documented [1, 2]. Evaluation of coated grains by clay minerals in estuarine sediments, however, has received less attention. This research is designed to quantify the rate of grain coating by clay minerals in shallow burial estuarine sediments.

The Ravenglass estuary in north-west England is a local name for an area which encompasses the tidal reaches of the three rivers: Esk, Irt and Mite with the different hinterland geology.SEM and BSE image analysis in association with Energy Dispersive X-ray technique on a statistic base are obtained to determine the quantity of coating by clay minerals. This analysis has been done on sediments up to 100cm along two cores in 10 steps (each 10cm sample). Esk estuary sediments show a significant variation of both fraction and coverage coating grains by clays. Irt estuary sediments with a range of %60-%90 coating show a massive coating fraction, simultaneously high rate of grain coating coverage %75-%100 by clays is compared to the esk estuary about %10-%75. To contribute to overgrowing understanding of grain coating pattern quantification in the estuarine sediments, fraction of coatings is vary subject to the host grain size and hinterland geology. Also it has been concluded that marine implications have a basic role on the accumulation of coating by clays.

[1] Burley & Worden (2003) *Int. Ass. of Sedimentologist*. [2] Worden & Morad (2003) *Int. Ass. of Sedimentologist* **34**, 3–41.