THE PETROGRAPHY AND GEOCHEMISTRY OF LUNAR METEORITE REGOLITH BRECCIA MET 01210.

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Introduction: MET 01210 [1] is an anorthosite bearing basaltic lunar regolith breccia [2] that is dominated by clast and mineral fragments consolidated in a predominately mare region of the Moon [3]. The MWG sections studied in this investigation (MET 01210,21 and MET 01210,27) have vesicular fusion crusts and are composed of an immature breccia sample with rock (<4mm) and mineral fragments (<1mm) fused in a fine grained crystalline and glass matrix.

Analytical Methods: Mineralogical analysis was done at the NHM using a WDS Cameca SX-50A and elemental mapping was performed using a LEO 1455VP EDS SEM fitted with Oxford Instrument's INCA analysis software.

Observations: Mare basalt fragments in MET 01210 have a range of textures. Examples of mare material include rapidly crystallized fine grained clasts that have a distinctive feathery or plumose texture with a low-Ti affinity. Holocrystalline, coarser grained ferro-basalt fragments have large zoned pyroxenes (<500µm $En_{1\text{-}47}$ $Fs_{27\text{-}86}$ $Wo_{10\text{-}30}$), evolved Low-Ti-VLT bulk compositions and some examples include small fractionated mesostasis assemblages (silica, fayalite, K-feldspar, glass, apatite, whitlockite). Additional clasts of very fine grained / granular symplectites of silica, fayalite and hedenbergite are the collective break-down products of pyroxferroite. Mineral fragments in the matrix are predominantly associated with a fractionated mare basalt parentage.

MET 01210 also contains a non-mare anorthositic component including fragments of anorthositic norite, feldspathic metaigneous clasts and granulites with Mg-rich mafic phases. Additional material in our sections includes small fragments of feldspathic impact melt derived rocks, glass beads (20-100 µm: including one with a HASP composition [4, 5]) and small melt veins.

Discussion: The mineralogical and clast assemblage of MET 01210 is dominated by Fe-enriched, low-Ti mare basalt material with a minor anorthositic component. The bulk rock composition was reported by [3] and is similar to typical average mare soils with elevated Al_2O_3 and depleted MgO as a consequence of additional mixing with anorthositic material. Bulk rock Th (0.86ppm [3]) is comparatively low for mare regolith breccia material [7] suggesting that the mare components in MET 01210 did not experience KREEP assimilation and are likely to have been emplaced distally to the PKT.

References: [1] Russell S.S. et al. 2004. The Meteoritical Bulletin, No. 88, *Meteoritics & Planetary Science* **39**, A215-A272 [2] Korotev, R.L. 2005. Chemie der Erde **65**, pp. 297–346. [3] Joy K.H. et al. 2006. Abstract #1247. 37th Lunar & Planetary Science Conference. [4] Kempa M. J. & Papike J. J. (1980) 11th Lunar and Planetary Science Conference. pp. 609–610. [5] Huber H. and Warren P. H. (2005) Abstract #2401. 36th Lunar & Planetary Science Conference. [6] Heiken et al. 1991. The Lunar Sourcebook. pp 450-451. [7] Korotev R.L. 2001. Abstract #1234. 32nd Lunar & Planetary Science Conference.