

PLAGIOCLASE DEPLETION BY COMMINATION IN THE VESTAN REGOLITH.

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Introduction: Based on their high concentrations of solar wind implanted gases, a number of howardites have been classified as surface regolith samples by [1,2]. These regolithic howardites are the best samples to petrographically study regolith formation and evolution on 4 Vesta, the parent body of howardites [e.g., 3].

Materials: This study includes thin sections allocated from MWG of meteorites collected in Antarctica that [1,2] classified as regolithic. Including 6 thin sections of 4 members of the (Grosvenor Mountains) GRO 95 howardite pairing group [4], 2 sections from each of the following unpaired howardites: GRO 95602, (Lewis Cliffs) LEW 85313, (Meteorite Hills) MET 00423, and (Scott Glacier) SCO 06040.

Methods: Quantitative modal mapping was conducted with ENVI 4.2 software, using methods similar to [4]. 8 WDS and 2 EDS x-ray maps were assembled into a multispectral image cube for each thin section. Regions of interest (ROIs) were selected based on mineral spot analyzes for each component: specific minerals or ranges of mineral chemistries. These ROIs and minimum distance classification were used to map and quantify the modal distributions of these howardite components.

Results: The modal abundances of eucritic pyroxenes—basaltic (En_{33-45}) and cumulate (En_{46-65})—relative to modal plagioclase are not the proportions expected from unbrecciated eucrites. Unbrecciated eucrites have an average of 48% plagioclase/(plagioclase + eucritic pyroxene) [5]. In contrast, the plagioclase/(plagioclase + eucritic pyroxene) in the GRO 95 pairing group howardites is 35-40% and in GRO 95602 is 38-39%. Results for LEW 85313, MET 00423, and SCO 06040 will be presented at the meeting.

Discussion: A comparable depletion in plagioclase relative to eucritic pyroxene is exhibited in Kapoeta, Bununu, and Bholgati mineral modes and compositional data of [6] when their data are arithmetically translated to resemble our data. These three meteorites are also regolithic based on their concentrations of solar wind implanted gases [7,8].

This reduction in plagioclase may be caused by extensive impact gardening on Vesta. Impact fragmentation experiments on a reasonable analog for eucrites (gabbro) indicate that plagioclase is more readily comminuted than pyroxene [9]. Finer grain-sized material may be melted by lower impact shocks [10], thus potentially preferentially decreasing plagioclase's abundance in regolith over time.

Conclusion: Regolithic howardites appear to be depleted in plagioclase relative to eucritic pyroxene. Plagioclase reduction relative to eucritic pyroxene may increase as regolith experiences iterations of impact fragmentation. The relative proportion of these phases may be an indicator of regolith maturity.

References: [1] Cartwright et al. 2014 *GCA* 140: 488-508 [2] Cartwright et al. 2013 *GCA* 105: 395-421 [3] McSween et al. 2013 *MAPS* 48: 2090-2104 [4] Lunning et al. in review *MAPS* [5] Mayne et al. 2009 *GCA* 73: 794-819 [6] Fuhrman & Papike 1981 *LPSC* 12: 1257-1279 [7] Schultz & Kruse 1989 *Meteoritics* 24: 155-172 [8] Warren 1997 *MAPS* 32: 945-963 [9] Hörz et al. 1984 *JGR* 98: C183-196 [10] Schaal et al. 1979 *LPSC* 10: 2547-2571