LITHOLOGIC MAPPING OF HOWARDITES: HOW MANY THIN SECTIONS ARE ENOUGH?

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Introduction: Software developed for remote sensing combined with element x-ray maps provides a powerful tool for quantitative determination of component percentages in rock thin sections. Using remote sensing software such as ENVI to analyze element maps for modal analysis enables researchers to collect many more counts (e.g., hundreds of thousands of counts in [1,2]) compared to manual point counting, which for practical purposes is usually limited to less than ten-thousand counts [e.g., 3]. Modal analysis methods that use color-mixing element maps in which each color is a unique phase can only use three element maps: red, green, and blue (RGB) [1]. Using remote sensing software removes this constraint on the number of element x-ray maps that can be incorporated into the modal analysis.

Method: Quantitative lithologic (modal) mapping was conducted with ENVI 4.2 software, using the method described by [1] or similar methods. At least 8 WDS 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 specific minerals or ranges of mineral chemistries. These ROIs and minimum distance classification were used to map and quantify the modal distributions for each component.

Materials: All thin sections are from meteorites found in Antarctica and were allocated from MWG. From the Pescora Escarpment Icefield (PCA), this poster will include maps of 9 thin sections from 6 members of PCA 02 howardite pairing group studied by [1]. From the Grosvenor Mountains (GRO) field area, 6 thin sections of 4 members of the GRO 95 howardite pairing group [2], and 2 sections of the unpaired howardite GRO 95602 [2,4]. Six sections of 6 members of the proposed DOM 10 howardite pairing group. Plus, 2 sections each of the following unpaired howardites: (Lewis Cliffs) LEW 85313, (Meteorite Hills) MET 00423, and (Scott Glacier) SCO 06040 [6].

Results: This poster will exhibit quantitative lithologic maps of 29 howardite thin sections from multiple howardite petrographic studies [1,2,5]. These thin sections sample 20 howardite stones, which come from three howardite pairing groups (established and potential) and four unpaired howardites. This poster will display lithologic distribution maps of 29 thin sections so the diverse textures, components, and component proportions found in howardites can be observed along side each other.

Conclusions: A single thin section is not consistently representative of a howardite pairing group, especially if a section contains numerous large (> 4 mm) clasts. This is particularly evident in the relatively coarse-grained PCA 02 and DOM 10 pairing groups, in which the modes between thin sections vary widely [e.g., 1]. In the GRO 95 howardite pairing group relatively large clasts are rare, the modes for major components (e.g., basaltic eucrite, cumulate eucrite, and diogenite pyroxene) are relatively consistent between *most* thin sections [2]. Even for relatively fine-grained howardites, at least two thin sections should be analyzed to well quantify the distribution of components.

References: [1] Beck, A. W. et al. 2012 *MAPS* 47: 947-969 [2] Lunning, N. G. et al. in review *MAPS* [3] Rubin et al. 2007 *GCA* 71: 2361-2382 [4] Cartwright, J. A. et al. 2014 *GCA* 140: 488-508 [5] Hahn, T. M. et al. 2015 LPSC #1964