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Formation of chondrules and matrix in Kakangari chondrites

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Abstract:
These files supplement Barosch et al. (2020), a comprehensive petrographic and chemical dataset of Kakangari and Lewis Cliff 87232 chondrules and matrix. Chondrules in Kakangari show a large compositional scatter, supporting material addition to chondrules during their formation. Contrary to almost all other chondrite groups, the majority of Kakangari compared to LEW 87232 chondrules are not mineralogically zoned. It is concluded that both chondrule and matrix components formed in the same reservoir.
Kchonds-ElementMaps: This folder contains X-ray emission element maps of Al, Ca, Fe, Mg, Na, Ni, P, S, Si and Ti by wavelength dispersive spectrometry (WDS) in each of the meteorite samples studied, collected with a 1 micron focused beam with 40 nA beam current at 15 kV accelerating voltage and 4 micron/pixel stage motion with 15 ms dwell time/pixel. Included are map-derived data allowing image analysis of samples, and examples of software code used to perform image analysis. Element maps are 32-bit mosaics collected on electron microprobes as described in the "Methods" section of Barosch et al. (2020). Maps "-xx.tif" are 8-bit masks that remove non-mapped portions of rectangular maps from consideration by software.
Kchonds-AnalysisMaps: This folder contains derived data based on outlining (segmentation) of inclusions includes maps "-GSclasts.tif" in which each type of inclusion has a different grayscale listed in Supplemental_Lists.csv of this supplement. Files "-IJdraw.tif" document the centers of mass (CofM) of each segmented object, output from the ImageJ software (see reference in Ebel et al. 2016). These CofM were manually corrected for CofM that fall in the matrix or mask, or in a nearby object. Files "-rgbTab.csv" list every inclusion, filtered for artifacts, their CofM, with the Red-Green-Blue color combination of that inclusion in "-rgbClasts.tif", and the minimum and maximum x and y of a bounding box around that inclusion. Other information includes the type of inclusion (originally assigned by inspection) and the computed area of each inclusion. With these tables and maps, it is possible to address rapidly and uniquely every pixel in any particular inclusion, and to then reference that pixel in all of the element maps. It is critical with the present software that all the maps and derived mappings have identical x-y dimensions. For three whole sections, "-Phasemap" results are presented, created using the PHAPS program (Hezel, 2010).

Kchonds-Tables_RGBmaps: This folder contains color-balanced, red-green-blue composites maps in Mg-Ca-Fe, and Fe-Ni-S of the sections analyzed. Four tables are provided in an Excel file, with a NOTES page. Tables are also provided as comma-separated-values (csv) ASCII files. Tab-A lists samples and mapping conditions. Tab-B lists grayscales and type code equivalences used for "-GSclasts.tif". Tab-C contains histograms of object types and matrix pixel fractions for 5 samples. Tab-D lists areas and total element counts for all pixels in each segmented object. The code for this work is very similar to, and derived from that reported by Ebel et al. (2016) and reproduced in their online data supplement.
