Extended Digital Supplement
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Abundance, Major Element Composition and Size of Components and Matrix in CV, CO and Acfer 094 Chondrites

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Abstract:
These files supplement Ebel et al. (2016), a detailed exploration of the relative abundances, chemical compositions, and sizes of all types of chondrules, Ca-, Al-rich inclusions (CAI), amoeboid olivine aggregates (AOA) and matrix in CO, Acfer 094, and CV type carbonaceous chondrites. We use the collective term "inclusions" to describe all these components except matrix. These data include informational tables about the samples and mapping, x-ray emission element maps of Si, Mg, Ca, Al, Ti and Fe in each of the meteorite samples studied, derived data that allows image analysis of samples, and examples of software code used to perform image analysis. Element maps are 32-bit mosaics collected on the electron microprobe as described in the "Methods" section of Ebel et al. (2016). Maps "-xx.tif" are 8-bit masks that remove non-mapped portions of rectangular maps from consideration by software. Derived data based on outlining (segmentation) of inclusions includes maps "-GSclasts.tif" in which each type of inclusion has a different grayscale as per Tab-C of this supplement. Files "-IJdraw.tif" document the centers of mass of each segmented object, output from the ImageJ software (see reference in Ebel et al. 2016). Files "-IJresultsC.csv" (csv are comma-separated values in ASCII) tabulate the centers of mass (CofM) of each segmented object, output from the ImageJ software, and these CofM are 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, 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 data, 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 in this work that all the maps and derived mappings have identical x-y dimensions.

Data are arrange in four directories (folders): BSE holds back-scattered electron maps of all samples for which BSE were collected, RGB holds red-green-blue composites in Mg-Ca-Al, and Si-Ca-Fe, CO holds all maps and derived data for CO and Acfer 094 chondrites, and CV holds the same for the CV chondrites.

Five tables are provided, with captions in the table files. Tab-A lists samples, Tab-B reproduces Ebel et al. (2016) Table 8, Tab-C lists grayscale color equivalences used for "-GSclasts.tif", Tab-D through Tab-F itemize all inclusions (see also "-rgbTab.csv" files) and the total element counts in each pixel in each inclusion, for CO, Allende and non-Allene CV chondrite samples, respectively. These data, with appropriate averaging and manipulation, are the basis for most of the figures and tabulated data presented in Ebel et al. (2016). Note that mapping conditions (dwell time and current) must be corrected among data sets to accurately compare element counts collected under different conditions.

A program written for IDL is provided, ClastCode-EbelEtal2016.pro (ASCII), that can be used to perform many of the image processing and analysis tasks described in the paper, using the digital data provided in this Extended Digital Supplement. This code is not guaranteed to work perfectly, however, it provides the basic algorithmic procedures used for much of the image analysis work reported.
