MASS CONSUMED ASSOCIATED WITH CARBONACEOUS CHONDRITE THIN SECTION MAKING: EXPERIENCE FROM THE U.S. ANTARCTIC METEORITE COLLECTION.

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Introduction: In addition to the tremendous scientific value of Antarctic meteorites to the planetary science community, the curatorial documentation of the U.S. Antarctic Meteorite collection is useful as a reference for planning distribution and allocation of other astromaterial collections, including future returned sample collections. Since the U.S. Antarctic Meteorite collection's formation–as part of the U.S. Antarctic Search for Meteorites (ANSMET)–the mass of meteorites, masses of subsplits of meteorites, and the parent-child relationships among subsplits of meteorites have been carefully tracked and documented [1]. This documentation enables us to use past experience to answer new questions as they arise. Here, we use this documentation from the U.S. Antarctic Meteorite Collection to examine the mass consumed on average in making thin and thick sections for several carbonaceous chondrite groups.

Methods: In this project, we identified all the CM, CO, CR, and CV chondrite meteorite chips (subsplits) that have been mounted (into potted butts) and then fully subdivided/consumed to make either thin or thick sections. The initial masses of the potted meteorite chips (the 'parent' chips) and the number of sections (the 'child' thin or thick sections) were then compared to calculate the average mass per section for these meteorite groups. This empirical dataset includes sections made at both Johnson Space Center [2] and the Smithsonian Institution by over twenty separate thin section makers over the nearly four-decade-long history of the U.S. Antarctic Meteorite Program.

Results and Discussion: Most Antarctic carbonaceous chondrite chips that have been mounted in epoxy for sectioning have not been fully subdivided (i.e., new sections can still be made from these potted butts, chips mounted in epoxy); for example, 385 CM chondrite chips have been mounted in epoxy for sectioning, but only 11 of these have been fully subdivided. The average mass per section for CM, CO, CR, and CV chondrite chips that have been fully subdivided is 0.233 g/section (22 fully subdivided potted butts), all data plotted on figure 1. If CM, CO, CR, and CV chondrite potted butts that were only subdivided into thin sections (no thick sections – no sections thicker than ~30 µm) are considered (12 potted butts), the average mass per section is 0.251 g/section. The average mass per section for fully subdivided CM chondrite chips is 0.222 g/section (11 fully subdivided potted butts). If CM chondrite potted butts that were only subdivided into thin sections are considered the average mass per section is 0.225/section. This is a preliminary indication that the mass consumed/lost to saw kerf and polishing are a more substantial factor in the quantity of material consumed in the section making process than the mass of meteorite that remains in thin and thick sections for CM, CO, CR, and CV chondrite chips.

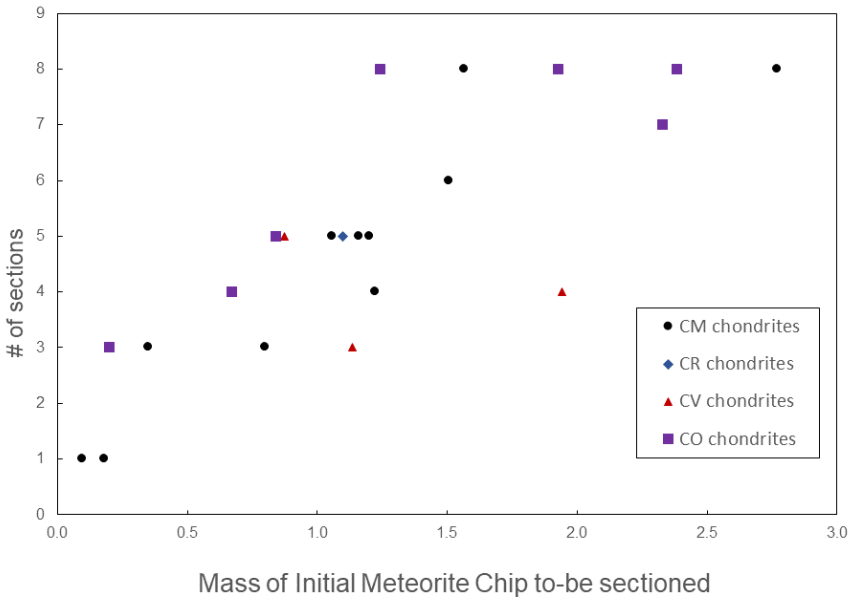

Figure 1: Masses of Antarctic carbonaceous chondrite chips that have been fully subdivided into sections and the number of sections they yielded. This plot includes chips that produced both thin and thick sections.

References: [1] Righter K. et al. (2015) 35 Seasons of U.S. Antarctic Meteorites. AGU/Wiley Sp. Pub. 68: 43-64. [2] Harrington R. & Righter K. (2017) *Annual MetSoc 80*, Abstract #6304.