

Method These files supplement Jenniskens et al. (2012), a comprehensive description of the April 22, 2012 fall and the petrology of the Sutter’s Mill CM2 chondrite breccia.

CT images record the attenuation of x-rays in each volume element (voxel) of the sample. High average atomic mass (*Z*) grains (e.g., Fe-Ni metal alloy) strongly attenuate x-rays, and are the brightest grayscale. Metal sulfide, and metal oxide grains are less bright, and low-*Z* grains (e.g., forsterite Mg₂SiO₄) are dark. Surrounding air is the darkest. Some scans, particularly SM9_24, show artifacts of reconstruction (e.g., white lines, also in SM54S_12), and all samples illustrate slight beam hardening resulting in faint, dark haloes near their geometrical center.

Samples SM3, SM18, and SM51 were borrowed from their owners by kind permission. Samples SM9 and SM54 (in a small piece SM54S, 4.14g, and a large piece SM54L, 15.347g) were purchased by AMNH from their finders. Between 20 May and 20 October of 2012, the entirety of each stone was imaged by X-ray computed tomography (CT; Ebel and Rivers 2007) using the 180 kV nanofocus tube on the GE Phoenix VtomexS dual-tube scanner at AMNH, at 1000 ms exposure, with voltages (kV) and currents (nA) listed below. Images show the cellophane tape holding each sample (sticky side out). A 0.1mm Cu beam filter was used for all scans except SM9_24A. For the highest spatial resolution (e.g., SM54S_12B), pairs of horizontal images are reconstructed using GE software into a single “tile”, and tiles “fused” vertically into whole volumes. These 3D density maps are output as stacks of TIF format files with 16-bit values for each cubic voxel. For example, slice SM18_14A_Z_s1_165, annotated as Fig. S28 of the supplementary online materials of Jenniskens et al. (2012), is the 165th slice in the archive SM18_14A-s1.tar, in this archive. Here, it retains the full 16-bit contrast range.

Stacks can be imported into the ImageJ (open source) or other software tool for viewing. Movies included here were saved from ImageJ in the 'avi' format, at 7 frames/sec, in jpeg compression, after importing each 'inc' slice of the stack. For a movie with inc=3, the distance between each movie frame is therefore 3x the stated voxel resolution (microns/voxel edge).

sample	file	inc	n	MB	res	v	kV	mA
SM3	SM3_13A_fused_inc5.avi	5	1588	32.2	13.648	2	110	120
SM3	SM3-22A_inc3.avi	3	963	13.4	22.189	1	120	130
SM9	SM9_24A_inc2.avi	2	968	24.0	24.543	1	110	150
SM51	SM51_14A_fused_inc3.avi	3	2106	159.4	14.348	3	110	125
SM54S	SM54S_12B_fused_inc3	3	1746	116.8	12.175	2	110	120
sample	file	f-MB	n	GB	res	v	kV	mA
SM18	SM18_14A-s1.tar	2.66	985	2.62	13.975	1	110	120
SM18	SM18_14A-s2.tar	2.66	973	2.75	13.975	1	110	120

Table: Data in this repository. Movies of size 'MB' through samples SM3, SM9, SM51 and SM54 (4.140g) have frames incremented each 'inc' of 'n' slices through image stacks. That is, SM3_13A_fused_inc5.avi has 1588/5 frames. For SM18, stacks of sequentially numbered tagged image file format (TIFF) virtual slices through each sample are aggregated in two parts (top, s1 + bottom, s2). Files 'tar' of size 'GB' aggregate 'n' files of size 'f-MB', at resolution 'res' micron/voxel edge. Column 'v' records the number of vertical scans 'fused' to make each dataset.

References

- Ebel, D. S. and M. L. Rivers. 2007. Meteorite 3-dimensional synchrotron micro-tomography: Methods and applications. *Meteoritics and Planetary Science* 42: 1627-1646.
- Jenniskens, P. and 69 coauthors. 2012. Radar enabled recovery of the Sutter’s Mill meteorite, a carbonaceous chondrite regolith breccia. *Science* 338: 1583-1587. DOI: 10.1126/science.1227163; Online Supplement: www.sciencemag.org/cgi/content/full/338/6114/1583/DC1