THE DENSITY, POROSITY AND MAGNETIC SUSCEPTIBILITY OF TWO RECENT METEORITE FALLS: TISSINT AND SUTTER'S MILL.

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Introduction: Part of the thrill of meteoritics is the excitement of studying new falls that expand our understanding of the complex cosmochemical processes of the solar system. Our group was able to measure the physical properties of loaned samples of two recent falls, the shergottite Tissint and the carbonaceous chondrite Sutter's Mill.

Measurements: These data are part of our ongoing comprehensive study of the physical properties of meteorites using consistent, non-destructive, non-contaminating methods for determining bulk and grain density, porosity, and magnetic susceptibility. The methodology is outlined in [1]. Grain density is measured by helium ideal-gas pycnometry. Bulk density is measured by the glass bead method developed by [2]. Porosity is calculated directly from bulk and grain densities. Magnetic susceptibility is measured with a handheld SM-30 magnetic susceptibility meter following techniques of [3], and corrected for sample geometry by [4].

Results: The Tissint sample (91.29 g) had the following physical properties:

Bulk Density	2.99 ± 0.05 g/cm^3
Grain Density	3.39 ± 0.01 g/cm^3
Porosity	$11.6\% \pm 1.4\%$

These values are consistent with those of previously reported shergottites [5] (except the anomalous Los Angeles). We have begun a program to systematically measure the physical properties of Martian meteorites and should have more comprehensive data in the future.

The Sutter's Mill meteorite (9.89 g) was a whole fusion-crusted stone designated SM 19 by Jenniskens.

Bulk Density	2.31 ± 0.04 g/cm^3
Grain Density	3.34 ± 0.02 g/cm^3
Porosity	$31.0\% \pm 1.4\%$
Magnetic susceptibility	$\log \chi = 4.30 \pm 0.08$

These values are consistent with measured data of CM carbonaceous chondrites [6], though above average for all physical properties reported. The high porosity is in contrast with reports of Sutter's Mill "hardness" and resistance to cutting (G. Hupé and D. Hill, personal communication).

References: [1] Consolmagno G. et al. 2008. *Chemie der Erde – Geochem. 68*: 1-29. [2] Consolmagno G. and Britt D. 1998. *Meteorit. Planet. Sci. 33*: 1231-1241. [3] Rochette P. et al. 2009. *Meteorit. Planet. Sci. 44*: 405-427. [4] Gattacceca J. et al. 2004. *Geophys. J. Int. 158*: 42-49. [5] Macke R. et al. 2011. *Meteorit. Planet. Sci. 46*: 311-326. [6] Macke R. et al. 2011. *Meteorit. Planet. Sci. 46*: 1842-1862.