SPHERULITIC AGGREGATES OF CHONDRITIC ORIGIN FROM THE TRANSANTARCTIC MOUNTAIN MICROMETEORITE TRAPS. M. van Ginneken[1], L. Folco[1], P. Rochette[2] and N. Perchiazzi[3]. [1]MNA, Siena, Italy. E-mail: vanginneken@unisi.it. [2]CEREGE, Aix-Marseille, France. [3]DST, Pisa, Italy.

Three spherulitic aggregates (ca. 400 µm) were magnetically extracted from the fine-grained, granitic detritus of the Transantarctic Mountain (TAM) micrometeorite traps at Miller Butte (Victoria Land) [1]. These traps have been collecting micrometeorites since at least the last Ma as documented by the Australasian (ca. 0.8 Ma old) microtektites found therein [2]. The three aggregates were sectioned and studied using a SEM-EDS and EMP in order to determine their mineralogical and bulk chemical composition. The aggregates mainly consist of porous assemblages of spherules and spherule fragments similar to cosmic spherules <50 µm in diameter. The spherule frequency by type (%) is: G-type spherules (G) 82, porphyritic olivine-type spherules (P) 7, feathered and barred olivine-type spherules (FO and BO) ~1, glassy spherules (V) 1, porphyritic olivine fragments (POF) 10. Abundances (vol%) are: POF 47, G 37, PO 12, FO-BO 3 and V 1. The range and mean diameter of a representative sample of 1236 spherules are: 0.4-39.8 and 3.7±4 µm. Mineral grains of the host detritus are also embedded in the aggregate suggesting that spherule aggregation, at least in part, occurred after deposition.

The non-volatile element bulk composition of the aggregate, reconstructed on the basis of modal abundances and EPMA bulk compositions of the spherules, is chondritic (Ca/Al=1.09; Mg/Si=0.91; Al/Si=0.079; Ca/Si=0.085; Fe(t)/Si=1.44; Fe(t)/Ni=17.36) with an affinity with OC or CR fusion crust compositions [3]. High contents of Na and Cl are due to terrestrial weathering. EPMA olivine composition is Fa16±2.5. Olivine and magnetite contain NiO up to 1-3 wt%, as observed in chondritic fusion crusts [3].

The bulk and mineral composition of the spherulitic aggregate from the TAM indicates that its parent material was chondritic. The geochemical affinity with OC or CR fusion crusts and the high Ni content of olivine suggests that the spherulitic aggregate represents ablation debris of a large OC or CR meteorite rather than an extraordinary high flux of cosmic spherules. The structure and bulk composition of the spherulitic aggregate from the TAM is similar to the particles found in the the 2833 m- and 2788 m-deep extraterrestrial dust-rich layers in the Dome Fuji and EPICA Dome C East Antarctic ice sheet cores with a model age of 481 ± 6 ka [4, 5]. The bulk composition, as well as the texture and mineralogy of the porphyritic fragments of the spherulitic aggregates from the TAM are indistinguishable from those of the BIT-58 H-chondritic ablation debris layer found in the Allan Hills blue ice [6]. We are thus exploring the possibility that these three extraterrestrial dust layers originated from a similar process and, possibly, from a single continental scale (or larger) meteoritic event that occurred ca. 480 ka ago.

References: [1] Rochette et al. 2008. *Proc. Natl. Ac. Sci. USA* 105, 18206-18211. [2] Folco et al. 2008, *Geology* 36, 291-294. [3] Genge et al. 1999, *MAPS* 34, 341-356. [4] Narcisi B. et al. 2007, *GRL* 34:L15502. [5] Misawa K. et al. 2008, *LPSC* 39, #1690. [6] Harvey R. et al. 1998, *Geology* 26:607-610.

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