AN UNUSUAL PARTICLE FROM THE TRANSANTACTIC MOUNTAIN MICROMETEORITE COLLECTION LIKELY RELATED TO THE ca. 480 ka COSMIC DUST LAYER IN THE EPICA DOME-C AND DOME FUJI ICE CORES

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We provide the preliminary mineralogical description of an unusual particle from the Transantarctic Mountain micrometeorite collection [1].

Method: The particle (#20c.25) was magnetically extracted from a sample of detritus collected from a joint of the million year old, glacially eroded top surface of Miller Butte in Victoria during the 2006 PNRA expedition [1]. SEM-EDS analysis of the particle provided preliminary information on its size, morphology and composition. The particle is presently mounted in a glass capillary tube for synchrotron x-ray diffraction analysis at the BM8 GILDA beam-line of the European Synchrotron Radiation Facility in Grenoble, France. Analyses will be run mid-May, and data will be presented at the meeting.

Physical characteristics and petrography: The particle is ca. 700 µm in size and mainly consists of a porous aggregate of spherules from <1 to 50 µm in diameter. Its hemispheric shape is probably the result of fragmentation of a particle which was originally spherical. The base of the hemisphere shows rounded hollows up to 300 µm in diameter which are likely crack-open vesicles. The constituting spherules are dominated by Fe-oxide dendrites set in a silicate matrix which are similar to the rare (<1% [2]) G-type cosmic spherules. A 50 µm silica-rich crystal and a 200 µm silica- and alumina-rich crystal both appear to be embedded in the spherulitic aggregate. Their nature as well as that of the material which holds the spherules together will possibly be determined by the planned synchrotron x-ray diffraction analyses. The SEM-EDS bulk composition of the particle is broadly chondritic, although slightly enriched in Al, Ti and K and depleted in Mg and S relative to the CI-chondrite composition.

Conclusions: Similar spherulitic aggregates ca. 20 µm in size (and/or disaggregated spherules) have only been found previously in one of the two extraterrestrial dust-rich layers in the Dome Fuji and EPICA Dome C East Antarctic ice sheet cores, namely the 2833 m- and 2788 m-deep layers with a model age of 481 ± 6 ka [3, 4]. We therefore argue that the relatively large aggregate found at Miller Butte is the best representative sample of the parent lithology of the extraterrestrial dust found in the Dome-F and Dome-C cores now available for study. Furthermore, the unique characteristics of the above aggregates, along with their compatible age (the micrometeorite trap in which particle #20c.25 was found is >0.8 Ma old, [5]), strongly suggest that they are paired, thereby documenting a continental-scale distribution of the extraterrestrial debris associated with a major, possibly global, meteoritic event ca. 480 ago. This remarkable finding further confirms [1, 5] the great scientific value of the Transantarctic Mountain micrometeorite collection.

References: [1] van Ginneken M. et al. 2008, *MAPS* this issue. [2] Genge M. et al. 2008, MAPS (in press). [3] Narcisi B. et al. (2007) GRL 34:L15502. [4] Misawa K. et al. (2008) *LPSC* 39, #1690. [5] Folco L. et al. 2008, *Geology* 36:291-294.

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