THE MICROMETEORITE MASS FLUX AS RECORDED IN DOME C CENTRAL ANTARCTIC SURFACE SNOW.

J. Duprat[1], C. Engrand[1], M. Maurette[1], F. Naulin[1], G. Kurat[2], M. Gounelle[3], [1]CSNSM, Bat.104, 91405 Orsay, Fr., [2]Univ. Wien, Inst. Geol. Wissenschaft, A-1090 Vienna, Austria. [3]MNHN, 57 rue Cuvier, 75231 Paris, Fr.

Introduction: We used the unique characteristics of central Antarctic surface snow to revisit the issue of the extraterrestrial (ET) dust flux reaching the Earth's surface. Marine osmium isotopic data indicate an average flux of ET material of $30x10^3$ tons/yr [1], in agreement with flux of micrometeoroids before atmospheric entry [2]. On short time scales (< Myrs), the bulk of ET material comes from dust with sizes ~200 m [2]. Still a challenging issue is to estimate the fraction of this flux that actually reaches the Earth surface as particles (i.e. micrometeorites) from the one that it vaporized during atmospheric entry.

Experimental procedure and results: The evaluation of the micrometeorite (MM) flux requires an accurate control on several critical parameters: i) the equivalent exposition surface, S, (in m^2.yr), ii) the collection efficiency, iii) the potential statistical biases. In January 2002, we collected MMs at CONCORDIA station at Dome C (75°S-123°E). A total of 10 m^3 of snow were manually extracted in a clean trench at 4 m depth, corresponding to S~100 m^2.yr. This snow was melted and sieved down to 30 m in a dedicated ultra-clean stainless steel snow smelter allowing us to measure, for each melt, the collection efficiency in two size ranges (30-100 m and >100 m). Dome C snow is well protected from terrestrial dust within the >30 m size range allowing the analysis of all the particles contained in the filters. The collection technique used and the unique conditions of Dome C snow allow recovering of all types of ET particles, i.e. both melted and unmelted. We identified by SEM imaging and EDX analysis a total of 500 MMs. The accumulation rate at Dome C is low and regular [3], thus the S parameter can be deduced accurately for each melt. The 10 consecutive melts yielded 10 independent flux values ranging from $3x10^3$ up to $10x10^3$ tons/yr. The large variations of these values can be understood as resulting from statistical sampling. Following [1], we developed a Monte Carlo numerical code simulating the expected flux. We find an average MM flux at Dome C of 5300 tons/yrs. The flux of MMs at Earth surface represent no more than 1/3 of the total incoming flux of particles before atmospheric entry, in agreement with recent studies conducted in Antarctic snow [4] and ice [5]. We will discuss the various sources of uncertainties for all these different studies and emphasis the assets of the present work as well as the corrections that have to be applied to both CONCORDIA flux and to values determined before atmospheric entry [1,6]. Finally, we will present the high statistics MMs collection we performed at CONCORDIA in January 2006.

Acknowledgements: We thank IPEV and PNRA for funding and logistical support to the CONCORDIA micrometeorite collection at Dome C.

References: [1] B. Peucker-Ehrenbrink and G. Ravizza, GCA, 2000. **64**(11): p. 1965-1970. [2] S. G. Love and D. E. Brownlee, Science, 1993. **262**: p. 550-553. [3] J.-R. Petit, et al., JRS, 1982. **87**: p. 4301-4308. [4] S. Taylor, et al., Science, 1998. **392**: p. 899-903. [5] T. Yada, et al., EPSL, 2004. **56**: p. 67-79. [6] E. Grün, et al., 2001. *Interplanetary dust*: Berlin, Springer.