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Thermoluminescence of meteorites from the Lewis Cliff: Ice movements, pairing, orbit, and Antarctic/Non-Antarctic comparisons. P. H. Benoit, H. Sears, and D. W. G. Sears. Cosmochemistry Group, Dept. of Chemistry and Biochemistry, University of Arkansas, Fayetteville, AR 72701, USA.

The Lewis Cliff region has been a prolific source of meteorites. To date, with sampling basically completed, approximately 2000 meteorite fragments have been returned from this area (1). We have been engaged in a routine thermoluminescence (TL) survey of these meteorites as part of their initial characterization (2, 3). We had noted several interesting features in the data (4) but only recently have we been able to examine the data in detail in the light of field and petrographic observations. We present here data for over 300 meteorites, this subset consisting of larger (>20 g) samples which are suitable for this analysis.

The Lewis Cliff site consists of two major geographic divisions, the Lower and Upper ice tongues (LIT and UIT, respectively), and several adjoining sites (Meteorite Moraine and South Lewis Cliff). The Lewis Cliff site is younger than most of the Allan Hills sites and this is reflected in the generally higher natural TL values in the Lewis Cliff samples. Within the Lewis Cliff sites, however, there is evidence that the UIT has meteorites with lower natural TL than the LIT and Meteorite Moraine. This suggests that the UIT consists of older ice relative to the other sites. This difference between the adjoining LIT and UIT is accentuated by the differences in shape and orientation of 27 pairing groups; those of the UIT are strongly oriented N-S while those of the LIT are randomly oriented and are often non-linear. All the icefields have a similar percentage (~15%), after accounting for pairing, of very low natural TL meteorites (<5 krad), which reflects the proportion of meteorites with low perihelion orbits (5).

The induced TL sensitivity of most of the Lewis Cliff samples is significantly lower than those of non-Antarctic falls, a difference which can be attributed largely or wholly to weathering (6). There are, however, differences in induced TL peak temperature-width between sites (Fig. 1) which cannot be explained by weathering. UIT meteorites have a broad range of peak temperatures similar to Allan Hills meteorites (7, 8). Meteorites from the LIT and Meteorite Moraine, however, tend to approach the non-Antarctic line.

We suggest that these data show that the ice at the UIT and the LIT is "uncoupled", with the older UIT overriding the LIT and Meteorite Moraine. The older meteorites (from UIT) are similar to those from the Allan Hills while the younger meteorites (LIT and Meteorite Moraine) are more similar to modern non-Antarctic meteorites. This suggests that there are at least two populations of meteorites in the Antarctic: an older group with more varied thermal (non-terrestrial) histories and a younger group with much more homogeneous histories. Supported by NASA grant 9-81 and NSF grant DPP 8817569. References: (1) Cassidy (1990) *LPI Tech. Rep.* **90-03.** (2) Score and Lindstrom (eds.) (1990) *Ant. Met. Newsletter,* **13.** (3) Hasan *et al. Smithson. Contrib. Earth Sci.,* in press. (4) Hasan *et al.* (1988) **51st** *Met. Soc.,* F-2. (5) Benoit *et al.* (1991) *LPSC* **22,** 87. (6) Benoit *et al. Meteoritics,* **26,** 157. (7) Sears and Benoit (1991) *LPSC* **22,** 1209. (8) Sears *et al.* (1991) *GCA* **55,** 1193.