Natural Thermoluminescence and its Relation to the Terrestrial Age of Meteorites

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Thermoluminescence (TL)

• Light given off by a meteorite when electrons trapped in crystalline defects are released upon heating
• Natural Thermoluminescence (NTL) is dependent upon radiation history of meteorite in space and storage environment after fall
•NTL can provide information on terrestrial age

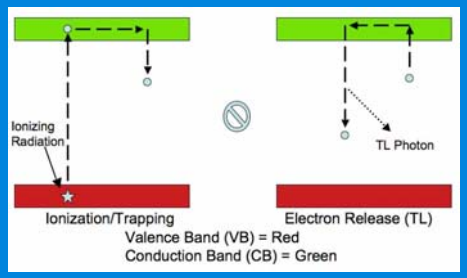

Figure 1. Diagram of TL mechanism [1]

Methods

•43 samples, 27 different meteorites
•Heated at linear rate up to 500°C
•Low Temp./High Temp. peak height ratio taken
•Terrestrial age known for observed falls
•For non-observed falls, terrestrial age estimated from NTL decay curves [2]

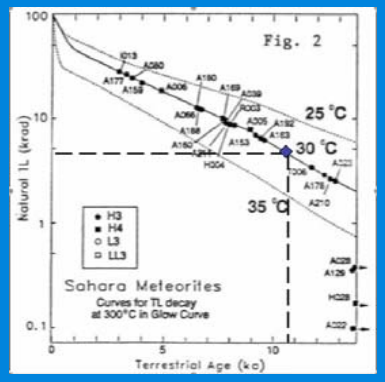

Figure 2. NTL decay curve for Saharan storage environment, with terrestrial age extrapolation method illustrated

NTL and Terrestrial Age

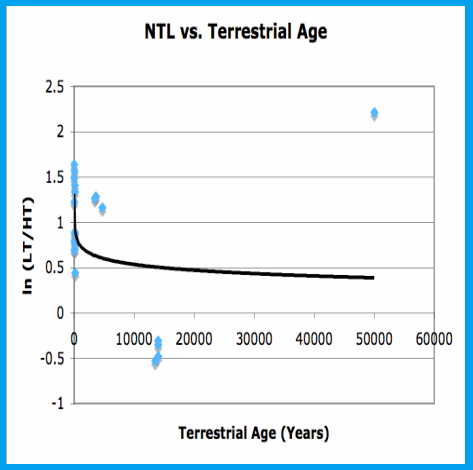

Figure 3. NTL vs. Terrestrial Age for all samples with measurable TL and age.

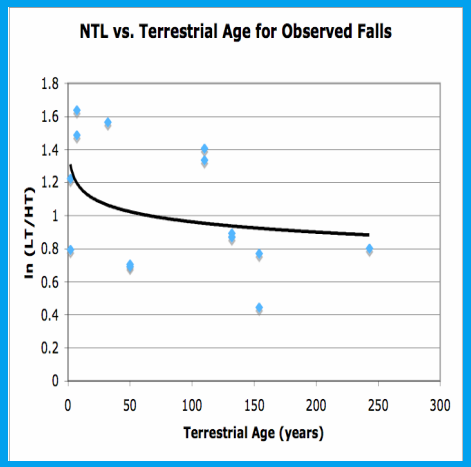

Figure 4. NTL vs. Terrestrial Age for Observed Falls

Results

•Results in Figures 2 and 3 appear to support the link between lower levels of NTL and higher terrestrial ages
•Some samples unable to be plotted due to lack of low temperature peak
•Terrestrial ages impossible to estimate for some Antarctic meteorites due to very gradual decay curve
• Observed falls, as expected, have lower terrestrial ages corresponding to their higher levels of NTL

References

[1] Sears, D. W. G. and Hasan, F. A. (1986) *Thermoluminescence and Antarctic Meteorites*, Lunar and Planetary Inst. International Workshop on Antarctic Meteorites, 83-100. [2] Benoit et al. (1992) *LPSC XXIII, 89-90*.

Acknowledgements

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