SPHERULE SIZE DISTRIBUTION AND LITHOLOGY IN THE DALES GORGE SPHERULE BED.

A.E.K. Davatzes[1] and M. Enos[1]. [1]Department of Earth and Environmental Science, Temple University (1901 N. 13th St. Philadelphia, PA 19122) (alix@temple.edu)

Introduction: Models of impact plumes have calculated the size of spherules produced by the condensation and crystallization of molten and vaporized rock [1,2]. Within the Hamersley Group of Western Australia are several spherule layers representative of numerous impacts. The Dales Gorge spherule layer (DGSL) is preserved in a sequence of rocks representative of a low-energy, submarine environment; it is composed of below wave-base, fine-grained siliceous sediments and banded-iron formations [3]. The DGSL is a thin layer of sand-sized spherules formed from an impact event dated to about 2.49 Ga [3]. The spherule layer is distal fall-out of an impact-associated vapor plume and represents a relatively instantaneous depositional event on a global scale [3].

Methods: Four thin sections representative of the thickness of the bed have been petrographically analyzed and >600 spherules counted and measured for long and short axis diameters. Each spherule was classified according to the classification scheme in table 1.

% of Type	Description
15%	**Massive** stilpnomelane; may contain vesicles
43%	Stilpnomelane **rimmed** of K-spar &/or opaques
16%	**Random**ly-oriented K-spar
5%	**Radial**: inward-radiating K-spar
5%	Multiple compositionally distinct **layers**
16%	**Miscellaneous**

Table 1: Spherule types classified based on the classification scheme in [4].

Discussion: All of the spherules in this section had a short to long axis ratio of approximately o.8. Spherule diameters range from 0.05mm to 0.69mm (Fig. 1). This full range was only observed in the miscellaneous category of spherules. The histogram of all types peaks at 0.30-0.35mm (Fig 1B) and the layered spherules, in particular, are tightly clustered around this peak (Fig 1A). This is due to the fact that layered spherules are only identified when the thin section cut is through the center of the spherule. The other spherules types will often be measured as a non-central cut of the spherule, resulting in an underestimate of diameter. Still, it is important to note there are slight variations in spherule types, particularly the shift toward larger spherules in the spherules with a feldspar rim (Fig. 1A). The massive stilpnomelane and randomly-oriented feldspar spherules are shifted to the lower sizes (Fig. 1A), and some of these may be layered spherules cut along the edge.

Though there are some variations by type, they are not nearly as pronounced as what is seen in the Paleoarchean spherule layers in the Barberton greenstone belt [5]. They are also significantly smaller in size as compared to the older Barberton spherules [5]. Comparison of all of the Archean impacts show variations in composition and size distribution consistent with differences in original impactor size and composition as well as target rock composition. Ongoing spherule measurements of separates and microCT scanning is helping to further elucidate the size distribution of spherules.

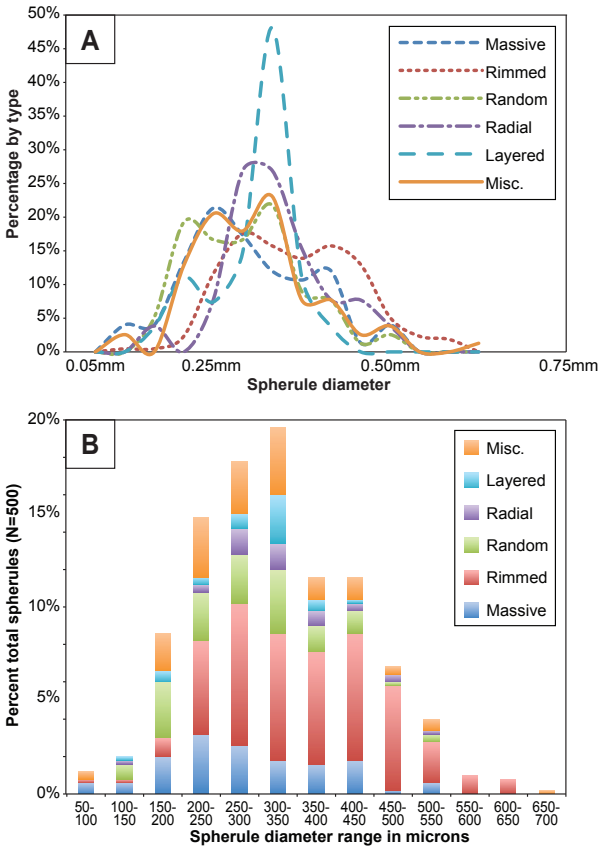

Figure 1: (A) spherule diameter normalized to percentage of type. (B) stacked histogram of spherule types.

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