Analysis of cosmic spherule candidates from the Kwajalein micrometeorite collection

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The Kwajalein micrometeorite collection utilised high volume air samplers fitted with 5 μm laser-etched polycarbonate membrane filters to capture particles directly from the atmosphere. The filters were changed weekly over several months throughout 2011/12, providing the opportunity to investigate the contemporary flux of micrometeorites [1]. We recently reported the results of our initial survey of cosmic spherule-like particles on several of these filters [2]. We identified three main groups of spherules based on bulk compositions: I. Silicate spherules rich in Mg and Fe, II. Silicate spherules rich in Al, Ca, K and Na and III. Fe-rich spherules. Abundances appeared to change over time suggesting links with celestial activity (e.g. meteor showers). However, spherules similar to groups II and III can be produced by terrestrial and anthropogenic activity (e.g. volcanic microspherules exhibit similar compositions to group II and metallic spherules similar to those of group III can be formed during fuel combustion [3] [4]). We are now studying the internal structures and chemistries of these spherules and comparing against cosmic spherules identified in other collections to confirm their origins and further constrain the contemporary micrometeorite flux (e.g. 5] [6]).

Particles are picked, embedded in resin and polished through to reveal their interiors. Here we will describe our ongoing analyses of these particles via SEM. We will also introduce our new collection using this method that is currently being performed in the Antarctic.

Acknowledgements: PJW is funded by a Marie Curie International Incoming Fellowship within the 7th European Community Framework Programme.

[1] Wozniakiewicz et al. 2013. *LPSC XXXXV* #1823 [2] Wozniakiewicz et al. 2014. *77th MetSoc*. #5274 [3] Lefèvre et al. 1986. *Nature* **322**:817 [4] Snowball et al. 2014. In *A Stratiagraphical basis for the Anthropocene*. Geol. Soc., London. Spec. Pub. **395**:119 [5] Taylor et al. 2000. *MAPS* **35**:651 [6] Genge et al. 2008. *MAPS* **43**:497.