INVESTIGATING THE PRESENT DAY COSMIC DUST FLUX AT THE EARTH'S SURFACE: INITIAL RESULTS FROM THE KWAJALEIN MICROMETEORITE COLLECTION.

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Introduction: Examination of impact craters on the Long Duration Exposure Facility satellite indicate a present day micrometeoroid flux of ~30,000 tonnes [1 after 2]. But what portion of this material arrives at the Earth's surface as micrometeorites? Studies of available micrometeorite collections from deep sea sediments [e.g. 3], Greenland blue ice [e.g. 4] and the South Pole water well [e.g. 1] may be complicated by terrestrial weathering and, in some cases, collection bias (magnetic separation for deep sea sediments) and poorly constrained ages. We have recently set up a micrometeorite collection station on Kwajalein Island in the Republic of the Marshall Islands in the Pacific Ocean, using high volume air samplers to collect particles directly from the atmosphere. By collecting in this way, the terrestrial age of the particles is known, the weathering they experience is minimal, and we are able to constrain particle arrival times. Collecting at this location also exploits the considerably reduced anthropogenic background [5].

Method: High volume air samplers were installed on top of the two-story airport building on Kwajalein. These were fitted with polycarbonate membrane filters with 5µm diameter perforations. The flow rates were set to $0.5 m^3/min$, and filters were changed once a week. After collection, filters were washed to remove salt and concentrate particles [see 5] in preparation for analysis by SEM.

Results and Discussion: A selection of filters have been prepared and surveyed. Due to their ease of identification our initial investigations have focused on particles resembling cosmic spherules. The spheres can be divided into three main groups: 1. Silicate spherules rich in Al, Ca, K and Na (to varying degrees), 2. Silicate spherules rich in Mg and Fe and 3. Fe-rich spherules. Group 1 spherules are often vesiculated and can occur as aggregates. They are similar in appearance and composition to volcanic microspheres [e.g. 6] and are thus likely terrestrial in origin (volcanic). Those of groups 2 and 3, however, typically exhibit quenched surface textures consistent with cosmic spherules. Initial results suggest there is significant variation in the abundance of these groups from filter to filter. Work is ongoing to fully characterize these spherules and to constrain their flux with time.

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