CONTEMPORARY COSMIC DUST ARRIVING 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]. Studies of available micrometeorite collections from deep sea sediments [e.g. 3], Greenland blue ice [e.g. 4] and South Pole water well [e.g. 1] may be complicated by terrestrial weathering, poorly constrained ages and, in some cases, collection bias (e.g. magnetic separation for deep sea sediments). We have recently established a micrometeorite collection station on Kwajalein, an atoll 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 so that collections can be timed to correlate with celestial events (e.g. meteor showers). Collecting at this location also exploits the considerably reduced anthropogenic background [5].

Method: High volume air samplers, fitted with polycarbonate membrane filters, were installed on top of the two-story airport building on Kwajalein. The flow rates were set to $0.5m^3$/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. The results to date demonstrate proof-of-concept for this collection approach. Due to their ease of identification, our initial investigations have focused on particles resembling cosmic spherules. These are <45µm in diameter and 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, 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 those likely of extraterrestrial origin and to constrain the flux of these particles with time.

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