

Microscopic Meteoritic Material at the Dalgaranga, Odessa and Veevers Meteorite Craters. Toby R. Smith and Paul W. Hodge. Department of Astronomy, Box 351580, University of Washington, Seattle WA, 98195-1580

While there has been a considerable amount of study into understanding the impact craters, cratering mechanisms, the meteorites and their parent bodies, relatively little consideration has been given to the small meteoritic particles that are created as a result of the meteorite's passage through the atmosphere and subsequent impact. We present an analysis of soil samples from three young terrestrial impact craters, the Odessa craters in Texas and the Dalgaranga and Veevers impact craters in Western Australia. The Dalgaranga crater is of special interest since it is the only crater known to be formed by the impact of a mesosiderite[1]. At the Odessa and Dalgaranga craters small meteoritic fragments are very abundant and their total calculated mass is much greater than the mass of recovered meteorites.

In our analysis of the samples we found that meteoritic material is an ubiquitous component of the soil at the Odessa and Dalgaranga craters. This meteoritic material occurs as small heavily weathered unmelted fragments of the parent meteorite. The size of the particles are less than 2mm with sizes typically in the 0.4 - 0.1 mm size range. The size distribution is typical of particles produced by a fragmentation event[2].

We calculate that the total mass of these fragments is nearly 10 metric tons at the Odessa craters, and about 40 kg at the Dalgaranga crater. Both of these calculated masses are about an order of magnitude greater than the total mass of ponderable meteorites recovered from the respective sites, but about two orders of magnitude smaller than the estimated mass of the impacting body[3, 1].

Morphologically, these particles show the same type of structures found in the parent meteorites. The vestiges of the Widmanstätten patterns are seen in the Odessa particles and the complex silicate-iron inclusions found in the Dalgaranga meteorite are seen even in the very small fragments. Chemically, the particles have been greatly altered by terrestrial weathering. The bulk of the particles are composed of iron-nickel oxides with a very small metallic component. The majority of metallic phases present are the electrolytically more positive ones such as taenite and schreibersite.

The Veevers crater site is rich in iron-rich laterite. This makes identifying small meteoritic particles in the soil particularly difficult. However, we were able to

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recover two heavily weathered particles with morphologies similar to the particles found at the Odessa craters. An estimate of the total mass of fragments at the Veevers craters was not made due to the paucity of the fragments.

References: [1] Ninninger, H. H., and Huss, G. I. (1960) *Min. Mag.* 32, 619-639. [2] Smith, T. R. (1995) Ph.D. Thesis, University of Washington. [3] Baldwin, R. B. (1963) in *Measure of the Moon*, Univ of Chicago.