NICKEL CONCENTRATION IN THE SOIL AROUND KAMIL CRATER (EGYPT).

L. Folco, A. Fazio, D’Orazio, C. Cordier, A. Zeoli, M. van Ginneken, A. El-Barkooky

Kamil Crater is a 45-m-diameter simple crater in SW Egypt [1, 2], produced by the hypervelocity impact of the Gebel Kamil iron meteorite on layered sandstones [3, 4]. Due to its very young age (probably <5000 yr) and the dry climatic conditions in the Sahara, it is exceptionally well-preserved with a pristine crater structure, rayed pattern of bright ejecta, various types of shock-metamorphosed and impact melt rocks, and a nearly intact assemblage of fragments of the projectile that exploded into thousands of shrapnel upon impact. The concentration of shrapnel ≈10 g to ≈30 kg due SE of the crater indicates an oblique impact from the NW [2, 3].

In order to study the microscopic impact debris of the iron impactor, [5] analyzed the < 5 mm magnetic extract of soil samples systematically collected around the crater during the February 2010 Italian-Egyptian geophysical expedition. Samples were collected at incremental distances along eight radial traverses (45° apart) extending up to 1.3 km from the crater rim. Each sample was obtained from a 30 x 30 x 5 cm soil volume. A total of 44 samples were collected. Based on the petrographic investigation of 10 representative samples, [5] concluded that Ni-bearing material in the soil around the crater is essentially Gebel Kamil debris (i.e., microshrapnel and microscopic impact melt particles) and could be used to study the distribution of impactor debris around the crater.

We thus determined the Ni concentrations in the above samples by means of ICP-MS. The azimuthal distribution is shown in Fig. 1. Maximum concentrations within 15 m of the crater rim are due SE, whereas concentration maxima at greater distances (up to 400 m) are due S. This distribution deviates slightly from that of the macroscopic shrapnel [2, 3] and suggests that the impact plume carrying microscopic impactor debris was somewhat wind-blown by dominant north-northeasterly winds. Kamil Crater thus documents that, compared to the distribution of macroscopic shrapnel the distribution of impactor debris is a weaker criterion for establishing the direction of impact.
