LUT DESERT (IRAN) METEORITES: DISTRIBUTION, CLASSIFICATION AND WEATHERING

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Introduction: Owing to their dry climate and low chemical weathering rates, hot deserts are suitable places for meteorite preservation and concentration. Different surface abundance, weathering degree and terrestrial age distribution is observed for meteorites from different hot deserts. These factors are mainly controlled by the climate, geology and the geomorphology of the region. Studies on the mentioned factors have been used to investigate the extraterrestrial material flux and the palaeoclimate of different hot desert [1-3].

Lut desert (Iran) is a suitable place for preservation of meteorites [4]. Fruitful field missions and the high number of meteorites found recently in Lut are in accordance with the mentioned suggestion.

Here we report the preliminary data on their distribution, classification and weathering.

Methods: Magnetic susceptibility and optical/electron microscopy were used to classify the collected meteorites from Lut and to evaluate the abundance of FeNi metal in relation to the weathering degree. Primary and secondary mineral phases were investigated by XRD. ICP-AES (CEREGE) and ICP-MS (Università di Pisa) were used to determine major and trace element concentrations.

Results and discussion: The majority of the recovered meteorites are from the Kalout region (western sector of Lut desert). The main reason is the accessibility of this region and also the low abundance of meteorite-sized terrestrial rock fragments in the Kalout. All the recovered meteorites are ordinary chondrites (mostly H and L) and the majority show high weathering degrees (W3 to W4). Contrary to meteorites from Atacama deserts which magnetic susceptibity tends to decrease for higher weathering degrees, the Lut meteorites do not show the same behavior and in higher weathering degrees magnetic susceptibility increases. This observation can be explained by the formation of ferromagnetic minerals such as magnetite during the terrestrial weathering. This observation can be explained by the formation of magnetic Fe oxide in heavily weathered meteorites. High abundances of Sr, Cs, Tl and LREEs, which are the main chemical features of the studied meteorites, could have been developed during the hot desert weathering. Based on the abundance of the recovered meteorites in the relatively small region of the Lut deserts, a very high number of meteorite fragments are expected to report in the near future.

Conclusion: The number of recovered meteorites from Lut desert are increasing and the recent field works in the Kalout region have been successful in finding about 60 meteorites (ordinary chondrites). Pairing is currently investigated but it will not drastically reduce this number. The study on the characteristics of Lut desert meteorites will get insights into the flux of extraterrestrial matter, meteorite weathering process and the paleoclimte of the region.

References:

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