NEW INSIGHTS IN PRESERVATION OF METEORITES IN HOT DESERTS: THE OLDEST HOT DESERT METEORITE COLLECTION.

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With a meteorite concentration up to 170 meteorites over 10 g per km² [1], the Central Depression of the Atacama Desert is an exceptional field for recovery of meteorites. Without clear evidence of physical concentration, and based on models calculating the falling rate of meteorites on Earth at 80 meteorites (>10 g) Ma^{-1} km^2 [2], the time needed to reach such a density is in the order of million years.

To test this hypothesis, a random subset of 25 chondrites from Chilean dense collection areas (DCA) were first ^{14}C-dated. Over 67% of them are beyond the C-14 dating limit, namely ~40 ka. This led us to conclude that longer half-lived cosmogenic nuclides are better-suited to study this collection.

A random subset of 24 ordinary chondrites was chosen from the 213 meteorites of the El Médano collection (El Médano and Caleta el Cobre DCAs). Their terrestrial ages were calculated using cosmogenic nuclide concentrations. For comparison, we also present the terrestrial ages calculated for 10 Chilean iron meteorites (4 from this study, 6 from the literature [3]).

Cosmogenic nuclides (^{10}Be, ^{26}Al, ^{36}Cl and ^{41}Ca) were extracted from iron fractions of chondrites and from iron meteorites following [4]. Their concentrations were measured at the French 5 MV AMS national facility ASTER (CEREGE, France)[5]. Terrestrial ages have been calculated using three different methods: T_{terr} $^{36}Cl/^{10}Be$, T_{terr} $^{36}Cl/^{41}Ca$ and T_{terr} ^{36}Cl [6][7].

The terrestrial ages of the El Médano collection meteorites are distributed between 35 ka and 1 Ma ($^{36}Cl/^{41}Ca$ method), with an unweighted average of (0.41±0.26) Ma. Terrestrial ages of the Chilean iron meteorites range between 0 and 2.7 Ma, with an unweighted average at (0.43±0.43) Ma. This distribution highlights significantly older terrestrial ages than those related to other hot desert collections. It is comparable to the age spectrum for DCAs from Antarctica, such as Allan Hills. According to these results, it is possible for a meteorite collection to be preserved for over 1 Ma in a hot desert environment, providing the environment shows long-standing hyperarid conditions. In view of its exceptional old age, the El Medano meteorite collection offers the possibility to study the meteorite flux to Earth on the million years time scale.

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