WEATHERING OF ORDINARY CHONDRITES FROM ATACAMA DESERT – A NEW DATASET.

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The Atacama Desert is located between the western central Andes and the Pacific coast and extends from southern border of Peru (18 °S) to Copiapó, Chile (30 °S). It is the oldest desert on Earth, comprising areas with semiarid, arid, and hyper-arid conditions [1]. These climatic and geomorphological features are extremely favorable for preservation and accumulation of meteorites. Meteorite densities are up to above 100 meteorites per km^2, [2], in accordance with an average terrestrial age of ~700 ka [3]. A large number of meteorites, mostly ordinary chondrites, have been collected in the Atacama desert. Their old terrestrial ages and statistical significance make them a choice material to study the effects of terrestrial weathering [3-8]. Here we present a new dataset about weathering of ordinary chondrites from the Atacama Desert, in order to better understand how weathering processes occur in different areas of the desert.

We studied about seventy ordinary chondrites recovered in San Juan, El Médano and Caleta el Cobre dense collection areas of the Atacama Desert. These meteorites have been characterized using ^{57}Fe Mössbauer spectroscopy. Following [9], transmission ^{57}Fe Mössbauer measurements using a 25 mCi 57Co/Rh radioactive source in sinusoidal mode were performed at room temperature (RT) and at liquid helium temperature (4.2 K). Mössbauer powder absorbers were prepared with nearly 100 mg/cm^2 of the bulk meteorite sample.

Combining the RT and 4.2 K Mössbauer measurements, the following iron-bearing primary phases were detected in all samples: olivine, pyroxene, troilite and Fe,Ni metal (kamacite, taenite). The following oxides/oxyhydroxides weathering products were found: goethite, akaganeite, maghemite. As described in [9], the abundance of oxidized iron in ordinary chondrites, as measured by Mössbauer spectroscopy, defines the weathering degree. The Mössbauer data reveals that for San Juan, El Médano and Caleta el Cobre samples the average weathering degree are 31%, 53% and 47%, respectively. Therefore, the lowest weathering degree was found for San Juan area. The Mössbauer data will be combined with ^{14}C terrestrial age as well as results from other techniques, in order to establish not only a broad picture of weathering processes (kinetics and mineralogy of weathering products) but also a possible proxy for paleoclimatic changes in Atacama Desert [6].

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