THE AGE OF THE MONTURAQUI IMPACT CRATER.

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Introduction: The Monturaqui crater is the only meteorite impact related structure yet found in Chile. The simple crater of ~400 m diameter and ~34 m of depth [1] is localized at 3015 m altitude in the precordillera near the southern end of Salar de Atacama. The crater age was estimated as older than 0.1 Ma with an appreciable error by [2] by thermoluminescence analysis. We are reporting the first absolute ages of the Monturaqui impact following two approaches: a) the terrestrial age of the impactor by measuring the residual activities of ^{10}Be, ^{26}Al, ^{36}Cl, ^{41}Ca, ^{59}Ni, ^{60}Fe, and ^{53}Mn in iron shale samples, which corresponds to the altered fragments of the impactor (coarse octahedrite - group I - deduced from Fe-Ni-spherules found in impact melt ejecta [2,3]), and b) surface exposure ages by measuring in-situ produced ^{10}Be in the granite outcrops exposed to cosmic radiation on Earth.

Experimental: Accelerator mass spectrometry of ^{10}Be and ^{26}Al took place at ASTER, ^{36}Cl at CAMS, and ^{53}Mn at the Maier-Leibnitz-Laboratory. Other nuclides are foreseen soon.

Results: Measured concentrations are compared with depth-depending production rates (PRs) from theoretical Monte-Carlo calculations [priv.com., I. Leya]. As these PRs are based on the chemical composition (in space), remaining fragments are highly altered and precise chemical analyses could not yet be achieved, certain assumptions are influencing the discussion of our, thus preliminary, data.

The longest-lived radionuclide ^{53}Mn ($t_{1/2}$=3.7 Ma), normalized to a fully corroded Fe_2O_3-sample, is the least sensitive nuclide to a varying terrestrial age, thus, providing us with the best value for a shielding depth: 62-71 cm. The best fit of the measured shortest-lived radionuclide ^{36}Cl ($t_{1/2}$=0.3 Ma) with theoretical PRs at that depth is for a terrestrial age of 500-600 ka. The ^{26}Al-activity ($t_{1/2}$=0.7 Ma) validates that age. The measured ^{10}Be is far too high compared to theoretical PRs (based on a C-content of 0.1%, as Canyon Diablo). This goes along with earlier studies [4,5] demonstrating the big influence of inhomogeneously distributed traces as C, S, and P on the production of light nuclides.

Our second approach, using terrestrial ^{10}Be, leads to a minimum in-situ exposure age of two quartz-rich samples from the crater wall of 200-250 ka. However, a larger age is very likely due to the subsequent erosion of the crater walls.

Preliminary paleomagnetic measurements of the granite within the crater revealed mixed normal and reverse magnetic field polarities suggesting a possible age for the impact remagnetization older than 780 ka.

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References: [1] Ugalde H. et al. 2007. *Meteoritics & Planetary Science* 42:2153. [2] Buchwald V. F. 1975. *Handbook of iron meteorites* 1:262. [3] Bunch P. E. and Cassidy W. 1972. *Contrib. Mineral. Petrol.* 36:95. [4] Leya I. and Michel R. 1998. Abstract #1172. 29th Lunar and Planetary Science Conference. [5] Leya I. et al. 1997. *Meteoritics & Planetary Science* 32:A78.