Muon produced Neon in quartz at large depths: BeNe project progress report.

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The BeNe project is a collaborative effort to calibrate the $^{21}Ne/^{10}Be$ ratio at large depths. No data exist for muon production rates of ^{21}Ne, which is an important nuclide in studies of erosion histories. ^{21}Ne is an integrating stable nuclide, and is considered to provide information for long-term irradiation processes and periods of glacial cover as well as for geological processes such as uplifts.

In order to determine muon produced ^{21}Ne, quartz core samples must meet several conditions: measured depth below surface with known erosion history, high quartz purity, low abundance of radioactive elements for minimizing the nucleogenic component, sample suitable for other cosmogenic nuclides such as 10Be for cross-calibration and preferably high altitude location. Other concerns are the separation of interfering Ne components, which require stepwise releases in actual NGMS analyses.

A high purity quartz dyke from A Gudiña, NW Spain, was selected for the BeNe project. The quartz dyke is located 1.500 m a.s.l., above a Pleistocene supraglacial landscape. Preservation of this landscape is excellent, allowing the inference of low erosion rates in the last 2.5 Ma. Two cores taken at different locations in the dyke were drilled to 25 m depth. Integrity of recovered cores was excellent, insuring accurate depth measurements of selected aliquots. At this time, first analyses are performed at UCSD for Ne in quartz samples from both cores and 10Be analyses are carried out by the CEREGE team. The research at University of A Coruna facility has been delayed due to the failed collector development by GVInstruments. First results on core samples will be presented at the meeting.

Precipitation of subsurface carbonates under acidic surface conditions on Mars: A terrestrial perspective

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After several decades of Mars exploration knowledge on the surface mineralogy has recently experienced a great revolution. Several mineral phases as phyllosilicates, iron oxides, sulfates and different silica phases have been revealed by means of Mars Express, MER and MRO [1-2]. On the contrary, carbonates unexpectively remain lacking on surface, being only detected in the Mars dust and in some Mars meteorites [3]. As a consecuence, some geochemical models have been focused in explaining this fact resulting from a low pCO_2 atmosphere which would equilibrate neutral to subalkaline solutions [1, 4]. However, mild to strong acidic solutions can produce subsurface carbonates when CO_2 is supplied. In the Río Tinto Mars analog a surface mineral association of acidic sulfates and phyllosilicates occur elsewhere in the fluvial basin; whereas in the suburface acidic waters are biotically and abiotically neutralized to less acidic (pH >4). Under these mildly conditions, carbonates (siderite and ankerite) are precipited when CO_2 is provided to the subsurface system. On Early Mars a CO_2-rich atmosphere would have induced acidification of surface and meteoric water preventing carbonate precipitation but favoring phyllosilicate production through silicate weathering. Weathering would also produce less acidic solutions in the Mars crust under which carbonates could be formed. Subsurface precipitation of carbonates could occur even under the late Noachian stronger acidic event. In this case, previous dissolution of shallow crustal carbonates followed by re-precipitation in deeper crustal areas would explain why these mineralogies are still lacking.

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