MICROMETEORITES FROM THE TRANSANTARCTIC MOUNTAINS: NOBLE GAS INDICATIONS FOR MULTIPLE POPULATIONS.
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Introduction: Earlier work on micrometeorites (MMs) focused mainly on He and Ne, with the results showing mostly solar-wind components e.g. [1]. So far, there have been only a few reports of Xe isotopic measurements on MMs e.g. [2]. At the MPIC Mainz we are performing a study on noble gases in MMs and aim to fill this gap. Initial results from MMs belonging to the PNRA - Transantarctic Mountain collection [3] are presented here. Our research includes material from other collections, e.g. CONCORDIA [4, 5].

Samples and Methods: We selected 51 MMs for our study: 26 cosmic spherules (CS), 11 scoriaceous (Sc) and 14 unmelted (Un), in the ~600-800 µm size range. The noble gases were released using a CO2 laser, cleaned with SAES getters and separated using activated charcoal. We used our high sensitivity Noblesse (Nu Instruments) noble gas mass spectrometer with multiion detection (8 channeltrons) to analyze our samples.

Results and Discussion: At present, we have obtained noble gas results for 4 CS, 5 Sc and 9 Un MMs. We reported our results in [6]. Overall, the results for the noble gases show major differences between the MMs, which may be an indication for multiple populations.

Neon: Most of the Sc and Un MMs have higher 20Ne/22Ne (~5 - 12.5) and 22Ne/20Ne (0.033-0.558) ratios compared to air. Similar to previous observations (e.g. [2]), this indicates the presence of solar plus spallogenic Ne.

CRE-ages (234/20Ne): Based on calculations with the combined GCR + SCR production rate for very small particles from [2] (1.15 x 108 cc/g/Ma), the MMs can be divided into two different CRE-age ranges: one ranging from 0.01 to 0.17 Ma, the other from 0.50 to 0.75 Ma.

Argon: Almost all of the measured Un and Sc MMs show 40Ar/36Ar ratios distinctly lower than air: 2.3 - 260 (air: ~298.6 [7]). The only exception is Sc 45c.25(2) with a ratio of ~349.

Xenon: The Sc MMs 45b.13(1), 45b.08(1) and the Un MM 45b.09(1) appear to have lost their original trapped Xe and acquired mass fractionated air Xe instead (by ~ 1% / amu). The Xe isotopic composition of Un 45c.35(3) resembles Xe from primitive meteorites such as Murchison. The concentration of 132Xe (1.05 x 108 cc/g) is in the range for CM2 meteorites.

Acknowledgments: We acknowledge support by DFG through SPP 1385 (Project OT 171/5-1) and PNRA.