U-Th-Pb SYSTEMATICS OF VACA MUERTA MESOSIDERITE.
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Mesosiderites are a small group of meteorites (~20 samples recovered), consisting of about equal parts of Ni-Fe metal and silicates. The silicates show complex petrologic features that record intense regolithic processes and metamorphism (e.g. 1, 2, 3). Bogard et al (4) measured ^{39}Ar-^{40}Ar ages for 14 different mesosiderites, including Vaca Muerta and showed that mesosiderites underwent a major degassing event(s) around 3.5-3.7 Ga. In the last few years, older ages were obtained for mesosiderites: a Rb-Sr model age of 4.5 Ga for gabbroic inclusions from Vaca Muerta (5), Sm-Nd age of 4.47±0.02 Ga for Morrisontown (6) and Pb-Pb and U-Pb ages of 4.42 to 4.56 ±0.04 Ga for Estherville (7). These results suggest that they formed early in solar system history and a major impact event no earlier than 4.0 Ga ago. However, it is not clear whether the middle ages (~4.4 Ga) resistered on the Rb-Sr (8) and U-Pb systems of Estherville and Sm-Nd of Morristown actually correspond some events or only produced by disturbance of the young 3.6 Ga event. Following Estherville, we have studied U-Th-Pb systematics of basaltic inclusions from Vaca Muerta.

Sample A was a 20-gram lithic fragment, with attached a basaltic clast (190 mg). B was basaltic clast (1.25 g) and sample C was a combination of three fragments (32 g) of silicate plus iron portion. The fragments were crushed with a stainless steel mortar and separated into two fractions (<63 μm and 63-150 μm). As much metal as possible was removed from the 63-150 μm fraction, and then the fraction was separated into four density separates ($\rho>3.3$, $2.95<\rho<3.3$, $2.58<\rho<2.95$, and $\rho<2.58$). Each separate was washed with acetone (sub-boiling distilled) and water, and then, leached twice each with 0.01N HBr solution and then distilled water. The HBr leaches and residues were analyzed for U-Th-Pb systematics. Regression of all residues yields a ^{207}Pb-^{206}Pb age of 4400 ±100 Ma (Fig. 1), which is probably a mixing line. This age is similar to that for all Pb data of Estherville (4228±85 Ma) which was also interpreted as a mixing line. Residues of fractions from fragments A and C give ^{207}Pb-^{206}Pb isochron ages of 4538±75 Ma and 4566±75 Ma., respectively (Fig. 2, 4). Data from residues fractions from fragment B show small variations in their Pb isotopic composition and did not provide an isochron age, but two trends correspond to younger ages of 4200 and 3360 Ma (Fig. 3). These results indicate that at least some portion of Vaca Muerta is old (>4.4 Ga). The large error associated with the ages indicates that the U-Pb system for these fragments (especially B) has been disturbed by subsequent impact event(s). We are currently studying the U-Pb systematics of fragments A, B, and C.

REFERENCES: (1) Powell, 1971, GCA 35, 5-34. (2) Floran, 1978, Proc. LPSC 9th, 1053-1081. (3) Hewins, 1983, Proc. LPSC 10th, 1109-1125. (4) Bogard et al., 1990, GCA 54, 2549-2564. (5) Mittlefehldt et al., 1986, Meteoritica 21, 460. (6) Prinzhoffer et al.,1989, Astropys. J. 344, L81-L84. (7) Brouxel and Tatsumoto, 1989, Proc. LPSC 20th, 309-319. (8) Murthy et al., 1978, LPS XIV, 781-783.

Fig. 1. RESIDUES

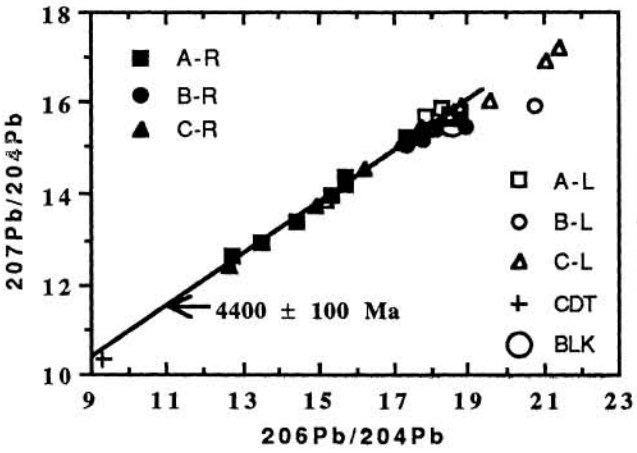

Fig. 2. Residues from A

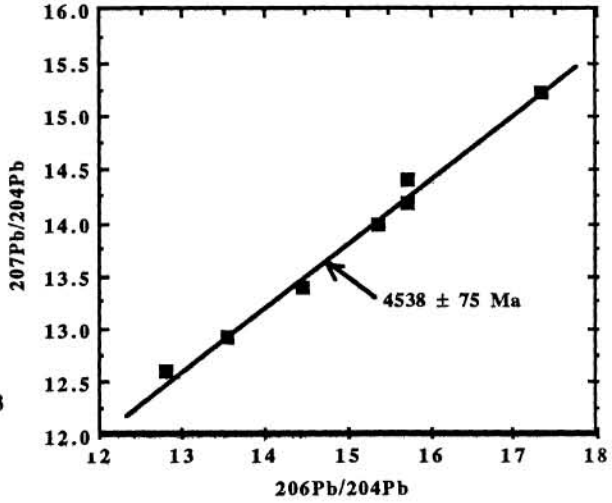

Fig. 3.. Residues from B

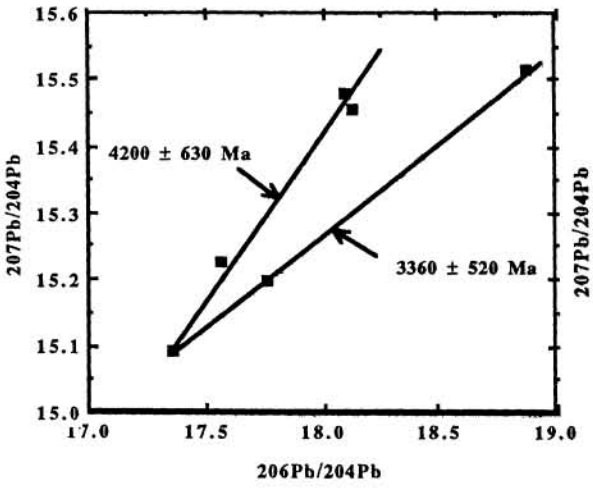

Fig. 4. Residues from C