Iodine-xenon studies of ordinary chondrites using RELAX

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Introduction
RELAX (Refrigerator Enhanced Laser Analyser for Xenon - Gilmour et al., 1994a) is a resonance ionization, time-of-flight mass spectrometer designed for the analysis of xenon from extraterrestrial samples. It combines a species-selective resonance ionization ion source with a cryogenic sample concentrator and a low-volume time-of-flight mass analyser to achieve sensitivities such that a sample of 500 atoms produces in excess of 1 cps.

We have previously reported results of iodine-xenon analyses chondrules from the Bjurböle (L6) and Parnallee (LL3) meteorites (Gilmour et al., 1994b). Here we present a preliminary report on the extension of this work to a wider selection of samples.

Experimental
Exotic clasts were separated from five ordinary chondrites and a sub-sample taken for irradiation for dating purposes, the remainder being used for petrographic and chemical analysis. Two samples were taken from Parnallee (LL3) and one each from Quenggouk (H4) and Barwell (L6). Each sample was initially subjected to dating by the Ar-Ar method (Ash et al., 1994) before being loaded into the laser port of the RELAX mass spectrometer. Extractions were made using laser powers between 0.2W and 4W in an attempt to mimic conventional stepped heating experiments - this technique has proved capable of resolving correlated and uncorrelated $^{128}\text{Xe}^+$ in our previous work (Gilmour et al., 1994b). Each extraction consisted of a 1 minute exposure to the laser, during which time the evolved gas was exposed to a hot zirconium getter, followed by immediate inlet to the mass spectrometer.

Results and discussion

Barwell: The isochron for the Barwell inclusion is shown in +0.08 \times 10^{-4} (Kirschbaum, 1986), enabling its use as a standard in these analyses. This inclusion also exhibits a correlation between $^{131}\text{Xe}^+$ (possibly derived from tellurium) and iodine-derived $^{128}\text{Xe}^+$ similar to that we have reported in Bjurböle chondrules (Gilmour et al., 1994b).

Parnallee: One of the samples analysed here (Parnallee 9) contains no detectable radiogenic $^{128}\text{Xe}^+$ while the other (Parnallee 6) has a clearly defined isochron (fig. 3). This is consistent with previous Ar-Ar (Ash et al., 1994) and I-Xe (Gilmour et al., 1994) analyses of Parnallee, indicating that the complexity of its whole-rock Ar-Ar stepped heating signature can be attributed to a mixture of degassed and undegassed material. Comparison of sample Parnallee 6 with the
Barwell inclusion suggests a formation age 5.0Ma after Bjurböle, compared to 4.62 (±0.44)Ma after Bjurböle for the cristobalite bearing inclusion CB1.

Quenggouk: In spite of the previously reported high Ar-Ar age (4.63 ± 0.04 Ga, Ash et al., 1994), this large porphyritic clast contains no $^{129}$Xe*. Petrography suggests that the material in this inclusion may have been shock produced, which could also account for the anomalously old Ar-Ar ages (McConville et al., 1988) as well as the absence of iodine-derived $^{129}$Xe. This sample also contains small amounts of excess $^{131}$Xe*, which exhibits correlation with excess $^{128}$Xe*.

References