I-Xe AGES AND TRAPPED XE COMPOSITIONS. C. M. Hohenberg, O. V. Pravdivtseva, and A. P Meshik, Washington University, CB1105, One Brookings Drive, Saint Louis, MO 63130, USA (cmh@wuphys.wustl.edu).

I-Xe isochrons are mixing lines between a single trapped and a single iodine derived component. The slope of this line establishes initial iodine and hence the I-Xe age. One end of the isochron is fixed by the composition of the trapped Xe component, which should be representative of the Xe that was present in the early solar system (Q-Xe or OC-Xe). Because the I/Xe ratio in the solar nebular was ~1, and the $^{129}\text{I}^{127}\text{I}$ was about $10^{-3}$, the $^{129}\text{Xe}$ in trapped Xe cannot evolve appreciably with decay of $^{129}\text{I}$. While it may be possible for Xe in a closed system with elevated I/Xe ratios to evolve producing trapped components with higher $^{129}\text{Xe}^{132}\text{Xe}$ ratios [1], trapped Xe compositions with lower (sub-planetary) $^{129}\text{Xe}^{132}\text{Xe}$ ratios seem implausible.

In general, isochron slopes (I-Xe ages) are much better constrained than end member (trapped Xe) compositions. High precision isochrons are required to convincingly constrain trapped compositions. Here we present new data and alternative explanations for the presence of sub-planetary trapped Xe.

I-Xe Ages of Allende Components (relative to Shallowater, Ma)

I-Xe isochrons from Allende CAIs and dark inclusions from Allende and Vigarno show two clustered groups of alteration ages, ~4 Ma apart (Figure 1), and a range of trapped Xe compositions, each determined with much greater precision than in previous studies [2]. By comparing irradiated and unirradiated samples, we can constrain the $^{128}\text{Xe}^{132}\text{Xe}$ ratio in these trapped components to be identical to conventional trapped (OC) Xe. The isochrons, however, pass below OC-Xe (Figures 2 and 3), suggesting that the trapped Xe in these inclusions is indeed sub-planetary ($^{129}\text{Xe}^{132}\text{Xe}$ ratios lower or $^{128}\text{Xe}^{132}\text{Xe}$ ratios higher, than OC-Xe). We propose here, however, that it may not be the $^{129}\text{Xe}$ that is anomalously low but the $^{128}\text{Xe}$ that is anomalously high in the irradiated samples (but identical to OC-Xe in the unirradiated samples).

If $^{127}\text{I}$ was intimately mixed with trapped xenon, it can result in a trapped Xe pseudo-component with enhanced $^{128}\text{Xe}$ (after neutron irradiation). That is, if iodine and Xe are identically sited, and exist in fixed proportion, any $^{128}\text{Xe}$ produced from $^{127}\text{I}$ by neutron capture during the irradiation will alter the composition of the apparent trapped component, producing a new pseudo component with enhanced $^{128}\text{Xe}$. If true, this has a number of important implications: a) Iodine can act very much like an isotope of Xe if it is similarly...
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trapped and, b) Although the I-Xe ages of these samples indicate that the major iodine hosts (presumably sodalite) must have closed early (few Ma after CAI formation), the trapping of (dead) iodine and Xe must have occurred much later, after decay of most of the $^{129}\text{I}$, and at identical sites. These implications place new constraints on the duration of aqueous alteration processes themselves, and on the mechanisms and location of the trapped Xe and dead iodine (phase Q?).

The CAIs were kindly provided by G. MacPherson and the dark inclusions by A.N. Krot. Supported by NASA grant NAG5-9442.