HEATING EXPERIMENTS OF INDIVIDUAL PARTICLES FROM THE RENAZZO MATRIX: SIMS MEASUREMENTS OF NITROGEN ISOTOPES. F.J. Stadermann[1,2] and C. Floss[1,3], [1]Laboratory for Space Sciences, [2]Physics Department, [3]Department of Earth & Planetary Sciences, Washington University, St. Louis, MO 63130, USA (fjs@wuphys.wustl.edu).

Introduction: Deuterium enrichments are common in primitive meteorites and IDPs, but the carriers of the anomalies are poorly characterized; these materials also often exhibit ^{15}N enrichments [1]. Although no direct correlations between hydrogen and nitrogen isotopic anomalies have been observed, it is striking that both anomalies tend to be present in the same primitive materials [1]. Identification of the carriers of these anomalies would be simplified if it could be shown that they are the same in both types of extraterrestrial materials. To this end, we are carrying out heating experiments on matrix material from Renazzo (CR), which contains significant enrichments of both deuterium and ^{15}N [2]. In the future, these experiments will be extended to IDPs and other primitive meteorites.

Our initial results [3] focused on the deuterium enrichments observed in Renazzo matrix material, and suggested the loss of two distinct deuterium carriers: a low temperature component tentatively identified as acid-resistant organic phases (lost between 200–400˚C) and a higher temperature component, possibly the waters of hydration in phyllosilicates (lost between 600–800˚C).

Here we report the results of nitrogen isotopic measurements on the same Renazzo matrix residues that we previously studied.

Experimental: Matrix material was mechanically separated from bulk Renazzo and heated at temperatures ranging up to 1000˚C [3]. After heating, individual fragments were pressed into Au foil, together with standards and unheated control samples. Nitrogen isotopes were measured as CN^- ions using SIMS.

Results and Discussion: The $\delta^{15}N$ values of the unheated control ranged from –53 to +660‰, in good agreement with previous measurements [2]. Figure 1 shows that ^{15}N enrichments are lost with increasing temperature; above 400˚C the range remains virtually constant. The most anomalous nitrogen component is lost between 200–400˚C, the same temperature interval in which the highest deuterium enrichments are lost [3]. This suggests that the ^{15}N enrichments may also be carried by organic phases. The lack of a quantitative correlation between hydrogen and nitrogen isotopic anomalies in primitive materials [1] could be due to several factors, including the possibility that the anomalies are carried by different organic components. Furthermore, hydrogen isotopic compositions in Renazzo contain a high temperature component that does not appear to have a nitrogen equivalent.

We are presently modifying our approach for additional Renazzo heating experiments: individual unheated matrix particles mounted in gold will be heated in sequential temperature steps. Their isotopic compositions will be measured initially and after each temperature step. Thus, it will be possible to follow the isotopic history of individual grains through the entire heating experiment. This is the only feasible approach for similar experiments on small, rare particles, like IDPs.

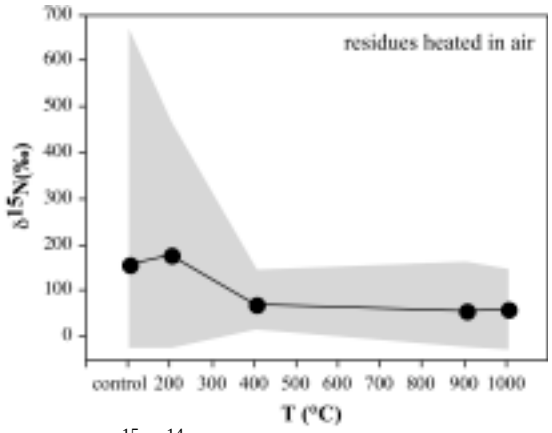

Figure 1: $^{15}N/^{14}N$ isotopic compositions (in $‰_{air}$) in Renazzo matrix fragments as a function of heating temperature. Shaded areas represent the range of observed values; circles indicate the average for each temperature step.

References: [1] Messenger S. and Walker R.M. (1997) In *Astrophysical implications of the laboratory study of presolar materials* (eds. Bernatowicz T.J. and Zinner E.) 545. [2] Guan Y. (1997) Ph.D. Thesis, Washington University. [3] Floss C. et al. (2000) *LPS XXXI*, #1359.