ARGON ANALYSES OF LHERZOLIC SHERGOTTITES Y984028 AND Y000097.

J. Park1,2,3, L. E. Nyquist2, D. D. Bogard2, D. H. Garrison4, C.-Y. Shih5, T. Mikouchi6 and K. Misawa7, 1Lunar and Planetary Institute, 3600 Bay Area Blvd, Houston, TX 77058, USA. (Email: Jisun.park-1@nasa.gov) 2ARES, Mail Code KR, NASA Johnson Space Center, Houston, TX 77058, USA. 3Current address: Space Science Office, NASA Marshall Space Flight Center, Huntsville AL 35812, and University of Alabama in Huntsville, Huntsville AL 35805, USA. 4ESCG/Barrios Technology, Houston, TX 77058, USA. 5ESCG/Jacobs Engineering, Houston, TX 77058, USA. 6Department of Earth and Planetary Science, University of Tokyo, Bunkyo-ku, Tokyo 113-0033, Japan. 7Meteorite Research Center, National Institute of Polar Research, 10-3 Midoricho, Takichikawa, Tokyo 190-8518, Japan.

Antarctic Martian meteorites Yamato (Y) 984028 and Y000097 have similar textures, mineralogy, chemistry, and isotopic composition and are possibly paired [1,2,3]. We analyzed the argon isotopic composition of Y984028 whole rock (WR) and pyroxene mineral separates (Px) in order to evaluate their trapped Ar components and compare with Y000097 Ar data. WR and Px yield an apparent 39Ar-40Ar age spectra of roughly 2 Ga, much older than the crystallization age determined by other isotopic techniques. Sm-Nd and Rb-Sr ages for Y984028 are ~170 Ma [3]. This discrepancy is likely the byproduct of several coexisting Ar components, such as radiogenic 40Ar*, cosmogenic Ar, and trapped Ar from the multiple minerals, as well as multiple source origins. Similarly, the reported 39Ar-40Ar age of Y000097 is ~260 Ma [4,5] with a Rb-Sr age of 147±28 Ma and a Sm-Nd age of 152±13 Ma [4]. Apparently Ar-Ar ages of both Y984028 and Y000097 show trapped Ar components. Stepwise temperature extractions of Ar from Y984028 Px show several Ar components released at different temperatures. For example, intermediate temperature data (800-1100°C) are nominally consistent with the Sm-Nd and Rb-Sr radiometric ages (~170 Ma) [3] with an approximately Martian atmosphere trapped Ar composition with a 40Ar/39Ar ratio of ~1800 [6]. Based on K/Ca distribution, we know that 39Ar at both lower and intermediate temperatures is primarily derived from plagioclase and olivine. Argon released during higher temperature extractions (1200-1500°C), however, differs significantly. The thermal profile of argon released from Martian meteorites is complicated by multiple sources, such as Martian atmosphere, Martian mantle, inherited Ar, terrestrial atmosphere, cosmogenic Ar. Obviously, Ar release at higher temperatures from Px should contain little terrestrial atmospheric component. Likewise, 129Xe/132Xe from high temperature (1200-1800°C) gives a value [2] above that of terrestrial Xe ratio of 0.98. The most plausible explanation of the high temperature argon data is that it contains a Martian mantle 40Ar component as well as excess 40Ar assimilated from inherited magma [5, 7] .