Noble gases in the recent shergottite fall Tissint: an ~1Ma ejection event on Mars.

P M RANJITH[1,2], HE HUAIYU[1], R WIELER[3,1], SU FEI[1], LIN YANGTING[1]

[1]Key Laboratory of Earth and Planetary Physics, IGGCAS, Beijing, 100029,PR China.
[2]University of Chinese Academy of Sciences, Beijing, China.
[3]ETH Zürich, Earth Sciences, CH-8092 Zürich, Switzerland

He, Ne and Ar isotopic measurements on 9 individual samples from the newest shergottite fall, Tissint, are reported here. Gases were extracted by a CO_2 laser and the measurements carried out by a *Noblesse* Mass spectrometer at IGGCAS following standard procedures.

All of the measured ^{3}He is assumed as cosmogenic. A major loss (>80%) of radiogenic ^{4}He is observed, which is consistent with the strong shock metamorphism recorded in Tissint based on shock features and the occurrence of high pressure minerals [1]. The range of measured $^{20}Ne/^{22}Ne$ in 8 samples is 0.8-0.9, showing purely cosmogenic Ne. In order to find the effect of trapped terrestrial air on the cosmogenic $^{21}Ne/^{22}Ne$, one sample was chosen with fusion crust material. The $^{20}Ne/^{22}Ne$ in this sample is 1.4. However, there is no trapped terrestrial air in any of the other 8 samples and the range of $(^{21}Ne/^{22}Ne\ is)_c$ is 0.786-0.806. This is consistent with the recently reported solar cosmic ray (SCR) produced Ne measured in Tissint [2], suggesting at least some of the samples measured here are from within a few cm below the pre atmospheric surface of the meteoroid. In addition, there is no evidence of ^{3}He loss. Although there are difficulties using $(^{22}Ne/^{21}Ne)_c$ as a shielding indicator because of compositional and SCR effects, we adopted the method suggested by ref. [2] to derive production rates and cosmic ray exposure ages (CREA).The estimated CREAs (in Ma) are 1.0-1.3 (T_3), 0.9-1.0 (T_{21}) and 0.8-1.2 (T_{38}).The average age is consistent with previous measurements of Tissint [2, 3, 4]. The ejection event on Mars at ~1Ma delivered at least 11 depleted shergottites with Tissint being the only observed fall. We are in the process of measuring trapped noble gas components by vaccum crushing of mineral separates, impact melt and bulk samples from Tissint. These results will also be presented.

[1] Baziotis *et al*.(2013) Nature communications **4**(1) 1404. [2] Wieler *et al.* (2016) *MAPS* **51** 407 428. [3] Nishiizumi *et al MAPS* **47**:A294 (2012). [4] Murty *et al*, *MAPS*, **47**:A284 (2012).