Position-specific ^{13}C isotope composition of non-methane hydrocarbons

A. GILBERT[1*], K. SUDA[2], K. YAMADA[3], Y. UENO[12] AND N. YOSHIDA[13]

[1]Earth-Life Science Institute, Tokyo Institute of Technology, Meguro, Tokyo 152-8551, Japan ([*]correspondence: gilbert.alexis@elsi.jp)

[2]Department of Earth and Planetary Sciences, Tokyo Institute of Technology, Meguro, Tokyo, 152-8551, Japan

[3]Department of Environmental Chemistry and Engineering, Tokyo Institute of Technology, 4259 Nagatsuta-cho, Midori-ku, Yokohama, Kanagawa 226-8503, Japan

Hydrocarbons are ubiquitous components occurring in a wide range of environments on Earth. Distinguishing hydrocarbons origin and mechanism of formation has wide implications for understanding Earth geochemistry [1] and for tracing biogenic and non-biogenic organic matter for extraterrestrial exploration [2]. Despite tremendous efforts using chemical and isotopic analyses (^{13}C, ^{2}H), a clear distinction is often made difficult due to overlap of signatures for different origins. Clearly therefore, new proxies must be explored in order to refine this information. Position-specific isotopic composition provide unique information regarding the sources, sinks and processes related to natural molecules [3] [4].

Here we evaluate a system consisting of on-line pyrolysis coupled with GC-C-IRMS [5] for the determination of the position-specific ^{13}C isotopic composition of short-chain hydrocarbons (propane, butane). This system enables the breakdown of hydrocarbons and subsequent analysis of the fragments formed from which the original intramolecular isotopic composition can be calculated. Preliminary results show different position-specific isotope composition depending on the source of the hydrocarbons.

[1] Sephton & Hazen, **2013**, *Rev. Mineral. Geochem.* **75**, 449 [2] Telling *et al.*, **2013**, *Astrobiology*, **13**, 483 [3] Gilbert et al., **2012**, *P.N.A.S.* **109**, 18204 [4] Gilbert *et al.*, **2013**, *Organic Geochemistry*, **62**, 56 [5] Corso & Brenna, **1997** *P.N.A.S.* **94**, 1049