Position-specific ^{13}C isotope analysis of propane from Southwest Ontario

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We have performed position-specific ^{13}C isotope analysis of propane samples from a Southwest Ontario topographic high between the Michigan and Apalachian basins [1]. The samples are from the Ordovician and Silurian strata and contain propane at relatively high concentration (1% to 8% vol.), with bulk $\delta^{13}C$ values ranging from −27‰ to −34‰. Isotope composition for each position of propane samples were measured using a method we recently developed [2]. The $\delta^{13}C$ value of the central position of propane increases by around 10‰ with increasing bulk $\delta^{13}C$ of propane, while the $\delta^{13}C$ value of the terminal position is uniform for all the samples measured.

These results are not consistent with production models for thermogenic natural gas generation, where the terminal position of propane is predicted to be ^{13}C-enriched with increasing maturity [3]. They are however consistent with secondary processes such as anaerobic bacterial oxidation of propane with a fumarate-addition mechanism [4]. Although this interpretation is still speculative, the data suggests that position-scpeific isotope composition can help refine the processes related to production and consumption of hydrocarbons.

[1] Sherwood Lollar *et al.* (1994) *Bulletin of Canadian Petroleum Geology* **42**, 283–295 [2] Gilbert *et al.* (2016) *GCA* **177**, 205–216; Suda *et al.* (2017) *GCA* **206**, 201–215 [3] Chung *et al.* (1988) *Chem. Geol.* **71**, 97–104; Tang *et al.* (2000) *GCA* **64**, 2673–2687 [4] Jaekel *et al.* (2014) *Environ. Microb.* **16**, 130–140