



## High-precision cavity ring-down measurements of $\delta^{13}\text{CO}_2$ and $\delta^{13}\text{CH}_4$ along the Eastern North Atlantic onboard the sailing research vessel *Fleur de Passion*

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Differentiating microbial, anthropogenic, and thermogenic sources of carbon dioxide ( $\text{CO}_2$ ) and methane ( $\text{CH}_4$ ) in background air is an important element of understanding upper ocean ecosystem processes. Concentrations of these gases alone are not dispositive indicators of processes, so additional diagnostic parameters including meteorological data, related gas species measurements, and isotopic values can allow researchers to better investigate processes. Here we present data from the *Fleur de Passion* sailing research vessel which traveled from Dakar, Senegal to the Azores, and to Northwest Spain between early April and October of 2019 as part of the larger Ocean Mapping Expedition by the Geneva-based NPO Fondation Pacifique. The 33-meter-long ketch research vessel carried as part of its instrument suite a Picarro G2201-i high precision gas analyzer, measuring concentrations and  $\delta^{13}\text{C}$  values of  $\text{CO}_2$  and  $\text{CH}_4$ . The high precision data collected by the isotopic carbon analyzer (which are being sampled as part of the University of Geneva's Winds of Change program) allow for subtle differentiation of modalities separated by a per mil or less, signals that could be lost by infrequent flask measurements or low-precision analyzers. We present findings from this expedition, as well as a brief description of future efforts to measure underway dissolved gases.