Stable Isotopic Measurements of Carbon Monoxide in Air: Work In Progress

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Stable Isotopes of Carbon Monoxide shows promise as a tracer of fossil fuel emissions, and as a reliable and less expensive supplement to $^{14}CO_2$ measurements. The $C^{18}O$ signature of combustion is particularly of interest for source identification, as can be seen in the figure below. At INSTAAR, University of Colorado, we are developing an extraction system that will be capable of measuring the mixing ratio and isotopic signatures primarily from ice cores, but it will also have the capability to measure atmospheric air samples as well. Due to the small sample size extracted from ice, we are developing this system to reliably measure samples with CO concentrations on the order of 50 ppb using only 80 cc's of air. The small volume requirements of this system will make it an easy measurement to add to air sampling campaigns such as the Indianapolis INFLUX project without impacting other measurements. While this effort is still very much a work in progress, we have shown that we can extract CO from ice, as well as air standards, and measure both the CO mixing ratio and the isotopic composition with increasing reproducibility. If successful, this could become a new method that would help to constrain fossil fuel emissions fraction in atmospheric CO_2.

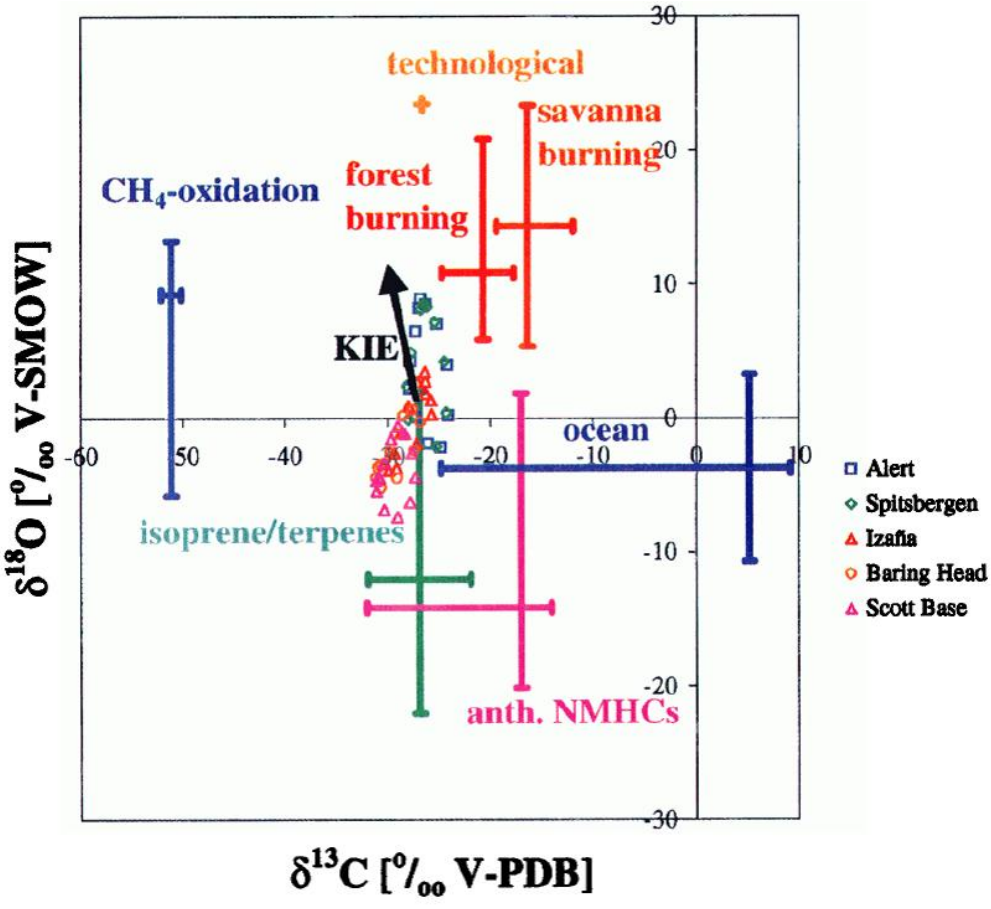

Figure 1. Isotopic Signatures of Carbon Monoxide Sources (Bergamaschi et al, 2000).