Isotopic impact of the alternative respiratory pathway in plants and marine phytoplankton: A significant unknown in the analysis of biosphere-climate interactions

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Abstract.
The net sequestration of carbon by the biosphere is the difference between carbon fixation and respiration. Much of this respiration takes place in photosynthetic organisms that, in addition to the dominant cytochrome c oxidase (COX) pathway, have retained a relatively energy inefficient, alternative oxidase (AOX) pathway. This project will implement a sensitive method to measure the AOX/COX partitioning based on the differences in the isotopic discrimination against ^{18}O between the two pathways. The project will bring this important new methodology to Lamont for the first time using the existing DELTA V plus mass spectrometer and GasBench II in the stable isotope lab. Preliminary data from this project will provide the basis for proposals to agencies such as NSF and NOAA on biosphere-carbon cycle studies and how climate changes are reflected in the oxygen isotopic signatures of major terrestrial and marine pools.