

1147-92-56

Alice Nadeau*, 206 Church Street SE, Vincent Hall 105, University of Minnesota, Minneapolis, MN 55455, and **Clarence Lehman** and **Richard McGehee**. *Conceptual carbon budget model shows net inorganic carbon source since 1980*. Preliminary report.

The Scripps Carbon Dioxide Program shows the history of carbon in the atmosphere from the mid-20th century to the present, including both carbon dioxide concentration and abundance of carbon's two stable isotopes. Observations from the Scripps Program's ten sampling stations implicate the effects of fossil fuel emissions on atmospheric carbon dioxide. However, the observed increase in atmospheric carbon dioxide is less than the amount emitted by burning fossil fuels. The question therefore arises, what were the dynamical rates of transfer between the atmosphere and other sources and sinks of carbon dioxide, both biological and physical, and what sources and sinks can be specified that put sufficient constraints on the global carbon budget? Here we introduce a mathematical method for analysis and show that balancing the carbon budget requires the expected large net biological sink but, surprisingly, a nontrivial net inorganic source. We find after analyzing the Scripps data and the emissions data for the net effects of organic and inorganic carbon that a net sink of organic carbon and a net source of inorganic carbon were robust to realistic choices of parameters within our analysis. Furthermore, these trends were present in the data from all ten Scripps sampling stations. (Received November 17, 2018)