

Interactive comment on “The regulation of the air: a hypothesis” by E. G. Nisbet et al.

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To readers: I sent the comments below to Euan Nisbet, after he directed me to his paper, and he suggested that I post the comments. Here is the email I sent:

Hello Euan,

I've now read your paper, and I read it before I read David Schwartzman's discussion, which I have also now read. Sorry to have to rain on your parade, but my bottom line is I just don't see what you propose working. My main issue is exactly expressed by David Schwartzman, in that the geochemical carbonate-silicate cycle sets the atmospheric CO₂ level. David gave the key references but there are many more over decades. As David said, organic activity enters in a huge way through the biotic enhancement of weathering, which ties directly into the carbonate-silicate cycle. Thus it is not just an either-or of inorganic precipitation versus biological controls as you imply in the

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predication/testable hypothesis #1. In fact, I agree with your statements in #1, it's just that the carbon and oxygen cycles have separate controls on them, via different parts of both biotic and inorganic dynamical processes. So I don't think your statements in #1 are specific enough to your proposal about Rubisco

What about the lower CO₂ during the ice ages with approximately the same atmospheric O₂? You note C₄/C₃ ratio shifts during ice ages, but are there changes in Rubisco? With Rubisco as capable of control? (I don't think you say this). Or the time in early Earth history when the O₂/CO₂ atm. mixing ratio was millions or more times lower than today (I didn't actually compute this, just an example) but there were photosynthesizers using Rubisco? How widely could the properties of Rubisco vary?

I'm not up on Rubisco literature, admittedly. But I don't see any mechanism to accomplish what you propose. Many of Lovelock's ideas (and Axel Kleidon's on MEP) have the same problem (and you'll see my critique of biological applications of MEP in my papers I sent you a couple days ago).

You are much more knowledgeable about Rubisco dynamics. So my remarks following my first paragraph are more questions I had while reading your paper. The main point of contention was expressed by David, on the controls of atmospheric CO₂, as I noted.

Thanks for valuing my advice. I've much enjoyed your work over the years, for your insights into geology and biological innovation,

-Tyler

Interactive comment on Solid Earth Discuss., 3, 769, 2011.