EPS 286: Electron budgets through time

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Office Hours: by appointment

Schedule: Thursdays, 9:00 – 12:00 (unless otherwise noted)

Assignments weeks 1-8:

1) Each week you will be responsible for reading each of the assigned papers and be prepared to discuss them (generally 4-6 papers).

2) For one of the assigned papers, you will (a) prepare a 1 page synopsis of the major points, type of argument (model, data, …), and strengths/weaknesses, as well as (b) lead a ~20 minute discussion on your paper (using some combination of PowerPoint and/or chalk talk). The papers will be chosen/assigned during the prior week's class.

Assignment in week 9:

Read the required papers (which in this case will be a review paper), and in a small group, present a comprehensive and novel critique of the review. Details will follow, however this assignment is aimed at proposing a future direction or new sort of proxy.

Term paper:

A 10-12 page, single-spaced, fully referenced (references not included in page count) paper targeting a specific proxy or metric of O_2. This can also include a simple modeling exercise related to one aspect of oxidant cycling or alkalinity.

Assessment:

45% Leading and participation in discussion.

10% Write-ups associated with discussion.

10% Presentation of review paper critique

5% Term paper proposal (due October 20).

30% Term paper (due December 8)

Schedule for the semester:

Sept 1: The state of affairs: (1) an overview of oxidant budgets in the modern, (2) the critical sources and sinks (with a nod to time-scales), (3) a quick history of the debate about Earth's surface evolution.

Sept 8: Classic mineralogical insights into the history of oxygen

Sept 15: Evaluating volatile budgets as it relates to long-timescales and atmospheric chemistry.

Sept 22: The biological controls on oxygen through time: older physiological arguments

Sept 29: The biological controls on oxygen through time: Organic geochemical records for O_2, as well as its biological production and consequences

Oct 6: Lessons learned from the sulfur cycle

Oct 13: Iron as a redox sensitive indicator of oxygen levels

Oct 20: More on Sulfur and Fe cycling. ***Paper proposals due (1 page).***

Oct 27: Free, open topic

Nov 3: Quantitative geochemical models for Phanerozoic O_2 and biogeochemical cycling

Nov 10: Incorporating feedbacks from the nitrogen and phosphorus cycles

Nov 17: A critical reading of papers capturing all topics from the semester

Dec 1: Presentations of Research papers (20 minute presentation per student)

Dec 8: ***Paper due***