**Title of unit**: (Our) Habitable World

**Date and Location of SI**: July 22-27, 2013; Louisiana State University

**Unit Developer/Contact Information**:

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**Context:**

What kind of course is unit designed for? For upper level class (juniors and seniors); interdisciplinary, including the fields of biology, chemistry and geosciences.

How long is the unit/when will the unit be used in the course: 2 weeks; early in the course

**Abstract**: The teachable unit aims to implicitly enable scientific modeling skills among the students. With developing a conceptual model from a set of observations as the underlying goal, variations in atmospheric oxygen content provides context. Accordingly, students would attempt to understand chemical, biological, and geological processes that affect oxygen content of Earth’s atmosphere over geologic time scales. We considered the period from the outgassing of Earth’s atmosphere >3 Ga ago to the present because those events had the most significant impact on atmospheric oxygen content. Sources and sinks for atmospheric O2 are emphasized. Students will be able to utilize the developed skills to predict the effect of a hypothetical event on atmospheric O2 levels.

**Rationale**:

How did the idea for the unit arise? Group discussion (biologists and geologists agree on the topic)

Why was the topic chosen? Related to biology, chemistry and geology (overlaps for all group members)

What misconceptions or difficult topics are addressed? Ideas of geological time, importance of photosynthesis over long term

**Learning goals:**

-Students will be able to analyze data and construct a graph.

-Students will be able to understand the importance of evolutionary events on atmospheric oxygen content.

**Learning outcomes:**

-Given an event, students will be able to use the graph to predict the outcome.

-Students will be able to develop a response to changes in an environmental condition.

-Students will understand the co-evolution of chemical and biological systems on a geological timescale.

**Pre-assessment:**

-Fill out the graphs by indicating the oxygen level for each event.

**Activities outside of class**

-Given the list of evolutionary events on the graph, familiarize with the events before next class.

-Review chemical aspects of photosynthesis

**How the unit is designed to include participants with a variety of experiences, abilities, and characteristics**

-Allow students to choose the medium or technology in which they research or find these events (internet, books, podcast, video, etc. to match the learning styles)

-As a diversity aspect, tidbits have been divided into four different aspects to accommodate different learning styles (lecture, group work, think-pair share, clickers)

-Separation of numerical event is math-friendly (no math bias)

-No grading bias

**Activities in class/during tidbit:**

-Estimate and graph the oxygen level for each event on the graph.

-Follow-up activities relate events to geological timescale in groups.

**Post-tidbit assessment:**

-Follow-up clicker questions on evaluating bloom levels 3-5.

-Addressing misconception of the important of chemical and biological processes over geological time.