In a recent homework assignment a student submitted about the nature of geoscience, he cited a webpage that discusses whether geology is a real science or not (<http://www.quantumpie.com/the-big-bang-theory-sheldon-asks-is-geology-a-real-science/>). The blog discusses how geology is different from some of the other traditional sciences because we can’t replicate Earth, so our laboratory is not one in which we can control the variables. I think this is so critical for our students to really understand what makes geology so challenging, but also how the process of science can still occur through the use of modeling. Many of our students’ understanding of models is limited to thinking of physical representations of objects (i.e., globes, science-fair-style volcanoes, etc…). They do not understand or recognize that models can be powerful tools for explaining and predicting (or “retrodicting” as is often the case in geology; Orion & Ault, 2007).

This becomes a critical aspect to the question of why we teach introductory geosciences to a non-major population. The more we can support our students with opportunities to explore the purpose and limitations of models through interpreting and using models to generate their own predictions, the more we can support our students ability to recognize the power of models. When they hear about models for climate change, volcanic eruption hazards, or risk-factors for different geoscientific phenomena, the more they may be willing to accept that a scientific model is our best way to explaining and predicting future phenomena. But just telling them isn’t enough. Students need to EXPERIENCE working with models and it must be explicitly tied to the construct of models. It is extremely difficult for students to learn about any aspect of the process of science and impossible if it isn’t made explicit (Lederman, 2007).

If we want our general education students to be “scientifically literate citizens,” we need to seriously examine what is important to address in an introductory class, how we approach the topics and what is emphasized. In all of my introductory geoscience courses, I weave the process of geoscience as a common theme through which the mechanism of the content is taught. In my disasters class, I ask students to reflect on how each topic relates to the process of geoscience in specifically targeted reflections in the context of case studies (Kraft, 2012). In my physical geology class, I integrate the importance of modeling throughout the class (see the sample activity with this submission). In my historical geology class, I emphasize the process of retrodiction throughout the course. And yet with all of these approaches, learning gains toward understanding the process of geoscience is limited (van der Hoeven Kraft, in preparation). And yet any gains are critical since many of our introductory students are exposed to one or two science classes in college, and yet they make some of the decisions at a citizen level that may impact how we are able to accomplish geologic research.

*Citations*

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