Becca Walker; Dept. of Earth Sciences and Astronomy, Mount San Antonio College, Walnut, CA

What are examples of what you've done that has been successful in terms of promoting Earth science literacy?

As a community college geoscience professor, the majority of my students are non-science majors, enroll in my courses to satisfy a general education transfer requirement, and do not intend on continuing in geoscience. Although I am thrilled when former students return for a second course, I teach with the assumption that for most of my students, this will be their last—and in many cases, only—exposure to Earth system science at an institution of higher education. As such, I believe that promoting Earth science literacy in all of my courses is essential and have thought deeply about how to infuse Earth science literacy into my curricula in ways that my students find intellectually engaging and useful. I have provided a few examples of strategies that I use—some are more time and labor-intensive than others—and forms of assessment.

Strategy #1: addressing misconceptions perpetuated in pop culture and the media.
My students and I have frequent opportunities to discuss misconceptions about the Earth system, a major component of Earth science literacy. I want my students to understand, and be able to convey to others, that the lithosphere is *not* floating on a molten layer of the Earth, tsunami are *not* huge "tidal waves" that manifest themselves as walls of water in the open ocean, scientists do *not* know what the results of an experiment will be before performing the experiment, and so on. I believe that explicit classroom discussions of geoscience misconceptions make my students think carefully about the Earth system and develop a more accurate understanding of Earth processes. Addressing a particular misconception often leads to tangential discussions and student questions that may not be as relevant to the topic as one would hope. It is challenging to find a balance between avoiding abrupt terminations of discussions and covering the material in the course outline of record. I have made the decision that in my general education courses, I am willing to sacrifice a small percentage of planned course content if it means that my students have their questions answered and leave the course with a more accurate understanding of geologic processes.

Assessment: Initial assessment of student misconceptions requires little time or labor: before we discuss a particular topic, I ask students to record and submit (anonymously) what they know about the topic. If the topic is a geologic process or phenomenon (examples: volcanic eruption, formation of sand dunes), I also ask them how/why the process occurs. These data allow me to target pre-existing misconceptions more efficiently during class. Assessing student understanding of misconceptions after we have discussed the topic is equally straightforward in the context of exam questions. For objective questions, this might be as simple as a multiple-choice question about a particular topic with three correct statements and one misconception. I have also used written questions on exams that involve misconceptions. For example, "Your friend is taking geology and tells you that earthquakes occur when the plates shift. To help him/her better understand the cause of earthquakes, provide a scientifically accurate explanation of where and why earthquakes occur."

Strategy #2: assignments geared toward a general audience
I teach linked lecture/laboratory courses in Earth science and oceanography. The Earth science section is an Earth science lecture/laboratory course for preservice teachers. After their field trip, each student prepares a field trip portfolio geared specifically toward a general audience. For the Earth science portfolio, the audience is inservice K-12 teachers doing reconnaissance for a

geology field trip. For the oceanography portfolio, the audience is a student about to enroll in an introductory oceanography course. I instruct my students that a non-scientist should be able to read their portfolio and understand the geologic features and rock types present at each field stop as well as the general geologic history of the field area. I believe that the ability to accurately convey a particular Earth science concept to a non-science audience has implications for Earth science literacy.

Assessment: I provide students with the grading rubric for the portfolio prior to the field trip. The "appropriate for the intended audience" category comprises roughly 10% of the portfolio grade. I explicitly state verbally and on the rubric that "audience-appropriate" includes scientific accuracy, appropriate vocabulary, clear definitions/explanations that non-scientists would understand, and labels and/or captions on images orienting the reader to what the image is showing.

Strategy #3: projects that require synthesis, application of course concepts, and debate

In some of my courses, I have developed final projects that involve a local problem and require students to synthesize course concepts in order to formulate an opinion about the problem. Often, these projects involve a role-playing exercise in which students must present evidence to support their opinion. For example, my oceanography students evaluate whether or not commercial and residential development should continue on the Palos Verdes Peninsula. Students are randomly assigned roles, including a physical oceanographer specializing in tsunami hazards, a geologist specializing in rock types and landslide hazards, a hydrologist specializing in water quality and availability, and a marine biologist. They are responsible for using their scientific content knowledge to evaluate the evidence in their specialty (I provide them with an extensive list of web resources, ranging from peer-reviewed journals to news articles, to get them started with their research), decide whether or not the evidence warrants continued development in Palos Verdes, and participate in a mock City Council meeting to convince the council member (me) to vote accordingly. In addition, students must design a position statement—papers, pamphlets, and brochures are all examples of acceptable position statements modes—summarizing their argument and using supporting evidence.

Assessment: I use rubrics to evaluate the City Council meetings and position statements. During the City Council meetings, I play the role of a non-scientist and ask a variety of questions about their argument and the scientific evidence that they present. This dialogue allows me to interpret their level of understanding of the Earth science concepts they used to formulate their opinion.