1. The Geological Globe of the World

The Geological Globe of the World by RealWorldGlobes was released for sale at AGU 2016. It was purchased for $3000 following a successful application for an internal teaching grant from the Center for Teaching Excellence (CTE) at Miami University. Discussion of spatial, and temporal, relationships on Earth’s surface is integral to any undergraduate geology course. The dry-erase surface of the Globe is unique, and naturally promotes the development of hands-on activities within the classroom. Any exercise designed using this Globe should therefore require critical thinking by challenging students to synthesize concepts and processes; e.g., plate motion, volcanic activity, distribution of igneous, sedimentary and metamorphic rocks, at the planetary scale.

2. Enhancing Learning

From Bamford (2013) it has been shown that visual learning improves understanding of functionality, and that by seeing the whole (the students) understand the parts. This research demonstrated that “students learning with 3D teaching aids were more likely to use gestures of body language when describing concepts, had better ordering of concepts, and had enhanced skills in describing their learning, including writing more, saying more, and being more likely to use models to demonstrate their (own) learning.” The Geological Globe will be integrated into an introductory Plate Tectonics lab during Spring semester 2017 at Miami University. Over 450 students complete our introductory geology lab course (GLG 115L) each semester. This course offers students the opportunity to explore topics outside of their own majors. This is fundamental to, and at the core of, a liberal arts education at Miami University.

3. Geoscience Outreach: DiscoverSTEM (8th grade)

DiscoverSTEM in Butler County, OH, is an annual event held in October during which 8th grade students are invited to participate in a day of interactive, STEM-focused, workshops and seminars. Students used the Geological Globe to evaluate where the plate tectonic boundaries are, and assess what motion is: CONVERGENT, DIVERGENT, or TRANSFORM. Each boundary was colored in a different color on the Globe.

4. Introductory Geology Activity

Prior to the lab, a short 10-minute presentation on different boundary types, and their features, is presented to the students. Learning Objectives

1. Identify Earth’s geological features on a 3-D projection
2. Recognize different plate tectonic environments
3. Interpret historical data
4. Predict the location of geological events based on plate motion
You will need:

The Geological Globe (3-D)
World topographic map (2-D)
Plate Tectonic map (2-D)
Geology Globe Legend
Volcano and Earthquake locations

Which data set represents volcanic activity and which dataset represents earthquake activity?

Explain your answer.

Use the 3-D Geology Globe, and associated legend, to discuss where Earth’s oldest and youngest rocks are relative to plate boundaries. How many oceanic and continental plates are there?

The relative motion of the Pacific Plate can be evaluated using the position of the Hawaiian-Emperor seamount chain. The rate of plate motion can also be calculated. What is the average rate of plate motion?

5. Acknowledgements

We are grateful to the Center for Teaching Excellence at Miami University for awarding us a teaching grant in March 2016 which enabled us to purchase the Geological Globe of the World. We are grateful to Doug Rogers at RealWorldGlobes, who facilitated our purchase and overview presentation of the globe, shipment, and delivery in time for Fall semester 2016. We thank Kendall Hauer, Director of the Karl E. Limper Museum at Miami University who assisted in the unpacking and installation of the Globe in our department. Reference: Bamford, A (2013): The 3D in Education White Paper.

Purchased May 2016

The Globe measures 30 inches in diameter and has a dry-erase surface - easy to clean! Globe arrived assembled, with stand.

Dry-erase surface

The process of Plate Tectonics was introduced as a process which has fundamentally re-shaped, re-worked, and re-surfaced the Earth throughout geological time. Following boundary identification, the students discussed which features were associated with those boundaries (e.g. earthquakes, tsunamis, volcanoes) and sketched the 2-D nature of the boundary at depth.

What did you like most about the Geological Globe?

“I liked to look at the globe and figure out where the plates were, and hypothesize about having one continent. It sparked my interest in being a geologist”

“That you can write on it”

“That the globe was interactive”

I liked the colors and how it showed different areas of geological time. I liked using it to help me visualize where different rocks are found. I also liked how it shows the Earth’s plates and areas of destruction, and where continents are separate.

How useful did you find the Geologic Globe for illustrating modern-day plate arrangement, boundary type, and rock-type distribution?

Students will plot the location of historical earthquakes and volcanic activity on the 3-D Globe.

The ages of the Hawaiian-Emperor seamount chain are marked on the Globe

Present day volcanic activity: 0 Ma

Volcanic activity: 10, 5 Ma

Historical volcanic activity: 20, 50 Ma

The relative motion of the Pacific Plate can be evaluated using the position of the Hawaiian-Emperor seamount chain. The rate of plate motion can also be calculated. What is the average rate of plate motion?