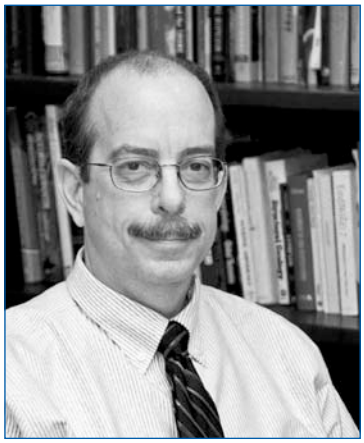

Alumni Profile: Brad Clement, PhD ’85

By Mary Tobin

Early on, Brad Clement enjoyed geology and amassing his own rock collection, but he credits his undergraduate professors for nurturing this interest into both a passion and lifelong career. He became fascinated with the geology of the Appalachian Mountain chain and its elongated bands of marine sedimentary rocks, volcanic rocks, and remnants of ancient ocean floor. Clement had hiked in these mountains as a boy and wondered about the processes that had shaped this meandering landscape. At the time of his graduation from college, Lamont-Doherty’s Neil Opdyke and Dennis Kent were conducting groundbreaking research on the tectonics of the northern extension of this 480-million-year-old mountain chain. Eager to work with them, Clement joined the Observatory in 1979 as a PhD student.

At Lamont-Doherty, Clement’s research evolved from Appalachian tectonics to examining changes in Earth’s magnetic field as recorded in the sediment cores housed in the Observatory’s vast Deep-Sea Sample Repository. His doctoral research, conducted under Dennis Kent’s supervision, examined changes in the direction and intensity of the Earth’s magnetic field as it reverses polarity, which it has done frequently throughout its history.

Today, Clement is a professor in the Department of Geology and Geophysics at Texas A&M University and serves as director of science services for the U.S. Implementing Organization of the Integrated Ocean Drilling Program (IODP). The IODP is perhaps the most successful international scientific collaboration of researchers ever established, with roots dating back to 1961. It is funded by the U.S. National Science Foundation and Japan’s Ministry of Education, Culture, Sports, Science and Technology, along with support from additional member organizations.

IODP provides the deep-sea drilling platforms from which researchers obtain samples of subterranean seafloor environments. These cylindrical cores of sediment and rocks hold the signature of our planet’s structure and history. The oldest marine rocks collected date back 220 million years. Samples are taken from locations in all of the world’s oceans and seas and are largely unchanged from their original state, unlike samples taken from land, where erosion can wash away valuable information. The deep-sea cores contain a wealth of data that over the years have allowed researchers to make leaps in their understanding of planet Earth. Proof of such theories as continental drift and plate tectonics are just some examples of the breakthroughs these samples have facilitated.

“Just as astronomers need telescopes to peer deep into the history of the cosmos, we geologists need a drill ship in order to see into our own planet’s history,” says Clement.

The complexities involved in drilling beneath the ocean basin through a mile or more of Earth’s crust are difficult to fathom. Drill time on research vessels is expensive; it is crucial to know exactly when one has achieved one’s research goals in a drill hole in order to move on to drill in another. Clement was well versed in a great many aspects of the job, having served as a staff scientist at the Ocean Drilling Program (ODP) in the early 1980s. The ODP was the United State’s predecessor program to IODP. During this time, Clement installed a superconducting rock magnetometer aboard the *JOIDES Resolution*, a vessel that was just being converted into a research drilling ship. The instrument was able to take immediate measurements of the magnetization of cores, providing rapid information on the age of the cored material and ultimately maximizing the efficiency of drill time.

Clement’s successful installation of this magnetometer—which many doubted could function effectively on a moving ship—was a personal achievement of which Clement is proud, and rightly so. It was exactly this kind of optimization of time and tools that made him a perfect candidate to be a director at IODP. One of his first missions as director was to reorganize the management structure of the organization in order to maximize the science that comes off the *JOIDES Resolution*, one of three drilling platforms now operated by IODP. To date, the *JOIDES Resolution* has traveled a total of 422,440 nautical miles and extracted nearly 40,000 cores representing 150 million years of Earth’s history.

When he is not engaged in his administrator role at IODP, where he has served since August of 2009, Clement continues to publish studies on paleomagnetism. His most recent work has examined the effects of wildfires on magnetic properties of soils in the Everglades, one of three wetland areas to be designated of global importance by UNESCO. The study Clement led indicates that fire-induced heating makes minerals in the surface soils more magnetic. Since wildfires are a frequent occurrence in the Everglades, Clement’s findings could have important implications for phosphorus cycling in this fragile ecosystem.

> “Beneath the oceans, the past 150 million years of our planet’s history remain largely intact. That history is critical: Only by understanding the natural variability of our planet can we come to understand how human actions may affect it.”

Because his life’s work was inspired by dynamic teachers, Clement has a similar desire to stimulate young students. He took great satisfaction in teaching upper-level science courses developed for non-science majors at Florida International University. Clement has received multiple outstanding teaching awards and looks forward to teaching again in the future.