

University Education in the Geosciences – Reflections on the Past, the Present, and the Future

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The geosciences are a broad area of sciences with a long and rich history. The founders of the geosciences were the “natural philosophers” of the late Renaissance. These pioneering scientists -- Ben Franklin being a good example -- took a holistic view of the Earth and did not distinguish formal disciplinary boundaries. The disciplines that we know today – geology, meteorology, and oceanography, each with myriad specialty areas – developed through the course of the 19th and early 20th centuries. This separation of disciplines was probably to be expected, given the need for concentrated focus on aspects of the Earth and its processes to develop basic knowledge, useful tools, and information for industrial applications. Each discipline developed its own characteristics and tradition that colored and shaped its further growth – geology, for example, has long been associated with the extractive industries, while meteorology has a strong emphasis on prediction of hazardous weather. However, in the closing decades of the 20th century, this situation began to change. Motivated in part by development of capabilities to observe Earth and other planets from space vehicles and in part by a growing interest in problems (such as Earth’s climate) that did not fit in any one of the traditional areas, it became apparent that the geoscience disciplines needed to become more closely linked, both among themselves and with the life sciences. This has given rise to new efforts such as “Earth System Science” and “biogeosciences” that are working to integrate and extend knowledge from the traditional disciplines to improve humankind’s understanding of Planet Earth.

This talk will explore how the history sketched above is reflected in our educational structures and processes, and in our expectations of what students are expected to come to know, understand, and be able to do through a course of university study. I will argue that all the geosciences disciplines are in the midst of a major transition, evolving from a largely descriptive, qualitative past into a quantitative future that is as yet very unclear. Constraints on the amount of time a student can spend in the university (nominally four years for a first degree in the U.S.), the explosion in knowledge about the Earth, and the rise of a broad range of companion technologies – computers of all forms, GIS, GPS, telecommunications, “smart” analytical instruments -- are significant challenges in themselves to today’s academic programs. However, expectations of government, students and their parents, and prospective employers (including academia itself) are also proving to be major challenges to those attempting to develop programs for students. I will close by speculating a bit on what the future may hold for students, academicians, and universities.