

Preamble

Our understanding of the natural world stems from both *observation* and *generalization*. Careful observation is essential in order to grasp the complexity of the natural world. However, this complexity often belies simple principles and symmetries (such as time invariance) that govern the dynamics. These can only be understood by generalization and abstraction. In many intriguing ways these two different approaches lead in opposing directions and the tension thus created provides the lifeblood of our science.¹ While the different approaches may require very different skills and temperaments, both are important to the development of our science, no one more so than the other.

This course fundamentally (and unashamedly) concerns the results and outcomes of the process of generalization (in which the Earth is necessarily considered a very simple beast responding to simple pleasures provided by the laws of nature). However, more than anything else, the questions addressed, and conclusions articulated, here represent the fruits of many hours spent observing at the outcrop scale where geology can appear very complex, indeed. While I believe many benefits accrue from the world-view that results from the process of generalization, I begin with an important disclaimer: careful observation and analysis will always be remembered and used long after once fashionable interpretation has been ridiculed and disbanded. After all, the time-honored tradition of the sciences is that, like biological species, theories have finite lifespans.

Mike Sandiford, January 2002.

¹ In many ways these two different approaches reflect the differences between Aristotelian and Platonic world-views as described by Barrow his excellent book *Pi in the sky* (Penguin, 1992) on the unreasonable effectiveness of mathematics in the sciences.