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Before Plate Tectonics: The Long Exchange between Physics and Geology from 1600 to the 20th Century

Good, G.A.¹

¹Center for History of Physics, American Institute of Physics, College Park, MD 20740 US

Stories of conflict between geologists and physicists are sometimes told as the model of relations between the two disciplines. Although physicists and geologists have sometimes argued over, for example, the thermodynamic history of the Earth and the age of the Earth, in fact, this is cherry picking of the historical data. A more accurate portrayal of the history of relations between the two constantly changing camps is to think of this as a variable exchange, an exchange of questions, topics, methods, and instruments. This more complete portrayal arises from taking a long, historical view of these exchanges. In the 17th and 18th centuries, most scientists described themselves as natural historians or natural philosophers, a distinction based broadly on the ways they conducted their scientific research and how they thought about it. Natural history tended to aim at collecting, cataloguing, and describing. Natural philosophy tended to emphasize experimenting, quantifying, and finding the causes and the causal laws behind phenomena. These were not hard and fast fields, and they did not line up directly against the disciplines which took shape in the 19th century. Before the emergence of disciplines like physics and geology as academic departments and (sometimes) carefully defined and defended fiefdoms of scientific practice, scientists often moved freely between more historical and more physical approaches to the study of terrestrial phenomena. From the late 19th century until the mid-20th century, although many geologists and many physicists diverged further apart in their methods and investigations, some in each group continued to see clearly the value of transgressing the boundaries between the two camps. From Hooke and Steno, through Herschel and Lyell, through Alexander du Toit, Ernest Rutherford, and Arthur Holmes, to the now well-known history of plate tectonics, the exchange has been nearly continuous between geologists and physicists. This longer historical perspective makes the increasing interdisciplinarity of geoscience part of a centuries-long exchange, of which the story of plate tectonics is but one prominent example. Today physicists and geologists (and chemists, biologists, etc.) are often found trading services and knowledge. This interaction has a long pedigree.



Figure 1: Alexander von Humboldt at Chimborazo, Ecuador

