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**Empiricism and Model-Building: Around the Hermeneutic Circle in the Pursuit of Stratigraphic Correlation**

The discipline of geology has various internal distinctions among objects and methods of study, and varying assumptions and approaches. By focusing on the ways in which geological theories are constructed through the use of various methodologies, we can better understand the means by which research approaches compete with each other to legitimate their own definition of science.

"Geologists tend to be staunchly empirical in their approach" (Hallam), but are also inveterate model builders. Geological research illustrates the hermeneutic circle (Frodeman, after Heidegger), in which empirical observation, generalization and theorizing (induction), are followed by construction of hypotheses (including models) and renewed observations to test and refine or abandon a theory (deduction). Ideally, this is a continuous and circular process, but history demonstrates that the inductive and deductive approaches have largely been followed by different groups of stratigraphers who have had different objectives and have had little to do with each other.

Geologists have always attempted to explain their universe by developing deductive models. This reflects a human need to find order (a "pulse of the earth") in nature's randomness (Zeller, Dott). Chamberlin, Ulrich, Grabau and Vail proposed theories of global diastrophism and eustasy that purported to explain broad "natural stratigraphic subdivisions." But in 1911 Ulrich complained about the "paleontological autocrat" whose data did not support his sweeping generalizations. Disvaluing data in favor of a predetermined model is a hazard of deductive models.

Modern dating methods should be rigorously empirical, including the cross-correlation of multivariate dating techniques and the use of non-events as boundary markers ("golden spike" concept). Extreme caution needs to be employed in introducing such deductive concepts as "global cycles," "event stratigraphy" and "cyclostratigraphy" into methods of high-resolution chronostratigraphy