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GEOL 5903 – Graduate Seminar Course

Seminar Abstract

Application of global eustatic models to chronostratigraphy: problems and perspectives

Regardless of subdiscipline, the first question asked by most geoscientists is "what age are these rocks?" This seemingly simple question is often difficult to answer. Ages may be referenced by their relative period or stage name (e.g., Ordovician or Hirnantian, respectively), or, where known, an absolute age (e.g., 445 ± 1.4 Ma). Problems arise, however, when a stage lacks a standardized, formal definition. One geoscientist may refer to a set of rocks as being of one age, while another geoscientist refers to them as being of the preceding age, if both researchers are using a different paleontological event to mark a stage boundary.

As of September 2018, 71 of 102 possible Phanerozoic "golden spikes" have been placed. These spikes, representing Global Boundary Stratotype Sections and Points (GSSPs) mark the formalized lower boundaries of chronostratigraphic stages. Historically defined by paleontological events, there has been a recent push to move away from this system. One major criticism of this format is its uncertainty with regards to the global synchronicity of a given biological event. Critics argue that biological appearances or extinctions may not in fact be global events and may represent entirely different points in time at different localities.

One suggested alternative to the paleontological system is a system based on sequence stratigraphy, particularly one that uses eustatic sequence boundaries as opposed to biostratigraphic markers. Proponents of this system note its potential for global stratigraphic correlation and that sequence boundaries can be expressed in nearly all varieties of sedimentary rocks. They also note that these boundaries mark significant events in Earth history, incorporating tectonism, climate, and sediment supply. Analyzing problems of sequence boundary recognition and the synchronicity of sea level events, this seminar focuses on the validity of the application of eustatic models to chronostratigraphy.