

# A section-based approach to quantifying the geologic record

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The spatio-temporal structure of the rock record both chronicles and controls a wide range of earth and life processes, yet we have rather little quantitative information about how the rock record varies over time. Using gap-bound packages as fundamental units of measure, we are providing unprecedented levels of detail in characterizing the distribution of all geological materials in time and space. This detail is being used to test a wide range of hypotheses across the earth and life sciences. For example, we have shown that area-weighted rates of expansion and contraction of sedimentary environments (shown at right) predict rates of extinction in the biosphere, thereby uniting quantitatively, for the first time, mass extinctions under a single set of causal factors related to sedimentation. In this first year we have:

- compiled the ranges, thicknesses, and lithologies of 21,806 gap-bound rock packages at 744 locations in North America
- improved the temporal resolution of 18,142 packages
- developed web-based data entry and retrieval forms for sharing of data
- predicted rates of biological extinction and origination
- measured environmental selectivity and rates of sediment cycling
- explored macrostratigraphy via analytical basin fill models

