



***CHRONOS* System: a large cyberinfrastructure project for sedimentary geology and paleobiology**

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The *CHRONOS System* (www.chronos.org) is a community facility funded by the U.S. National Science Foundation that addresses the geoinformatics needs of sedimentary geology and paleobiology, emphasizes global correlation and time-series analysis, and directly supports cutting-edge research on topics that include the evolution and diversity of life, climate change, geochemical cycles, paleoceanography, crustal dynamics of orogenic systems, and many other aspects of the Earth system. It provides the data management structure for three major science initiatives supported by the U.S. National Science Foundation: ANDRILL (www.andrill.org), EARTHTIME (www.earth-time.org), and GeoSystems (www.geosystems.org), and partners with a growing network of U.S.-based and international groups and organizations.

The purpose of the *CHRONOS System* is to *provide an open, community-based geoinformatics platform for storing, accessing, and analyzing sedimentary geological, geochemical, and paleobiological data*. By augmenting and connecting community databases and giving them an unprecedented level of interoperability, the *CHRONOS System* will realize a virtual, on-line, electronic stratigraphic record - a means to boost the pace and enlarge the scope of integrative geoscience. The *CHRONOS System* is a repository of information comparable to the repositories previously available only for the ocean drilling records. The *CHRONOS System* data include: lithostratigraphic, biostratigraphic, taxonomic, sequence stratigraphic, cyclostratigraphic, geochronologic, major, trace, and isotope geochemical, and other data and metadata relevant to sedimentary geology and paleobiology research. For other databases with closely related information (e.g., the Paleobiology Database), we add value by pro-

viding simultaneous, seamless integration. These data and tools support a broad array of integrative research projects that need to combine data in a framework of geologic age and stratigraphic succession. The interoperability has two key components. The first exploits software advances for translating between different data structures and terminologies. The second is the *System's* unique focus on evidence of geologic age, the universal means to combine stratigraphic information into a common time scale and to conduct global correlation and time series analysis.

The *CHRONOS System* includes a core Information Technology (IT) facility and databases, an international network of federated databases, tools, targeted development projects, and education-outreach activities. *CHRONOS* and its partners cooperate to: 1) link existing databases and other geoinformatics components into a single interoperable network, 2) provide primary databases to capture relevant data types, 3) offer tool sets for data analysis, and 4) create working groups and organize workshops to ensure that the needs of the community are met. Whereas no single facility can encompass all the data types needed for all of Earth sciences, nor provide all the analytical tools necessary to work with and synthesize these data, we are developing a facility that addresses many of these needs, that interoperates with other data collections, and is connected to a national geoinformatics and computational grid (GEONGrid).

CHRONOS enables the deep-time geologic record to be understood within a cross-disciplinary framework of the chemical, physical, climatic, astronomical, eustatic, and tectonic processes that collectively govern the operation of the Earth system. It also facilitates the merging of this deep-time record with the modern record to allow researchers to develop a more complete understanding of how our ecological and climate systems operate. By focusing on the record of Earth processes through time, *CHRONOS* is providing a unique source of information for K-16 students and classes, and the public. It partners with DLESE, PaleoPortal, local and national organizations and Earth science teachers groups, and museums and exploratoria to both provide effective educational material, and to reach as broad an audience as possible.