Geochemist aids development of geologic time scale for study of Earth's history

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A Boise State University researcher has taken a lead role in developing the most current timetable on Earth's geologic history.

Geochemist Mark Schmitz is one of four editors on The Geologic Time Scale 2012, or GTS2012, a 1,144-page compilation of the latest understanding of Earth's history, and the means by which geoscientists around the world investigate the rock record. In addition, the Isotope Geology Laboratory at Boise State directly produced 47 of the 260 radiometric ages used in the GTS2012, more than any other geochronology lab in the world, as part of the lab's comprehensive studies of the Late Paleozoic era of Earth history.

"Our understanding of Earth's history is constantly evolving as we collect and interpret more data from the geologic record," Schmitz said. "Geology is very much a forensic science. We are trying to reconstruct Earth's past to predict as accurately as possible what might happen in its future. The Geologic Time Scale gives us a quantitative basis for that."

Schmitz, his students, and a network of colleagues collect volcanic rocks from around the world and bring them back to the Boise State lab where they extract miniscule amounts of rare minerals that serve as natural clocks.

"If you were to break a paperclip into a million pieces, and break one of those pieces into a million more, that's the tiny bit of matter we're analyzing from a single crystal of a rock, that's the scale that we work

on," Schmitz said. "Our lab has become well known around the world for the detail we put into understanding the accuracy of these difficult measurements."

In addition to understanding Earth's timetable, there also is an economic element to the work Schmitz does. Most of the coal and significant shale gas resources on Earth come from the time period in which he specializes. A team including Schmitz and two undergraduate researchers will return to southern Alberta, Canada, this summer to continue their studies of 360 million-year-old organic-rich sediments that preserve one of the largest biological extinction events in Earth history, and are a source rock for shale gas throughout North America. His work has been funded through the National Science Foundation as well as industry partnerships.

The GTS2012 reference work serves as the standard international framework for deciphering the history of the planet, providing a complete stratigraphy of all periods and stages with regional applications. Schmitz was invited in 2006 to serve as co-editor on the publication, with a specific charge to compile the full set of radiometric ages—those determined via measurements of natural radioactive decay in minerals and rocks—that are used to calibrate the geologic time scale.

The GTS2012 is available in digital format through Albertsons Library at www.sciencedirect.com/science/book/9780444594259.

In addition to the GTS2012, Schmitz also served as guest editor and author of a recent issue of the journal *Elements*, published bimonthly by the Mineralogical Society of America and 16 other geochemical and mineralogical societies. Each issue of *Elements* explores an invited theme of broad and current interest in the mineral sciences. Schmitz proposed and guest-edited the first issue of 2013 entitled "One Hundred Years of Isotope Geochronology" and co-authored an article titled "High-

Precision Geochronology."

Learn more at elements.geoscienceworld.org/content/9/1/15.full.

Schmitz is associate professor of geochemistry at Boise State and director of the Isotope Geology Laboratory. He has extensive research experience and broad interests in the development and application of radiogenic isotope geochemistry and high-precision U-Pb geochronology to problems of Earth systems and history.

Provided by Boise State University