

The Geological Society of Washington

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Speaker **BLURBS**

Meeting No. 1583 (11/16/2022)

Lyle Nelson, Department of Earth Sciences, Carleton University

"Utilizing tandem in situ and isotope dilution U-Pb detrital zircon geochronology to calibrate evolution of life and climate in the late Neoproterozoic and early Cambrian"

The Death Valley region of California hosts beautifully exposed late Neoproterozoic-early Paleozoic strata deposited during rifting and passive margin development in western North America. While these units provide globally significant sedimentary records of evolutionary and environmental changes during this dynamic interval of Earth history, a notorious lack of radioisotopic age constraints has hindered calibration of the biostratigraphy, chemostratigraphy, and paleoclimate records. In this talk, I highlight recent efforts to improve age models for the Neoproterozoic-Cambrian strata of Death Valley using tandem in situ and isotope dilution U-Pb geochronology of detrital zircons. Results contribute to calibration of the Cryogenian snowball Earth glaciations and the Cambrian explosion of animal life.

Sean Gaynor, Department of Geosciences, Princeton University

"Local melt contamination and global climate impacts: Geochronology of Karoo LIP sills in organic-rich shales"

Large Igneous Provinces (LIPs) are commonly correlated with global climate change and mass extinctions. To establish this causative link, chemical proxies from marine sedimentary sections must be temporally tied to LIP activity through high-precision geochronology. These temporal relations need to be established through highly precise and accurate U-Pb geochronology; however, many LIP rocks lack U-rich mineral phases, and therefore present challenges for utilizing U-Pb geochronology. The Eccra Group of the Karoo basin hosts Jurassic LIP mafic sills, as well as abundant shale horizons, so the emplacement of sills and subsequent thermogenic degassing of their carbon-rich wall rocks is a potential climate change driver. Unlike the basalts that make up much of the Karoo LIP, pegmatitic pods from mafic Karoo LIP sills yield abundant zircon, which is considered the "gold standard" for U-Pb geochronology. However, analyses from these mafic pods yield unusually variable dates and geochemical compositions, which indicate that localized assimilation of sedimentary rocks enabled localized zircon crystallization. These complications come with a benefit, because of this assimilation-crystallization relationship, these minerals directly date interaction of LIP magmas with carbon-rich wall rock. Given the temporal overlap of the emplacement of sills and the timing of the global Toarcian Oceanic Anoxic Event (TOAE), our data support a causal link between this discrete period of Karoo sills emplacement and global climate change that took place during the Early Jurassic.

Nicholas Tailby, American Museum of Natural History

"Rutilated quartz: a useful and cautionary tale involving thermobarometry and diffusion"

In this presentation we briefly explore quartz thermometry (often referred to as "TitaniQ"). The technique has a previously established set of assumptions that need to be met in order to study quartz – including

themes like pressure, temperature and activity. In this presentation we present some new information regarding complications regarding the technique.