

## AGU 2020 – Virtual Meeting

### Session

Submit to EP003: Assessing paleotopography, relief, and elevation across spatio-temporal scales

### Authors

Anne C. Fetrow

anne.fetrow@colorado.edu, 651-233-0027

University of Colorado Boulder, 2200 Colorado Ave, Boulder, CO, 80309, USA

Kathryn E. Snell

kathryn.snell@colorado.edu, 303-492-1461

University of Colorado Boulder, 2200 Colorado Ave, Boulder, CO, 80309, USA

Russell V. Di Fiori

russelld@uidaho.edu, 626-241-6154

Idaho Geological Survey, Morrill Hall, University of Idaho, Moscow, Idaho 83844, USA

Sean P. Long

sean.p.long@wsu.edu, 509-335-8868

Washington State University, 1228 Webster Hall, Pullman, WA, 99164, USA

Joshua W. Bonde

joshua.bonde@nvscicenter.org, 702-384-3466

Nevada Science Center, 702-468-2500, 331 South Water St. Unit D, Henderson, NV 89015, USA

### Title

Paleoaltimetry estimates suggest low surface elevations for the mid-Cretaceous Newark Canyon Formation within the Sevier hinterland

### Abstract

The retroarc of the North American Cordilleran orogen in Nevada and Utah has been divided into the frontal Sevier fold-thrust belt in Utah, which accommodated shortening between ~145 and ~50 Ma, and a broad region of Nevada referred to as the ‘Sevier hinterland’. The hinterland is hypothesized to have developed into a high-elevation orogenic plateau (or ‘Nevadaplano’) at some point between the Late Jurassic and the Paleogene. Recent paleoaltimetry utilizing clumped isotope temperature estimates suggests that at least some basins on the Nevadaplano were at an elevation of 2.2-3.1 km by the latest Cretaceous. However, it remains uncertain precisely when the Nevadaplano attained these high elevations and if surface uplift developed steadily along with protracted shortening in the Sevier fold-thrust belt or occurred rapidly and was decoupled from the shortening record. In order to extend the surface elevation history of the Nevadaplano further back in time, we have investigated the type-exposure of the mid-Cretaceous (~113-98 Ma) Newark Canyon Formation (Knc) in central Nevada. The Knc records synorogenic sedimentation in the Sevier hinterland during the early to middle stages of shortening in the Sevier thrust belt.

We will present terrestrial surface temperature estimates from clumped isotope analyses derived from palustrine, lacustrine, and pedogenic carbonate-bearing facies. Contextualized by structural evidence and corrected for secular climate change, these data suggest that the studied Knc basin had not developed substantial surface elevation by the mid-Cretaceous. However, there was likely some considerable surface relief in this region associated with active fold-thrust structures in the upper crust. Preliminary temperature estimates range between 22 and 70°C. These temperatures reflect a range of facies-specific differences in primary carbonate formation, as well as, diagenetic overprinting of some samples. Consistently warm temperatures throughout the stratigraphic section suggest that there was no significant cooling due to elevation gain between ~113 and ~98 Ma. We will discuss the implications of these results for the style and timing of deformation and surface uplift within the Nevadaplano.