



Seismic investigation of Unaweep Canyon (Colorado): Implications for Late Paleozoic alpine glaciation in the tropics

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The formation of Unaweep Canyon, a unique alpine landform in Western Colorado remains debated. It is currently occupied by two opposite-flowing creeks emanating from a drainage divide in the middle of the canyon, with only a small elevation difference between both mouths of the canyon. All recognize that these small creeks could not have carved the canyon, and most suggest canyon formation by the ancestral Gunnison and/or Colorado rivers. But a competing hypothesis holds that the inner, Precambrian-hosted gorge was carved by late Paleozoic glaciation of the paleo-equatorial Uncompahgre uplift, buried in the Permian, and then exhumed by the ancestral Gunnison River. This is highly controversial in part because it implies alpine glaciation at low latitudes and at relatively low-moderate paleoelevations, requiring colder conditions than typically envisioned for the late Paleozoic tropics.

To test this idea, we acquired new seismic reflection and refraction data to characterize the subsurface of Unaweep Canyon, and in particular to image possible over-deepening and U-shape of the basement surface. Determining the basement profile and structure will help to determine whether the canyon was carved by a glacier and later exhumed by the Gunnison River, or if the Gunnison River was the only contributor to formation of the canyon. We will present a first model of the subsurface of the canyon based on first-arrival travel time tomography. Joint interpretation of these new and vintage geophysical as well as geological data will help to constrain the likelihood of Paleozoic glaciation. Glaciation at this paleolatitude and elevation would imply that our understanding of late Paleozoic climate requires significant revision, and require further investigation into the climate forcings that enabled this.