SUPPLEMENTARY MATERIAL: ABANDONMENT OF UNAWEEP CANYON (1.4 TO 0.8 MA), WESTERN COLORADO: EFFECTS OF STREAM CAPTURE AND ANOMALOUSLY RAPID PLEISTOCENE RIVER INCISION

Andres Aslan[1], William C. Hood[2], Karl E. Karlstrom[3], Eric Kirby[4], Darryl E. Granger[5], Shari Kelley[6], Ryan Crow[3], Magdalena S. Donahue[3], Victor Polyak[3] , and Yemane Asmerom[3]

[1] Colorado Mesa University, Dept. of Physical and Environmental Sciences, Grand Junction, CO 81501, USA aaslan@coloradomesa.edu

[2] Grand Junction Geological Society, Grand Junction, CO 81501, USA whood@bresnan.net

[3] University of New Mexico, Department of Earth and Planetary Sciences, Northrop Hall 141, Albuquerque, NM 87131, USA kek1@unm.edu magdalena.donahue@gmail.com crow.ryan@gmail.com

[4] Oregon State University, College of Earth, Ocean and Atmospheric Sciences, Corvallis, OR, USA d

[5] Purdue University, Department of Earth and Atmospheric Sciences, 550 Stadium Mall Drive, West Lafayette, IN 47907, USA dgranger@purdue.edu

[6] New Mexico Bureau of Mines, New Mexico Tech, Socorro, NM, USA sakelley@nmbg.nmt.edu

SUMMARY

Supplementary materials consist of two parts: 1) complete analyses of U-Pb ages of detrital zircon samples and 2) analyses of U-series age estimates for calcite rinds sampled from Colorado River terrace gravels. Data repository table 1 consists of LA-ICP-MS results from modern river samples (Colorado, Gunnison, Uncompahgre Rivers) and ancient river samples (Cactus Park, Gateway). Locations of the samples are shown in Figure 2. All the samples were acquired from either sand bars (modern samples) or shallow artificial pits (ancient river samples). Detrital zircons were separated using standard crushing, density, and magnetic

separation techniques. Zircons were analyzed at the University of Arizona LaserChron Center with a Nu HR ICPMS.

Samples for U/Th dating were obtained from strath terraces at multiple heights above the river at X locations around Grand Junction where well-exposed strath terrace sequences are preserved. Samples of clean calcite coatings around mainstem Colorado River gravels were sampled (see Table 2 for locations, heights). 50-70 mg of calcite powder was micro drilled from laminations within the travertine samples and mixed with a ^{229}Th-^{233}U-^{236}U spike after dissolution in HNO_3. U and Th were separated using conventional anion exchange chromatography. U and Th isotopes were measured using a Thermo Neptune multi-collector inductively coupled plasma mass spectrometer (MC-ICPMS) at the University of New Mexico which was optimized for U-series analytical work as described by Asmerom et al. (2006). ^{234}U was measured on a secondary electron multiplier (SEM) with high abundance filter or on the center Faraday cup, while the other isotopes of uranium were measured on Faraday cups. Mass fractionation was monitored using the ^{238}U/^{235}U ratio, while SEM/Faraday gain was set using sample standard bracketing and uranium standard NBL-112. A similar procedure was used for Th isotope measurements with ^{230}Th measured in the SEM and ^{229}Th and ^{232}Th measured in Faraday cups. An in-house ^{230}Th standard was used to measure the SEM/Faraday gain, and mass fractionation was corrected using ^{238}U/^{235}U or ^{236}U/^{233}U. All analyses used new half-lives for ^{234}U and ^{230}Th from Cheng et al. (2013).