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The M_W 6.9 14 April 2010 Yushu Earthquake and a 10,000-Year Record of Paleoseismicity along the Guoqiong Segment of the Yushu Fault, Qinghai Province, China

Taylor F. ARMSTRONG [1*], Mervin J. BARTHOLOMEW[1], FENG Lian[1], LI Dewei[2], LIU Demin[2], Tammy RITTENOUR[3], and SUN Guoqiang[2]

1 Department of Earth Sciences, University of Memphis, Memphis, TN, USA
2 Faculty of Earth Sciences and Earthquake Research Center, China University of Geosciences, Wuhan, China
3 Department of Geology, Utah State University, Logan, UT, USA

The Mw6.9 April 14, 2010 Yushu earthquake occurred in the central region of the Tibetan Plateau, within the Banyan Har Mountain Range along the Ganzi-Yushu fault system. The focal mechanism for the main shock indicated left-lateral, strike-slip movement along a WNW-ESE-striking, near-vertical fault. Near the village of Guoqiong (30km-NW of Jiegu town), a maximum of ~1.8m left-lateral surface displacement occurred along the Guoqiong Segment of the Yushu fault. In October 2011, we located a trench (CUG2011-1) along this segment across a Late-Pleistocene alluvial fan perpendicular to the surface rupture. A Holocene stream channel, incised 3m into the fan, was deflected left-laterally ~6m indicating substantial strike-slip displacement since incision. The trench-location was specifically selected to ensure excellent preservation of the Holocene sedimentary record. We then used both ^{14}C and OSL dating-techniques to determine that only four major earthquakes produced surface ruptures along the Guoqiong Segment during the last 10,000 years. Within the trench, three buried A-soil horizons were preserved along the downthrown side of the fault. Line-length balancing and progressive retro-deformation for the 2010 event and three previous surface ruptures indicate ~2m of horizontal shortening perpendicular to the fault and ~1.2m of vertical displacement. If the 2010 event, with ~1.5m left-lateral displacement, was similar to the three earlier events, these 4 events could account for the ~6m of left-lateral displacement in the incised Holocene stream channel. Four events in 10,000-years indicates a much longer recurrence interval than previous estimates.

Key words: 2010 Yushu Earthquake, Paleoseismicity

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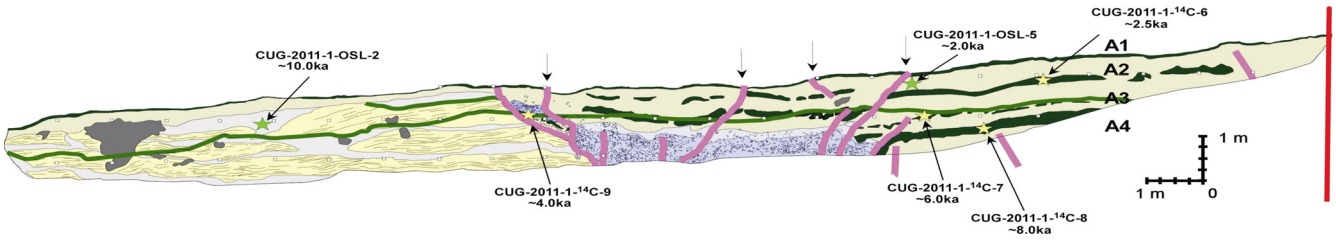

Fig. 1 Trench log of CUG-2011-1 East Wall with sample location and approximate age of OSL and ^{14}C samples.

* Corresponding author. E-mail: trmstrn1@memphis.edu

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