YIN An, DONG Shuwen and YU Xiangjiang , 2013. Is Chengdu Underlain by an Active East-Dipping Thrust and How Frequent Did it Generate Earthquakes With Surface Ruptures? *Acta Geologica Sinica* (English Edition), 87(supp.): 85.

# Is Chengdu Underlain by an Active East-Dipping Thrust and How Frequent Did it Generate Earthquakes With Surface Ruptures?

YIN An [1], DONG Shuwen [2] and YU Xiangjiang [3]

*1 University of cal:fornia, los Angele*
*2 Institute of Geomechanics, Chinese Academy of Geological Sciences, 100081, Beijing, China;*
*3 School of Earth and Space Sciences, Peking University, Beijing 10871, China*

With more than 14 million people, the metropolitan region of Chengdu is the fourth most populous city in China (~7,000 persons/ km2). Because it is situated adjacent to the tectonically active Tibetan plateau, determining the distribution and history of active faults within, and adjacent to, Chengdu has been the focus of many studies in the past four decades. The most important structure that possesses earthquake threats within Chengdu City is the Chadianzi fault running through its west side. This fault has long been regarded as a segment of the 300-km long, northeast-striking Pojiang-Xinjin-Chengdu-Deyang fault zone, hereafter referred to as the Po-De fault zone. The existence of the Chadianzi fault in western Chengdu City was inferred mostly from sparse seismic-reflection studies, analysis of satellite images, isopach maps of Quaternary strata constructed from water-well recordings, and the distribution of several levels of fluvial terraces across the Chengdu Plains. Evidence for the Po-De fault zone comes from a similar data set in addition to its geometric projection into the east-dipping Xiong Po thrust exposed south of Chengdu along the west side of the Xiong Po anticline. The Xiong Po thrust may be linked via a sub-horizontal detachment with the Longquan Shan thrust system that bounds the east side of the Chengdu Plains. The above correlation and local seismic reflection data all suggest that the Po-De fault zone is a major west-directed thrust dipping below Chengdu City.

The great limitation of the early work on the active structures of the Chengdu region is the lack of direct observations, which includes the Chadianzi fault in particular. As a result, the kinematics and temporal evolution of the interpreted blind structure were completely unknown. In this study, we take the advantage of the newly excavated Jinsha Culture Site in western Chengdu, which exposes thrusts, folds, and growth structures within the trench walls. According to the existing active-fault maps, the trace of the Chadianzi thrust was inferred to run through the Jinsha site. Based on the presence of an abrupt change from a dominantly meandering to dominantly straight course for Modi River, we place the Chadianzi fault directly east of the Jinsha excavation site. That is, the structures exposed at the Jinsha trench walls are located in the footwall of the inferred east-dipping Chadianzi thrust.

Based on our preliminary observations, the trench walls at the Jinsha site expose reverse faults and folds trending dominantly to the northeast, which is parallel to the regional strike of the nearby Chadianzi fault and the overall Po-De fault zone. Growth strata associated with thrusts and folds are also present. Although northwest-dipping thrusts are locally present, the majority of the thrusts exposed on trench walls dip southwest that is the same as the Chadianzi thrust. Based on the chronology of the stratigraphy at the Jinsha site and the cross-cutting relationships of the mapped faults and folds on the trench walls, we tentatively recognize three paleo-earthquake events associated with surface ruptures at 1000-500 yr B.C, 200 B.C., and 600-900 A.D., respectively. The above observations help elucidate the geometry, kinematics, and paleo-seismic history of the long speculated Chadianzi thrust running through the west side of Chengdu City. It also supports the early suggestion that Chengdu City is underlain by a regionally extensive, east-dipping thrust. It is important to note that the magnitudes of our interpreted paleo-earthquakes are currently unknown. However, a systematic investigation of rupture length for each event along the Chadianzi thrust may resolve this problem.

**Key words:** Tibetan plateau, Chengdu Plains, seismic hazards, Jinsha excavation site

* Corresponding author. E-mail: yin@ess.ucla.edu