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Channel morphology evolution near the First Bend of Yangtze River and its tectonic implications

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The First Bend along the Yangtze River formed in the southeast margin of the Tibet Plateau and middle of Three Parallel Rivers area, located within the fold belt that formed between the northward subducting Indian plate and the stable Yangtze Platform. The rivers evolution in this region is critically related to the tectonic deformation. Large-scale strike-slip faults, linear geomorphic features, block mountains and graben basins widely formed, near the First Bend along Changjiang River, where the river landscape is one ideal indicators for study the tectonic, climate and other geological processes.

The Tiger-leap gorge, in the northwestern part of Yunnan(China), has cut a 3500m-deep valley arcoss the Yulong-Haba Xue Shan anticline and formed a knickpoint that may be critically related to the evolution of the First Bend landscape. The mechanism of this knickpoint is likely to give a proper explaination of the special landform along the Judian-Daju segment of Jinsha River. We employed data from 90m SRTM DEM to study the features of river channel and its drainage basin near the First Bend and compared with the field data. We suggest that the knickpoint is stable, its formation and stabilization perhaps controlled by the differential tectonic at this region. The results of topographical parameters(Ks and HI) show distinct differences on two sides of the Longpan-Qiaohou Fault, the value of Ks and HI is higher on the eastern side. During our field investigation, we found the elevation of terrace above the river water is increased along the Jinsha River to the lower reaches of the Tiger-leap gorge. And revealed by the field observation and OSL ages, the downstream incision rate of our study area is higher than upstream. Those results demonstrate that the downstream segment behaved as different tectonic block with differential tectonic movement. And the Yulong-Haba Xue Shan anticline experienced a faster uplift possibly.