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Fluvial processes along a tectonically active coast, eastern Coastal Range, Taiwan

D. Pflanz and B.H. Shyu

Department of Geosciences, National Taiwan University, Taipei, Taiwan (dorthe.pflanz@googlemail.com)

The eastern Coastal Range of Taiwan is part of the accreted north Luzon arc, which belongs to the Philippine Sea plate that is colliding with the Eurasian plate margin. Many authors have described the intensive collision and the rigorous neotectonic activity of eastern Taiwan. In the working area along the eastern coast of Taiwan, this affects river morphology.

This is expressed in knick points, a location at which stream gradient is locally large and intensive erosion occurs. A knick point has been regarded as an important geomorphic feature in river morphology. The distribution of knick points can provide evidences about active faults.

In the study area there is no other climatic or lithological control that could result in different steepness along river profiles.

This study will examine the distribution of fluvial knick points along the main rivers in the Coastal Range in Taiwan (mainly in between the cities of Changping and Chengkung).

Based on a digital elevation model (ASTER DEM), hydrological analyses, such as flow accumulation, flow directions and watershed analyses were made. On this fundamental information a stream grid was calculated, limited to rivers with a threshold of 2000 cells to exclude smaller streams.

For further analysis only rivers of the Strahler order 1 were used to exclude knick points resulting from changes in the additional amount of water. After the classification, the knick points of every single stream were studied, including the calculations of the stream gradient and the stream length index. Nearly every river shows the similar knick points independent from the river length but on different heights or positions. Furthermore, all major river catchments show a similar asymmetry of catchments in hill slope analysis, and such asymmetry is difficult to explain solely by lithological controls. The stream gradient of the rivers was calculated by using a wiggling window along every stream profile to calculate the slope. To compare the different rivers, we evaluated the results using an approach of statistics that contains the height, length, gradients and knick point frequency of the rivers. The results will be compared by field observations.