



Late Pleistocene to Holocene geomorphological processes in the high mountains of Taiwan

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Seismicity and uplift, humid monsoon climate including typhoons, and the resulting steep slopes are the main driving forces of present-day geomorphological processes in the high mountains of Taiwan. Nevertheless, the results of recent studies provide evidence that hillslope processes are variable in space and time. The variability is at least partly driven by climatic changes.

During the Late Holocene, erosion is related to high-magnitude rainfall events, and the impact of typhoons is general local. The combination of earthquakes and subsequent typhoons increases the propensity of slopes for landslides. Consequently, interdependent slope and river systems show an unsteady behaviour, making it difficult to identify phases of specific activity from few archives. Slope-riverbed coupling is a major research issue in the attempt to learn more about present-day processes. It is observed that processes change with altitude and the highest part of the mountains is less affected by climatic forcing than by the catchment situation in relation to headward erosion. In general, precipitation above the monsoon circulation provides less soil moisture. Therefore much reduced present-day hillslope processes and the preservation of older landforms such as glacial landforms and sediments are characteristic of the westward trending uppermost fluvial catchments.

Climate changes in the Late Pleistocene may have influenced erosional activities. The preserved archives are sparse, but detailed studies of sediment properties as well as dating by means of OSL protocols and the radiocarbon method have brought insights into the timeframe of varying processes.

- In the non-glaciated mid-altitudes, a reduced slope activity in late MIS 4 / early MIS 3 appears possible; silt was deposited in a depositional sequence of a terrace remnant. This silt layer is referred to as loess-like sediment. No present-day processes form similar deposits in this environment. This suggests a drier climatic phase with transport and deposition of exclusively fine-grained material.
- Around 38.5 ka, a phase of high slope activity is documented.
- The climatic LGM is still not well understood, whereas at least in altitudes above 3200 m glacial slope formation and glacial deposits such as terminal moraines and boulders deposited by glaciers dated to the Late Glacial / Holocene transition.
- During the Late Holocene, a phase from about 4 to 2 ka was characterised by increased slope activity at high altitudes above 3000 m asl relative to present-day conditions, possibly including a phase with wildfires, as charcoal has been found repeatedly.

Besides geological factors, Late Quaternary climate change has also played a role in changing hillslope processes in Taiwan.