Sedimentation in the late Cenozoic Taiwan foreland basin
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The area in western Taiwan and the Taiwan Strait is a foreland basin resulted from the flexure of the Eurasian plate caused by loading of the Taiwan mountain belt. The basin is formed since the overriding of Luzon volcanic arc of the Philippine Sea plate on top of the rifted continental margin of Eurasian plate in late Miocene (~6.5 Ma). In central Taiwan, the foreland sequence is up to 5 km in thickness and exhibits a deepening followed by shallowing upward succession. The basal deepening trend (~6.5-3 Ma) reflects the growing and advancing loads of the proto-Taiwan mountain belt with sediments sourced mostly from continental interior (i.e., China) and paleo-environments evolved from fluvial to outer shelf settings; the upper shallowing and coarsening upward succession (~3 Ma to present-day) records the rapid growth and denudation of the orogenic belt and filling-up of the foreland basin with paleo-environments evolved from outer shelf to braided river settings. Notably, the presence of the spectacular upper Pleistocene, ~1 km-thick succession of braided-river conglomerates (Hoyenshan Member of the Toukoshan Formation) at the top of the foreland basin indicates a delicate balance between basin subsidence and sediment supply during the latest stage of foreland basin development.

On the cover: A rapid and deep incision in the Pleistocene deltaic sandstones of the Taiwan foreland basin along the Ta-An River in central Taiwan. The ca. 20 m incision has occurred since the 1999 Chi-Chi earthquake in central Taiwan. This thrust earthquake produced a ca. 100-km long surface rupture in the fold-and-thrust belts with its northern end terminates at a decollement fold, the Tungshih Anticline. The coseismic folding of this anticline uplifted the Cholan Formation in the western foothills at the Ta-An River and resulted in a temporary dammed lake upstream the anticline. Since then, rapid incision has been brought about especially by floods during the annual Typhoon seasons. Photo by Shin-Liang Shiu.

Fig.1: Burrowed and cross-bedded upper shoreface sandstones with mudelastics (now become hollowed holes) lined up along the foresets. Burrows are dominated by Skolithos (left) and Ophiomorpha (middle). This lithofacies is a typical facies of the late Miocene Kueichulin Formation, the basal formation of the Taiwan foreland sequence.

Fig.2: The Pliocene Chinsui Shale in the lower part of the Taiwan foreland sequence. The Chinsui Shale is of outer to inner shelf origin and represents the deepest paleo-water depth of the Taiwan foreland sequence in central Taiwan. The Chinsui Shale overlies the Kueichulin Formation and this photo is taken at the Tachia River in central Taiwan.

Fig.3: Deltaic sandstones of the lower Pleistocene Cholan Formation in the middle part of the central Taiwan foreland sequence. Photo taken at the Ta-An River.

Fig.4: Braided-river conglomerates with sandstones infilled braided channels of the upper Pleistocene Tokoushan Formation. Photo taken at the Tsaohu River in central Taiwan.