



## **Depositional history of an extensional collapse basin in northern Taiwan Mountain Belt**

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In the northern tip of the active Taiwan Mountain Belt, a Quaternary rift, namely Taipei Basin, has developed atop the deformed orogenic basement as a result of post-orogenic collapse. Bounded by a normal fault on the western border, the basin displays a classic half-graben configuration and is filled with siliciclastic sediments up to 670-m thick. The depositional history of the basin, as recorded in its sedimentary sequences, reveals a complex interplay of paleo-topography, tectonic subsidence, and glacio-eustatic fluctuations.

The basin deposits consist of four stratigraphical units: (1) the lowermost alluvial-fan gravels intercalated with volcanoclastic strata (400-160ka); (2) the lower-middle fluvial/lacustrine sand/mud with minor alluvial-fan gravels (160-30ka); (3) the upper-middle alluvial-fan gravels (30-12ka); (4) the uppermost fluvio-estuarine sand/mud deposits (12-0ka). The lowermost gravels exhibit a ribbon-like geometry extending from the major feeding river in the southeast to the basin center near the bounding fault in the northwest. The other 3 units each appears like a sedimentary wedge that thickens toward the bounding fault, except that the upper-middle alluvial-fan gravels show two distinctive fan-shaped depocenters on southeast and southwestern basin margin.

By integrating Taipei Basin stratigraphy with regional geology, it can be inferred that the basin started accumulating sediment along a paleo-valley inherited from the mountain building stage. As the bounding normal fault formed in consequence of orogenic collapse, its hangingwall slid down to a depression that began to pond gravels of the lowermost unit along the northwestern basin margin. Continued basin subsidence enlarged the accommodation space to allow for widespread fluvial/lacustrine deposits of the lower middle unit. Later a large amount of sediment was fed from a captured river draining from the surrounding mountain in the Last Glacial Age to deposit the alluvial fan gravels of the upper middle unit. When sea level rose since the last glacial maximum, the basin was first inundated as a large estuary and then filled by fluvial sediment of the upper unit.

The depositional history of a collapse basin, as viewed from Taipei, is obviously controlled by the inherited orogenic topography in the earliest stage and then by tectonic subsidence associated with the bounding fault. The stratigraphic stacking patterns and sedimentary facies characteristics are, however, modulated by glacio-eustatic fluctuations and induced river captures as the basin subsided to a broad and flat lowland close to the sea level.