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Sedimentary Facies and Cycles of Foredeep Squences in Inner Foothills Belt, Southwestern Taiwan

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The Taiwan orogenic belt is located on the boundary between the Eurasia and Philippine Sea plates and has developed by oblique arc-continent collision since the Pliocene time. Because of the character of oblique collision the variation in geology of orogenic belt and the foreland basin system can be viewed as the evolution from the earliest to late stages of the orogen-foreland basin system development. In terms of such tectonic framework, we regard the upper Neogene sedimentary sequences of the inner foothills belt in southwestern Taiwan as foredeep sequences accumulated during the early stage of basin development in this study. We made detailed description and analysis of stratigraphic sections in the field and well bore data in the study area and demonstrate time-spatial variation of sedimentary facies and cycles of the foredeep sequences from the basin center to the proximal part of the foreland basin. The constructed tectonostratigraphic architecture gives some implications of chronology of development of the adjacent ancient fold-and-thrust belt.

The inner foothills belt is separated by a major frontal thrust from the outer foothills belt and the coastal plain in southwestern Taiwan. The demarcation is also manifested by different sedimentary facies of the foredeep sequences occurred on both sides of the thrust. In the inner foothills belt, the sedimentary layers predominantly are mud- and siltstones in the western part of the study area, in contrast to that in the eastern part, where is mainly characterized by silt- and fine-grained sandstones. As a whole, the grain size increases to the east or the proximal part of the foreland basin; the variation in grain size indicates the relative distance of a depocenter from the ancient orogenic belt. In the early stage of basin development, the strata were thicker and sedimentary environments became shallower toward the front of the orogenic belt. In late stage, the strata in the depocenter were the thickest and thinning toward the distal and proximal parts of the basin.

Interpretation of sedimentary facies suggests that the sedimentary environments were from pro-delta to outer shelf. Two scales of cycle for sedimentary facies changes can be recognized in the successions. For each cycle of small scale ($\sim$10 meters for each cycle), the sedimentary environment is shallower upward to prodelta. In addition, the sedimentary facies change in each cycle of small scale is more prominent in the proximal part than that in the basin center of the study area. As the cycles of large scale ($\sim$100's meters thick for each cycle), the sedimentary environment becomes shallower upward (from outer shelf changing into inner shelf) within each cycle. However, in the areas adjacent to the basin center, most of strata are mudstones and the cyclic facies changes within the strata are not so obvious.

We interpret the sedimentary cycles of small scale as the result of global sea-level fluctuation. We also suggest that the sedimentary environment change of the cycles of large scale indicates the tectonic evolution in area from the basin center to proximal part of the foreland basin since the Pliocene; each sedimentary cycle of large scale corresponds to a period from the beginning to the end of an active tectonic episode in the adjacent orogenic belt.