

Development of cliff-top dunes in the Hengchun Peninsula of the southern Taiwan

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Fung-Chuei-Sha cliff-top dune is located on a 60-meter-high cliff surface in the Hengchun Peninsula of Taiwan. It is still unclear that the history of the aeolian sediment deposition on the top of the cliff, and what factors may influence the evolution of the cliff-top dune. This study aims to investigate the evolutionary history of the Fung-Chuei-Sha cliff-top dune by analyzing the grain size, CaCO_3 concentration and absolute dates of the dune sediment, and the land snail species found in the deposit. The results show three phases of aeolian sand accumulation in the Fung-Chuei-Sha cliff-top dune.

1. Phase I: aeolian sediment may accumulate in the bottom of the cliff between 2800 yr BP and 2100 yr BP.

2. Phase II: the cliff-top dune accumulated a 3.1-meter-thick sediment layer from 1500 yr BP to 1300 yr BP. In this phase, dune sediment deposited in a rate of 1.55 cm/yr. The paleoclimate proxy data from the nearby area indicate that the environment was cool and dry, and the Asian winter monsoon was strong during 1500-1300 yr BP. It blew the old coastal dune deposit at the bottom of the cliff up to the cliff top, and induced the C14 age reverse phenomenon. The aeolian deposition began to stabilize because of the wetter environment in the end of the Phase II. At the same time, the stable dune formed the silt and clay layer on the surface of the dune. A layer cemented by CaCO_3 may indicate the position of the palaeo-groundwater table.

3. Phase III: the phase started from 1500-1300 yr BP to the present. A 2.4-meter-thick eolian deposit was accumulated in a rate of 0.18 cm/yr during this phase. Four kinds of land snail shells, *Cyclophorus formosensis*, *Hemiphaedusa similaris*, *Platyrhapha swinhoei*, *Odontartemon heudei*, which prefer to live in a relatively humid environment, were commonly observed in the dune deposit, indicating the environment was wet and consequently caused a slower aeolian deposition rate at this phase. Between 1000 yr BP and 500 yr BP, there was a relatively stable period of time in dune accumulation, because of a wetter environmental condition. Dune restarted to accumulate from 500 yr BP to present.