



The morphology, sedimentation and evolution of Changyun Sand Ridge in Taiwan Strait, Southeastern Asia

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The Taiwan Strait is a shallow shelf between the mainland China and Taiwan island and a tidal dominated strait. The tidal force formed the tidal sand ridge- the Changyun Ridge.

The sand ridge located in the central-east of the Taiwan Strait, consists of three sand bodies: the eastern Changyun sand ridge, a ridge-like sand shoal and a sand sheet. Off the western coast of Taiwan about 30 km the eastern Changyun sand ridge is about 65 km long and 15 km wide, showing typical morphology of linear sand ridges. Its long axis is oriented parallel to the coastline and narrow reciprocal tidal ellipses. Farther west the ridge-like sand body has a length of 53 km and a maximum width of 26 km, trending northwest-southeast normal to the coast and oblique to the broad rotary tidal ellipses. Distal to the western Taiwan shoreline the sand shoal is 20 to 40 km wide, 22 m high and 60 km long, oriented parallel to the coastline and broad rotary tidal ellipses. Surface sediments of the Changyun Ridge are composed of very fine to coarse sands in a progressive seaward decrease in grain size. The configuration and spatial distribution of these three sand bodies with corresponding decrease in tidal speed and in grain size together suggest that the sand bodies developed sequentially from near-shore to offshore, presumably in response to westward shifting of the north-flowing tidal currents.

Chirp sonar profiles indicate that sand bodies of the Changyun Ridge rest upon a relative flat basal reflector at a water depth of 75m, suggesting a mainly hydrodynamically controlled origin. The variations of the hydrodynamic conditions (mainly

tidal currents) on the central-eastern Taiwan Strait shelf seem to be the primary control on sedimentary facies shift, morphological changes and sand ridge growth for the Changyun Ridge. The Changyun sand ridge is ongoing to receive sands from the south in a transitional development stage.

It is proposed that there are three stages in the sand ridge evolution. The first stage (low stand): 17ka-15ka, the sea waters from the South China Sea began to flow over the sea floor between the Penghu Islands and Taiwan and the paleo-tidal currents finally excavated the sea bed into a channel now known as the Penghu Channel. The second stage (transgression stage): 15ka-14ka, the northward flowing currents from the Penghu Channel are blocked by paleo-Choshui River delta and slowed down. The sediments are deposited on the delta and carried out westward. The third stage (high stand): 14ka-the present, the early formed Changyun Ridge is continued to be modified by the tidal currents in the Taiwan Strait and forms the present sand ridge.