

Sequence stratigraphic evolution of the Kumano Basin, SW Japan

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Based on a combination of seismic datasets and IODP well data, we investigate the Pleistocene–Holocene deposits of the tectonically active Kumano upper forearc basin (UFB), Japan, to better understand the eustatic sea-level forcing on the sediment dynamics. During the last deglaciation, starting ~18,500 years ago, sea level variation was a primary control on the sediment dynamics in the basin. The lowstand stage is defined by debris- and mud-flow deposits, with the sediments accumulating in the deep basin. As sea level rose, there was an increase in sand supply, and the transgressive stage deposits are characterized by sandy turbidites. There was a progradation followed by a retrogradation of the sandy deposits. This was related to the increase in meltwater discharge from the Japanese Alps at the beginning of the transgression phase, followed by flooding of the shelf. There was a drastic reduction in supply of sandy material during the highstand stage, with most of them accumulating on the shelf.

In the deeper and older deposits of the UFB, eight stratigraphic units are defined. The dominant stratigraphic pattern is controlled by 100-kyr Milankovitch eccentricity cycles indicating a strong eustatic control on the sediment supply over the last 400 kyr. The presence of para-sequences shows that the sediment dynamics result from the interaction between eustatic and tectonic controls. We propose different scenarios regarding the tectonic controls on the sediment dynamic, e.g., the implication of the subduction of the paleo-Zenisu ridge triggering accommodation space or the mud volcanism and related volcanoes acting as a natural barrier.

This study is one of the first to use sequence stratigraphic to deconvolve the tectonic from eustatic signals in the deposits of Kumano Basin, using a multidisciplinary approach. It attests that glacio-eustasy is one of the primary controls on the sediment supply and, therefore, on the basin morphodynamics despite the tectonic control.

Mots-Clés : Sequence stratigraphy, glacio-eustatic control, submarine-fan dynamic, forearc basin