

Canyon Formation on Clinoform Foresets of a Prograding Eocene-Miocene Carbonate Shelf, Offshore Northwest Australia

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Seismic data from the western part of the Browse Basin, North West Shelf, Australia, reveal the internal geometry and depositional history of a progradational Eocene-Miocene carbonate shelf. The prograding slope system is superbly imaged by two adjacent, three-dimensional multichannel seismic volumes embedded in a two-dimensional multichannel seismic grid. Based on this data, the 3-D stratal architecture of prograding clinoforms can be mapped throughout an area of ~ 1000 km². The Eocene-Miocene slope system can be divided into an Eocene clinoform succession strongly prograding towards the northwest, and an Oligocene to Late Miocene progradational to aggradational clinoform sequence.

The prograding clinoforms of the Eocene succession progressively develop highly dissected, gullied foresets. In contrast, the Oligocene to Late Miocene system is characterized by relatively smooth foresets that lack major incisions. This change in downs-lope erosion is accompanied by a transition in platform morphology from an unrimmed heterozoan carbonate shelf in the Eocene to a carbonate platform dominated by coral buildups in the Oligocene and Miocene. The spatial control provided by the 3-D seismic volume supports a detailed analysis of the relationship between the overall morphology of carbonate systems and the erosion mechanisms on their foresets. A better knowledge of the Tertiary succession will further help to optimize seismic velocity models for the study area.