

Examples of Morpho-Sedimentary Features From Broadband Seismic Data Offshore South Africa

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ABSTRACT

Bottom current – controlled depositional and erosional features are recognized along the slope in the Durban basin, offshore South Africa. The basin is formed on a major transform margin and has undergone a complex tectonic history with major rifting and rotation of fault blocks. A significant quantity of sediments was transported from the hinterland to the slope area by the Tugela Canyon as a result of various uplift phases during the Tertiary period mainly the mid-Oligocene uplift, the Miocene uplift, and the Pliocene uplift. The margin is dominated by a mixed turbidite - contourite depositional system.

This work examines a buried mixed system of gravitational deposits and contourites using broadband seismic data in the Durban basin. Seafloor morphology illustrates the large-scale interplay of along slope and down-slope features. Submarine canyon systems have been identified from north to south. These canyons reach widths of up to 6 km and incision times of over 1.1s. Water depths in the study area range from almost 1.5s to over 2.9s.

We observed channel complexes that transport sediments from shelf deltas out into basinal areas. Contourites formed by deep-water oceanic currents that circulate along the continental slope are mostly controlled by the local seabed morphology, sediment supply, and prevailing bottom current dynamics. High-amplitude wavy reflections are frequent within the contourites and are indicative of a high-energy drift system. They are often altered by turbiditic gravitational deposits. These contourites provide insight into the sedimentary processes and bottom current circulation patterns that existed during that period. Mass transport deposits form a significant component of the Neogene within this basin.

We propose the use of seismic attributes, internal reflection and amplitude characteristics for a detailed understanding of the morphologies of these deep water sediments and in differentiating these systems.