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Sequence Stratigraphy of the Durban Basin, South Africa.

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The Durban basin occurs as a structurally complex, 10 000 km^2 offshore rift basin, preserved on the eastern continental margin of South Africa, extending from the shoreline in the west to the 2500 m isobath in the east. The area, although having been the target for oil and gas exploration in the 1980's, has not been well studied, with legacy seismic coverage constituting ~13000 km of 2D seismic and four wildcat exploration wells drilled on the continental shelf. Analysis of existing legacy 2D seismic and exploration borehole data has been combined with analyses of new data, to provide a better understanding of the evolution and depositional architecture of this portion of the South African continental shelf.

Regional 2D seismic data were obtained from the continental shelf and Tugela Cone offshore the KwaZulu-Natal east coast. These data reveal seven seismic units (A-G) separated by major sequence boundaries. Internal seismic reflector geometries suggest variable deposition in syn-rift to upper slope and outer shelf conditions. Aggradational syn-rift successions (Unit A) correlate with restricted highstand systems tract deposition prior to base level subsidence within the basin. Units B, and C, deposited during Turonian and Campanian times, represent two periods of falling stage systems tract deposition with sediment thinning against the antecedent palaeoslope to the west. Within units B and C, mounded and slope-attached fans have been deposited during late forced regression and are overlain by strongly progradational seismic reflections on the upper slope. Unit D represents a preserved transgressive systems tract of Palaeocene to Eocene age, with onlapping retrogradational to aggradational units deposited on the slope apron. Unit D is capped by a highstand systems tract represented by progradational reflectors in the proximal basin. Three pulses of sedimentation (Units E, F, G) occurred within the basin since the Oligocene, each separated by pronounced erosional hiatus's (SB 5, 6, 7). The sequence boundaries separating Units E, F and G correlate with periods of relative sea-level fall (falling stage systems tracts) with sediment bypass to the deep basin causing incision of numerous channel/valley systems on the continental shelf. Unit E represents falling stage systems tract deposition with aggradational to progradational deposition confined mainly to the slope. Unit F although similar to Unit E in seismic architecture, represents an offlapping shelf-edge wedge deposited in a lowstand systems tract. Unit G represents Pliocene sedimentation in either a lowstand systems tract or early transgressive systems tract. Sedimentation of units E-G along the shelf represents the main progradational phase of the Tugela Cone.