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Seismic Stratigraphy of the Saldanha Bay and Langebaan Lagoon areas

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In this study, seismic stratigraphic principles are applied with the aim of interpreting continental shelf stratigraphy offshore of Saldanha Bay and Langebaan Lagoon, located on the West Coast of South Africa, 100 km northwest of Cape Town. The coastal plain and the adjacent continental shelf are defined by a Precambrian to Cambrian Cape Granite bedrock suite overlain by younger, Cenozoic sedimentary rocks [1]. The continental shelf has a width of approximately 50 km, the narrowest along the west coast [2]. It is, however, not very well understood due to limited sediment exposure and published reports resulting from confidentiality clauses imposed by diamond mining firms operating off the west coast [3]. This study aims at describing the seismic stratigraphy of the continental shelf and trying to compare, correlate and contrast results with already published work done on: (i) the coastal plain, (ii) offshore Cape Columbine north of the study area, (iii) within Saldanha Bay and Langebaan Lagoon, and (iv) the Orange Basin.

Boomer seismic data were collected for this work and have been processed and interpreted to define the stratigraphy. The two longest and most detailed lines are oriented coast-perpendicular and coast-parallel. Each line is 40 km long and reach a maximum depth of 300 m below mean sea level (BMSL), and 80 m BMSL, respectively. The coast-parallel transect extends as far south as Yzerfontein. Shorter seismic profiles were also collected in a relatively small area near the Langebaan Lagoon entrance in Saldanha Bay. Post-processing of the seismic data was performed to enhance the signal to noise ratio and to achieve an overall satisfactory display suitable for interpretation and correlation. In the inner bay, an almost east-west bedrock depression approximately 13 km in length and reaching depths of about 80 m BMSL is overlain by younger, 50-60 m thick Cenozoic strata of the Sandveld Group. It is linked to an onshore 20 m BMSL depression beneath Saldanha Bay in the northeast, possibly forming a palaeo-Berg river channel along which the river discharged to the sea. Five distinct lithological units (labelled 1 to 5) are identified above the Cape Granite. The lowermost Unit 5 is a broad zone and has a maximum thickness of 45 m. Overlying this unit is a 15 to 17 m succession comprising the other 4 units. Unit 4 is thin, inextensive and defined by relatively weak but definable reflectors. Unit 3 is bound by weak reflectors, and Unit 2 consists of and is bound by strong reflectors. The uppermost Unit 1 is bound by the seafloor and a strong reflector at its base. These units are correlated with the Sandveld Group, from the Elandsfontein Formation at the base to the Witzand Formation at the top.

References:

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