Cretaceous–Paleogene calcareous nannofossils from International Ocean Discovery Program Expedition 392 to the Agulhas Plateau, Southwest Indian Ocean

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IODP Expedition 392 Scientific Party

International Ocean Discovery Program (IODP) Expedition 392 cored three sites on the Agulhas Plateau and one site in the Transkei Basin to address questions regarding the origin and timing of emplacement of Agulhas Plateau, as well as examine Southern Ocean climate history and opening of oceanic gateways from the Cretaceous through the Paleogene. Age models for the sites rely primarily on calcareous nannofossils and magnetostratigraphy, with

dinoflagellates providing key events for some intervals, and additional constraints from planktonic foraminifers and diatoms. Site U1579, located in a depression on the central Agulhas Plateau, records a nearly continuous section dated to the Santonian to earliest Miocene. Dinoflagellates provide age control for the zeolitic sandstone and siltstone with glauconite at the base of the cored section. Above this, nannofossils are common to abundant and moderately preserved in upper Santonian to Maastrichtian calcareous chalks and the assemblages show Southern Ocean affinities. Paleogene nannofossils are abundant and moderately to well preserved. Sedimentation rates were lowest in the Eocene, which includes either condensed intervals or hiatuses. Nannofossils are well preserved in the Oligocene and assemblages consist of primarily mid-latitude species with occasional incursions of cold-water taxa. Site U1580 is located on the southern Agulhas Plateau adjacent to a basement high. Cretaceous–Cenozoic sedimentation at this is interrupted by several unconformities, and the lowermost part of the cored interval is interspersed with basalt layers interpreted as sills. The oldest sediment is likely uppermost Cenomanian in age. Overlying the shallowest basalt is Coniacian–Santonian silt- and sandstone with varying proportions of zeolites, glauconite, and carbonate. Sedimentation rates were very high (~10 cm/kyr) during this time. Much of the early Campanian and mid-Maastrichtian is missing at this site. Paleocene nannofossils are moderately well preserved and suggest a continuous section with sedimentation rates of 1.5 cm/kyr. Sedimentation rates increased in the late Paleocene to early Eocene, and nannofossils are quite well preserved through the Paleocene-Eocene Thermal Maximum and in the lower Eocene chalk/ooze. Site U1581 in Transkei Basin includes a thick section of upper Campanian to Maastrichtian mudstone with occasional sandstone beds. Nannofossils are sparse but very well preserved through much of this interval, although preservation decreases with depth, concomitant with increasing siderite. The Cretaceous assemblages include both Southern Ocean and mid-latitude taxa. Reworking is common throughout the Cenozoic and this interval is also interspersed with hiatuses, especially in the Eocene and Miocene. Sedimentation appears to be more continuous from the latest Miocene to present, with sedimentation rates of ~2.8 cm/kyr. Site U1582, cored on the northern Agulhas Plateau, includes only ~40 m of ooze and siliciclastic sediments overlying basement. Manganese nodules are common and the section is highly condensed, with at least 70 Myr represented. Future work will refine the age models for each site to provide a framework for the paleoclimatic and paleoceanographic studies planned by the expedition science party members.