direction which is along the axis of the East African Rift System. This conclusion is drawn from inspection of regional gravity and magnetic maps of the region.

OCEAN SEDIMENT FLUXES: SPATIAL AND TEMPORAL VARIABILITY IN THE ATLANTIC OCEAN

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DSDP and ODP have provided a data base to quantify sediment fluxes into the ocean basins during the Late Mesozoic and the Cenozoic. As part of a major project to study the history of pelagic sedimentation in the world ocean we are concentrating presently on the Late Cenozoic Atlantic Ocean. Due to its late plate tectonic history and the opening of gateways connecting the Arctic and the Antarctic, today it is principally different from the Indian and Pacific oceans. Deep-water renewal occurs both in the Greenland Sea and in the Atlantic sector of the Southern Ocean due to the down-welling of cold, oxygen-rich waters causing an intense stratification of the deep intervals of the oceanic water column, whereas the Atlantic Ocean has been disconnected from the circum-equatorial current system due to the collision of the African and Eurasian plates and due to the construction of the middle American land bridge during the Middle and Late Cenozoic. The distributional patterns of Late Cenozoic sediment fluxes plotted into a carefully reconstructed palinspastic framework of the paleophysiography of the Atlantic reflect the major elements of the surface-water circulation, as well as the source areas for the lateral advection of the terrigenous components. The peculiar mode of Atlantic deep-water renewal and circulation can also be deduced from the temporal and spatial distribution of hiatuses in the various sediment columns. A major effort is required to homogenize the stratigraphic data base, which is accomplished by establishing an artificial holo-stratigraphy through stacking of all potential bio-events. Sediment compositions and physical properties are compiled from the DSDP/ODP data bases with minor corrections. The results of the project are illustrated in a series of palinspastic maps illustrating the mass-balanced distribution of sediment fluxes of biogenic and terrigenous sediment components for time slices of 1 - 5 mio. y. in duration. They allow the establishment of descriptive paleoceanographic models for the Late Cenozoic Atlantic Ocean.

THE MODERN ATMOSPHERIC AND OCEANIC SURFACE CIRCULATION AND ITS RECORD IN SEDIMENTS OF THE SOUTHWEST PACIFIC OCEAN

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Due to its shallow topography, the seafloor east of Australia is one of the few extensive areas of the Pacific Ocean where biogenous calcareous components are widely preserved. 180 surface sediment samples were investigated for their planktic foraminiferal (> 149 μm) and terrigenous sediment components. These data were used to trace atmospheric and oceanic circulation patterns and to develop, with multivariate statistical methods, an equation for the calculation of sea-surface temperatures and salinities. The pattern of the percentage distribution of quartz can be related to modern wind regimes. In recent sediments the quartz content is a distinct

tracer for the atmospheric circulation in the region east of Australia. A large lobe of high quartz concentrations extends eastwards from the coastline. This is related to major wind and storm tracks acting as transport mechanism across the southern part of the landmass. The concentration of biogenous opal is related to productivity of surface-water masses. The abundance of opaline components in the sediments decreases slightly towards the west. South of the highly productive tropical water masses they are strongly decreasing. The distribution patterns of major species of planktic foraminifers reflect different surface-water masses. The impact of subtropical-tropical water masses is indicated by high abundances of *G. ruber* and *G. sacculifer*. High percentages of *G. bulloides*, *G. inflata* and *N. pachyderma* reveal the influence of subpolar-polar waters. Q-mode factor analysis of the planktic foraminiferal counts (63 core tops) allows definition of characteristical foraminiferal assemblages. The four most important factors explain 95.5% ot the total variance. Factor 1 (66%) is dominated by the tropical-subtropical species *G. sacculifer* and *G. ruber*. The transitional to subpolar species *G. inflata* is important in factor 2 (12%). The temperate cool factor 3 (13%) is composed of *G. quinqueloba* and *G. glutinata*. Factor 4 explains 3% of the total variance and is represented by various species. It is assigned to high productive coastal waters off the Australian continental margin. The computed equation allows one to evaluate sea-surface temperatures and salinities. The results were correlated to data adapted from the literature and correspond with 95% (temperatures) and 77% (salinities).

THE PALEOCENE BENTHIC FORAMINIFERAL EXTINCTION

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Deep-sea benthic foraminifera underwent one global mass extinction during the last 75Ma, in the latest Paleocene, which occurred rapidly (10^4 yrs. or less), and was coeval with large, transient excursions to lighter carbon and oxygen isotopic values in benthic and planktonic foraminifers. Isotopic excursions have been observed over depths between 1000 and 3500m in Atlantic, Pacific and Indian Oceans. At high latitudes (southern-most Atlantic and Indian Oceans) post-extinction faunas were dominated by small, thin-walled biserial forms (e.g., *Tappanina selmensis*), from 1100 - 1900m paleo-depth. *Nuttallides truempyi* was absent for several hundred thousand years after the extinction. At sites on Walvis Ridge (mid-latitude, southern Atlantic Ocean, 1600-3400m paleodepth) post-extinction faunas were dominated by *N. truempyi*, and, especially at greater depth, abysaminids; all specimens were small and thin-walled. On Walvis Ridge and in the Indian Ocean the extinction occurs a few cm above the base of a clay layer ($CaCO_3$ <35%) within the calcareous oozes; at Maud Rise $CaCO_3$ dropped from ±90 to 65%. During the late Paleocene there were global high turnover rates in planktonic organisms, and overall low productivity. The dominance of biserial forms just after the extinction argues against a drop in surface-water productivity at high latitudes as the cause of the extinction; these faunas suggest (local) high productivity and/or low oxygen levels in deep waters. The synchroneity of the extinction and large, transient isotopic changes suggest that extinction was synchronous worldwide and occured at a time of major changes in climate and the functioning of the carbon cycle. We speculate that temporary short-term, extremely high rates of CO_2 emissions from North Atlantic flood basalt activity caused high-latitude warming, and thus a major decrease in the contribution of high-latitude sources to the global deep water masses, with concominant changes in deep-