than those of the Holocene. These results indicate some warming and minor deglaciation of Antarctica, but are inconsistent with scenarios calling for major warming and deglaciation of the Antarctica ice-sheet. The climate system operated within relatively narrow limits during the Pliocene prior to ~3.2 Ma (i.e., ~0.5 ‰), and the Antarctic cryosphere probably did not fluctuate on a large scale until the Late Pliocene.

The late Gauss was the time of greatest change in Neogene climate in the northern antarctic and subantarctic regions. The mean and amplitude of the $\delta^{18}O$ signal increased abruptly at 2.7 Ma, and the greatest $\delta^{18}O$ values of the Gauss and Gilbert Chrons occurred at ~2.6 Ma, just below a hiatus that removed the interval from ~2.6 to 2.3 Ma in Site 704. During this climatic transition, surface waters cooled as the Polar Front Zone (PFZ) migrated north and ice volume increased on both Antarctica and Northern Hemisphere continents. At ~2.6 Ma, benthic $\delta^{13}C$ values decreased toward the Pacific, marking the onset of glacial suppression of NADW.

The early Matuyama Chron (~2.3 to 1.7 Ma) was marked by relatively warm climates except for strong glacial events associated with isotopic stages 82, 78, and 70. At 1.67 Ma (stage 65/64), surface waters cooled as the PFZ migrated equatorward and oscillated about a far northerly position between 1.67 and 1.5 Ma (stages 65 to 57). Beginning at ~1.42 Ma (stage 52), all parameters ($\delta^{18}O$, $\delta^{13}C$, %opal, $\%CaCO_3$) in Hole 704 become highly correlated with each other and display a very strong 41-kyr cyclicity.

During the Late Pleistocene, oxygen isotopic stages 7, 9, and 11 were the warmest interglacial conditions in surface waters of the Southern Ocean, whereas the strongest glacial conditions occurred during stage 12. Comparisons of benthic carbon isotopic gradients reveal that production rates of NADW were strongest during stages 7, 9, and 11 and weakest during stage 12, supporting a link between the flux of NADW and paleoceanographic conditions in the Southern Ocean.

ORGANIC FACIES EVOLUTION OF NEOGENE AND QUATERNARY SEDIMENTS FROM THE NORWEGIAN SEA (ODP LEG 104/VØRING PLATEAU)

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The quantity and the type of organic matter in sediments from the Vøring Plateau (Leg 104, Sites 642, 643, and 644) were studied in detail by Rock-Eval-pyrolysis and organic petrology.

During the Early Miocene the organic matter composition was changing from a terrestrial dominated assemblage with moderate to high accumulation rates of organic carbon (AR_{TOC}) to a more marine organic facies with a lower AR_{TOC}. This is caused by a decreasing input of terrestrial organic matter due to climatic changes on the nearby continent, or a successive sea level rise which would result in enhanced entrapment of organic matter on the continental shelves.

High AR_{TOC} and organic carbon contents of more than 5 wt.% (Site 642) are characteristic for the Lower Middle Miocene (15.5-14 Ma). The organic matter spectrum shows a high proportion of large organic particles of terrestrial origin, mainly oxidized plant fragments. It is not completely understood If this is related to sea-level and/or climatic changes or a high reworking of older sediments from the continental slope.

Although the Early and Lower Middle Miocene sediments show a high accumulation rate of biogenic opal, the organic matter related to the high opal-

productivity is almost completely mineralized. The major autochthonous particles were dinoflagellate cysts and partly degraded fragments of algae.

Low AR_{TOC} and a predominance of autochthonous organic matter are diagnostic for the time period from 14 to 2.5 Ma. This is followed by a dramatic change of the organic facies at 2.5 Ma recorded at all three sites. At this time the first major glaciations on the Scandinavian continent caused an intensive glacial abrasion of outcropping Mesozoic organic-rich rocks that rimmed the Scandinavian continent at its eastern border. This thermally mature organic matter was redeposited in the Norwegian Sea by ice rafting and is generally found in large amounts in the glacial sediments younger than 2.5 Ma. Here, peak TOC values of 1-1.5 wt.% are almost exclusively made up by reworked organic particles (vitrinites, inertinites, and coal fragments).

PHYSICAL PROPERTIES OF SEDIMENTS FROM THE EQUATORIAL EAST PACIFIC (ODP LEG 138)

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The primary objective of ODP Leg 138 was to define the paleoceanographic evolution of the eastern equatorial Pacific during the last 12 million years. To address this objective, over 5500 m of core were recovered from 11 sites drilled along two north-south (9° W and 110°W) transects that crossed the complex oceanographic circulation system of the equatorial Pacific. One goal of the Leg 138 physical property program was to determine the impact of paleoceanographic changes to the physical properties of sediments.

The lithologies recovered during Leg 138 ranged from siliceous clays and carbonates through laminated diatomites and metalliferous sediments.

The downcore distribution of physical properties generally shows that two factors control physical property data. Gravitational compaction causes a reduction of water content and porosity. Due to consolidation processes, shear-strength, wet-bulk density, and thermal conductivity increase. Variations in lithology from calcareous to siliceous sediments result in an increase in water content and porosity, whereas wet-bulk densities and thermal conductivities decrease. Grain density, the "material constant", is lower for intervals rich in siliceous material. The lithologic variations recorded in all holes generally mask the effects of gravitational compaction.

SEQUENCING OF EVENTS IN THE NORTH PACIFIC WITH RESPECT TO CONTINENTAL DUST AVAILABILITY

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Core V21-146 provides a continuous record of northwest Pacific pelagic sedimentation spanning the past 530,000 years. Downcore variations of $\delta^{18}O$ from benthic foraminiferal calcite were correlated to the SPECMAP record to provide an age model for late Pleistocene paleoclimatic and paleoceanographic variation.

Eolian material was isolated using a series of chemical extractions and analyzed to determine mass flux and grain size data. The flux of eolian dust is a proxy measure of the source area aridity and correlates well to the loess-soil