the Paleogene California continental margin. Diverse subtropical upper Paleocene-lower Eocene faunas containing *Morozovella* pass upward into temperate middle Eocene ones characterized by diminished diversity, lack of *Morozovella*, and by high dominance values for truncorotaloidid and subbotinid species, thus lending support for the concept of a bipolar middle Eocene cooling interval.

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BIOGENIC AND SEDIMENTARY FEATURES ASSOCIATED WITH JURASSIC CARBONATE TIDAL CHANNEL, WEST PAKISTAN

Exposures of steeply dipping Jurassic limestones in the Surghar Range, West Pakistan, allow detailed observations of various biogenic and sedimentary features. Thin-bedded dolomites, desiccation cracks, scour-and-fill structures, and shallow-water benthonic Foraminifera, within a dominant lithology of pellet carbonate grainstones and mudstones, indicate very shallow carbonate shelf conditions at the time of deposition. Periods of subaerial exposure, and subsequent lithification are indicated by the presence of oriented bivalve borings, both on surfaces which have been desiccated and on one surface which has been corraded by tidal currents. The latter exposure surface contains pebbles of identical lithology within the reticular gullies. Encrusting oysters are common. Submarine cementation of the surfaces is discounted because of the absence of inverted borings, superimposed bored surfaces, and extensively bioturbated sediment.

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ASPECTS OF SUBSURFACE BAHAMIAN DOLOMITES AND INSIGHTS INTO THEIR ORIGIN

A continuous 168-m core was collected on San Salvador in the eastern Bahamas. Dolomite is present in the interval between 35 and 147 m. The dolomite is of 2 basic lithologic types. Those dolomites which are probably supratidal mudstones and show laminations, a poorly developed fauna, a few intraformational clasts, and in places a capping red crust, are termed "stratal" dolomites. These stratal sequences are less than 10 cm thick. Those dolomites which are replacements of grain-supported carbonate sediments or rocks, probably of backreef or lagoonal facies, are termed "massive" dolomites.

Stable isotope analyses show both types of dolomite to have δC^{13} values within the range of Holocene sediments, but to be higher in δO^{18} than either Holocene sediments or Pleistocene limestones. These data indicate the dolomites formed by reaction of host carbonate sediments or rock with Mg-rich hypersaline brines. The stratal sequences were probably dolomitized by upward capillary movement of the fluids, whereas the massive sequences were dolomitized by seepage refluxion. Stratal dolomites seem to be relatively lower in δO^{18} and mol % $MgCO_3$ and more poorly ordered than massive dolomites. This may reflect different efficiencies of the 2 dolomitization processes.

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GEOLOGIC HISTORY OF OCEANIC PLANKTON

In its evolution throughout geologic time, the oceanic microplankton became increasingly diverse in major taxonomic representation and biochemical variety, but fluctuated markedly in species diversity, abundance, size range, morphology, and dominant skeletal composition.

Organic-walled phytoplankton of the Precambrian was locally abundant, specimens relatively large, but diversity low. By Ordovician and Silurian times, phytoplankton varied widely in size and morphology; zooplankton included radiolarians and rare tintinnids. Decreasing suddenly in the Late Devonian, both phyto- and zooplankton were rare in the late Paleozoic.

Slow development of plankton in the Triassic left a meager record of acritarchs, coccolithophorids and radiolarians. Rapid diversification characterized the later Mesozoic; abundant dinoflagellates, tintinnids (calpionellids), and planktonic Foraminifera were added during the Jurassic; siliceous phytoplankton arose in the Cretaceous (diatoms, silicoflagellates, chrysomonads), and radiolarians and coccolithophorids expanded.

Another severe reduction in plankton diversity and abundance closed the Mesozoic, hence most groups are poorly represented in the Danian. Paleocene and Eocene diversification and proliferation of phytoplankton (dinoflagellates, coccolithoporids, diatoms, silicoflagellates, ebridians) and zooplankton (radiolarians, foraminifers and some tintinnids) were accompanied by increased morphologic complexity and greater size range. Although plankton abundance, diversity, and complexity fluctuated in the later Cenozoic, no new higher taxa arose.

At present, abundant plankton indicates high productivity, but diversity may be low. Geologically, this abundance was reflected in rapid accumulation of biogenic sediments (chalks, cherts, diatomites); extensive photosynthetic utilization of CO_2 also may have contributed to the accumulation and preservation of calcareous sediments.

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CONTINUITY OF PLIOCENE TURBIDITE SANDSTONES, VENTURA AREA, CALIFORNIA, WITH APPLICATIONS TO SUPPLEMENTAL RECOVERY

Outcrops of turbidite sandstones of the Pico Formation (upper Pliocene) at Ventura field and vicinity were examined to gain an insight into their continuity.

Two types of reservoir quality sandstones were recognized based on physical and petrophysical properties. Type A sandstones (graded, poorly sorted) have low permeabilities (several hundred millidarcys). Type B sandstones (nongraded, moderately to well sorted) have high permeabilities (several thousand millidarcys).

Three classes of turbidite packages were distinguished based on internal arrangement of sandstone types. All 3 packages contain thin-bedded Type A and B sandstones. A Class I package has, in addition, massive, composite Type A sandstones at the base; a Class II package has the massive, composite Type A sandstones in the middle; and a Class III package has no massive, composite Type A sandstones.

Thick, composite Type A sandstones have good lateral continuity because they are amalgamated. Type B sandstones have poorer lateral continuity because of lack of communication with other sandstones.

Observations on a single turbidite package over a