isotope composition of the ocean[9], which is the result of an increased difference in productivity between the deep sea and coastal waters. Increased coastal productivity captures a greater share of nutrients for the margins, with the result that sedimentation in the deep sea is decreased.

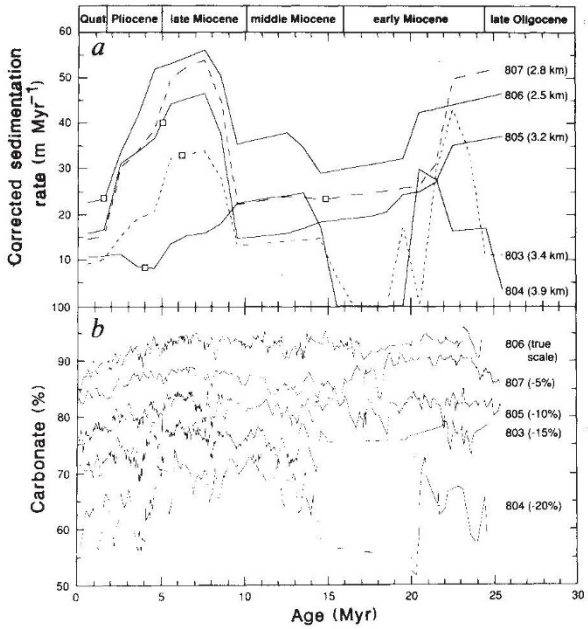

FIG. 2 *a*, Sedimentation rates (corrected for compaction) as a function of age for Leg 130 sites 803–807. Water depth for each site is indicated on the far right-hand side. Squares indicate the times when the sites crossed the equator. *b*, Carbonate percentages as a function of age for Leg 130 sites 803–807. Note that the absolute carbonate values for the sites have been adjusted by 5–20 per cent (see right-hand side of figure) to facilitate comparison. Acoustic reflectors in the seismic profiles often coincide with sharp changes in carbonate content.

The period of high sedimentation rate, centred around 7 Myr, in fact displays some of the highest rates (about 50 m Myr^{-1}) ever recorded in open-ocean pelagic sediments. The timing of this period suggests that these high rates may be associated with the closing of the Tethys and with important phases of mountain-building, leading to an increased supply to the ocean of continent-derived materials. At this time, a pronounced gradient of productivity developed from east to west in the equatorial Pacific[10,11]. Eventually the piling up of warm water in the western Pacific, owing to increased trade winds, led to a reduction of productivity. The high sedimentation rates fell off during the Pliocene and especially during the Quaternary, accompanied by decreasing preservation of diatoms and radiolarians in the sediments. This drop also may be the result of removal of nutrients and silica along the coastal oceans by increased coastal upwelling. This finding is puzzling because we must assume that strong trade winds continued to drive upwelling in equatorial regions, and yet the sedimentation rate dropped at the sites drilled.

Since the middle Miocene, sedimentation rates at all the sites have been similar. The amounts of carbonate deposited (Fig. 2*b*) are also highly correlated between sites for the past 12 million years, but poorly correlated before this. These observations suggest that a strong vertical gradient of carbonate saturation, which controls the increase of dissolution of carbonate with depth, became established at this time as a result of increased cold deep water formation. But it is puzzling that the carbonate values of deep sites are so similar to those of shallow sites. Carbonate removal by dissolution cannot by itself explain simultaneously the (distinct) differences in sedimentation-rate patterns between the sites, and the (slight) differences in carbonate content. More will be learned on this point by improving the resolution of sedimentation rates through analyses of Milankovitch frequencies in the record, of physical properties and of stable isotopes.

An important objective of Leg 130 was to account for the strong acoustic reflectors that give a 'layer-cake' appearance to seismic profiles of the sediments. Many of these reflectors correspond to the sharp changes in carbonate content seen in Fig. 2*b*, and there is some correlation between sites. On the whole, the results support the proposition that at least some of the major reflectors are caused by palaeoceanographic events (such as dissolution pulses) that affect carbonate deposition[12,13]. □

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DAEDALUS

Animal warmth

ANIMAL fur and feathers are wonderfully self-adjusting. An animal or bird can fluff up its coat in cold weather for extra insulation, or smooth it down in the warm to dissipate heat. Daedalus is now imbuing human clothing with the same thermostatic cunning.

He is exploiting the 'bimetallic strip' principle: a laminate of two materials with different coefficients of expansion curls with change of temperature. Two-component synthetic fibres are already well known, so it should be easy to bond two polymers of contrasting expansion coefficients, like nylon and polyester, into a highly thermosensitive fibre. Inserted as flock or tufting in a conventionally woven fabric, such fibres will form a velvety 'Cat-fur'. Its pile will fluff up in the cold, but curl over and lay flat in the heat, neatly thermostatting the wearer.

DREADCO's Cat-fur will come with a range of transition temperatures. For coats and other outerwear, it should fluff up at moderate outdoor-air temperatures, so as to respond to changes in the weather. A higher-temperature grade will be used in underwear. Responsive to typical skin temperatures, it will maintain intimate comfort in the face of wide swings of metabolic rate, from the hot sweat of exertion or anxiety to the chill of desperate foreboding.

The ultimate in thermostatted clothing will be a complete one-piece 'Cat-suit'. Each element of its surface will incorporate the right mix of Cat-fur fibres to maintain the skin beneath at its optimum temperature. It will be equally comfortable indoors or outdoors, in winter or summer, in violent exercise or total relaxation. The wearer will need no other garment!

An extreme test of Cat-fur will be at night, in its role as pyjamas or bed-clothes. A sleeper produces so little heat that he needs the maximum of thermal insulation; even so, modern beds (especially duvets) probably overdo it. A time-lapse film of a sleeper looks like a fight with an invisible boa constrictor, but is really a constant search for thermal equilibrium. When overheated, the sleeper must move to a cooler part of the bed, which soon heats up in its turn; when too chilly, he must curl up to conserve heat. This ceaseless unconscious activity is far from restful.

In blissful contrast, a sleeper insulated by DREADCO's Cat-fur will be in perfect thermal equilibrium all through the night. He will never have to move, and will truly 'sleep like a log'. A whole new era of total nocturnal comfort and perfect sleep will be ushered in! The dreary syndrome of daytime exhaustion, with its gummed eyelids and drained enthusiasm, will be abolished; instinctive zest for life, long-forgotten by the legions of Insomniacs Anonymous, will be restored. David Jones