NEWS AND VIEWS

Sea Floor and Others

from our Geomagnetism Correspondent

THE annual meeting of the American Geophysical Union, in Washington, is regarded as something of an event in the geophysicist's calendar if only by virtue of sheer magnitude. Between April 21 and 25 more than 2,100 delegates listened to more than 1,200 papers covering almost every aspect of geophysics. It can hardly be said that excitement reached fever pitch—that last happened in 1967 after the interpretation of ocean magnetic anomalies and magnetic field reversal patterns in deep sea cores.

Sea floor spreading continued to attract considerable attention. New surveys of magnetic anomalies and their interpretation in terms of geomagnetic field reversal were introduced by B. P. Luyendyk (Scripps Institution of Oceanography), who has made magnetometer measurements over Mason–Raff anomalies close to the ocean floor. At this level, surveys reveal anomalies of shorter wavelength and higher amplitude than those detected at the surface. Because they remain, even after allowing for topographic effects, they must be the result either of petrographic variations in the oceanic second layer or of real fluctuations in geomagnetic field intensity.

The next step in the sea floor saga is, of course, to obtain actual samples from the sub-sedimentary oceanic layer. This is being done within the JOIDES programme; but in the meantime some dredge samples are available. J. de Boer (University of Rhode Island) reported magnetic polarity measurements on pillow lavas dredged from the central normal and first reversed anomaly regions of the Reykjanes Ridge. The vertical orientations of these samples were determined from small scale volcanic features within the samples themselves. Polarities agreed with those deduced from the signs of the corresponding anomalies, thus supporting field reversal as the source of at least the first two anomalies. Measurements on basalt dredge samples, this time from the mid-Atlantic Ridge, were also reported by Dr C. M. Carmichael (University of Western Ontario). Because they were unoriented, these particular samples were unsuitable for palaeomagnetic directional analysis, though ancient field intensities deduced from them varied between 40 per cent and 200 per cent of the present field value, again supporting the reality of dipole field fluctuations.

Turning to the directional palaeomagnetism of continental rocks, Dr R. R. Doell (US Geological Survey) reported further results from Hawaiian Holocene basalts which indicate an angular standard deviation in direction of only 0.05 radians attributable to secular variation of the non-dipole field. The new measurements thus support the existence of a non-dipole field low in the Central Pacific. The angular standard deviation for dipole wobble during the Brunhes polarity epoch, calculated from all relevant Hawaiian data,

was only 0.20 radians. On the other hand, measurements made by A. V. Cox (Stanford University) on New Zealand rocks magnetized during the Brunhes epoch showed that at the relevant latitude the angular dispersion of directions caused by secular variation was greater than that predicted by current field models.

J. H. Foster (Lamont–Doherty Geological Observatory) described magnetic polarity measurements on a 28 metre core of deep sea sediment from the equatorial Pacific. Twenty-two reversals were discovered between the Gilbert–Epoch 5 boundary and the bottom of the core, estimated at about 12 million years. The pattern of polarity zones was in good agreement with that predicted from sea floor spreading. N. D. Opdyke, also from Lamont, confirmed by interpolating between the Brunhes–Matuyama and Matuyama–Gauss boundaries that the long event seen in many deep sea cores in the lower part of the Matuyama epoch is the Olduvai event and not, as some have supposed, the earlier Gilsa event. The duration of the Olduvai was thus deduced to be $150,000 \pm 47,000$ years.

J. M. Ade-Hall (University of Liverpool) presented further data showing a correlation between magnetic polarity and opaque petrology—this time from the Isle of Mull (Scotland) dykes. The paradox whereby reversed rocks, though magnetized in a reversed magnetic field, are petrographically different from normally magnetized rocks was thus extended. Adequate explanation of this phenomenon seems to be no closer. And continuing on the theme of paradoxes, Dr J. D. Hayes (Lamont–Doherty Geological Observatory) reported the extinction of a certain North Pacific radiolaria species at the base of the Jaramillo event (0.9 million years), although no other species became extinct at that time. In this case, however, an explanation may be at hand. The size of the species members showed a marked correlation with latitude, and thus implicitly with temperature, suggesting that a slight increase in temperature rather than radiation is the more likely cause of extinction.

PALAEOGEOGRAPHY

Boreal Inland Sea

SINCE the time of Cortez, few people have been lucky enough to discover new oceans—a privilege that now seems to have befallen the Oxford palaeontologist A. Hallam (*Palaeontology*, 12, 1; 1969). Dr Hallam's ocean, which he has named the Boreal Inland Sea, was probably a prominent feature of the world in Jurassic times, which lasted from about 185 to 140 million years ago.

Jurassic marine fossils, as has been known since Neumayr's work in 1883, are restricted to two chief faunal realms. The Boreal realm occupies the northern part of the Northern Hemisphere and the rest of the