environ. Engng Div., Am. Soc. civ. Engrs, 107(EE5):1100-1105.

A model is created which treats a sediment as a combination of distinct chemical phases; a pesticide adsorption relationship is developed for each phase. It was found that sediment organics are the dominant sink for lindane in model systems. Dept. of Civ. Engrg., Oregon State Univ., Corvallis, Oreg., USA. (bwt)

82:1731

Sen Gupta, R. and T.W. Kureishy, 1981. **Present state of oil pollution in the northern Indian Ocean.** *Mar. Pollut. Bull.,* 12(9):295-301.

Concentration of floating tar balls ranges 0-6.0 mg/m^2 in the Arabian Sea; the oil tanker route in the Bay of Bengal exhibits 0-69.75 mg/m^2. North of this route, the bay is comparatively free of floating tar. Nat. Inst. of Oceanogr., Dona Paula, Goa 403004, India.

C240. Corrosion

82:1732

Bessone, J.B., R.A. Suarez Baldo and S.M. de De Micheli, 1981. **Seawater testing of Al-Zn, Al-Zn-Sn, and Al-Zn-In sacrificial anodes.** *Corrosion,* 37(9):533-540.

Al-Zn-In showed high galvanic efficiencies at relatively higher flows of circulating seawater; low efficiencies were found for the ternary alloys when flow velocities decreased. Al-Zn alloys exhibited uniform dissolution. Dept. of Ciencias Exactas, Univ. Nacional del Sur, Bahia Blanca, Argentina. (smf)

D. SUBMARINE GEOLOGY AND GEOPHYSICS

D10. Apparatus and methods

82:1733

Almagor, Gideon and Dan Argas, 1981. **Long hydroplastic (plastic-barrel) sediment cores suitable for geotechnical testing.** *Mar. Geol.,* 43(3/4):M69-M73. Geol. Survey of Israel, 30 Malkhe Yisrael St., Jerusalem 95 501, Israel.

82:1734

Baldwin, K.C., Barbaros Celikkol and A.J. Silva, 1981. **Marine sediment acoustic measurement system.** *Ocean Engng,* 8(5):481-488.

An acoustic probe for measuring compressional wave velocity and temperature in extruded split or unsplit sediment cores was fully field tested. The system is unaffected by ship motion, adaptable to samples from various coring devices, and can measure either axial or cross-core wave speeds. Dept. of Ocean Eng., Univ. of Rhode Island, Kingston, RI 02881, USA. (mwf)

82:1735

Brocher, T.M., B.T. Iwatake, J.F. Gettrust, G.H. Sutton and L.N. Frazer, 1981. **Comparison of the S/N ratios of low-frequency hydrophones and geophones as a function of ocean depth.** *Bull. seism. Soc. Am.,* 71(5):1649-1659.

Three telemetered OBS arrays (3 orthogonal geophones and 1 external hydrophone) off Nova Scotia were monitored for 9 days in the 1-30 Hz range for pressure and particle velocities in response to a variety of sources and noise. Vertical geophones expressed the best signal-to-noise ratio for all depths (the S/N ratio increased with sensor depth) and nearly all ranges of sediment-borne signals. Hawaii Inst. of Geophysics, Univ. of Hawaii, 2525 Correa Rd., Honolulu, Hawaii 96822, USA. (bas)

82:1736

Dodson, Martin, 1981. **Thermochronometry.** *Nature, Lond.,* 293(5834):606-607.

Rb-Sr ages of micas from the Central Alps demonstrated that measured mineral ages may be millions of years less than their ages of crystallization; mineral ages are thought to correspond to the time of cooling through mineral-specific 'blocking temperatures.' Findings such as these can be complemented by K-Ar dating and U-238 fission track ages. Fission track data and ratios of cooling rate to estimated geothermal gradient also can provide information on relative rates of erosion and uplift. Laboratory measurement of diffusion parameters has recently been attempted with some success; thus far, however, geochronology is best served by a synthesis of results obtained by different techniques. Dept. of Earth Sci., Univ. of Leeds, UK. (hbf)

82:1737

King, J.L. and J.N. Brune, 1981. **Modeling the seismic response of sedimentary basins.** *Bull. seism. Soc. Am.,* 71(5):1469-1487.

The utility and accuracy of seismic models constructed from polyurethane foam of different densities and rigidities are tested in the forms of a 2-D semi-cylindrical basin and an idealized alluvial fan. Excellent agreement between Trifunac's (1971) analytic solution and actual measurements of displacements due to SH waves in the foam model was obtained. U.S. NRC, Office of Nuclear Reactor Regulation, Washington, DC 20555, USA. (slr)

82:1738

Shuchman, R.A. and D.K. Rea, 1981. **Determination of beach sand parameters using remotely sensed aircraft reflectance data.** *Remote Sens. Environ.,* 11(4):295-310. Environ. Res. Inst. of Michigan, P.O. Box 8618, Ann Arbor, Mich. 48107, USA.

82:1739

Tomoda, Yoshibumi, Hiromi Fujimoto, Akinori Uchiyama, Tomio Emura and Iwao Nakano, 1981. **Ocean bottom proton magnetometer: design and test.** *J. Geomagn. Geoelect.,* 33(5):335-339. Ocean Res. Inst., Univ. of Tokyo, Japan.

D40. Area studies, surveys, bathymetry

82:1740

Berezhniy, B.D. and M.V. Rudenko, 1981. **Quantitative characteristics of the bottom relief in the abyssal hill zone of the Atlantic Ocean.** *Okeanologiia,* 21(4):645-650. (In Russian, English abstract.)

82:1741

Collins, M.B., V. Lykousis and G. Ferentinos, 1981. **Temporal variations in sedimentation patterns: NW Aegean Sea.** *Mar. Geol.,* 43(1/2):M39-M48.

Sporadhes Basin lithofacies—turbiditic mud and hemipelagic mud grading into calcareous ooze—represent a Late Quaternary decrease in 'gravitite' and increase in 'suspensite' mechanisms of deposition. Sedimentation rate for the 7000-yr period represented is estimated at 20–34 cm/1000 yr. Foraminiferal evidence suggests that sapropel formation may be occurring now. Dept. of Oceanography, Univ. College, Wales, UK. (hbf)

82:1742

Cronan, D.S. et al., 1981. **Sediments from the Braemar Ridge and Yasawa Trough, northwest of Fiji.** *S. Pacif. mar. geol. Notes, U.N., Suva,* 2(2):25-35.

The ridge and trough are largely bottomed with normal in-situ pelagic calcareous clays and oozes; there is no evidence for any significant hydrothermal input. In several cores slumping is suggested by displacement of assemblages, sharp changes in lithology, and graded bedding. Appl. Geochem. Res. Group, Imperial Coll., London, UK. (hbf)

82:1743

Healy, Terry, 1981. **Submarine terraces and morphology in the Kieler Bucht, western Baltic, and their relation to Late Quaternary events.** *Boreas,* 10(2):209-217. Dept. of Earth Sci., Univ. of Waikato, Private Bag, Hamilton, New Zealand.

82:1744

McLeish, William, D.J.P. Swift, R.B. Long, Duncan Ross and George Merrill, 1981. **Ocean surface patterns above sea-floor bedforms as recorded by radar, Southern Bight of the North Sea.** *Mar. Geol.,* 43(1/2):M1-M8.

Airborne observations revealed sea-surface patterns that reflect sea-floor sand waves and ridges; the patterns result from local horizontal differences in the amplitude of water surface waves with wavelengths <1 cm. Such modulations result from surface convergences and divergences as the water flows across structures on the ocean floor. Depth appears to be the sand features' controlling variable, with shallow water leading to the steepest slopes, most intense asymmetry and the most marked separation of sand waves into ebb- and flood-dominated domains. Atlantic Oceanogr. and Meteorol. Lab., 4301 Rickenbacker Causeway, Miami, Fla. 33149, USA.

82:1745

Siegel, F.R., J.W. Pierce and D.S. Kostick, 1981.

Suspensates and bottom sediments in the Chilean Archipelago. *Mod. Geol.*, 7(4):217-229.

The <2 μm fraction of bottom sediments from 40 stations between 55° and 42°S, a stretch of water adjacent to an area of rugged terrain and heavy rainfall, showed suspensate concentrations of 0.11–3.84 mg/L, with organics contributing 0–2.48 mg/L. Resuspension was detected at half the stations in waters <190 m. Bottom fine sediments reflected the composition of overlying suspensates; latitudinal changes in mineralogy could be attributed to differences in the lithology of the provenance area. Dept. of Geol., George Wash. Univ., Washington, D.C. 20052, USA. (hbf)

D50. Subsurface structure

82:1746

McGinnis, L.D., 1981. **Seismic refraction study in western McMurdo Sound.** *Antarct. Res. Ser., Am. geophys. Un.*, 33:27-35.

High seafloor compressional velocities, 2.7–3.1 km/sec, are found in 3 reversed profiles shot from the sea ice in water depths of 100–200 m. These velocities are thought to be associated with submarine permafrost. Characteristics and thicknesses of these and other sediments are discussed, in addition to some preliminary data on crystalline basement lithology and structure. Dept. of Geology, No. Ill. Univ., DeKalb, Ill. 60115, USA. (bas)

82:1747

Pustilnikov, M.P. and Yu.I. Svistunov, 1981. **Structural-genetic relations of the Archangel and Moiseyev underwater ridges in the Black Sea.** *Sov. Geol.*, 1981(7):50-55. (In Russian.)

82:1748

Wong, How Kin and D.A. Christoffel, 1981. **A reconnaissance seismic survey of McMurdo Sound and Terra Nova Bay, Ross Sea.** *Antarct. Res. Ser., Am. geophys. Un.*, 33:37-62.

McMurdo Sound overlies an east-dipping slope incised by 2 fjord-like valleys and underlain by 4 subparallel sedimentary layers and an angular unconformity. Terra Nova Bay is situated above a series of NE-SW trending troughs and depressions and a large, stratified feature interpreted as a delta moraine. Seismic profiling between the 2 areas indicates the presence of the angular unconformity, meltwater deposits and 2 near-vertical faults. Geologisch-Palaontol. Inst., Univ. Hamburg, 2000 Hamburg 13, FRG. (hbf)

82:1749

Zakharov, M.V., 1981. **Geological nature of the sedimentary cover and acoustic basement of the northeastern Walvis Ridge from radiosonobuoy seismic soundings.** *Okeanologiia*, 21(4):651-657. (In Russian, English abstract.)

D60. Geomorphology (fans, canyons, etc.)

82:1750

Bellaiche, Gilbert et al., 1981. **The Ebro and the Rhone deep-sea fans: first comparative study.** *Mar. Geol.*, 43(3/4):M75-M85.

Despite great differences in morphology and volume, the two fans are similar in structure with a 500 millisec thick series of superposed lenticular acoustic units lying above more homogeneous sediments. These units are tentatively attributed to channel-infilling, associated with overbank deposits shifting through time; some may represent large sedimentary slides. Lab. de Geodynam. sous-mar., 06230 Villefranche-sur-Mer, France.

82:1751

Smoot, N.C., 1981. **Multi-beam sonar surveys of guyots of the Gulf of Alaska.** *Mar. Geol.*, 43(3/4):M87-M94.

Detailed descriptions of the geomorphology of these guyots—Welker, Durgin and Pratt—are presented and used to speculate on the ultimate demise of the Juan de Fuca hot spot. Ocean Surv. Div., U.S. Naval Oceanogr. Office, NSTL Station, Miss. 39522, USA.

D70. Coasts, beaches, marshes

82:1752

Anderson, F.E., Luther Black, L.E. Watling, William Mook and L.M. Mayer, 1981. **A temporal and spatial study of mudflat erosion and deposition.** *J. sedim. Petrology*, 51(3):729-736.

On an intertidal mudflat in Maine, winter and spring were the times of greatest sediment change, with winter erosion followed by rapid spring accretion. Areas of erosion quickly became sites of accretion, indicating that an equilibrium surface level was being maintained. Mudflats may strongly influence the adjacent estuary by acting as 'sediment banks' that can periodically lend sediments to the particulate pool offshore. Jackson Estuarine Lab., Univ. of New Hampshire, Durham, NH 03824, USA.

82:1753

Chaudhri, R.S., H.M.M. Khan and S. Kaur, 1981. **Sedimentology of beach sediments of the west coast of India.** *Sedim. Geol.,* 30(1/2):79-94. Centre of Adv. Study in Geol., Panjab Univ., Chandigarh-160014, India.

82:1754

Dolan, Robert and Bruce Hayden, 1981. **Storms and shoreline configuration.** *J. sedim. Petrology,* 51(3):737-744.

Spectral analysis of the 1962 great storm penetration (overwash) along the Outer Banks of North Carolina and Fenwick Island, Maryland, reveals along-the-coast periodicities ranging 14–15 km in wavelength. Periodicities with similar wavelengths exist in long-term mean rates of change of the shoreline and storm-surge penetration line, suggesting systematic distributions of the location and magnitude of storm deposits and storm hazards along the Atlantic coast. Dept. of Environ. Sci., Univ. of Virginia, Charlottesville, Va., USA.

82:1755

Frenkel, R.E., H.P. Eilers and C.A. Jefferson, 1981. **Oregon coastal salt marsh upper limits and tidal datums.** *Estuaries,* 4(3):198-205.

Because specifying the extent of wetlands is a problem, 'the degree of agreement between 2 sets of experienced investigators in defining the upper limit of intertidal wetland [was tested]...after consensus as to the vegetation criteria for defining the ecotone between wetland and upland.' Limits were related to tidal datums. Oregon State Univ., Corvallis, Oreg. 97331, USA. (isz)

82:1756

Otvos, E.G., 1981. **Barrier island formation through nearshore aggradation: stratigraphic and field evidence.** *Mar. Geol.,* 43(3/4):195-243.

Core drilling data from the sound and barrier island chain of Mississippi and from the Apalachicola Bay area, old charts, and aerial photographs were used to document vertical aggradational formation of barrier islands. Emergence occurs during constructive, fair weather periods where wave-bore currents can transport sand over subtidal shoals and accrete it to high tidal levels. Includes several aerial photos. Gulf Coast Res. Lab., Ocean Springs, Miss. 39564, USA. (hbf)

82:1757

Semeniuk, V., 1981. **Long-term erosion of the tidal flats of King Sound, northwestern Australia.** *Mar. Geol.,* 43(1/2):21-48. 21 Glenmere Rd., Warwick, W.A. 6024, Australia.

D80. Reefs and atolls

82:1758

Marshall, J.F. and P.J. Davies, 1981. **Submarine lithification on windward reef slopes: Capricorn-Bunker Group, southern Great Barrier Reef.** *J. sedim. Petrology,* 51(3):953-960.

Windward reef slopes are the sites of extensive submarine lithification. Cements are contemporaneous with reef growth, developing in environments characterized by slow accretion rates. Continuous precipitation of aragonite cement has, in some places, been inhibited by the formation of Mg-calcite micrite. Apparent dissolution of some of the Mg-calcite cements was observed, but processes involved are unknown. Bureau of Mineral Resources, Canberra, 2601 Australia.

82:1759

Mullins, H.T., C.R. Newton, Kathryn Heath and H.M. Vanburen, 1981. **Modern deep-water coral mounds north of Little Bahama Bank: criteria for recognition of deep-water coral bioherms in the rock record.** *J. sedim. Petrology,* 51(3):999-1013.

Ahermatypic corals from 1000–1300 m of water were found on 5–40 m high bioherm type mounds; a minimum age for the mounds is $\sim 22 \times 10^3$ yr, and coral is probably still actively forming. Bottom currents providing oxygen, nutrients and fine-grained sediments appear important for the development of such colonies. Factors which may aid in distinguishing ancient shallow from deep-water coral buildups are discussed. San Jose State Univ., Moss Landing, Calif. 95039, USA. (hbf)

D120. Sedimentary processes (deposition, diagenesis, etc.)

82:1760

Bordovskii, O.K. and M.M. Domanov, 1981. **Rate of organic matter decomposition during early diagenesis of Recent marine deposits.** *Dokl. Akad. Nauk SSSR,* 259(3):664-666. (In Russian.)

82:1761

Castaing, Patrice, Isabelle Philipps and Olivier Weber, 1981. **Hydrodynamic processes at the [Bay of Biscay] shelf break: effects of turbulence**

and upwellings on sediments. *C. r. hebd. Séanc. Acad. Sci., Paris,* (II)292(22):1481-1484. (In French, English abstract.) Dept. de Geol. et Oceanogr., Univ. de Bordeaux 1, ave. des Facultes, 33405 Talence Cedex, France.

82:1762

Chough, S.K. and D.C. Kim, 1981. **Dispersal of fine-grained sediments in the southeastern Yellow Sea: a steady-state model.** *J. sedim. Petrology,* 51(3):721-728.

Sediments supplied to the Yellow Sea by the short rivers draining the Korean coast are primarily coarse-grained; however, farther east fine fractions increase. Nearshore and tidal currents play a role in dispersal, which appears to take place largely under steady state conditions. Dept. of Oceanog., Seoul National Univ., Seoul 151, Korea. (hbf)

82:1763

Elderfield, H., R.J. McCaffrey, N. Luedtke, M. Bender and V.W. Truesdale, 1981. **Chemical diagenesis in Narragansett Bay sediments.** *Am. J. Sci.,* 281(8):1021-1055.

Concentrations of major cations, trace metals, I, organic materials, S species and nutrients, and benthic fluxes of metals and nutrients were measured in pore waters at a heavily polluted, a relatively unpolluted and an intermediate site. Spatiotemporal variability of the interstitial chemistry and the diagenetic processes effecting the pore-water profiles are discussed. Dept. of Earth Sci., Univ. of Leeds, LS2 9JT, UK. (isz)

82:1764

Langhorne, D.N., 1981. **An evaluation of Bagnold's dimensionless coefficient of proportionality using measurements of sandwave movement.** *Mar. Geol.,* 43(1/2):49-64.

Sediment volume changes were 'restricted to the crestal areas. Away from the crest, with the progressive reduction of bed shear stress, volume changes decreased to zero.' Bagnold's dimensionless coefficient of proportionality (K) increased from 0.5 to 2.7 as the normalized excess shear stress increased from 3 to 15, a weaker dependence than that proposed by Sternberg (1972). There was no tendency for K to approach a constant at the high flow velocities examined. Inst. of Oceanographic Sci., Taunton, Somerset, UK. (slr)

82:1765

Lykousis, V., M.B. Collins and G. Ferentinos, 1981. **Modern sedimentation in the NW Aegean Sea.** *Mar. Geol.,* 43(1/2):111-130.

Five physiographic environments and 4 sedimentary provinces are identified. Terrigenous material is introduced by rivers and the coastal erosion of cliffs. Fine particles transported beyond the shelf (Thermaicon Plateau) are carried north and northwest by bottom currents. Dept. of Oceanog., Univ. College, Singleton Park, S. Wales, UK. (hbf)

82:1766

Marks, N.S., 1981. **Sedimentation on new ocean crust: the Mid-Atlantic Ridge at 37°N.** *Mar. Geol.,* 43(1/2):65-82.

Sediment cover reflected asymmetric spreading as well as the age of the underlying crust. The linear decrease of grain size with increasing depth indicates bioturbation and gravity transport of resuspended sediment. Active bottom currents caused ripple and scour marks. Benthic Foraminifera assemblages were highly variable over short distances. Dept. of Geol., Stanford Univ., Stanford, Calif. 94305, USA. (hbf)

D130. Sediments (rocks, formations, type, composition, etc.)

82:1767

Alam, Mahmood and D.J.W. Piper, 1981. **Detrital mineralogy and petrology of deep-water continental margin sediments off Newfoundland.** *Can. J. Earth Sci.,* 18(8):1336-1345.

Four facies groups were identified in 17 Holocene-Late Wisconsinan sediment cores from the Grand Banks and adjacent seamounts; 3 suites of ice-rafted debris and 3 heavy mineral assemblages were delineated. Sediments deposited during high stands of sea level were largely biogenic; more ice rafting was evident; there was little geographic variation in clay minerals. During glacio-eustatic lowered sea stands, sediments showed terrigenous influences with more geographic variation. Dept. of Geol., Dalhousie Univ., Halifax, NS, B3H 3J4, Canada. (hbf)

82:1769

Busch, W.H. and G.H. Keller, 1981. **The physical properties of Peru-Chile continental margin sediments: the influence of coastal upwelling on sediment properties.** *J. sedim. Petrology,* 51(3): 705-719.

Four sediment provinces are identified from the surface (4 m) sediments of the Peru-Chile slope and eastern Nazca Plate. A large mud lens on the upper slope in an area of intense upwelling (10.5–13.6°S)

contains material of anomalously fine texture; high water content, Atterberg limits, plasticity and shear strength; and low wet bulk density and grain specific gravity. The lens sediments also exhibit the greatest variation with depth, generally correlated with changes in organic content. Dept. of Geol. and Geophys., Univ. of Minnesota, Minneapolis, Minn. 55455, USA. (hbf)

82:1770

Gale, N.H., E.T.C. Spooner and P.J. Potts, 1981. **The lead and strontium isotope geochemistry of metalliferous sediments associated with Upper Cretaceous ophiolitic rocks in Cyprus, Syria, and the Sultanate of Oman.** *Can. J. Earth Sci.,* 18(8):1290-1302.

Sediment isotopic compositions suggest that much of the Pb is derived from seawater leaching of underlying basalts. Late Cretaceous seawater appears to be the predominant source of Sr. Causes of variations in the initial ratios of Pb and Sr are discussed, with diagenesis ruled out as a significant modifying influence. Dept. of Geol. and Miner., Univ. of Oxford, Parks Rd., Oxford, OX1 3PR, UK. (bas)

82:1771

Lonsdale, Peter, 1981. **Drifts and ponds of reworked pelagic sediment in part of the southwest Pacific.** *Mar. Geol.,* 43(3/4):153-193.

From a 750 km^2 area (the sill and spillway of the Samoan Passage) immediately adjacent to the tropical Pacific western boundary current, detailed bathymetric and sediment distribution data were gathered. Rapid vertical and lateral facies changes from zeolitic clay and nodules to radiolarian clay and ooze (muddy contourite) document fluctuations in current velocity. The most rapid periods of deposition occurred during the Late Oligocene-Early Miocene and Late Miocene-Early Pliocene. Scripps Inst. of Oceanogr., La Jolla, Calif. 92093, USA. (hbf)

82:1772

Mahmood, Arshud, C.J. Ehlers and B.A. Cilweck, 1981. **Sand waves in lower Cook Inlet, Alaska.** *J. geotech. Engng Div., Am. Soc. civ. Engrs,* 107(GT10):1293-1307.

A multisystem, high resolution acoustic survey of the seafloor revealed waveshaped bedforms 0.6-15 m in height with wavelengths 6-305 m. Although sand waves are considered a hazard to offshore construction, repeat surveys indicated that these bedforms were generally stable with only localized movement. Bedform development appeared to be a product of severe storm conditions. McClelland Engrs., Inc., Houston, Tex., USA. (hbf)

82:1773

Rateev, M.A., K.M. Shimkus and M.B. Kheirov, 1981. **Distribution of clay minerals in Recent sediments of the Mediterranean Sea.** *Okeanologiia,* 21(4):665-672. (In Russian, English abstract.)

82:1774

Stanley, D.J. and P.T. Taylor, 1981. **Volcanogenic sediment and proximal versus distal provenance in abyssal plains.** *Mar. Geol.,* 43(1/2):M29-M38.

A detailed marine geological investigation of the Sohm Abyssal Plain demonstrates that as access to terrigenous sources decreases, pelagic and volcanic sediment components increase; even during low stands of sea level, volcanics derived from adjacent topographic highs remained significant. Div. of Sediment., Smithsonian Inst., Washington, D.C. 20560, USA. (hbf)

D140. Submarine hydrology (springs, hydrothermal deposits, etc.)

82:1775

Vidal, V.M.V., F.V. Vidal and J.D. Isaacs, 1981. **Coastal submarine hydrothermal activity off northern Baja California. 2. Evolutionary history and isotope geochemistry.** *J. geophys. Res.,* 86(B10):9451-9468.

$^{18}O/^{16}O$, D/H, $^{34}S/^{32}S$, ^{3}H, water and gas chemistry data are incorporated into a geochemical model of the Punta Banda submarine hydrothermal system (PBSHS). 'PBSHS water is a primary high temperature, acid, reducing fluid of old seawater origin which has been titrated by cold, alkaline groundwater of meteoric origin.' Inst. de Invest. Elect., Div. Fuentes de Energia Apartado Postal 475, Cuernavaca, Morelos, Mexico. (isz)

D170. Historical geology, stratigraphy

82:1776

Allen, J.R.L., 1981. **Palaeotidal speeds and ranges estimated from cross-bedding sets with mud drapes.** *Nature, Lond.,* 293(5831):394-396. Dept. of Geol., The Univ., Reading RG6 2AB, UK.

82:1777

Allen, P.A., 1981. **Some guidelines in reconstructing ancient sea conditions from wave ripple marks.** *Mar. Geol.,* 43(3/4):M59-M67.

Some 'rules of thumb' on how to use wave ripples to reconstruct ancient wave conditions were derived from substantial field data. Only relatively steep ripple marks (VFI <7.5, i.e., vortex ripples) gave good results. Penecontemporaneous overwashing or post-depositional compaction, superimposed unidirectional currents, and other factors seriously affected wave reconstructions. Geol. Inst., Univ. of Bern, Sahlistrasse 6, 3012 Bern, Switzerland. (mwf)

82:1778

Auzende, J.-M., J.-L. Olivet and Léo Pastouret, 1981. **Structural and paleogeographical implications of the existence of Messinian layers west of Gibraltar.** *Mar. Geol.,* 43(1/2):M9-M18. (In French, English abstract.)

Messinian sediments typical of the Mediterranean underlying Atlantic-type Pleistocene sediments suggest the existence of a basin west of Gibraltar, isolated from the Atlantic during the Upper Miocene, though still communicating with the Mediterranean via a strait. Messinian isolation would result from a 'South-Iberian spur' made up of the series folded during Miocene events between Morocco and Iberia at ~9°W. Centre Oceanol. de Bretagne, B.P. 337-29273 Brest Cedex, France.

82:1779

Beck, Lennart, 1981. **Hydrographically controlled distribution of Late Quaternary sediments and Foraminifera on the continental margin west of Tröndelag, Norway.** *Sarsia,* 66(2):89-101.

Investigation indicates distributions of benthic Foraminifera as well as surface sediments to be strongly related to past and present hydrography. In postglacial sediments, a faunal and sedimentological boundary coincides with the lower limit of the Atlantic Water (Norwegian Current) at 500-700 m depth. Includes 35 micrographs. Inst. of Geol., Univ. of Bergen, Allegaten 41, N-5014 Bergen-Univ., Norway.

82:1780

Blackwelder, B.W., 1981. **Late Cenozoic stages and molluscan zones of the U.S. Middle Atlantic Coastal Plain.** *J. Paleont.,* 55(5)(Suppl.)(Memoir 12):34pp.

Stages and substages (identifiable from Florida to Massachusetts), which are based upon measured stratigraphic sections with described molluscan ranges and biostratigraphic intervals, are proposed. The divisions represent glacio-eustatically controlled depositional cycles. Includes stratigraphic tables and numerous photos. USGS, Washington, DC 20560, USA. (hbf)

82:1781

Blanpied, Christian and Gilbert Bellaiche, 1981. **Bioturbation on the Pelagian Platform [Tunisia]: ichnofacies variations as paleoclimatic indicator.** *Mar. Geol.,* 43(3/4):M49-M57. CFP. 39–43, Quai Citroen, Tour Mirabeau, 75739 Paris Cedex 15, France.

82:1782

Brunner, C.A. and L.D. Keigwin Jr., 1981. **Late Neogene biostratigraphy and stable isotope stratigraphy of a drilled core from the Gulf of Mexico.** *Mar. Micropaleont.,* 6(4):397-418.

Taken at 725 m depth in the De Soto Canyon, the 305-m core contains well-preserved Late Miocene, Early and Late Pliocene, and Quaternary planktonic foraminiferal assemblages; 34 selected species allow greater biostratigraphic resolution than that previously attained, particularly for the Late Pliocene-Quaternary sequence. Correlations were made with other Gulf of Mexico sections, the North and South Atlantic, and the Caribbean. Stable isotope stratigraphy, based on *Uvigerina,* was similar to global trends. Includes 76 micrographs. Dept. of Paleontology, Univ. of Calif., Berkeley, Calif. 94720, USA. (slr)

82:1783

Corliss, B.H., 1981. **Deep-sea benthonic foraminiferal faunal turnover near the Eocene/Oligocene boundary.** *Mar. Micropaleont.,* 6(4):367-384.

Biostratigraphic ranges of 41 taxa found throughout the Late Eocene to Early Oligocene sequence at DSDP Site 277 in the SW Pacific suggest a gradual overall faunal change in response to the development of the psychrosphere. These data and data from 6 other DSDP sites indicate 'that bottom-water circulation may have developed during the Middle Eocene to Early Oligocene interval, with the 3C° bottom-water cooling near the Eocene/Oligocene boundary representing part of this development.' WHOI, Woods Hole, Mass. 02543, USA. (mwf)

82:1784

Elverhøi, A., 1981. **Evidence for a Late Wisconsin glaciation of the Weddell Sea.** *Nature, Lond.,* 293(5834):641-642. Norsk Polarinst., Boks 158, 1330 Oslo Lufthavn, Norway.

82:1785

Ganapathy, R., S. Gartner and Ming-Jung Jiang, 1981. **Iridium anomaly [50-fold increase over background values] at the Cretaceous-Tertiary boundary in Texas [U.S.A.].** *Earth planet. Sci. Letts,* 54(3):393-396. Res. Lab., J.T. Baker Chem. Co., Phillipsburg, NJ 08865, USA.

82:1786

Kahn, M.I., Tadamichi Oba and Teh-Lung Ku, 1981. **Paleotemperatures and the glacially induced changes in the oxygen-isotope composition of seawater during Late Pleistocene and Holocene time in Tanner Basin, California.** *Geology, geol. Soc. Am.,* 9(10):485-490.

Based on foram tests in a Tanner Basin piston core, seawater glacially-induced isotopic compositional changes 'reached a maximum of 1.5 ppt in the Late Pleistocene,' and an ~5C° increase in mean surface-water temperatures occurred from the 'end of the Wisconsin glaciation to the Holocene thermal maximum ~7500 yrBP.' Superimposed on the 'major warm-cold-cool cycle of the past 55,000 yr...are smaller changes with periods a few thousand years or less.' Dept. of Geol. Sci., California State Univ., Northridge, Calif. 91330, USA. (isz)

82:1787

Larson, R.L. and S.O. Schlanger, 1981. **Cretaceous volcanism and Jurassic magnetic anomalies in the Nauru Basin, western Pacific Ocean.** *Geology, geol. Soc. Am.,* 9(10):480-484.

Tension cracks and fractures are suggested pathways for Mid-Cretaceous magma emplacement in an area with lineated, undisturbed Late Jurassic magnetic anomalies. Associated magnetic, structural and thermal problems of the volcanic complex's presence and emplacement are covered. Grad. Sch. of Oceanogr., Univ. of Rhode Island, Kingston, RI 02881, USA. (bas)

82:1788

Loutit, T.S. and J.P. Kennett, 1981. **New Zealand and Australian Cenozoic sedimentary cycles and global sea-level changes.** *Am. Ass. Petrol. Geol. Bull.,* 65(9):1586-1601.

A case is made for the utility of unconformities (formed in response to eustatic sea-level changes) as a correlation tool based on a comparison between Vail et al.'s (1977) global sea-level history and the shallow-marine sedimentary sequences of the continental margins of Australia and New Zealand. Grad. Sch. of Oceanogr., Univ. of Rhode Island, Kingston, RI 02881, USA. (isz)

82:1789

Maldonado, Andres, Gilbert Kelling and George Anastasakis, 1981. **Late Quaternary sedimentation in a zone of continental plate convergence: the central Hellenic Trench System.** *Mar. Geol.,* 43(1/2):83-110.

Although 'broadly comparable' and stratigraphically correlable with other eastern Mediterranean Late Quaternary sediments, central Hellenic Trench deposits exhibit important differences. Calculated sedimentation rate is considerably lower than elsewhere, but higher than the thickness of sediment allows, indicating that sediments are also being consumed (underthrust) in a discontinuous, diachronous manner. The area appears to be an excellent example of 'deposition associated with alpine-type compressional settings'. U.E.I. Geol. Mar. y Reg., CSIC, Egipciacas 9, Barcelona-1, Spain. (slr)

82:1790

Papanikolaou, D.J. and M.D. Dermitzakis, 1981. **The Aegean Arc during the Burdigalian and Messinian: a comparison.** *Riv. ital. Paleont. Stratig.,* 87(1):83-92. Dept. of Geol. & Paleont., Athens Univ., Zogratov, 1760 Athens, Greece.

82:1791

Petit, J.-R., Martine Briat and Alain Royer, 1981. **Ice age aerosol content from east Antarctic ice core samples and past wind strength.** *Nature, Lond.,* 293(5831):391-394.

Microparticle and trace element analysis suggested that, although no volcanic activity was evident, marine and continental inputs were 5 and 20 times higher, respectively, at the end of the last glaciation than at present. These inputs 'are considered to reflect glacial age climate with stronger atmospheric circulation, enhanced activity, and faster aerosol transport toward the Antarctic continent.' Lab. de Glaciol. et Geophys. de l'Environ., 2, rue Tres Cloitres, 38031 Grenoble Cedex, France. (mwf)

82:1792

Romein, A.J.T. and J. Smit, 1981. **The Cretaceous/Tertiary boundary: calcareous nannofossils and stable isotopes.** *Proc. K. ned. Akad. Wet.,* (B)84(3):295-314.

Similar and significant changes in the ratios of C and O stable isotopes across the Cretaceous/Tertiary boundary were found for calcareous nannofossil assemblages in Spain, Israel and Denmark. Results are discussed in relation to current models of the boundary event, which does appear to have been catastrophic, although no particular model can be supported. Inst. for Earth Sci., State Univ., Utrecht, Netherlands. (mjj)

82:1793

Steineck, P.L., 1981. **Upper Eocene to Middle Miocene ostracode faunas and paleo-oceanography of the North Coastal Belt, Jamaica, West Indies.** *Mar. Micropaleont.,* 6(4):339-366.

The first appearance of psychrospheric ostracodes in the earliest Miocene sediments marks the entry of frigid (<8–10°C) water masses into the Cayman Trench. Late Early Miocene faunas suggest paleodepths of 1500–2000 m and the presence of a 3–4°C water mass (North Atlantic Deep Water?). Shallower paleodepths (1000–1500 m) are indicated by later assemblages. Includes drawings and 30 micrographs. Div. of Nat. Sci., SUNY, Coll. at Purchase, NY 10577, USA. (isz)

D180. Paleontology (see also E-BIOLOGICAL OCEANOGRAPHY)

82:1794

Arnold, A.J. and B.K. Sen Gupta, 1981. **Diversity changes in the foraminiferal thanatocoenoses of the Georgia-South Carolina continental slope.** *J. foram. Res.,* 11(4):268-276.

Quaternary benthic foraminiferal diversity indices are distinctly lower beyond the 100 m isobath. While faunal mixing and Gulf Stream-induced bottom water instability cannot be eliminated as partial causes, 'the close packing and overlap of depth-correlated biotopes' on the steeper gradient of the slope beyond this point appear to be the major factors in diversity reduction. Dept. of Geol. Sci., Harvard Univ., Cambridge, Mass. 02138, USA. (slr)

82:1795

Curry, W.B. and R.K. Matthews, 1981. **Equilibrium ^{18}O fractionation in small size fraction planktic Foraminifera: evidence from Recent Indian Ocean sediments.** *Mar. Micropaleont.,* 6(4):327-337.

Isotopic variation in *Globigerinoides ruber* and *G. bulloides* from core tops representing surface temperatures of 5-28°C was analyzed because these species were considered 'most likely to be out of equilibrium with regard to ^{18}O.' Oxygen isotopes were substantially in equilibrium with sea surface conditions although carbon isotopes were in strong disequilibrium. Results support the use of oxygen isotopic variations in planktic Foraminifera as a way of estimating SST and water column structure. Dept. of Geol. and Geophys., WHOI, Woods Hole, Mass. 02543, USA. (mwf)

82:1796

Dmitrenko, O.B., 1981. **Calcareous nannoplankton in sediments and sedimentary rocks of the East Indian Ridge.** *Okeanologiia,* 21(4):658-664. (In Russian, English abstract.)

82:1797

Hallam, A., 1981. **Diversity changes of marine organisms through the Phanerozoic.** *Nature, Lond.,* 293(5832):p.428.

'One of the most important palaeontological debates of the past decade,' that of whether organisms have substantially diversified since the Cambrian or merely appear to have done so as an artifact of the fossil record, seems to have been resolved. The debate's chief protagonists have reached agreement supporting the former position in the face of an analysis of 5 independent diversity measures which all show high intercorrelations 'even when the ubiquitous correlation with time is removed.' Dept. of Geol., Univ. of Birmingham, UK. (slr)

82:1798

Henbest, Nigel, 1981. **'Oldest cells' are only weathered crystals.** *New Scient.,* 92(1275):p.164.

Microscopic inclusions in 3800 mya rocks from Isua, Greenland, reputed to be (by H.D. Pflug) the preserved remains of the Earth's earliest cells, are determined to be 'crystals of dolomite-type carbonates, rusted by water' seepage based on experiments by Edwin Roedder of the U.S. Geological Survey. (isz)

82:1799

Hendey, N.I., 1981. **Miocene diatoms from the subantarctic southwest Pacific, Deep Sea Drilling Project Leg 29, Site 278, Core 10.** *Bacillaria,* 4:65-124. Includes 25 micrographs. 12 Penwinnick Parc, St. Agnes, Cornwall TR5 OUQ, UK.

82:1800

Pouyet, Simone and Louis David, 1981. **Paleoenvironmental significance of fossil Bryozoa: continental mobility and oceanic paleoclimatology.** *Bull. Soc. géol. Fr.,* (7)23(2):169-174. (In French, English abstract.)

Steginoporella includes >50 recent and fossil species. Comparison of recent and fossil biogeography shows remarkable differences; neritic benthic bryozoans provide valuable information about landmasses, currents, and marine climates since the Eocene. Centre de Paleont. Stratigr. Paleoecol. de l'Univ. Claude-Bernard, 69622 Villeurbanne Cedex, France.

82:1801

Roedder, Edwin, 1981. **Are the 3,800-Myr-old Isua objects microfossils, limonite-stained fluid inclusions, or neither?** *Nature, Lond.,* 293(5832):459-462.

Arguments by Pflug et al. that the Isua objects are yeast-like microfossils, and by Bridgwater et al. that they are 'limonite-stained fluid inclusions' are shown to be ambiguous or invalid. Roedder demonstrates the objects to be 'limonite-stained cavities from...dissolution by weathering of ferruginous dolomite grains.' USGS, 959, Reston, Va. 22092, USA. (mjj)

82:1802

Schafer, C.T., F.E. Cole and L. Carter, 1981. **Bathyal zone benthic foraminiferal genera off northeast Newfoundland.** *J. foram. Res.*, 11(4):296-316.

Distribution and abundance of arenaceous (1.5 specimens/cc wet sediment) and calcareous (2.5/cc) genera are reported and related to oceanographic and geologic factors. Bedford Inst. of Oceanog., P.O. Box 1006, Dartmouth, NS B2Y 4A2, Canada. (mjj)

82:1803

Sejrup, H.-P. et al., 1981. **Benthonic Foraminifera in surface samples from the Norwegian continental margin between 62°N and 65°N.** *J. foram. Res.*, 11(4):277-295.

Effects of hydrography and sediment on the surface distribution of benthonic Foraminifera are discussed. Five biofacies extending from the shelf to 2800 m are recognized. Includes 24 micrographs. Geol. Inst., Avd. B, Allegt. 41, N-5014 Bergen-Univ., Norway. (mjj)

82:1804

Sepkoski, J.J. Jr., R.K. Bambach, D.M. Raup and J.W. Valentine, 1981. **Phanerozoic marine diversity and the fossil record.** *Nature, Lond.*, 293(5832):435-437.

Strong correlations between various local and global estimates of Phanerozoic marine diversity for taxa below the ordinal level indicate a single pattern of change underlying all fossil density data. Geological time alone seems insufficient to explain all significant covariation among the data sets, and it is proposed that the common pattern in diversity reflects the signal from a real evolutionary phenomenon strong enough to overcome the biases inherent in the fossil record. Dept. Geophys. Sci., Univ. of Chicago, 5734 South Ellis Ave., Chicago, Ill. 60637, USA.

82:1805

Stanley, S.M. and L.D. Campbell, 1981. **Neogene mass extinction of western Atlantic molluscs.** *Nature, Lond.*, 293(5832):457-459.

Explanations of the unusually high rates of extinction within Late Cenozoic marine faunas of the tropical western Atlantic have focused on possible blocking of nutrient-laden waters by the origin of the Isthmus of Panama and on Pleistocene cooling or regression. Major episodes of molluscan extinction occurred at least as far north as Virginia; these episodes are hypothesized due primarily to refrigeration associated with Late Pliocene and Pleistocene glaciation. Dept. of Earth and Plan. Sci., Johns Hopkins Univ., Baltimore, Md. 21218, USA.

82:1806

Stone, P. and I. Strachan, 1981. **A fossiliferous borehole section within the Ballantrae ophiolite [SW Scotland].** *Nature, Lond.*, 293(5832):455-457.

The fossiliferous sequence contains a rich assemblage of Middle Arenig (~475-480 Myr) graptolites accompanied by inarticulate brachiopods and rare conodonts. Of particular importance is the presence of *Pseudisograptus dumosus*, an Australasian species not previously recorded from Europe. Inst. of Geol. Sci., West Mains Rd., Edinburgh EH9 3LA, UK.

82:1807

Szabo, B.J., G.H. Miller, J.T. Andrews and M. Stuiver, 1981. **Comparison of uranium-series, radiocarbon, and amino acid data from marine molluscs, Baffin Island, Arctic Canada.** *Geology, geol. Soc. Am.*, 9(10):451-457.

A reasonable chronology consisting of five broad age groups (7000 to 300,000 yr) can be established by comparing radiometric ages, which are only minimum age estimates, with relative ages determined by the extent of amino acid racemization. Paleotemperature estimates of about –5°C are determined based on epimerization reactions in *Hiatella arctica*. USGS, Denver Federal Center, Denver, Colo. 80225, USA. (mjj)

82:1808

Wise, K.P. and T.J.M. Schopf, 1981. **Was marine faunal diversity in the Pleistocene affected by changes in sea level?** *Paleobiology*, 7(3):394-399.

The species-area relationship is applied to presumed Pleistocene sea level maxima and minima as they affected shelf areas. Estimates of ~25% change in species diversity, ~10% in generic diversity and <5% in familial diversity accord with the lack of fossil evidence supporting widespread Pleistocene diversity changes above the species level; faunal province *size* changes are less significant than province *number* changes in altering marine diversity. Dept. of Geophys. Sci., Univ. of Chicago, 5734 South Ellis Ave., Chicago, Ill. 60637, USA. (slr)

D200. Gravity, geodesy, magnetism

82:1809

Hewson-Browne, R.C., 1981. **The numerical solution of oceanic electromagnetic induction problems.** *Geophys. Jl R. astr. Soc.,* 67(1):235-238. Dept. of Appl. and Computational Math., The University, Sheffield S10 2TN, UK.

82:1810

Isezaki, Nobuhiro, Jun-ichi Matsuda, Hiroo Inokuchi and Katsumi Yaskawa, 1981. **Shipboard measurement of three components of the geomagnetic field.** *J. Geomagn. Geoelect.,* 33(5):329-333.

The three-component field of Zenisu Seamount, SE of Honshu, is measured using a flux gate magnetometer. Uninterpreted results are presented as contour maps. Dept. of Earth Sci., Kobe Univ., Kobe, Japan. (bas)

82:1811

Kogan, M.G. and V.V. Kostoglodov, 1981. **Isostasy of fracture zones in the Atlantic Ocean.** *J. geophys. Res.,* 86(B10):9248-9258.

Thirty 400-km gravity and topography profiles run parallel to the MAR between 40°S and 40°N are analyzed using a cross-spectral method. Fracture zone and median valley gravity anomalies can be explained by a single isostatic mechanism which requires a 6–9 km thick elastic lithosphere. Inst. of Phys. of the Earth, Acad. of Sci., Moscow D-242, USSR. (bas)

82:1812

Miles, P.R. and D.G. Roberts, 1981. **The magnetisation of Rosemary Bank Seamount, Rockall Trough, northeast Atlantic.** *Earth planet. Sci. Letts,* 54(3):442-448.

The reversely magnetised portion of the non-uniformly magnetised seamount is modelled using the Talwani 3-D method and simulated using numerical methods. The magnetisation agrees with a Late Cretaceous-to-Tertiary age and a volcanic origin. Inst. of Oceanogr. Sci., Wormley, Godalming, Surrey, UK. (bas)

82:1813

Pederson, D.R., G.E. Montgomery, L.D. McGinnis, C.P. Ervin and H.K. Wong, 1981. **Aeromagnetic survey of Ross Island, McMurdo Sound, and the dry valleys.** *Antarct. Res. Ser., Am. geophys. Un.,* 33:7-25.

Eleven ground surveys and aeromagnetic lines at 300 m height and 2 km spacings delineate the area's magnetic anomalies which are correlated with regional geology and associated with structure under the water, ice and non-magnetic sediments. Anomaly sources include volcanic and intrusive structures and volcanogenic sediments. Beneath the Ross Ice Shelf, the existence of extensive pyroclastics or lava flows is inferred. Chevron Oil Co., Harvey, La. 70058, USA. (bas)

82:1814

Raval, U., J.T. Weaver and T.W. Dawson, 1981. **The ocean-coast effect re-examined.** *Geophys. Jl R. astr. Soc.,* 67(1):115-123. Nat. Geophys. Res. Inst., Uppal Rd., Hyderabad 500 007, India.

D210. Heat flow

82:1815

Burch, T.K. and M.G. Langseth, 1981. **Heat-flow determination in three DSDP boreholes near the Japan Trench.** *J. geophys. Res.,* 86(B10):9411-9419.

These first deep borehole measurements of a forearc and a trench's landward wall yielded heat flow values of 28 and 32 mW/m^2 for a deep terrace and 22 mW/m^2 for a midslope basin—results agreeing well with previous seafloor measurements. Heat flow increases slightly from the trench to the arc. Vertical temperature gradients suggest upward flow of pore waters (~1.4 cm/yr). Accurate 'temperature logs in deep-sea drill holes can be used to estimate in-situ temperature profiles.' Lamont-Doherty Geol. Observ., Palisades, NY 10964, USA. (isz)

D240. Local or regional tectonics

82:1816

Allen, R.B. and B.E. Tucholke, 1981. **Petrography and implications of continental rocks from the Agulhas Plateau, southwest Indian Ocean.** *Geology, geol. Soc. Am.,* 9(10):463-468.

Petrographic analysis and K-Ar dating of low-to-high grade continental metamorphic, indurated sedimentary, and igneous basaltic dredge samples concur with the previously suggested continental-fragment origin for the Agulhas Plateau. Ages and nature of the sampled rocks agree well with those of adjacent continental areas. Lamont-Doherty Geol. Observ., Palisades, NY 10964, USA. (bas)

82:1817

Bonneton, J.-R. and A.E. Scheidegger, 1981. **Tectonic significance of joints in Martinique (Lesser**

Antilles). *Bull. Soc. géol. Fr.,* (7)23(2):195-202. (In French, English abstract.) Lab. de Geol. Centre Univ. Antilles-Guyane, B.P. 592, Pointe-a-Pitre, Guadeloupe.

82:1818

Bouysse, Philippe, R.C. Maury, Denis Westercamp, J.-C. Baubron, Patrick Andreieff and Joseph Cotten, 1981. **Luymes Bank, northern termination of the Lesser Antilles Recent island arc.** *Bull. Soc. géol. Fr.,* (7)23(2):185-194. (In French, English abstract.)

Luymes Bank is a small volcanic ridge capped with Plio-Quaternary sediments. A K-Ar determination yields an age of 3.6 ± 0.6 m.y. In spite of its topographic connection with Saba Bank, Luymes Bank has to be considered as the northern termination, now inactive, of the inner Lesser Antilles volcanic arc, beyond the island of Saba. Bureau de rech. geol. et min. B.P. 6009, 45060 Orleans Cedex, France.

82:1819

Clark, J.A. (comment) and B.W. Blackwelder (reply), 1981. Forum. **Late Wisconsin and Holocene tectonic stability of the United States mid-Atlantic coastal region.** *Geology, geol. Soc. Am.,* 9(10):438-439.

82:1820

Gardner, J.V. and T.L. Vallier, 1981. **Faulting in the outer continental shelf of the southern Bering Sea.** *Am. Ass. Petrol. Geol. Bull.,* 65(9):1568-1573.

Surface, minor and major faults and their distribution and trend are delineated by 10,000 km high-resolution seismic coverage of the southern Bering Sea. Displacements are correlated with regional structures. Energy associated with earthquakes may be reactivating weakness zones resulting from the Late Mesozoic-Early Tertiary margin collapse to generate these faults. USGS, Menlo Park, Calif. 94025, USA. (bas)

82:1822

Hancock, P.L., S.O. Al-Khatieb and A. Al-Kadhi, 1981. **Structural and photogeological evidence for the boundaries to an East Arabian Block.** *Geol. Mag.,* 118(5):533-538 + 1 plate.

A 1000-km long arcuate fault zone is identified from structural and photogeological (enhanced Landsat images) evidence in the eastern Arabian subplate. The area is interpreted as an arc segment which forms major tectonic boundaries of the Arabian subplate. Stratigraphic and hydrocarbon relations are presented. Includes a Landsat mosaic. Dept. of Geol., Univ. of Bristol, Bristol BS8 1TR, UK. (bas)

82:1823

Hirahara, Kazuro, 1981. **Three-dimensional seismic structure beneath southwest Japan: the subducting Philippine Sea Plate.** *Tectonophysics,* 79(1/2):1-44.

The inversion method of Aki et al. (1976, 1977) is applied to 42 events to detail the lateral inhomogeneity of the upper mantle above 200 km. Implications for resulting earthquake source mechanisms and the past and present Philippine Sea Plate subduction along the Nankai Trough are covered. Several narrow LVZ's are identified. Intersection of the Philippine Sea and Asian plates seems collisional under the Izu Peninsula. Disaster Prevention Res. Inst., Kyoto Univ., Uji, Kyoto 611, Japan. (bas)

82:1824

John, Norris, 1981. **Source parameters of the northeast coast Venezuelan [earthquake] event of September 20, 1968.** *Rept seism. Inst., Uppsala,* 2-81:25pp. Seismological Dept., Box 12019, S-750 12 Uppsala, Sweden.

82:1825

Kumar, Surendar, 1981. **Geodynamics of Burma and the Andaman–Nicobar region, on the basis of tectonic stresses and regional seismicity.** *Tectonophysics,* 79(1/2):75-95.

Variable horizontal compression and relative movement of tectonic segments are implied by the nature, and vertical and latitudinal earthquake and deformation distributions for the area. The geodynamic model details plate motions from the Andaman transform fault to the Andaman Trench. Wadia Inst. of Himalayan Geology, Dehra Dun 248001, India. (bas)

82:1826

Sborshchikov, I.M., L.A. Savostin and L.P. Zonenshain, 1981. **Present plate tectonics between Turkey and Tibet.** *Tectonophysics,* 79(1/2):45-73. Inst. of Oceanology, Acad. of Sci., Moscow 117218, USSR.

82:1827

Scrutton, R.A., W.B. Heptonstall and J.H. Peacock, 1981. **Constraints on the motion of Madagascar with respect to Africa.** *Mar. Geol.,* 43(1/2):1-20.

Previously published data on Somali Basin and Mozambique Channel fracture-zone morphology and direction, the relative position of paleomagnetic poles, and crustal structure all constrain the drift of

Madagascar—generally southerly. Implications of the resulting model for the east African continental margin are discussed. Grant Inst. of Geol., Univ. of Edinburgh, West Mains Rd., Edinburgh, UK. (bas)

82:1828

Thatcher, Wayne and Tokihiko Matsuda, 1981. **Quaternary and geodetically measured crustal movements in the Tokai district, central Honshu, Japan.** *J. geophys. Res.*, 86(B10):9237-9247.

Since the Late Mesozoic, the area's tectonics have been dictated by plate convergence and associated subduction. Izu Peninsula collided with central Honshu in the Quaternary, resulting in crustal shortening, complex folding and faulting, active volcanism and fracturing of the peninsula. Deformation is 'very intense' north of the peninsula. Behind the active subduction zone, uplift and mountain-building continue. USGS, Menlo Park, Calif. 94025, USA. (slr)

82:1829

Thiébault, François, 1981. **Geodynamic evolution of the external Hellenids in southern Peloponnesus (Greece) since the Eocene.** *C. r. hebd. Séanc. Acad. Sci., Paris,* (II)292(22):1491-1496. (In French, English abstract.) U.E.R. Sci. de la Terre, Univ. de Lille, 59655 Villeneuve d'Ascq Cedex, France.

82:1830

Watts, D.R. and A.M. Bramall, 1981. **Palaeomagnetic evidence for a displaced terrain in Western Antarctica.** *Nature, Lond.,* 293(5834):638-640.

NRM intensities and directions and stepwise thermal and AF demagnetization of Cambrian argillites provide evidence for Western Antarctica's being a microplate. This helps resolve (1) the relation between Western Antarctic Late Palaeozoic-Cenozoic orogenic belts and the Eastern Antarctic craton and (2) some problems of Gondwanaland reconstructions. Dept. of Earth Sci., The Univ., Leeds LS2 9JT, UK. (bas)

D250. Plate and global tectonics

82:1831

Davies, G.F., 1981. **Regional compensation of subducted lithosphere: effects on geoid, gravity and topography from a preliminary model.** *Earth planet. Sci. Letts,* 54(3):431-441.

A 2-D model of an elastic layer over a fluid half-space demonstrates that two regional compensation mechanisms can account for first-order geoid, gravity and topography anomalies associated with subducted lithosphere. It is suggested that the trench results from ~30% of the stresses being conducted up through the slab, and that a broad shallow depression results from ~50% of the stresses conducted through a mantle wedge over the slab. Dept. of Earth and Plan. Sci., Washington Univ., St. Louis, Mo. 63130, USA. (bas)

82:1832

Hellinger, S.J., 1981. **The uncertainties of finite rotations in plate tectonics.** *J. geophys. Res.*, 86(B10):9312-9318.

Reconstruction uncertainty for the South Pacific for the times of anomalies 13 and 18 is studied with a new method which reflects the incompleteness of magnetic lineation and fossil transform fault data. The method 'minimizes a weighted least squares measure of fit as a function of the rotation parameters...[and] may be utilized to obtain an uncertainty region for the pole and angle of rotation that characterize the finite rotation.' (bas)

82:1833

Minamino, Toshizo and Naoyuki Fujii, 1981. **The effect of the contorted 'nose' of a subducting slab on the stress field in the continental lithosphere at an arc-arc junction.** *Geophys. Jl R. astr. Soc.,* 67(1):145-158.

State of stress, vertical displacement, and stress distribution in an isotropic-elastic continental lithosphere at an arc-arc junction are modelled with a 3-D finite element method. The model is applied to the Kurile-Japan junction. Predicted extension of the anomalous stress field (due to the subducting slab's contorted 'nose') a considerable distance inland from the Hokkaido corner generally agrees with geophysical observations. Century Res. Center Co. Ltd., Kitakyutaro-cho 4-68, Higashi-ku, Osaka 541, Japan. (bas)

82:1834

Shlezinger, A.E. and A.L. Yanshin, 1981. **Tectonic non-uniformity of the World Ocean floor.** *Sov. Geol.,* 1981(7):41-50. (In Russian.)

D280. Volcanism, magmatism

82:1835

Ailin-Pyzik, I.B. and S.E. Sommer, 1981. **Microscale chemical effects of low temperature alteration of DSDP basaltic glasses.** *J. geophys. Res.*, 86(B10):9503-9510.

A new, non-invasive technique involving x-ray fluorescence is described which allows major and trace element analysis of adjacent fresh and altered glass; it is clear from the degree of alteration demonstrated that only the freshest glasses reflect the initial magmatic composition. During alteration from fresh glass (sideromelane) to palagonite (smectite), elements are lost in the following amounts: Si and Al, 50%; Mg, Na, 65%; Ca, >90%; Zn, Cu, Ni, >25%; Mn, 40%; and Cr, >10%. K increased by a factor of 40. Owens-Corning Fiberglas, Tech. Center, Granville, Ohio 43023, USA. (slr)

82:1836

Belyi, V.F., 1981. **Andesite volcanism zones of the Pacific segment of the Earth.** *Sov. Geol.*, 1981(7): 108-117. (In Russian.)

82:1837

Bokhari, F.Y. and J.D. Kramers, 1981. **Island arc character and Late Precambrian age of volcanics at Wadi Shwas, Hijaz, Saudi Arabia: geochemical and Sr and Nd isotopic evidence.** *Earth planet. Sci. Letts,* 54(3):409-422. General Directorate of Mineral Resources, Jeddah, Saudi Arabia.

82:1838

Clague, D.A., F.A. Frey, Geoff Thompson and Susan Rindge, 1981. **Minor and trace element geochemistry of volcanic rocks dredged from the Galapagos Spreading Center: role of crystal fractionation and mantle heterogeneity.** *J. geophys. Res.*, 86(B10):9469-9482.

Evaluations of abyssal tholeiites, Fe-Ti-rich basalts, andesites and rhyodacites dredged near 95°W and 85°W on the Galapagos Spreading Center showed the rocks to be extremely fractionated and derived from different parental magmas. The chemically distinct mantle souces were both depleted with that 'beneath 85°W more severely depleted in light REE and K.' USGS, Menlo Park, Calif. 94025, USA. (isz)

82:1839

McLennan, S.M. and S.R. Taylor, 1981. **Role of subducted sediments in island-arc magmatism: constraints from REE patterns.** *Earth planet. Sci. Letts,* 54(3):423-430.

The amount of sediment inclusion in island arc basalt and andesite magma sources is constrained by the resultant europium anomaly. The decrease in europium relative to other REE in post-Archean continental sedimentary rocks is used to suggest percent sediment inclusion in MORB (10%), single- (1%) and two-stage (0.1–0.3%) depleted mantle sources. Res. Sch. of Earth Sci., Australian Nat. Univ., Canberra, A.C.T., Australia. (bas)

82:1840

Sigurdsson, Haraldur, 1981. **First-order major element variation in basalt glasses from the Mid-Atlantic Ridge: 29°N to 73°N.** *J. geophys. Res.*, 86(B10):9483-9502.

'Different major element concentrations, phase assemblages and partition coefficients' characterize the two basaltic glass groups (A and B), which also represent separate geographic areas. Group A glasses occur on the MAR north of Gibbs Fracture Zone (54°N) up to Jan Mayen Fracture Zone (70°N), and also from 29°N to 34°N. Group B glasses occur between 35°N and 53°N and north of Jan Mayen, at least to 73°N. These findings apparently reflect differences in melt and source compositions, thus defining major MAR petrographic provinces. Grad. Sch. of Oceanog., Univ. of Rhode Island, Kingston, RI 02881, USA. (slr)

82:1841

Sparks, R.S.J., 1981. **Inside a volcano: the first three-dimensional map.** *Nature, Lond.*, 293(5833):p.512.

The well-constrained, 3-D, Plexiglass scale model of Kilauea provides a means of relating every documented eruption since 1952 to the volcano's reservoir and transport system; the model may also have predictive value for future volcanic activity. Dept. of Earth Sci., Univ. of Cambridge, UK. (hbf)

D290. Crust, mantle, core

82:1842

Barenblatt, G.I., V.I. Keilis-Borok and M.M. Vishik, 1981. **Model of clustering of earthquakes.** *Proc. natn. Acad. Sci. U.S.A.*, 78(9):5284-5287.

Two-phase crack expansion in which the first phase has a greater slip rate and a smaller expansion rate than the second can result in a shock sequence that can then be associated with earthquake clusters. The crack model is 2-D in an elastic medium and assumes that friction is a function of slip rate and that cohesion modulus is a function of crack expansion velocity. Inst. of Oceanology, Acad. of Sci., Moscow, USSR. (bas)

82:1843

Biswas, N.N., 1981. **Comparison between magnitudes and Rayleigh wave spectra of Aleutian underground explosions and earthquakes.** *Tectonophysics,* 79(1/2):97-107.

The Cannikin cavity collapse, 3 underground nuclear explosions, and 80 shallow earthquakes (all with

$4.8 \leq mb \leq 6.8$) were the sources for the magnitude comparison between surface and body waves. Source dependent differences between the surface and body waves' magnitudes and their ratio are discussed. Geopys. Inst., Univ. of Alaska, Fairbanks, Alaska 99701, USA. (bas)

82:1844

Bonatti, Enrico, Paul Hamlyn and Giulio Ottonello, 1981. **Upper mantle beneath a young oceanic rift: peridotites from the island of Zabargad (Red Sea).** *Geology, geol. Soc. Am.,* 9(10):474-479.

Mineralogy, mineral chemistry, and rare-earth and major element analyses of fresh spinel lherzolite samples suggest oceanic affinities. These mantle-derived bodies were probably uplifted with the Red Sea Rift and imply that, in this lithospheric transition zone, the Red Sea is underlain by ultramafics with oceanic affinities but covered with continental crust. Lamont-Doherty Geol. Observ., Palisades, NY 10964, USA. (bas)

82:1845

Canas, J.A. and B.J. Mitchell, 1981. **Rayleigh wave attenuation and its variation across the Atlantic Ocean.** *Geophys. Jl R. astr. Soc.,* 67(1):159-176.

Anelastic attenuation coefficients, group and phase velocities, and specific quality factors for periods 15–100 s are determined from fundamental mode Rayleigh wave data for 28 Atlantic events. Higher Q values are associated with older areas. No age-dependent variation of Rayleigh or shear waves is resolved. A comparison with Pacific regions is discussed. Dept. of Earth and Atmos. Sci., Saint Louis Univ., St. Louis, Mo. 63156, USA. (bas)

82:1846

Fitch, T.J., R.G. North and M.W. Shields, 1981. **Focal depths and moment tensor representations of shallow earthquakes associated with the Great Sumba earthquake.** *J. geophys. Res.,* 86(B10): 9357-9374. MIT Lincoln Lab., Cambridge, Mass. 02142, USA.

82:1847

Klein, F.W., 1981. **A linear gradient crustal model for south Hawaii.** *Bull. seism. Soc. Am.,* 71(5):1503-1510.

South Hawaii local event travel-time residuals and focal mechanism solution consistency are used as positive tests for a crustal model which has no artificial velocity discontinuities and no basal LVZ; the model is applied to the location of events in the Hawaiian seismic network. USGS, Hawaiian Volcano Observ., Hawaii National Park, Hawaii 96718, USA. (bas)

82:1848

Lambeck, Kurt, 1981. **Flexure of the ocean lithosphere from island uplift, bathymetry and geoid height observations: the Society Islands [South Pacific].** *Geophys. Jl R. astr. Soc.,* 67(1):91-114.

A flexure model constrained by geoid height anomalies from satellite altimetry data, moat and arch geometry, and degree of island uplift on this arch gives values for load density and flexural rigidity. Model results agree well with recent Seasat altimeter observations. Res. Sch. of Earth Sci., Australian Nat. Univ., Canberra 2600, Australia. (bas)

82:1849

Ohnenstetter, M., D. Ohnenstetter, P. Vidal, J. Cornichet, D. Hermitte and J. Mace, 1981. **Crystallization and age of zircon from Corsican ophiolitic albitites: consequences for oceanic expansion in Jurassic times.** *Earth planet. Sci. Letts,* 54(3):397-408.

Zircons from albitite and albite-granites of Liguro-Piedmont Basin ophiolite remnants are studied for their morphology, typology and age. U-Pb isotopes give an age of 161 ± 3 m.y. which, with other results, suggests that the remnants may be part of the Mid-to-Upper Jurassic central Atlantic. Lab. de Petrologie, C.O. 140, 54037 Nancy Cedex, France. (bas)

82:1850

Staudigel, Hubert, Karlis Muehlenbachs, S.H. Richardson and S.R. Hart, 1981. **Agents of low temperature ocean crust alteration.** *Contr. Miner. Petrology,* 77(2):150-157.

A simplified 4-stage model is offered for sequential alteration of ocean crust based on (1) vein and whole rock $\delta^{18}O$ and $^{87}Sr/^{86}Sr$ analyses of DSDP samples collected south of Bermuda Rise, (2) petrography, (3) alkali element concentrations, and (4) published isotopic ages. 'Water of seawater Sr and O isotopic composition is shown to percolate to at least 500 m into the basaltic basement.' Lamont-Doherty Geol. Obs., Columbia Univ., Palisades, NY 10964, USA. (isz)

82:1851

von Seggern, David, S.S. Alexander and Chang-Eob Baag, 1981. **Seismicity parameters preceding moderate to major earthquakes.** *J. geophys. Res.,* 86(B10):9325-9351.

Data from bulletin recordings of 510 events of $m_b \geqslant 5.8$ for the LASA and NORSAR arrays were statistically analyzed to determine if seismic precursors occurred. Less than 30% of the main shock regions showed any precursory events; <20% had

foreshocks and those were associated only with shallow (<100 km) events. Teledyne Geotech, Alexandria, Va. 22313, USA. (bas)

D330. Oil and gas

82:1852

Carozzi, A.V., 1981. **Porosity models and oil exploration of Amapá carbonates, Paleogene, Foz do Amazonas Basin, offshore NW Brazil.** *J. Petrol. Geol.,* 4(1):3-34.

The huge Paleogene carbonate platform beneath the mouth of the Amazon was investigated petrographically. The resultant depositional-diagenetic model portrays the successive development of a large coralgal-foraminiferal platform during 4 depositional cycles reflecting eustatic shifts of sea level. Successive subaerial exposures of the platform have enhanced the porosity of the carbonates, but may also have flushed the hydrocarbons. Univ. of Ill., Urbana, Ill. 61801, USA. (hbf)

D340. Manganese nodules, etc.

82:1853

Exon, N.F., 1981. **Manganese nodules in the Cook Islands region, southwest Pacific.** *S. Pacif. mar. geol. Notes, U.N., Suva,* 2(4):47-65.

Nowhere in an area ~2,500,000 km^2 'were nodules of potentially economic grade (>2% Ni+Cu+Co) found in potentially economic concentrations (>10 kg wet nodules/m^2).' The relatively low Ni and Cu grades in nodules may result from low productivity of surface waters. Future prospecting should concentrate on the Penrhyn Basin where both high nodule concentrations and grades may be found at 5000–5600 m. UN Offshore Min. Prosp. Mineral Res. Dept., Private Mail Bag, G.P.O. Suva, Fiji. (ahm)

82:1854

Glasby, G.P., 1981. **Manganese nodule studies in the southwest Pacific 1975-1980.** A review. *S. Pacif. mar. geol. Notes, U.N., Suva,* 2(3):37-46.

Nodule geochemistry, genesis, economic potential, and factors controlling nodule formation and distribution are discussed. Previous estimates of the 'wealth' of nodules are deemed unrealistic. Equatorial North Pacific sites are considered economically feasible to mine; SW Pacific, not so in the foreseeable future. A scientific rather than economic approach to the problem is urged. NZOI, DSIR, P.O. Box 12346, Wellington, New Zealand. (ahm)

D360. Books, collections (general)

82:1855

Lister, G.S., H.-J. Behr, K. Weber and H.J. Zwart (eds.), 1980/81. **The effect of deformation on rocks.** Selected papers from the conference, Göttingen, April 9-12, 1980. Special issue. *Tectonophysics,* 78(1/4):698pp; 35 papers.

Causes, mechanisms, rheology and consequences of rock deformation were all under consideration in this large collection. Fabric, texture, and cleavage characteristics induced by high- and low-grade metamorphism; geochemical and isotopic behavior during deformation; phase composition; shear zone development; partial melting; fluid inclusions; and optical characteristics are among the aspects addressed. (slr)

82:1856

McGinnis, L.D. (ed.), 1981. **Dry Valley [Antarctica] Drilling Project.** *Antarct. Res. Ser., Am. geophys. Un.,* 33:465pp; 28 papers.

This project comprises the coordinated efforts of researchers from the U.S., Japan and New Zealand. Although the emphasis is on core analysis, geophysical surveys are included. Thus far, coring has penetrated only 225 m of sediment beneath McMurdo Sound; a major need is a drill rig capable of several kilometers of drilling. A discussion of DVDP's role in Antarctic and international science policy is followed by sections on exploration geophysics (aeromagnetic and seismic); lithologic, geophysical and geochemical logs; lake chemistry and hydrogeology; crystalline and sedimentary rock analyses; glacial and geologic history; and DVDP core storage and bibliography. (slr)

D370. Miscellaneous

82:1857

Kerr, R.A., 1981. **Assessing the risk of eastern U.S. earthquakes.** *Science,* 214(4517):169-171.