The PLATES 2001
Atlas of Plate Reconstructions
(750 Ma to Present Day)

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530 Ma
Late Tommotian/Early Atdabanian (Early Cambrian)
520 Ma
Lenian (Early Cambrian)

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510 Ma
Middle Cambrian
490 Ma
Tremadocian (Early Ordovician)
480 Ma
Arenigian (Early Ordovician)
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430 Ma
Late Llandoveryan (Early Silurian)

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420 Ma
Ludlovian (Late Silurian)

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400 Ma
Late Praghian/Early Emsian (Early Devonian)

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390 Ma
Early Eifelian (Early Devonian)

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350 Ma
Tournaissian (Mississippian)
320 Ma
Bashkirian (Pennsylvanian)
240 Ma
Anisian (Middle Triassic)

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230 Ma
Ladinian (Middle Triassic)

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220 Ma
Early Norian (Late Triassic)

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August 2001
140 Ma
Ryazanian (Early Cretaceous)

PLATES/UTIG
August 2001
70 Ma
Maastrichtian (Late Cretaceous)
50 Ma
Early Eocene

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August 2001
References for Plate Model


Burke, K. and Rutherford, E., 1987, Sumba as a sideways slipping sliver, unpublished manuscript.


Epp 1978


(editors), v. 5A, pp. 117-1146, Circum Pacific Conference for Energy and Mineral Resources, Houston, TX.


Liou, J.G. and Maruyama, S., 1986, Post-Permian evolution of Asia, and some implications for Taiwan, Acta Geologica Taiwanica, No. 24, pp. 5-49.


Molnar, P., Atwater, T., Mammerickx, J., and Smith, S.M., 1975, Magnetic anomalies, bathymetry and the
tectonic evolution of the South Pacific since the Late Cretaceous, Geophysical Journal of Royal
Molnar, P., Pardo-Casas, F., and Stock, J., 1988, The Cenozoic and Late Cretaceous evolution of the
Indian Ocean basin: uncertainties in the reconstructed positions of the Indian, African and Antarctic
plates, Basin Research, 1: 23-40.
Late Cretaceous/Tertiary plate tectonic evolution of the Caribbean, in Caribbean Basins, P. Mann
(editor), Sedimentary Basins of the World series, Elsevier Science B.V., Amsterdam, The Netherlands,
4:33-59.
Müller, R.D., Royer, J.-Y., and Lawver, L.A., 1993, Revisited plate motions relative to the hotspots from
combined Atlantic and Indian Ocean hotspot tracks, Geology, vol. 21, pp. 275-278.
Müller, R.D., Sandwell, D.T., Tucholke, B.E., Sclater, J.G., and Shaw, P.R., 1990, Depth to basement and
g eo id expression of the Kane Fracture Zone: a comparison, Marine Geophysical Researches, 13: 105-
129.
Niocci, C.M., and Smethurst, M.A., 1994, Palaeozoic palaeogeography of Laurentia and its margins: A
Norton, I.O. and Sclater, J.G., 1979, A model for the evolution of the Indian Ocean and the breakup of
the Greenland - Scotland Ridge, pp. 11-30.
Nürnberg, D. and Müller, R.D., 1991, The tectonic evolution of the South Atlantic from Late Jurassic to
clockwise rotation of the northern arm of Sulawesi, Indonesia, Earth and Planetary Science Letters, 54:
272-280.
Otsuki, K. and Ehiro, M., 1979, Major strike-slip faults and their bearing on spreading in the Japan Sea, in
Uyeda, S., Murphy, R.W., and Kobayashi, K. (eds.), Geodynamics of the Western Pacific,
Proceedings of the International Conference on Geodynamics of the Westm Pacific-Indonesian
Panuska, B.C., and Stone, D.B., 1985, Latitudinal motion of Wrangellia and Alexander terranes and the
southern Alaska Superterrane, in D.G. Howell (eds.), Tectonostratigraphic terranes of the circum-
Pacific region, Circum-Pacific Council for Energy and Mineral Resources Earth Science Series, 1:
109-120, Houston.
Park, J.K., Norris, D.K., and Larochelle, A., 1989, Paleomagnetism and the origin of the Mackenzie arc of
northwestern Canada, Canadian Journal of Earth Sciences, 26:123-140.
Patriat, P., 1983, Evolution du système de dorsales de l'Ocean Indien, These Doctorat d'Etat, Universite
Pierre et Marie Curie, Paris.
Patriat, P., 1987, Reconstitution de l'évolution du systeme de dorsales de l'océan Indien par les méthodes de
and H.C. Berg (eds.), The Geology of Alaska, G-1: 989-1021, Geological Society of America,
Boulder, CO.
Powell, C.M., Roots, S.R., and Veevers, J.J., 1988, Pre-breakup continental extension in East
Rabinowitz, P.D., and LaBrecque, J., 1979, The Mesozoic South Atlantic Ocean and evolution of its
Roest, 1987, Seafloor Spreading Pattern of the North Atlantic between 10∞ and 40∞N, Geologica
Ultraiectina, Mededelingen van het Instituut voor Aardwetenschappen der Riksuniversiteit te Utrecht,
v. 40, 121 pp.
and the Mesozoic evolution of the Central North Atlantic, Marine Geophysical Researches, 14(1): 1-
24.
Geology, 17: 1000-1004.


Smith, A.B., 1988, Late Palaeozoic biogeography of East Asia and palaeontological constraints on plate tectonic reconstructions, Phil. Trans. R. Soc. Lond., A326: 189-227.


Veevers & Eittreim 1988


References for digital data


Index map to principal geographic features and locations discussed in chapter B, Antarctica. Base map modified from Sheet 4.1(1:10,000,000) of “Antarctica: Glaciological and Geophysical Folio”, Scott Polar Research Institute, Cambridge (Drewry, 1983). Professional paper 1386-B, plate 1, Dept. of the Interior U.S. Gological Survey.

Tectonic map of Australia and New Guinea, 1971, scale 1:5,000,000, Geological Society of Australia, Sydney, Australia.

Total sedimentary isopach map, offshore east Asia, 1991, Working group on resource assessment, committee for co-ordination of joint prospecting for mineral resources in Asian offshore areas (CCOP), scale 1:4,000,000.


Bergh, H.W., pers. comm.


Bradshaw, J.D., 1997, Terrane Dynamics 1997 Guidebook for Field Excursions A, B, & C, University of Canterbury, Christchurch, New Zealand, Figure 1, page III.

British Antarctic Survey, 1985, Tectonic Map of the Scotia Arc, Scale 1:3,000,000. BAS (Misc.) 3. Cambridge, British Antarctic Survey.

British Oceanographic Data Centre (Proudman Oceanographic Laboratory), 1997, General Bathymetric Chart of the Oceans (GEBCO) Digital Atlas, Bidston Observatory, Merseyside L43 7RA, UK (cdrom).


Case, J. and Holcombe, T., 1980, Geologic-tectonic map of the Caribbean region, scale 1:2,500,000.
Coffin, M.F. and Eldholm, O., in prep., Chapman paper.
Cuban Gulf Oil Co., 1956, Regional Geologic Map of Cuba; air photographic base; scale approximately 1:100,000; sheets B6, C6, and C7.
Defense Mapping Agency Hydrographic/Topographic Center, 1980, Shetland Islands: Deception Island to King George Island, map, mercator projection, scale: 1:200,000 at latitude 65°.
(Based on: Draper, G., Mann, P., and Lewis, J.F., 1994, Hispaniola, in S.K. Donovan and T.A. Jackson (eds.), Caribbean Geology: An Introduction, 129-150, University of the West Indies Publisher's Association, Kingston, Jamaica.)
Dunbar, J. and Sawyer, D., 1986, Crust extension within the Gulf of Mexico: Implications for the breakup of Western Pangea, abs. from 1986 Geodynamics Symposium.

Exxon Production Research Company (World Mapping Project), 1985, Tectonic Map Series of the World, Exxon Production Research Company, Houston, TX.


Falconer, R.H.K. and Tharp, M., 1981, General Bathymetric Map of the Oceans (GEBCO), scale 1:10,000,000, sheet 5*14, Canadian Hydrographic Service.


Fisher, R.L., pers. comm.


Hayes, D.E. and Vogel, M., 1981, General Bathymetric Map of the Oceans (GEBCO), scale 1:10,000,000, sheet 5*13, Canadian Hydrographic Service.


Instituto Geográfico Nacional, 1970, Mapa Geológico de la República de Guatemala, scale 1:500,000.

Iwabuchi, Y., 1979, General Bathymetric Map of the Oceans (GEBCO), scale 1:10,000,000, sheet 5*6, Canadian Hydrographic Service.


Jennings, C.W., 1961, Geologic map of California: Kingman sheet, scale 1:250,000, California Division of Mines and Geology, Sacramento, CA.

Johnson, G.L., and Vanney, J.R., 1980, General Bathymetric Map of the Oceans (GEBCO), scale 1:10,000,000, sheet 5*18, Canadian Hydrographic Service.


Kovacs, L.C., Srivastava, S.P. and Jackson, H.R., 1986, Results from an aeromagnetic investigation of the Nares Strait Region, J. Geodynamics, 6: 91-110.


LaBrecque, J. and Rabinowitz, P.D., 1981, General Bathymetric Map of the Oceans (GEBCO), scale 1:10,000,000, sheet 5+16, Canadian Hydrographic Service.


Laughton, A.S., 1975, General Bathymetric Map of the Oceans (GEBCO), scale 1:10,000,000, sheet 5+16, Canadian Hydrographic Service.


Pre-rotation outlines of Yukon Composite and Wrangellia North terranes and pre-compression outline of Yukatá Terrane.


Mann, P., personal communication. NEHRP Proposal. Active tectonic lineaments in Mona Passage, between Hispaniola and Puerto Rico.


Marocco, R., Lavenu, A., Baudino, R., Jaillard, E., and Ordonez, M., 1995, Intermontane late Paleogene
Neogene basins of the Andes of Ecuador and Peru: Sedimentologic and tectonic characteristics, in A.J.
Tankard, R.S. Soruco and H.J. Welsink (eds.), Petroleum Basins of South America, AAPG Memoirs,
62: 597-613.

tectonic structures developed under high-gra d metamorphism in the southern part of Madagascar,

Falkland Plateau relative to southern Africa using Mesozoic seafloor spreading anomalies,

Martin, A.K. and Hartnady, C.J.H., 1986, Plate tectonic development of the south west Indian Ocean: a
revised reconstruction of East Antarctica and Africa, Journal of Geophysical Research, 91(B5): 4767-
4786.

Marton, G. and Buffler, R.T., 1994, Jurassic reconstruction of the Gulf of Mexico Basin, International

Marzoli, A., Renne, P.R., Piccirillo, E.M., Ernesto, M., Bellieni, G., and DeMin, A., 1999, Extensive 200-
million-year-old continental flood basalts of the Central Atlantic Magmatic Province, Science,
284(5414): 616-618.

Implications for the connection between the Central and Southern Atlantic ocean, Sond. Geol.
Rundschau, 75(1): 57-70.

Massell, C.G., 1996, The Neotectonics of the Macquarie Ridge Complex, Pacific-Australia Plate

Masson, D.P., Kidd, R.B., and Roberts, D.G., 1982, Late Cretaceous sediment sample from the Amirante
Passage, western Indian Ocean, Geology, 10: 264-266.

Mauffret, A., and Leroy, S., 1999, Neogene intraplate deformation of the Caribbean Plate at the Beata
Science B.V., Amsterdam, The Netherlands.

May, P.R., 1971, Pattern of Triassic-Jurassic diabase dikes around the North Atlantic in the context of


McKenzie, D. and Sclater, J.G., 1971, The evolution of the Indian Ocean since the Late Cretaceous,

California, San Diego, 121 pp.

Mejorada, P., 1976, Carta geologica del la Republica Mexicana, scale 1:2,000,000.

Nova, 10(4): 211-216.

Miall, A.D., 1983, the Neves Strait problem: A re-evaluation of the geological evidence in terms of a
diffuse oblique-slip plate boundary between Greenland and the Canadian Arctic Islands,
Tectonophysics, 100:227-239.

Miles, P.R., Munschy, M., and Segoufin, J., 1998, Structure and early evolution of the Arabian Sea and


Mitchell, C., G.K. Taylor, K.G. Cox, and J. Shaw, Are the Falkland Islands a rotated microplate?, Nature,

Mobil Exploration and Producing Technical Center, 1994,Global Isopach Map and Digital Database,
Dallas, TX.


Alagous and Jacuipie basins, offshore northeastern Brazil, Tectonophysics, 288, 199-220.

Molnar, P., Atwater, T., Mammerickx, J., and Smith, S.M., 1975, Magnetic anomalies, bathymetry, and the
tectonic evolution of the South Pacific since the Late Cretaceous, Geophys. J. R. astr. Soc., 40: 383-
420.

Monahan, D., Falconer, R.H.K., and Tharp, M., 1982, General Bathymetric Map of the Oceans (GEBCO),
scale 1:10,000,000, sheet 5*10,Canadian Hydrographic Service.


New Zealand Geological Survey, 1972, "Geological map of New Zealand 1:1,000,000", North and South Islands sheets (1st edition), Department of Scientific and Industrial Research, Wellington, New Zealand.


Pardo-Casas, F. and Molnar, P., 1987, Relative motion of the Nazca (Farallon) and South American plates since Late Cretaceous time, Tectonics, 6(3): 215-232.

Parfenov, L. & others, in press, "Comprehensive Geodynamic Chart," inset of northeastern Siberia from the "Geodynamic map of Okhotsk and surrounding territories."


Peter et al.


Rosencrantz, E. and Pardo, G., 19??, Investigations Into the Geology of Cuba, University of Texas at Austin Institute for Geophysics unpublished atlas, p. 47. Data digitized from Figure 1 of Section 1.1, "An Overview of the Cuban Orogen Geological Divisions."


St. John, B., 1984, Sedimentary provinces of the world - hydrocarbon productive and nonproductive, Williams & Heinz Map Corporation, Capitol Heights, MD, 20743. Scale 1:31,368,000 or 500 miles to the inch at the equator. Van der Grinten projection.


Schlich, R., Wise, S.W., Jr., et al., 1989, Leg 120, Proceedings of the Ocean Drilling Program, Initial Reports, College Station, TX.


Scripps Data Center.


Stern, T.A. and Davey, 1989, Crustal structure and origin of basins formed behind the Hikurangi subduction zone, New Zealand, in R.A. Price (eds.), Origin and evolution of sedimentary basins and their energy and mineral resources, 48, pp. 73-86, American Geophysical Union, Washington, D.C.,


Theberge, A.E., Jr., 1971, Magnetic survey off southern California and Baja California: Rockwell, Maryland, National Oceanographic and Atmospheric Administration, National Ocean Survey, scale 1:1,000,000.


References for paleomagnetic data


References for paleomagnetic data


