Geology

The Decade of North American Geology 1983 Geologic Time Scale

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Notes

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Preparation of the 27 synthesis volumes of *The Geology of North America* for the Decade of North American Geology (DNAG) is now in progress. In order to encourage uniformity among DNAG authors in the citation of numerical ages for chronostratigraphic units of the geologic time scale, an ad hoc Time Scale Advisory Committee was established by the DNAG Steering Committee in 1982. This advisory committee, consisting of Z. E. Peterman (Chairman) and J. E. Harrison, U.S. Geological Survey; R. L. Armstrong, University of British Columbia; and W. A. Berggren, Woods Hole Oceanographic Institution, was asked to evaluate numerical dating schemes that were either recently published or in press and to provide recommendations for the best numbers to use in preparation of a DNAG time scale. The chart on the opposite side of this page was developed from the recommendations of the Time Scale Advisory Committee.

Geochronometric ages (Ma, Ga) assigned to chronostratigraphic boundaries are subject to several uncertainties in addition to those introduced by the numerical dating methods themselves; boundary stratotypes for many units are not yet chosen, so disagreement exists about exact biostratigraphic placement and correlation of a boundary; and many materials that can be numerically dated are not known in good context with biostratigraphic data, so extrapolation to a chronostratigraphic boundary is commonly required. Furthermore, with respect to the late Mesozoic and the Cenozoic, differing numerical age calibrations of the magnetic polarity-reversal scale based on differing choices of scattered isotopically dated tie points, differing interpretations of the positions of biostratigraphic boundaries with respect to the polarity-reversal scale, and uncertainties in the meaning of isotopic ages derived from glauconies lead to disagreement about ages assigned to some chronostratigraphic boundaries.

With these caveats, the numerical ages given in this chart represent interpretations acceptable to the DNAG Time Scale Advisory Committee. The uncertainty bars for Paleozoic and Mesozoic ages are from data in Harland and others (1982). Uncertainty bars for the Cenozoic are not available.

Sources for the numerical ages and for the chronostratigraphic nomenclature are given below.

CENOZOIC

Berggren, W. A., Kent, D. V., and Van Couvering, J. A., 1984, Neogene geochronology and chronostratigraphy; *in* Geochronology and the geologic record: Geological Society of London (in press).

Berggren, W. A., Kent, D. V., and Flynn, J. J., 1984, Paleogene geochronology and chronostratigraphy, *in* Geochronology and the geologic record: Geological Society of London (in press).

MESOZOIC

Base of Campanian to end of Cretaceous

Berggren, W. A., Kent, D. V., and Flynn, J. J., 1984, Appendix, *in* Geochronology and the geologic record: Geological Society of London (in press).

Base of Aptian to base of Santonian

Harland, W. B., Cox, A. V., Llewellyn, P. G., Picton, C.A.G., Smith, A. G., and Walters, R., 1982, A geological time scale: Cambridge, Cambridge University Press, 128 p.

Base of Hettangian to base of Barremian (dating and chronostratigraphic correlation of the "M" series)

Kent, D. V., and Gradstein, F. M., 1984, A Jurassic to Recent chronology, *in* Tucholke, B. E., and Vogt, P. R., eds., The Western Atlantic region, Volume M of The geology of North America: Boulder, Colorado, Geological Society of America (in press).

Note: Rhaetian has been eliminated from the Late Triassic chronostratigraphic scale following Tozer, E. T., 1979, Latest Triassic ammonoid faunas and biochronology, western Canada: Geological Survey of Canada Paper 79-1B, p. 127–135.

Base of Ladinian to base of Norian

Armstrong, R. L., 1982, Late Triassic–Early Jurassic time scale calibration in British Columbia, Canada, *in* Odin, G. S., ed., Numerical dating in stratigraphy: New York, John Wiley & Sons, p. 509–513.

Base of Scythian to base of Anisian

Webb, J. A., 1982, Triassic radiometric dates from eastern Australia: *in* Odin, G. S., ed., Numerical dating in stratigraphy: New York, John Wiley & Sons, p. 515–521.

PALEOZOIC

All numerical ages except those for the upper and lower boundaries of the Paleozoic are derived from Harland and others (see above, 1982, p. 52–55). Late Carboniferous numbers are for continentally based ages (N = "Namurian"; W = Westphalian; S = Stephanian). The marine-based ages are from Harland and others (1982, Fig. 5.6). The earlier estimate for the base of the Cambrian at 570 Ma is retained.

PRECAMBRIAN

Harrison, J. E., and Peterman, Z. E., 1982, North American Commission on Stratigraphic Nomenclature, Report 9, Adoption of geochronometric units for divisions of Precambrian time: American Association of Petroleum Geologists Bulletin, v. 66, p. 801–802.

DECADE OF NORTH AMERICAN GEOLOGY
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