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Title: PASSIVE MARGINS THROUGH EARTH HISTORY
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Abstract: The ages and lifespans of all existing passive (Atlantic-type) margins plus 59 ancient ones were compiled. The abundance of passive margins has fluctuated dramatically since they first appeared in the Neoarchean. For the past 2200 Ma, the compiled age distribution of passive margins appears to be robust and not an artifact of an incomplete geologic record or shortcomings of the compilation. It closely tracks all the first-order highs and lows of the seawater $^{87}Sr/^{86}Sr$ secular curve, an utterly independent data set.

The age distribution shows the following: (1) A present-day maximum in both number and aggregate length of passive margins corresponds to a time of continental dispersal following the breakup of Pangea. (2) A 250-350-Ma minimum corresponds to the period of Pangea's greatest extent. (3) A 500-600-Ma maximum represents a time of continental dispersal following staged breakup from 600 to 1000 Ma of one or more larger continents (Rodinia in most models). (4) Passive margins are rare between 1000 and 1650 Ma, and none are known at all between 1650 and 1750 Ma. Whereas the Mesoproterozoic may not have seen many modern-style Wilson Cycles involving the opening and closing of Atlantic-type oceans, it nonetheless was a time of plate tectonics involving subduction and collision, as witnessed by the Grenville orogeny. (5) Passive margins were abundant between 1750 to 2250 Ma. A maximum at 1850-2050 Ma corresponds to a time of dispersed small continents. The close of this interval at 1750-1800 Ma was marked by the collisional assembly of Laurentia, Baltica, and other cratons, which themselves may have been part of a supercontinent (Columbia in some models). (6) The record of passive margins before 2250 Ma is patchy. It definitely extends back to 2685 Ma (Kaapvaal craton), and possibly to about 3000 Ma.

For most margins, the lifespan was calculated from the time between the rift-drift transition and the passive margin to foredeep transition. The present-day passive margins have a mean age of 104 m.y. and a maximum age of 180 m.y.; these are only partial lifespans. Fifty-nine ancient margins have a mean (full) lifespan of 187 m.y. and a maximum lifespan of 550 m.y. Of the 59 ancient margins, 20 had lifespans that were longer than any of today's margins, and all 20 are either wholly or partly Precambrian in

age. The world-record holder is the Mesoproterozoic eastern margin of Siberia, which appears to have lasted 550 m.y.

The number of long-lived Precambrian margins is inconsistent with the widely held notion that the tempo of Wilson Cycles was faster in the Precambrian than at present, as has been predicted from the long-term decline in Earth's radiogenic heat production. Thus, the duration of Wilson Cycles involving passive margins is not a good proxy for rates of plate motion. Greater heat production in the Precambrian might still be linked to faster rates of plate motion, if the effect was confined to oceanic (Pacific-type) plates.