

PERMIAN AND TRIASSIC HIGH LATITUDE PALEOCLIMATES: EVIDENCE FROM FOSSIL BIOTAS

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High latitude fossil floras provide an important source of data on past climates, since the plants were living in a strongly seasonal light regime and often existed at the limits of their environmental tolerances. Permian and Triassic rocks from Antarctica have been a rich source of fossil floras, both in the number of sites available and in the preservation of the plants. Anatomically preserved plants from sites in the Beardmore Glacier region (central Transantarctic Mountains) and in southern Victoria Land, Antarctica, provide a unique source of fossil tree ring data. Samples have been collected from fluvial settings, permineralized peat deposits, and in situ forest sites (in growth position). Although preservation is variable at different sites, the wood exhibits distinct growth rings which have been analyzed for paleoclimate signals. Both Permian and Triassic rings are generally large, ranging from a few millimeters to several centimeters in width, and represent growth rates 1-2 orders of magnitude larger than those seen at high latitudes today. In addition, the structure of individual rings differs from that in temperate zones today. Each ring consists of many cells of earlywood with only a small amount (1-2 cells) of latewood, suggesting that light may have been the limiting factor in seasonal growth for these fossil forests.

Data from tree rings, in addition to floral diversity information from nearby compression sites, are at variance with the majority of paleoclimate models (GCM's) that have been produced for this region during the Permian and Triassic. Permian floral diversity is low, but abundance is high, while Triassic floras exhibit both high diversity and abundance. Coupled with the fast tree growth exhibited by wood samples, these biological data suggest much warmer paleoclimates than models based on physical data alone have predicted. Possible reasons for this discrepancy will be discussed and preliminary data from two new floral sites near the Shackleton Glacier (central Transantarctic Mountains) will be presented.