PHANEROZOIC PALEOGEOGRAPHIC, PLATE TECTONIC AND PALEOCLIMATIC RECONSTRUCTIONS

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In 1913, in the concluding remarks to his two volume compendium, Principles of Stratigraphy, Amadeus Grabau wrote, "When the science of Stratigraphy has developed so that its basis is no longer purely or chiefly paleontological, and when the sciences of Lithogenisis and Orogenesis . . . are given their due share in the comprehensive investigation of the history of the earth, then we may hope that Paleogeography, the youthful daughter science of Stratigraphy will have attained unto that stature that will make it the crowning attraction to the student of earth history." It has taken nearly 80 years for Grabau's vision to be realized. The fruits of the plate tectonic revolution combined with our new understanding of global eustasy and event stratigraphy, make it now possible to map the changing geography of the earth's surface with unparalleled detail and accuracy.

In this poster session, we present 28 paleogeographic maps illustrating the changing configuration of mountains, land, shallow seas, and deep ocean basins during the Phanerozoic. The plate boundaries (spreading ridges, subduction zones, and transform faults) that were active during each time interval are also shown. For the Mesozoic and Cenozoic these plate boundaries are based on a synthesis of linear magnetic anomaly data and fracture zone locations compiled by PALEOMAP Project (International Lithosphere Program). The Mesozoic and Cenozoic orientation of the continents relative to the Earth's axis of rotation has been determined using a combination of paleomagnetic data and hot spot tracks. The location of Paleozoic plate boundaries, though speculative, is based evidence of past subduction and inferred sea floor spreading. The relative longitudinal positions of the continents and the width of the intervening Paleozoic oceans have been adjusted to best explain changing biogeographic and paleoclimatic patterns.

The land, sea and mountain distributions portrayed on these 28 paleogeographic reconstructions have been used as input for a series of computer simulations of paleoclimate. The paleoclimatic model, which was developed by C.R. Scotese and M. I. Ross, uses the latitudinal distribution of land and sea, as well as the orientation of ancient mountain belts to predict the distr ibution of high and low pressure cells, prevailing wind direction, relative wetness/dryness, as well as zones of coastal upwelling. This model, which takes a simple parametric approach, makes predictions which are similar to the more robust General Circulation Model (GCM), but requires far less computer resources.

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