UNITED STATES DEPARTMENT OF THE INTERIOR

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Global paleogeography, atmospheric circulation, and rainfall in the Barremian Age (late Early Cretaceous)

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

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The Barremian Age (late Early Cretaceous) was a turning point in Earth's paleoclimatic history. Sea level was higher than it had been earlier in the Mesozoic (Vail et al., 1977) and Gondwana had begun breaking up (University of Chicago Paleogeographic Atlas Project, 1984). The combined effect of these two changes was the breakdown of the Pangaean monsoonal circulation (Robinson, 1973; Parrish et al., in press; Parrish and Doyle, 1984). The purpose of this report is to provide global maps of paleogeography, global atmospheric circulation for the northern winter and summer, and rainfall for Barremian time.

Because the sole purpose of this report is simply to make the maps available, a detailed description of the procedure for constructing the paleoclimatic maps is not included here. The methods for constructing atmospheric circulation maps are presented in Parrish (1982) and Parrish and Curtis (1982). Preparation of the rainfall maps is described in Parrish et al. (1982).

The paleogeography was reconstructed on a base map of continental outlines and positions from the data base of the University of Chicago Paleogeographic Atlas Project (1984). The map style is similar to that of Scotese et al. (1979) and Ziegler et al. (1983), except that shelf and deep ocean are not differentiated. In general, wherever the continental outline extends beyond the shoreline, the shelf edge can be inferred to have followed that outline. Shorelines were determined from data and regional reconstructions from a variety of sources (Table 1). Highlands are extrapolated from the Volgian (latest Jurassic) and Cenomanian (middle Cretaceous) maps of Ziegler et al. (1983), who based their reconstruction of highlands on tectonic evidence and interpretations, such as continent-continent collisions.

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Table 1. Locations, ages, and sources of data used to construct the Barremian Age paleogeographic map (Fig. 1).

Region	Age of data	Reference
central California	125 my	Ingersoll, 1978
Washington	Neocomian	Tennyson and Cole, 1978
western North America	Early Cretaceous	Howell and McDougall, 1978
	Early Cretaceous	Mallory, 1972
Canada	Infra-Valanginian	Williams and Stelck, 1975
	Barremian	Jeletzky, 1975
northeast North America	Early Cretaceous	Jansa and Wade, 1975
	Hauterivian	Thiede, 1979
southeast U.S.	Early Cretaceous	Emery and Uchupi, 1972; Thiede, 1979
Central America	120 my	Pindell and Dewey, 1982
	Early Cretaceous	Finch, 1981
western Europe	Berriasian-Barremian	Ziegler, 1982
northwest Europe, Greenland	Hauterivian	Thiede, 1979
	Barremian	Stets et al., 1969
Svalbard	Early Cretaceous	Edwards, 1979
U.S.S.R.	Barremian	Vinogradov, 1968
eastern China	Early Cretaceous	Klimetz, 1983
Southeast Asia	Volgian-Cenomanian	Ziegler et al., 1983
southern continents	Early Cretaceous	Stevens, 1980
	120 my	Barron et al., 1981
northern South America	Early Cretaceous	Bartok et al., 1981
Brazil	Early Cretaceous	Petri and Campanha, 1981; Ojeda, 1982
Chile	Early Cretaceous	Cecioni, 1970
southern South America	Early Cretaceous	Urien and Zambrano, 1973; Dott et al., 1982; Harrington, 1968
South Atlantic	Early Cretaceous	Detrick et al., 1977; Campos et al., 1974
northern Africa	Hauterivian	Thiede, 1979
	Early Cretaceous	von Rad et al., 1982; Reyment, 1980
	Barremian	Bishop, 1975; Barnes, 1976; Murris, 1980; Van Houten, 1980; Lorenz, 1978; El-Zouki, 1978; Ibrahim, 1983; Ala, 1982
Madagascar	Barremian	Besairie, 1972
southern, eastern Africa	Early Cretaceous	Furon, 1968
India	Early Cretaceous	Biswas, 1982
Antarctic Peninsula	Early Cretaceous	Thomson, 1982; Dott et al., 1982

Table 1. Continued

New Zealand, Marie Byrdland	Early Cretaceous	Cooper et al., 1982; Dott et al., 1982
Australia	Late Jurassic-Neocomian	Kraus and Parker, 1979
	Early Cretaceous	Mollan et al., 1970
	pre-Aptian	Brown et al., 1968

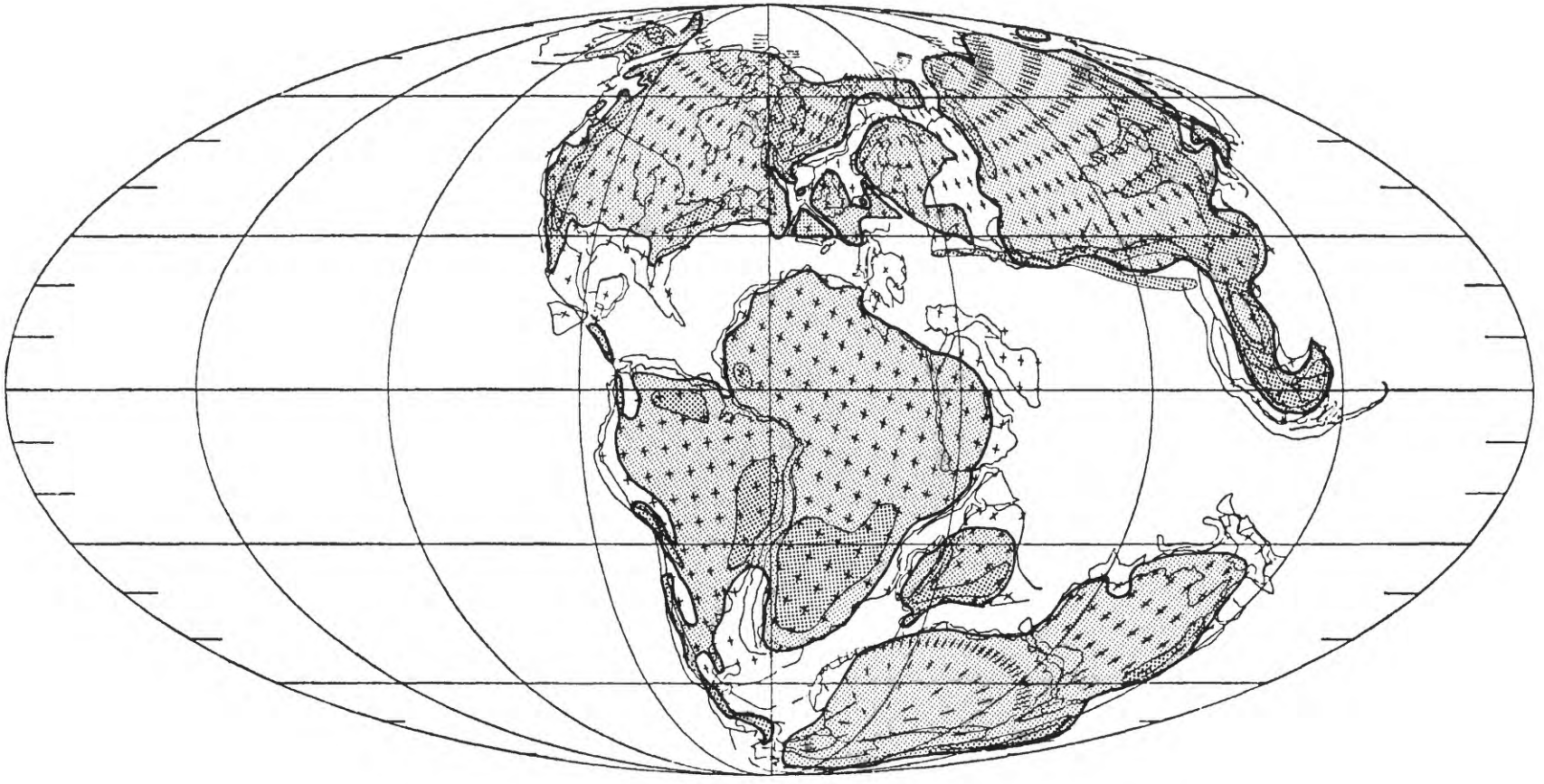

Figure 1. Global paleogeography in the Barremian Age. Light shading = highlands, dark shading = lowlands. Base map from the University of Chicago Paleogeographic Atlas Project, 1984.

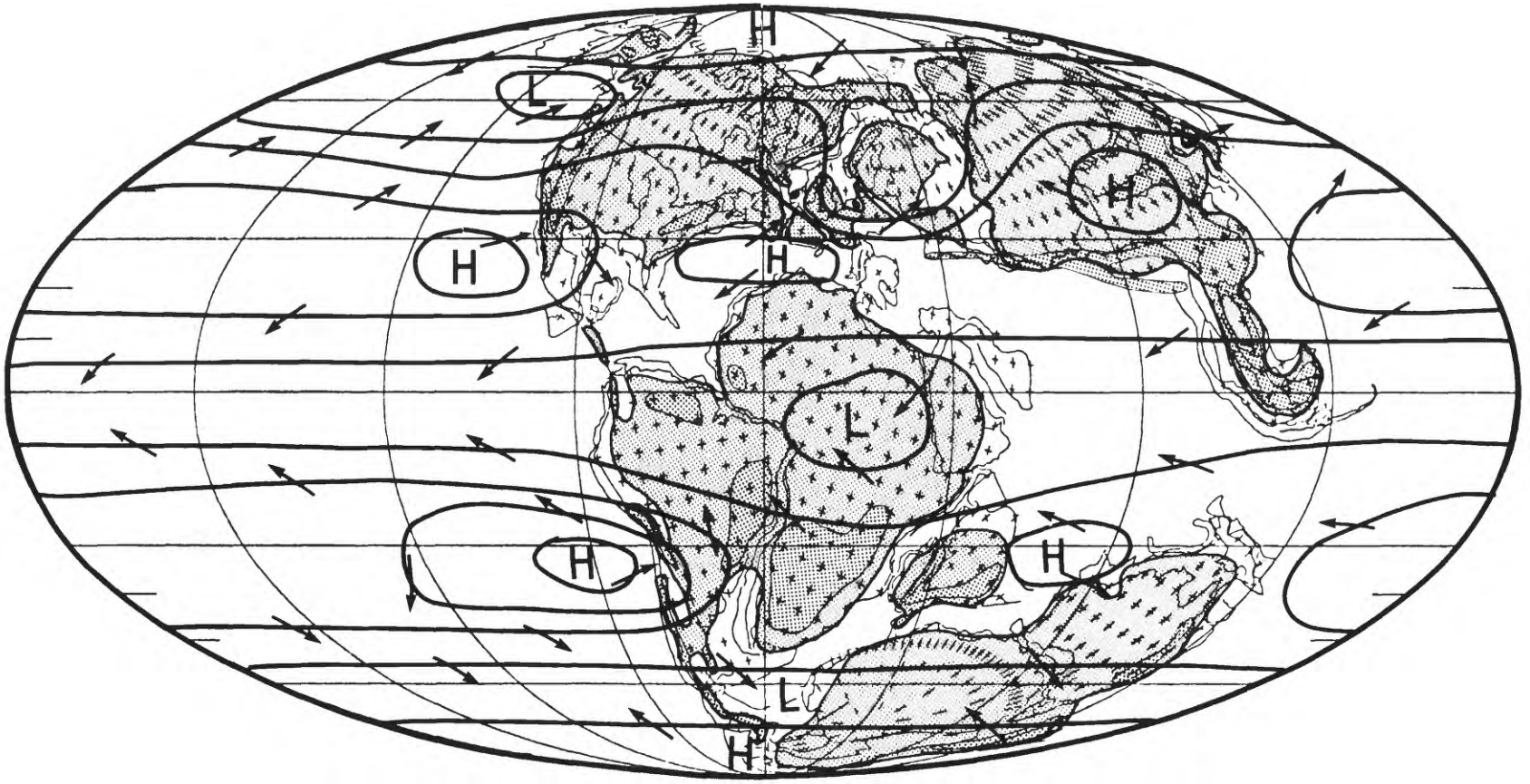

Figure 2. Predicted atmospheric circulation for the Barremian Age northern winter. H = high pressure, L = low pressure; heavy lines are isobars; arrows are surface wind directions.

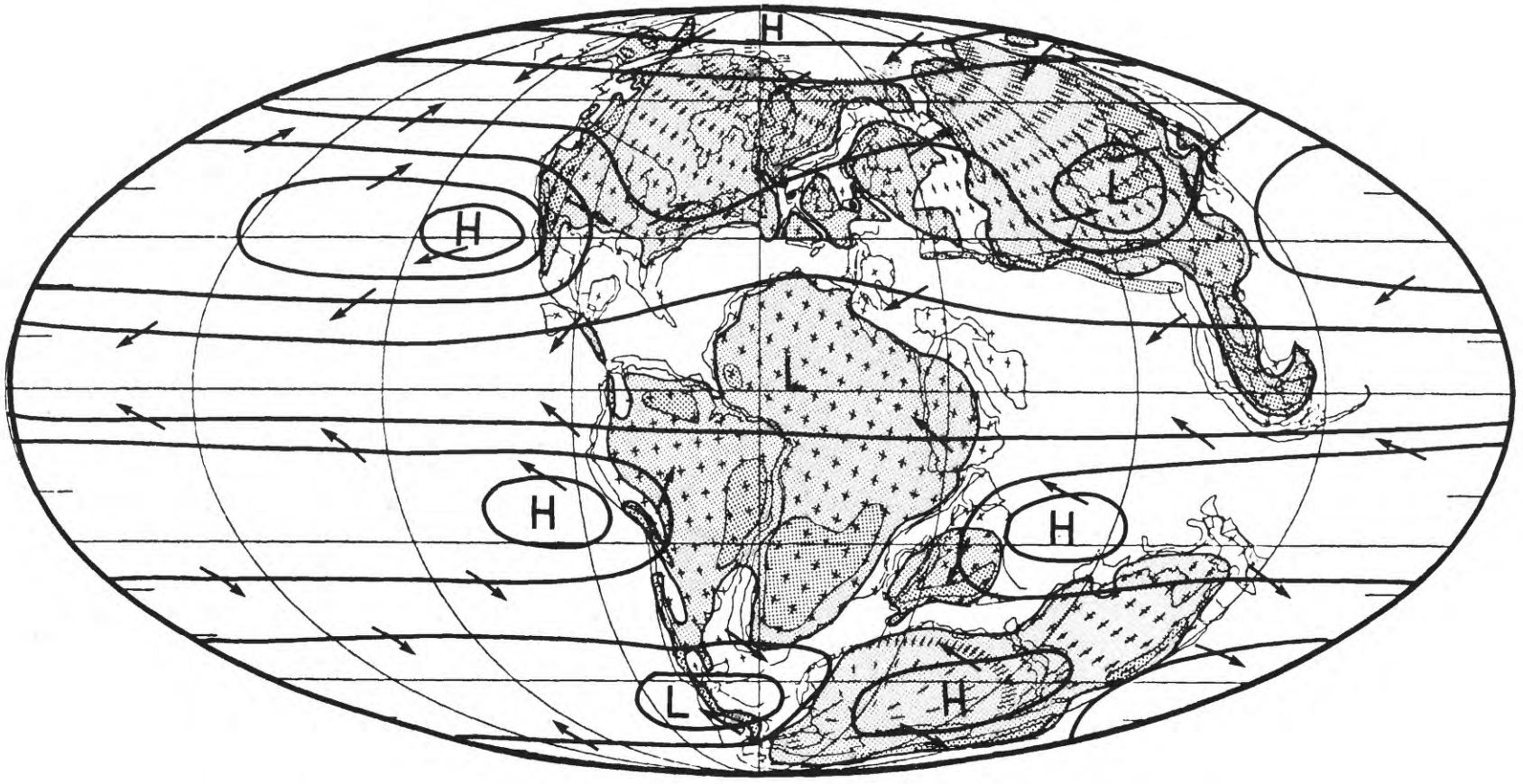

Figure 3. Predicted atmospheric circulation for the Barremian northern summer. Symbols as in Figure 2.

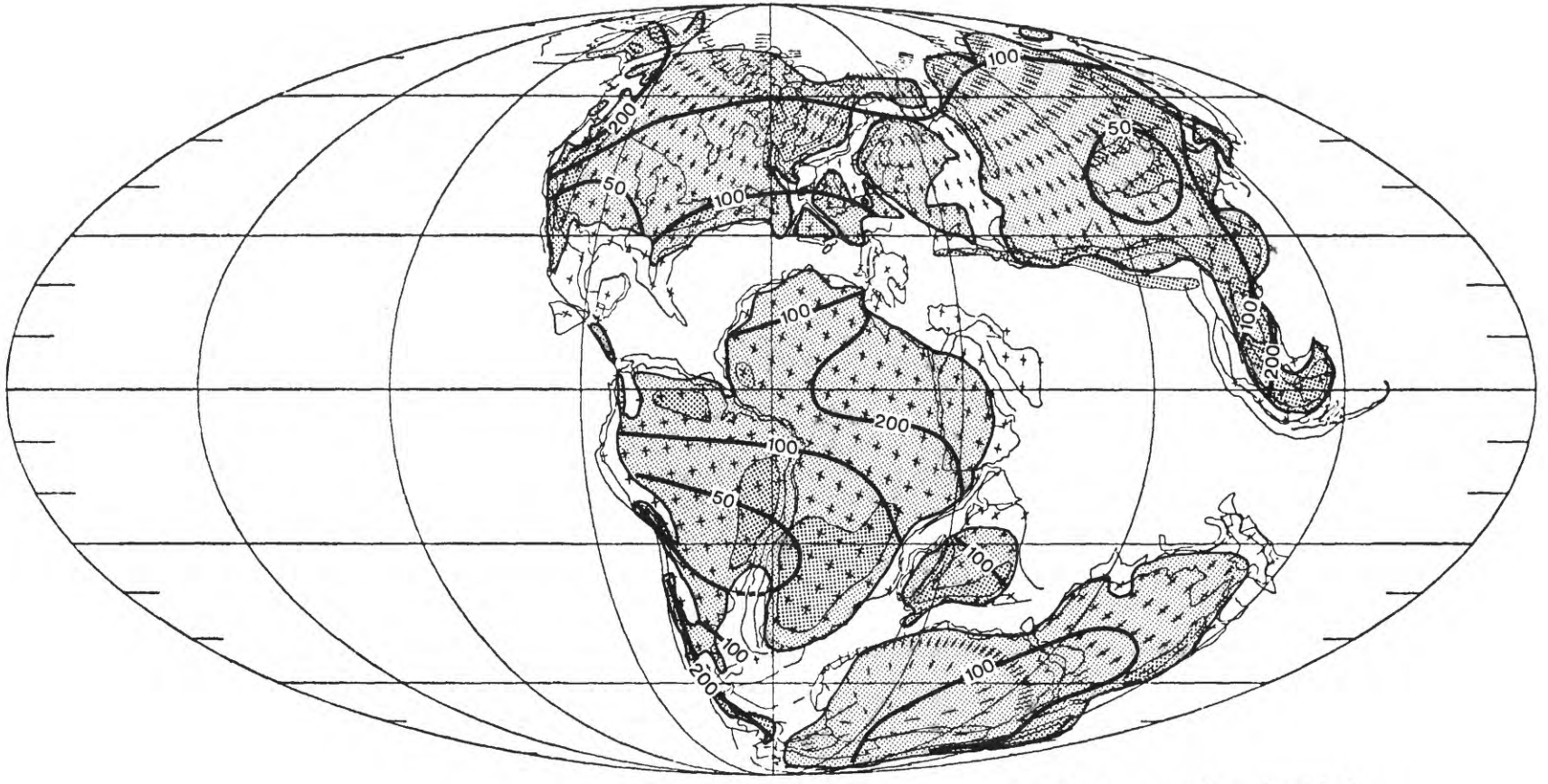

Figure 4. Predicted rainfall for the Barremian. Numbers are relative; no units implied.