Palaeogeography, Palaeoclimatology, Palaeoecology

Volume 91, Issues 3–4, February 1992, Pages 363-375

Regular research paper

Carboniferous glaciation in Gondwana. Evidence for grounded marine ice and continental glaciation in southwestern Argentina

Author links open overlay panel
https://doi.org/10.1016/0031-0182(92)90077-IGet rights and content

Abstract

Upper Paleozoic sedimentary rocks in western Argentina accumulated in retro-arc foreland basins in the Gondwana continental margin. A glacial component in these rocks was recognized early in this century but reconstructions of the nature of the glaciation differ markedly. The dominant proposal sustains that glaciation in this region was of alpine-type, with glaciers descending from mountain ranges both inland and along the edge of the continent, and that the numerous intercalated diamictites were mostly deposited as subaquatic debris flows only indirectly connected with the presence of glacier ice.

A stratigraphic and sedimentologic study of Middle Carboniferous glacigenic deposits of the Tepuel Group in central western Patagonia, southwestern Argentina, shows that two major diamictite facies are present: (a) massive diamictite, the more abundant, forms regionally extensive and thick (<60 m) pebbly bodies with boundaries transitional to non-glacial open shelf deposits; these are interpreted as rain-out till; and (b) chaotic diamictite, yielding thin (< 10 m) laterally discontinuous bouldery bodies showing erosive bases, strong substratal deformation, and upward transition to massive diamictite; these are interpreted as subglacial till. A third type of glacial deposit consists of interbedded current-deposited and wave-worked conglomerates and sandstones, in strata that downlap onto non-glacial shelf mudstones; these are interpreted as submarine outwash fan deposits. The position of subglacial till and outwash fans relative to the paleoshoreline indicate deep regional incursions of grounded ice onto the shelf. In addition, deepening of the shelf coincident with

initial glacial marine sedimentation in the early Middle Carboniferous, at a time of global lowstand, argues for glacio-isostatic depression of the shelf and suggests a considerable ice thickness. Paleotopographic considerations indicate that the centres of ice dispersal were located on moderately high intracratonic highlands. A regional erosion surface across these highlands is attributed to subglacial scour under a Patagonian ice cap that expanded onto the adjacent shelf during glacial maxima. Published information concerning ice distribution in Middle Carboniferous Gondwana supports the existence of an ice cover similar in lateral extent to that in modern Antarctica. The Patagonian ice cap would have been peripheral to this continental-sized ice mass.