



Plate Tectonics in the Late Paleozoic

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As the chronicle of plate motions through time, paleogeography is fundamental to our understanding of plate tectonics and its role in shaping the geology of the present-day. To properly appreciate the history of tectonics—and its influence on the deep Earth and climate—it is imperative to seek an accurate and global model of paleogeography. However, owing to the incessant loss of oceanic lithosphere through subduction, the paleogeographic reconstruction of ‘full-plates’ (including oceanic lithosphere) becomes increasingly challenging with age. Prior to 150 Ma ~60% of the lithosphere is missing and reconstructions are developed without explicit regard for oceanic lithosphere or plate tectonic principles; in effect, reflecting the earlier mobilistic paradigm of continental drift. Although these ‘continental’ reconstructions have been immensely useful, the next-generation of mantle models requires global plate kinematic descriptions with full-plate reconstructions. Moreover, in disregarding (or only loosely applying) plate tectonic rules, continental reconstructions fail to take advantage of a wealth of additional information in the form of practical constraints. Following a series of new developments, both in geodynamic theory and analytical tools, it is now feasible to construct full-plate models that lend themselves to testing by the wider Earth-science community. Such a model is presented here for the late Paleozoic (410-250 Ma). Although we expect this model to be particularly useful for numerical mantle modeling, we hope that it can also serve as a general framework for understanding late Paleozoic tectonics, one on which future improvements can be built and further tested.