



Plate tectonic reconstructions of the Iapetus Ocean

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The Iapetus Ocean is formed during the breakup of the supercontinent Rodinia resulting from the separation of three major continental blocks: Laurentia, Baltica and Amazonia. The timing of the Iapetus Ocean opening is still very debated in the literature, as it remains unclear how best to interpret the fragmentary geological record along the rifted margins. The observations along the eastern margin of Laurentia suggest a protracted rifting period of time from 750 to 520 Ma consisting of two major magmatic pulses at 750-680 Ma and 615-550 Ma. Interpretations involve either an Early Cambrian opening or multiple breakup events possibly as early as 750-680 Ma, with a possible large diachronism between the separation of Amazonia and Laurentia, and between Baltica and Laurentia.

In this study, we built regional-scale plate reconstruction models based on geological observations, paleomagnetism and simple plate tectonic principles to test these various hypotheses. First, we conducted an extensive regional review of geological observations and revised the paleomagnetic database for Laurentia, Baltica and Amazonia. From this compilation work, we built several continental drift models describing the relative movement of these continental blocks compatible with observations. Then, we implemented plate boundaries between each rifting block for each model based on geological evidences and basic plate tectonic rules to construct tectonic plate models. Finally, we discuss the regional consistency of these models with geology and paleomagnetism but also their kinematic coherence.