



Devonian tides: a driver for the evolution of terrestrial vertebrates?

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The Devonian era saw one of the biggest evolutionary phases for Vertebrates, branching off from lobed-finned fish (sarcopterygians) to develop limbs enabling the transition from a marine to a terrestrial life. It has recently been suggested that the evolutionary pressure came from unusually large semidiurnal tides at the time, leaving individuals stranded in rock pools for up to a fortnight. It was therefore advantageous if the organism had some form of mechanism to transition between these pools, and so brought about the development of limbs. Here, we simulate the tides from the Devonian using the dedicated tidal model OTIS and a series of Devonian plate reconstructions. The reconstructions span the entire Devonian era (410 Mya – 340 Mya) and comprise of Classic and Alternative models of the Devonian. The results shows that as Gondwana and Laurasia collided, the ocean basin between them did go through several resonances, indeed producing unusually large local tides and associated spring-neap cycles. This not only support the idea that tides produced the pressure for the evolution of tetrapods, but can also have contributed to the vast areas of anoxia implied by the sediments from the period which led to mass extinction events during the late Devonian.