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Influence of the tides on the evolution of early tetrapods: numerical and statistical perspectives

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We investigate the possibility that tides, and in particular upper intertidal zones left by a large spring-neap tidal range, played an important role in influencing the evolution of the early tetrapods. In order to test this, we have carried out hydrodynamic simulations to determine what the tidal patterns might have looked like during the Devonian period, when tetrapods first emerged. Due to the uncertainties in paleobathymetric reconstructions, we have take a novel ensemble modelling approach. In this study, we present a fast tidal model using the finite element modelling Firedrake platform, and a meshing software, Qmesh. By exploiting the computational speed of this model, we are able to present a preliminary ensemble covering a wide range of plausible Devonian bathymetric reconstructions in order to search for large scale tidal resonances and enhanced ranges. We discuss the implications of our preliminary results, which seem very promising, for tetrapod evolution.