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Different motion modes of a mobile plate on top of a thermally convecting fluid YADAN MAO, Institute of Geophysics and Geomatics, China University of Geosciences, Wuhan, China, JIN-QIANG ZHONG, School of Physics Sciences and Engineering, Tongji University, Shanghai, China, JUN ZHANG, Courant Institute, New York University, New York , USA and NYU Shanghai, China — Numerical simulations are conducted to model the dynamics of a mobile, insulating plate floating on top of a Rayleigh-Benard convecting fluid with infinite Prandtl number in a two dimensional rectangular domain, which is roughly analogues to the geological model of continent drift over mantle. We focus on the effect of plate size on the dynamic feedback between the plate and the underlying convection. Four different modes of coupling are revealed as plate size varies. Among them, two transient stable modes are identified:1. a very small plate tends to linger for long time over a cold downwelling bordering two counter-rotating convection cells; 2. a relatively small plate sometimes lingers over an upwelling plume bordering two convection cells with cold downwellings on the edges of the plate. A relatively large plate rides on a moving convection cell and oscillates periodically between the two ends walls. A very large plate executes only small excursions in response to the competition between the two neighbouring cells underneath and no longer touches the end walls. These modes are well related to different continent motions since the breakup of the Pangaea supercontinent.

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