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The Continental Drift Convection Cell JOHN WHITEHEAD, Department of Physical Oceanography, Woods Hole Oceanographic Institution, MARK BEHN, Departmeint of Geology and Geophysics, Woods Hole Oceanographic Institution — Continents on Earth periodically assemble to form supercontinents, and then break up again into smaller continental blocks (the Wilson Cycle). Highly developed, realistic numerical models cannot resolve if continents respond passively to mantle convection or whether they modulate flow. Our simplified numerical model addresses this: A thermally insulating continent floats on a stress-free surface for infinite Prandtl number cellular convection with constant material properties in a chamber 8 times longer than depth. The continent moves back and forth across the chamber driven by a "continental drift convection cell" of a form not previously described. Subduction exists at the upstream end with cold slabs dipping at an angle beneath the moving continent. Many continent/subduction regions on Earth have this feature. Drift enhances vertical heat transport by approximately 30% compared to a fixed continent, especially at the core-mantle boundary. Drift also significantly decreases lateral mantle temperature differences but it has smaller effects on profiles of horizontally averaged temperature. Although calculations are done at Rayleigh numbers lower than expected for Earth's mantle ($2\text{x}10^5$ and 10^6), the drift speed extrapolates to reasonable Wilson Cycle speeds for larger *Ra*.

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