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# Thermochemical Convection in Two Superimposed Miscible Viscous Fluids

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Marginal stability analysis and laboratory experiments have been performed to investigate thermal convection in two superimposed layers of miscible fluids. Four dimensionless numbers characterize the dynamics of the system: the viscosity ratio, the layer depth ratio, the Rayleigh number and the buoyancy number, ratio of chemical stabilizing density anomaly and thermal destabilizing density anomaly. Two different regimes are observed: an oscillatory doming regime for small B, where the interface deforms in large domes moving up and down quasi-periodically; a stratified regime for large B, where convection develops in the two superimposed layers, separated by a relatively undeformed interface. The critical buoyancy number determined by the marginal stability analysis agrees well with experimental results. We also propose scaling laws for domes direction of spouting, size, speed and periodicity. Such an experimental model has direct implications for the Earth's mantle dynamics: the oscillatory doming regime could explain the present-day observations.

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