# Singular limits for stratified fluids

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We investigate the rigorous derivation of two models for incompressible fluid flow: a) Majda's "stack of pancakes" model, governing essentially two-dimensional flow with momentum coupling in the vertical variable; b) the Oberbeck-Boussinesq approximation, governing the motion of a heat conducting fluid heated from below and cooled from above. Their derivation from the full compressible Navier-Stokes-Fourier system has been done for a) the inviscid (Euler) case where no coupling occurs, and b) the case of Neumann BC for the temperature. We will investigate the rigorous justification of both models for the case of viscous fluids with temperature Dirichlet BC, and show that a) indeed there is vertical coupling, and b) an unexpected temperature term arises. This is joint work with Peter Bella (TU Dortmund), Eduard Feireisl (CAS); Danica Basarić (CAS), and Edriss S. Titi (Uni Cambridge).