

Viscous entrainment and mixing of mantle plumes

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Entrainment of a starting plume at very low Reynolds number ($Re \ll 1$) was investigated experimentally by supplying a buoyant fluid into a matrix fluid from a nozzle. The variables that were independently tested in this experiment were viscosity ratio of matrix fluid to buoyant fluid and mass flux of buoyant fluid. In the case of low viscosity ratio, the plume head had a curled structure, while it had a two-layered structure in the case of high viscosity ratio.