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How time-varying heating of a wall changes the stratification in a room RACHAEL BONNEBAIGT, DAMTP, University of Cambridge, C.P. CAULFIELD, BP Institute & DAMTP, University of Cambridge, PAUL LINDEN, DAMTP, University of Cambridge — Building interiors often experience time-dependent heating of vertical surfaces, for example, through sunlight falling on walls. How do these heated surfaces change the temperature stratification in a room? We consider a vertically distributed source of buoyancy, in a sealed insulated space, that provides a linearly-varying-in-time (with slope a) buoyancy flux. This source drives a time-dependent flow: a plume rising up the wall, and return flow in the ambient. We solve the governing equations numerically, using Germeles's method (1975 *J. Fluid Mech.* **71** 601-623), but we allow the plume to detrain. We find that at small times, the ambient stratification profiles for rates of decrease of source buoyancy flux that are slower than a critical rate, $a_c < a < 0$, are qualitatively similar to those with $a > 0$, with the profiles getting steeper near the ceiling, while the profiles for $a < a_c < 0$ are qualitatively different, with the profiles getting shallower near the ceiling. We compare these predictions with analogue laboratory experiments.

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