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Surface-tension-driven convection in pure liquid layers evaporating into ambient air: influence of liquid volatility[1] FABIEN CHAUVET, SAM DEHAECK, PIERRE COLINET, ULB-TIPs, CP 165/67 — The spontaneous surface-tension-driven convective patterns induced by evaporation of a pure liquid layer are studied experimentally. A volatile liquid layer placed in a cylindrical container is left free to evaporate into air at rest under ambient conditions. The thermal dynamics of the evaporating liquid layer is visualized using an infrared camera. Evaporation rate and liquid thickness are measured by weighting. We focus on the transition between the convective state and the conductive state appearing at a certain instant during the drying of the liquid layer. The critical Marangoni number Ma_c associated to this transition is estimated from evaporation rate and layer thickness measurements at this instant. The effect of the evaporation rate on Ma_c and k_c (the critical wavenumber) has been investigated by changing the container height and, separately, the effect of the liquid volatility has been studied by using different liquids. Interestingly, it appears that Ma_c does not depend on the evaporation rate while it depends strongly on the liquid volatility. Given the typical uncertainties associated with liquid properties, a quite reasonable agreement is found with a "one-sided" linear stability analysis of this problem.

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