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The critical slope for orographic rain ROBERT BREIDENTHAL, University of Washington, NEDJELJKA ZAGAR, University of Ljubljana — Krishnamurti has shown that orographic rain depends on the slope of the windward terrain rather than just the total elevation gain. A simple physical model is proposed to account for the effect of slope. Based on the inhibiting effect of vortex (rotational) acceleration on entrainment, a critical slope angle is derived. If the rate of orographic lifting is sufficiently large, the enhanced buoyancy from latent heat release increases the acceleration parameter. As a consequence, the entrainment rate of under-saturated air is reduced. The critical slope corresponds to the situation where the rate of condensation in a rising adiabatic parcel just equals the rate of evaporation due to the entrainment of under-saturated air. The model is also applied to the trigger conditions for towering cumulus in general.

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