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Plain Language Summary: We examine how mountain upslope geometry controls aerosol effects on orographic precipitation from shallow warm convective clouds through idealized simulations using the WRF model with a bin microphysics scheme. The windward-width of the mountain controls advection timescale of liquid drops. Greater aerosol loading leads to reduction and downstream shift of precipitation. The aerosol effects are more clearly seen when the windward-width of the mountain is narrower.

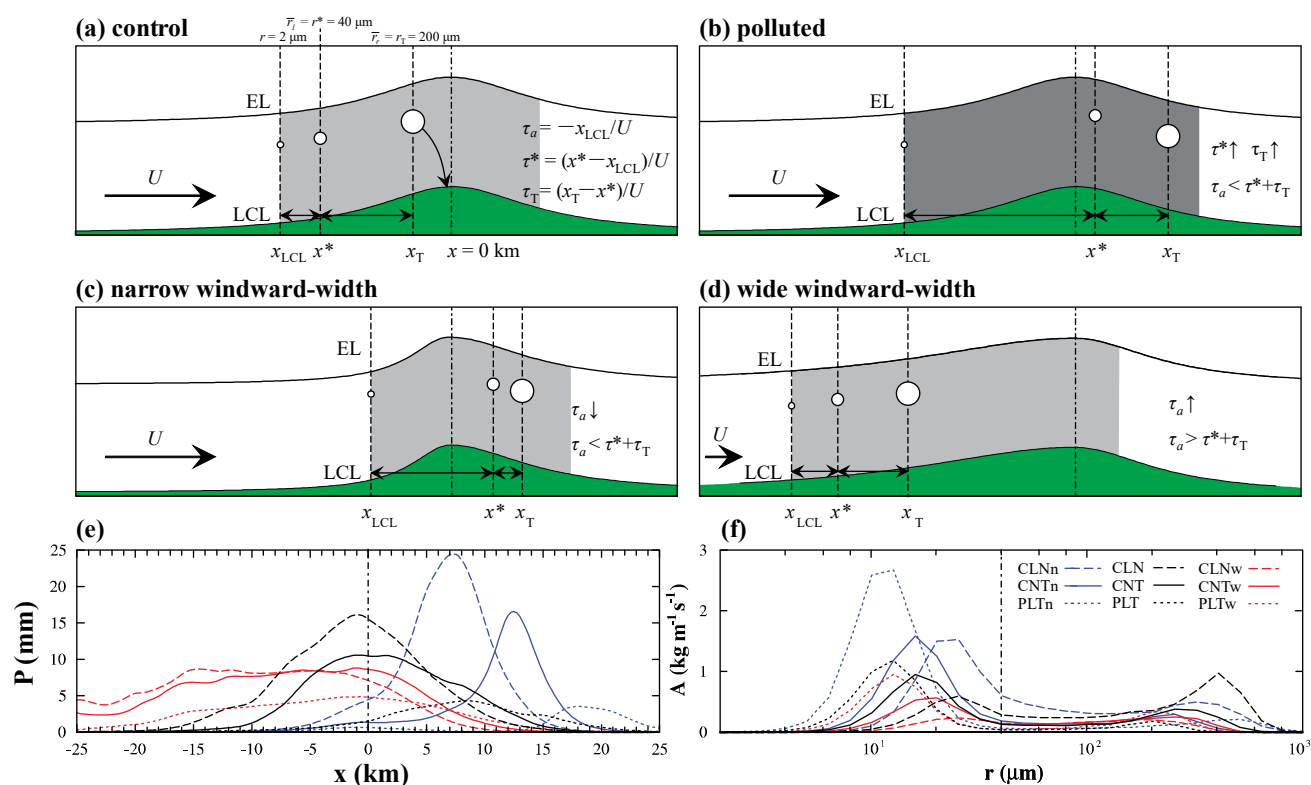


Figure 1. Schematics of the liquid drop growth for the (a) control and (b) polluted cases with the symmetric mountain and for the control case with (c) narrow and (d) wide windward-widths of the mountain. (e) Horizontal distributions of surface precipitation amount and (f) 6-hour averaged advection rates of liquid drops over the mountain peak in the cases with symmetric mountain (black), narrow (blue), and wide (red) windward-widths of the mountain.

- We study how mountain upslope and aerosol loading affect orographic precipitation.
- Warm convective clouds are simulated using WRF model with a bin microphysics scheme.
- Greater aerosol loading leads to reduction and downstream shift of precipitation.
- The narrower windward-width of the mountain, the clearer the aerosol effects are.