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On the evening onset of deep moist convection in complex orography

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The evening onset of deep moist convection (hereafter DMC) in areas characterized by complex orography is quite well documented, being evidenced both by human observations and by automatic sensors (e.g., peaks of lightning frequency around 20 local time) . In these areas, evening events play a relevant role in the climate of DMC because, in some months, they represent the main DMC activity peak, even larger than the afternoon peak. Moreover, they often affect human activities
which are erroneously planned during evening time, in a moment of the day when DMC is considered unfavored. In this work, the onset of evening DMC in Friuli Venezia Giulia (Italy) is analyzed by way of cloud-to-ground (hereafter CG) lightning frequency and through rain gauge measurements. It is evidenced that evening DMC occurrence is favored in relatively narrow alpine valleys and in steep orographyc relieves bordered by sea. The hypothesis advanced to explain these events is the
interplay between day-time and night-time breezes which, during the switch between their modes, produce a local convergence, then the needed initial lifting to parcels for the onset of DMC. This hypothesis is tested by way of observations and numerical models. the reason why this modes switch is only effective in evening and in complex orography is that morning temperatures are too low to assure buoyancy and because orography can supply more potential energy (related to the slanted borders) to enhance an otherwise too week convergence.