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- Volumes
- Library Search
- Title and Author Search

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Review

Production

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Adv. Geosci., 7, 327-331, 2006
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Cyclogenesis in the lee of the Atlas Mountains: a factor separation numerical study

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Abstract. The initiation of a deep and severe impact Mediterranean cyclone in the lee of Atlas Mountains is investigated by a series of numerical experiments using the MM5 forecast model. Roles of orography, surface sensible heat flux and an upper-level potential vorticity anomaly are identified using factor separation method. Results of model simulations show that orography blocking is responsible for generation of the low-level shallow vortex in the first phase of lee development. Upper-level potential vorticity is a principal ingredient of this event, responsible for a dominant deepening effect in the later stage of lee formation. Analysis of cyclone paths shows that orography tends to keep the cyclone stationary, while upper-level dynamical factors are crucial for advection of the system to the Mediterranean Sea. The most noteworthy influence of surface sensible heat flux is identified as an afternoon destruction of a surface baroclinic zone and associated weaker cyclogenesis.

Full Article in PDF (PDF, 2400 KB)

Citation: Horvath, K., Fita, L., Romero, R., Ivancan-Picek, B., and Stiperski, I.: Cyclogenesis in the lee of the Atlas Mountains: a factor separation numerical study, Adv. Geosci., 7, 327-331, 2006. [Bibtex](#) [EndNote](#) [Reference Manager](#)



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