AOGS 2005

Numerical Simulation of the Moist Stratified Flow over an Idealized Three-dimensional Mountain: Conditional Unstable Flow

TAN ZHE-MIN[1] and DONG JILI[1]

[1]*Department of Atmospheric Sciences and Key Laboratory of Meso-scale Severe Weather of Minster of Education*

The properties of orographically induced precipitation are strongly dependent on the stability and moisture content of the impinging airflow and orographic profile. In present study, a series numerical experiment to the quasi-steady stratified flow over an idealized three-dimensional mountain with an upstream profile of uniform wind speed, constant moist buoyancy frequency and constant relative humidity are undertaken.

In the three-dimensional simulation, four flow regimes, which are different from two-dimensional cases, are identified: (1) an downstream propagating convection mode (2) an upstream and an downstream propagating convections mode (3) an over-peak quasi-stationary and an downstream propagating convections mode (4) an downslope quasi-stationary and an downstream propagating convections mode. The sensitive simulation with a lower CAPE sounding demonstrates that the decreased initial convection makes the flow regime shift back to the terrain modified flow as dry cases. The simulations with different aspect ratio and shape of terrain emphasize the importance of convergence in 3-d environment.

Acknowledgements

This work was supported by NFSC under Grant 40333031 and 40325041 and by the State Key Basic Research Program with 2004CB18300.