Home
Articles GMD
- Recent final revised papers
- Volumes and issues
- Special issues
- Full text search
- Title and author search

Articles GMDD
Alerts & RSS Feeds
Editorial & Advisory Board
General Information
Submission
Review
Print Subscription
Comment on a Paper

Follow @EGU_GMD

Geosci. Model Dev., 5, 499-521, 2012
www.geosci-model-dev.net/5/499/2012/
doi:10.5194/gmd-5-499-2012

A subgrid parameterization scheme for precipitation

S. Turner, J.-L. Brenguier, and C. Lac
Groupe d'Etude de l'Atmosphère Météorologique/CNRM-GAME Météo-France, URA1357, 42 Av Gaspard Coriolis, 31057 Toulouse Cedex 1, France

Abstract. With increasing computing power, the horizontal resolution of numerical weather prediction (NWP) models is improving and today reaches 1 to 5 km. Nevertheless, clouds and precipitation formation are still subgrid scale processes for most cloud types, such as cumulus and stratocumulus. Subgrid scale parameterizations for water vapor condensation have been in use for many years and are based on a prescribed probability density function (PDF) of relative humidity spatial variability within the model grid box, thus providing a diagnosis of the cloud fraction. A similar scheme is developed and tested here. It is based on a prescribed PDF of cloud water variability and a threshold value of liquid water content for droplet collection to derive a rain fraction within the model grid. Precipitation of rainwater raises additional concerns relative to the overlap of cloud and rain fractions, however. The scheme is developed following an analysis of data collected during field campaigns in stratocumulus (DYCOMS-II) and fair weather cumulus (RICO) and tested in a 1-D framework against large eddy simulations of these observed cases. The new parameterization is then implemented in a 3-D NWP model with a horizontal resolution of 2.5 km to simulate real cases of precipitating cloud systems over France.

Citation: Turner, S., Brenguier, J.-L., and Lac, C.: A subgrid parameterization scheme for precipitation, Geosci. Model Dev., 5, 499-521, doi:10.5194/gmd-5-499-2012, 2012.