

SIMULATION OF CONVECTIVE CLOUD FIELDS IN LARGE SCALE MODELS

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As the material presented at the workshop had already been discussed at the ECMWF SEMINAR on TROPICAL EXTRA-TROPICAL INTERACTIONS (Tiedtke, 1990), only a summary is given here.

The problem of simulating convective cloud fields in large scale models was addressed and a new parametrization to predict convective cloud fields based on prognostic equations for cloud water content and cloud area was presented. Clouds form as a result of the detrainment of cloud air from convective updrafts into the environmental air (predicted by the mass flux scheme) and dissipate due to adiabatic and diabatic heating, formation of precipitation and turbulent mixing of cloud air and unsaturated environmental air at cloud edges.

The new cloud scheme was tested and compared with the diagnostic scheme of the ECMWF operational model at T42 resolution. It produces more realistic cloud fields over land, in particular with respect to their time evolution as the maximum cloud cover occurs in the afternoon rather than at noon (EC diagnostic scheme) and clouds persist after convection has ceased. Also, cloud water contents are much larger than in the EC scheme and agree better with recent estimates from SSM/I.

References

Tiedtke, M., 1990: Aspects of cumulus parametrization. Proceedings of ECMWF Seminar on Tropical extra-tropical interaction, 10-14 September, 1990, pp 441-466.