Evaluation of summertime convection forecasts against IASI observations

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Convective and Orographically-induced Precipitation Study

June-July-August 2007

Extension of radar coverage

Transect with supersites, observations along valleys

Densification of networks

Mobile teams

Regional observations between supersites performed by various airborne platforms

Large-scale and mesoscale observations provided by dedicated aircrafts

Montancy (F)
MESO-NH forecasts for COPS
30-h daily forecasts since 1st July 2007

Δx=2 km
~400 km

Δx=8 km

Δx=32 km

Precipitation
The storm of 15 July 2007

Observations

Meso-NH forecast

M. Hagen, H. Höller (DLR)
Our approach: model to observation

- High clouds (Tb 10.8 µm)
- Precipitation (150, 90, 37 GHz)
- Cirrus/dust (ΔTb 8.7, 10.8, 12 µm)
- Overshoots (ΔTb 6.2, 10.8 µm)
- 3D clouds/precip. (lidar/radar)

IR: RTTOV (parameterization)
MW: ATM (int. size dist.)
Active: Pinty et al. (int. size dist.)

- Quantitative comparison with scale similarity

CSRM
Radiative Transfer code
Simulated Tb
Observed Tb

model
satellite
MESO-NH against MSG at 10.8 µm
Spectral signature of dust & cirrus

Matricardi, ECMWF 2005
A MSG-based tuning for cirrus

Autoconversion = f(T)
(Ryan 2000)

Adaptation to Meso-NH

\[ r_i^* = \min \left( 2 \times 10^{-5}, 10^{0.06 \times (T - 273.16) - 3.5} \right) \]

Chaboureau and Pinty, GRL 2006
30 days of statistical assessment

Cirrus cover defined with BTD>1K

Chaboureau and Pinty, GRL 2006
Remote sensing of dust & cirrus

12UTC 26 August 2005 (+45h)

Chaboureau et al., GRL, 2007
Monitoring of dust & cirrus signal

Chaboureau et al., GRL, 2007
MESO-NH forecasts for COPS

10.8 µm – 12.0 µm BTD
Case study: export of dust to COPS region

Acc. aerosol burden (g/m²) and 5 km altitude wind at 03 UTC 29 July

Dust observed by the CNRS lidar at 15 UTC 1st August
Export of dust over N. Atlantic

CALIOPI (Δx=0.3-1km, Δz=30-60m)

MESO-NH (Δx=32km, Δz=600m)

03 UTC 29 July 2007
Export of dust over N. Atlantic

Preliminary results with RTTOV-9β

MSG 10.8 – 12.0 µm BTD

Dust impact on IASI BTD

Preliminary results with RTTOV-9β
Conclusions

High value of satellite observation for evaluation
  • objective tuning of empirical parameter (ice)
  • verification of hydrometeor contents & conc.
  • use of long series for statistical assessment

Work in progress
  • verification of forecasts for COPS with MetOp (IASI, AMSU, MHS) and A-Train obs.

http://mesonh.aero.obs-mip.fr/chaboureau/PUB/