



Combined visualizations of MSG multi-channel data, DWD radar composite data and GPS integrated water vapour data for process studies within COPS



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Introduction

For process studies within COPS, overlay plots of Meteosat-8 (MSG1) multi-channel images, DWD radar data (DX precipitation composite) and GPS-derived integrated water vapour (IWV) are produced. With these plots, the characteristics of clouds, their development and dynamics can be related to precipitation and IWV which is especially interesting for the study of deep convection.

We present here the resulting images of IOP 9c (20 July 2007).

1. Data description & tools for their visualisation

1.1. Data description

Table 1. Description of the data used for visualisation

| Data | Covered area | Spatial resolution (over Germany) | Temporal resolution (minutes) | Format | Provided by |
|--|----------------------|---|-------------------------------|---|--|
| Meteosat-8 (MSG1) Rapid Scan | 15-69° N in latitude | High Resolution Visible (HRV) channel: 1.9 km/1.1 km (north-south-west-east) The other channels: 5.7 km/3.2 km (north-south-west-east) | 5 | High Rate Information Transmission (HRIT) | European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) |
| Stationwise Integrated Water Vapour | Germany | - | 15 | ASCII | GeoForschungsZentrum Potsdam (GFZ) |
| Gridded Integrated Water Vapour | Germany | 2.8 km (same grid as DX radar data) | 15 | ASCII | GFZ |
| DX composite radar data (the product of RV (radar quality composite) and QV (radar quality product) composite) | Germany | 2.8 km | 5 | GRIB1 | Deutscher Wetterdienst (DWD) |

1.2. Tools for Visualisation

Interactive Data Language (IDL) is used for processing and visualisation the data. The routines for MSG1 multi-channel composite images and the calculation of brightness temperatures were developed by Deutsches Zentrum für Luft- und Raumfahrt (DLR). We have extended these programs to overlay DWD precipitation radar data and GPS integrated water vapour.

2. Overlay plots

2.1. MSG multi-channel composite image, radar precipitation and GPS stationwise IWV plots

MSG multi-channel images:

- Red: VIS006 (0.56 ~ 0.71 μm)
- Green: HRV (about 0.4 ~ 1.1 μm)
- Blue: IR10.8 (inverted) (9.8 ~ 11.8 μm)

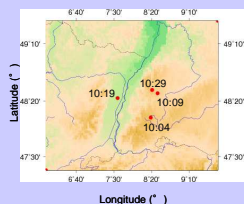


Fig. 1. Convection Initiations identified by brightness temperature of IR108 channel of MSG1 between 0930 and 1030 UTC on 20 July 2007 (Aoshima et al., 2008).

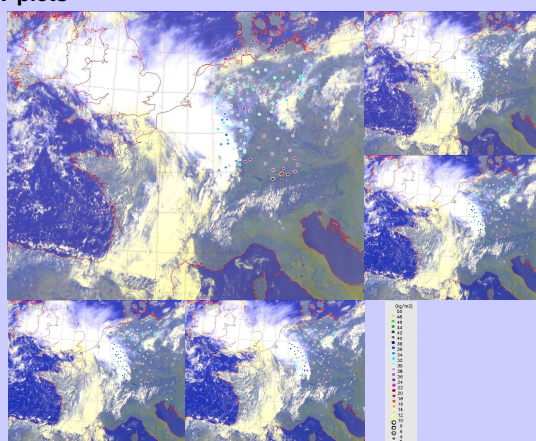


Fig. 2. Overlay plots of MSG1 and IWV data between 0905 and 1105 UTC for Europe.

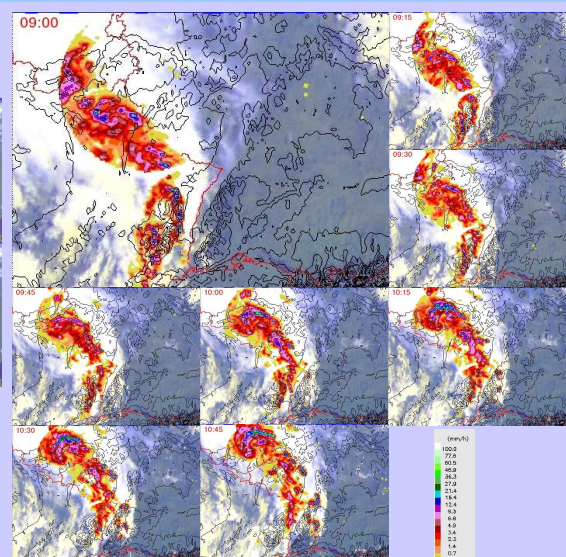


Fig. 3. Overlay plots of MSG1 and radar data with contour lines (every 200 m up to 2000 m) between 0900 and 1045 UTC for the COPS area.

2.2. MSG brightness temperatures at 10.8 and 6.2 μm , radar precipitation and GPS gridded IWV plots

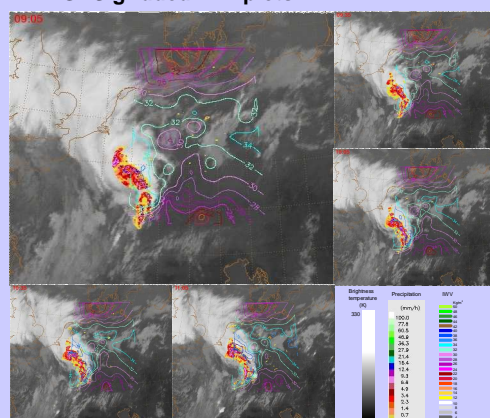


Fig. 4. Overlay plots of MSG1 brightness temperature at 10.8 μm (IR10.8), radar precipitation and gridded integrated water vapour between 0905 and 1105 UTC for Europe

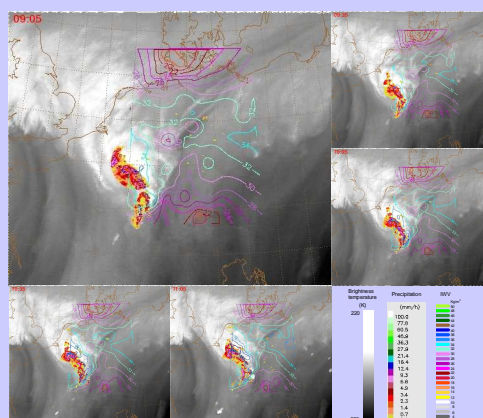


Fig. 5. Same as Fig. 4 but brightness temperatures at 6.2 μm (WV062) are shown.

Outlook

- Combined visualisation of different data sources will help analysing convection processes.
- Data to be included in the combined plots next: VERA fields, D-PHASE model output.
- Data can be interpolated to lower or higher resolution to be compared with model output and differences can then be investigated quantitatively
- Plots of IOP13 (01 and 02 August 2007) will be produced next.
- Plots for all COPS IOPs shall be made as soon as possible.

Acknowledgements

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Reference

Aoshima, F., A. Behrendt, H.S. Bauer, V. Wulfmeyer, 2008: Statistics of Convection Initiation by use of Meteosat Rapid Scan Data during the Convective and Orographically-Induced Precipitation Study (COPS), Meteorol. Z., accepted.