EUMETSAT's Geostationary Satellites as a Part of GEOSS

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with contributions from many colleagues

EUMETSAT, Darmstadt

AMS Annual Meeting 2008, 5th GOES-R Users' Conference, New Orleans, January 2008

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European contribution and commitment to environment and climate observations is evolving:

- **Development of the European initiative of Global Monitoring for Environment and Security (GMES) places space-based observations at the heart of future European activities for managing the European environment**

- **GMES is identified as the main European contribution to international initiatives such as Global Earth Observation System of Systems (GEOSS)**

- **EUMETSAT operational satellite systems are key elements of established Space-based observing system coordinated by WMO => Important existing element of a GEOSS**

- **EUMETSAT programmes are an essential part or sine-qua-non for a global space- based observing system**

Global Meteorological Satellite System

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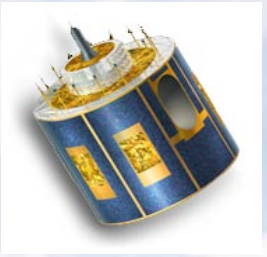
Status Meteosat- Programme

- Since February 2007, Meteosat-7 has taken over the IODC (Indian Ocean Data Coverage) Mission from Meteosat-5
- Since April 2007 Meteosat-6 is placed at 67.5° E to support Meteosat-7 during eclipse periods and as a back-up satellite
- Meteosat-7 also supports an International Data Collection System (IDCS)
- In the Indian Ocean and Western Pacific regions the IDCS is used for the relay of Tsunami warning information from currently 30 remotely located Data Collection Platforms
- Meteosat-9 (MSG-2) provides primary service at 0°
- Meteosat-8 (currently at 3.4°) is prepared for rapid scanning service from) 9.5°E (starting in 2008)
- The new Rapid Scanning service has a basic repeat cycle of 5 minutes for 1/3 of a full earth scan (15 deg N -> 70 deg N)



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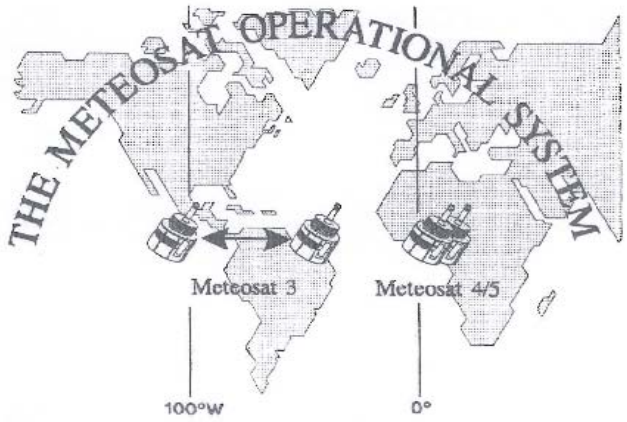
Meteosat First Generation

- Meteosat-1through Meteosat-7
- 1977 - now
- Three channels
- 30 mins for full disk
- Meteosat-3 was moved over to 50° W and 75° W in support of NOAA
- => CGMS coordinates contingency planning
- => coordination increases robustness of system (of systems)

Atlantic Data Coverage by *METEOSAT-3*

Johannes de Waard,* W. Paul Menzel,+ and Johannes Schmetz*



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Meteosat Second Generation: A breakthrough for meteorology

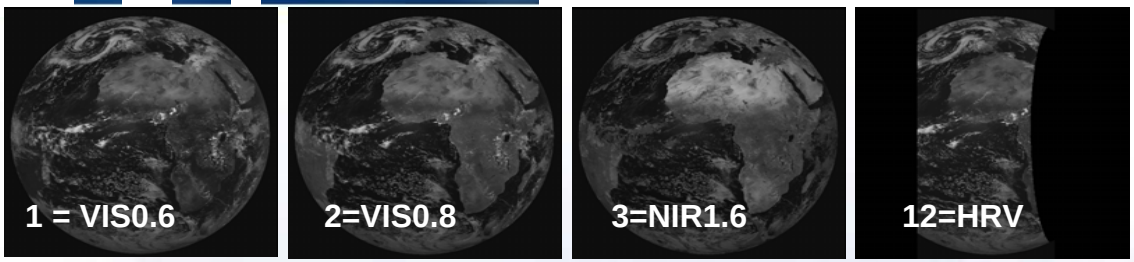
MSG SEVIRI:

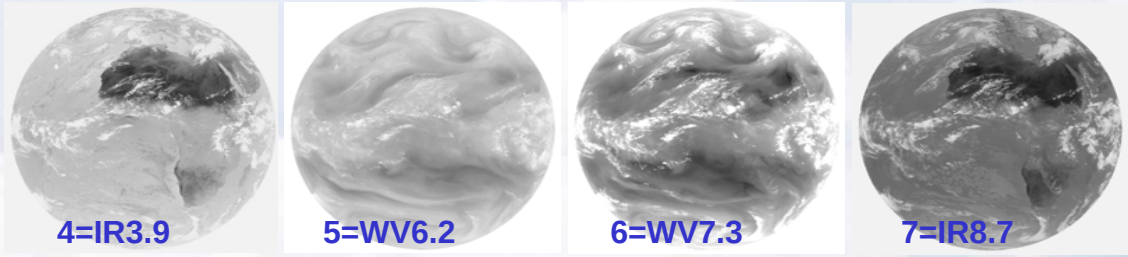
12 channel instrument

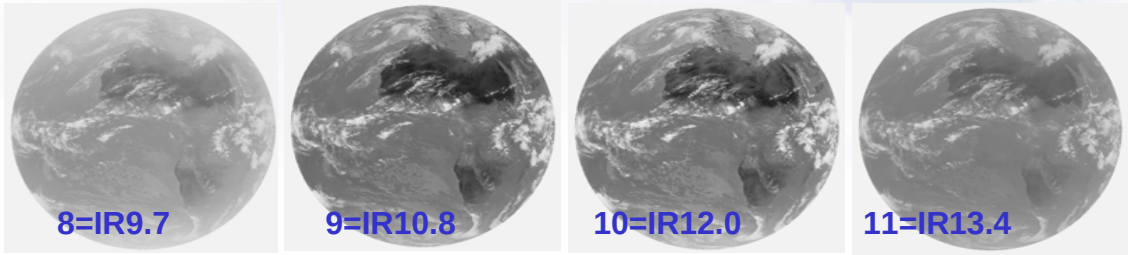
3 km sampling distance

15 minute repeat cycle

(5 min. in rapid scan mode)







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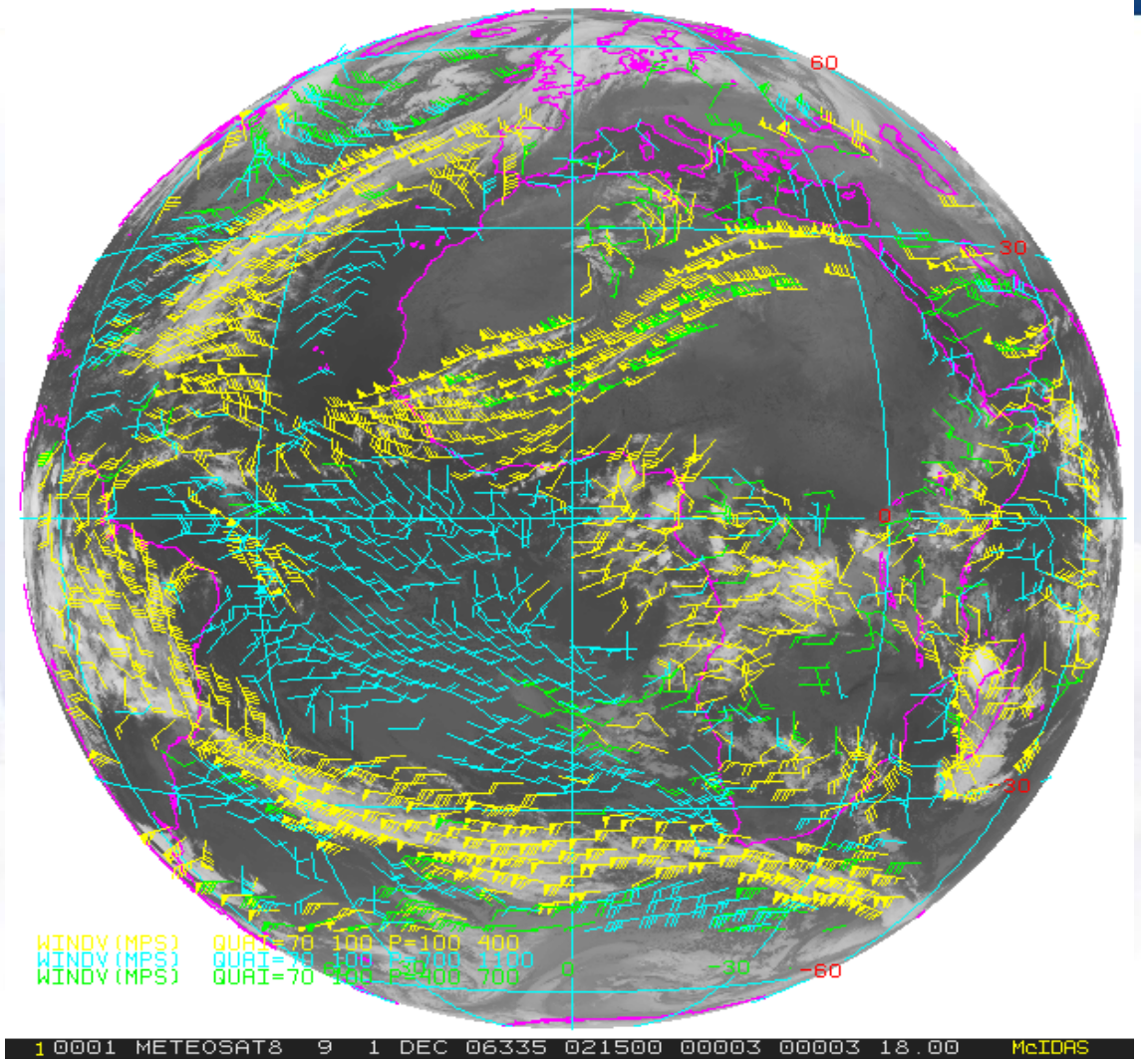
Winds for Numerical Weather Predictions



Winds from tracking atmospheric motions

Here:
10.8 µm channel

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What is the impact of AMVs on NWP?

Kelly et al., 2006: OSE on AMV impact, N.H. 20°N – 90°N

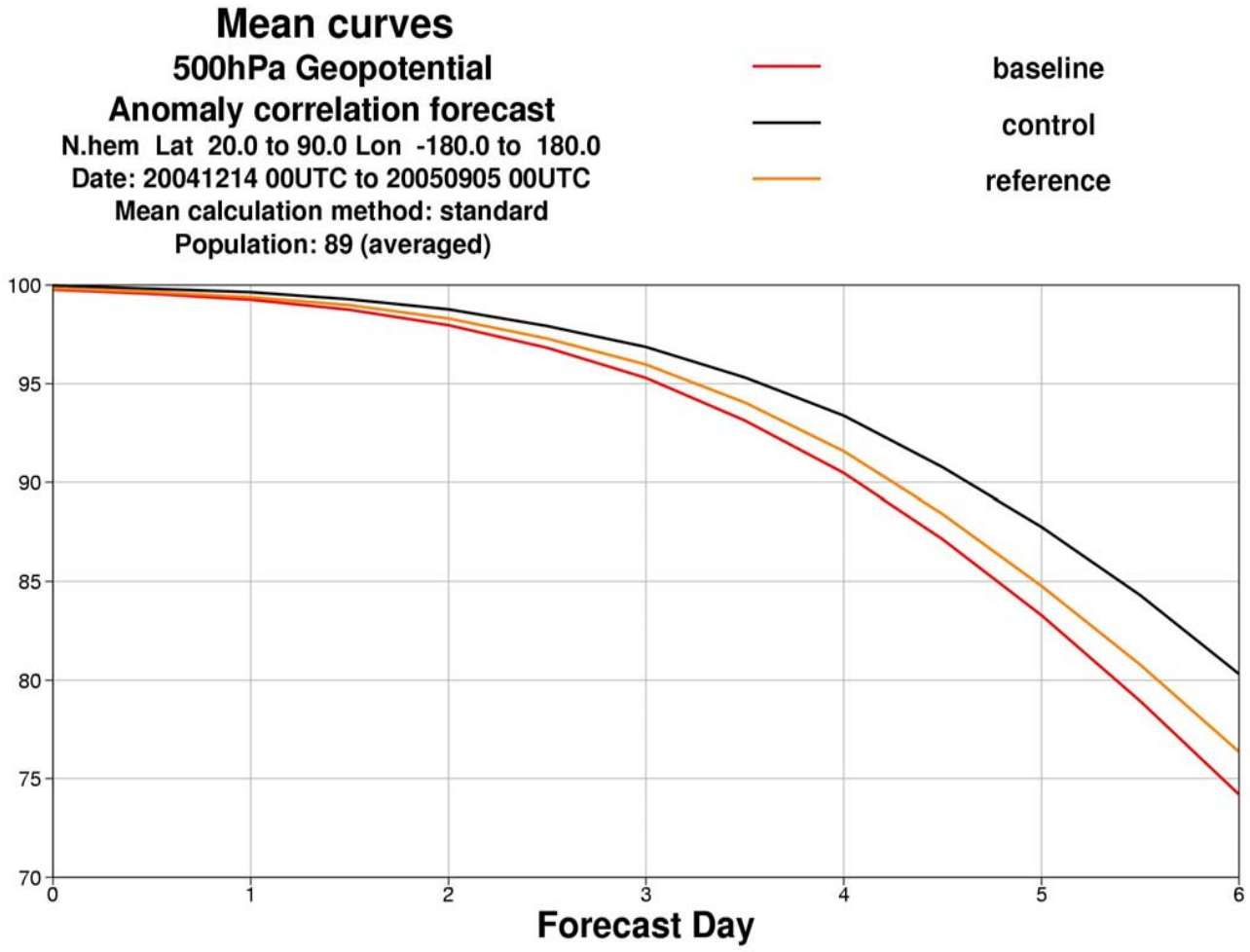

Figure 6

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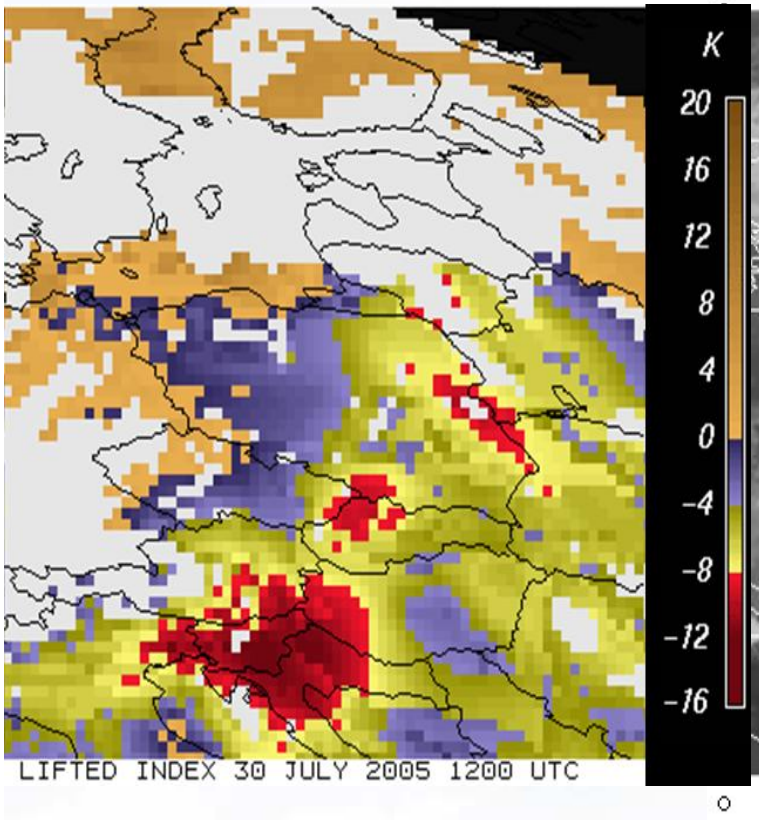
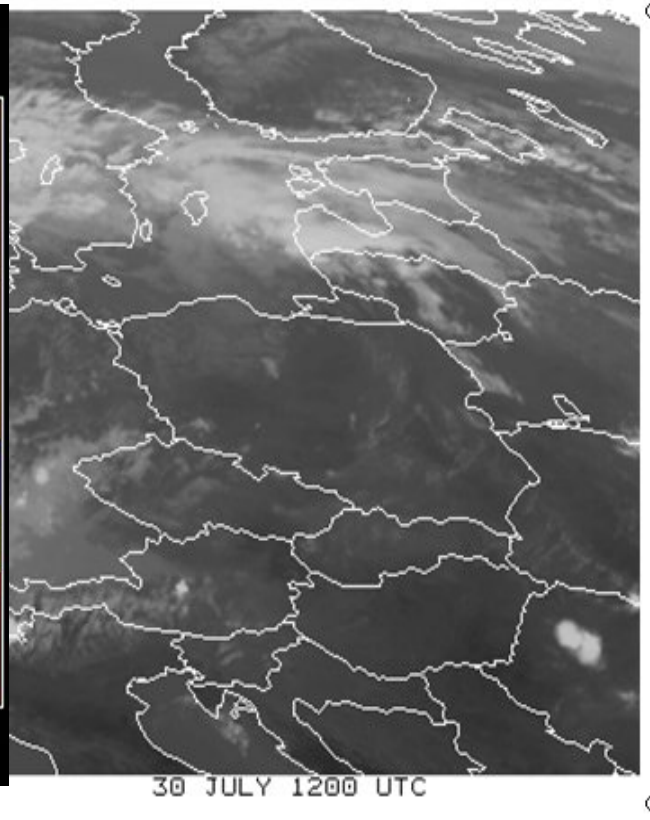
Meteosat monitors onset of convection

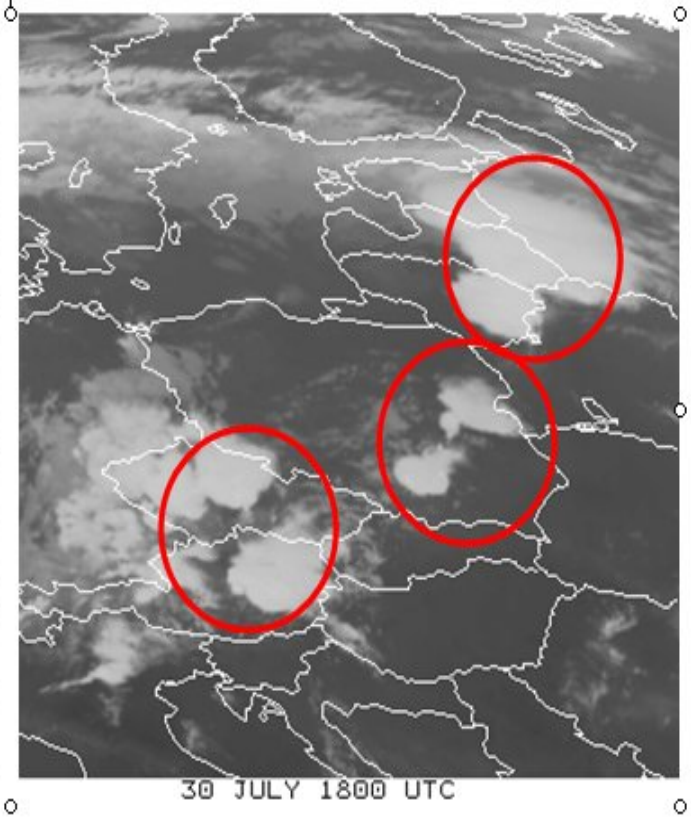
Lifted index at 1200 UTC



10.8µm image at 1200 UTC



10.8µm image at 1800 UTC



M. König, 2006

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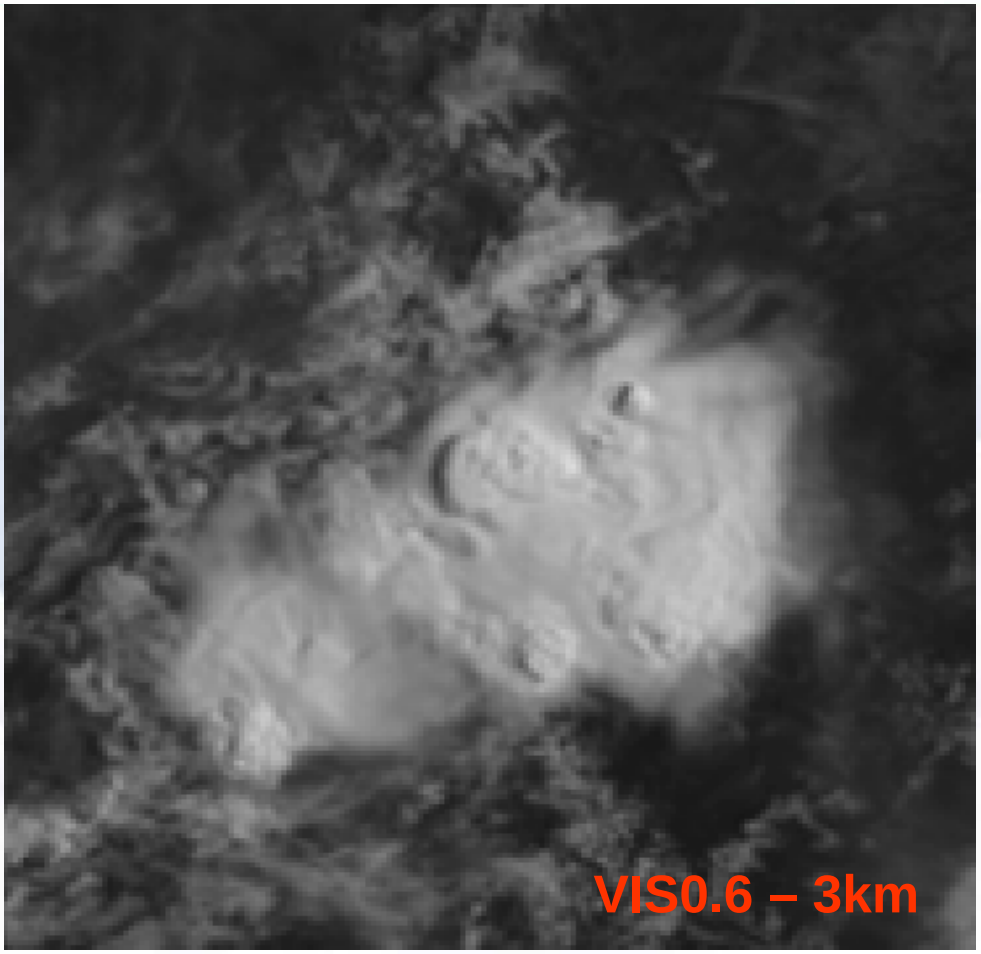
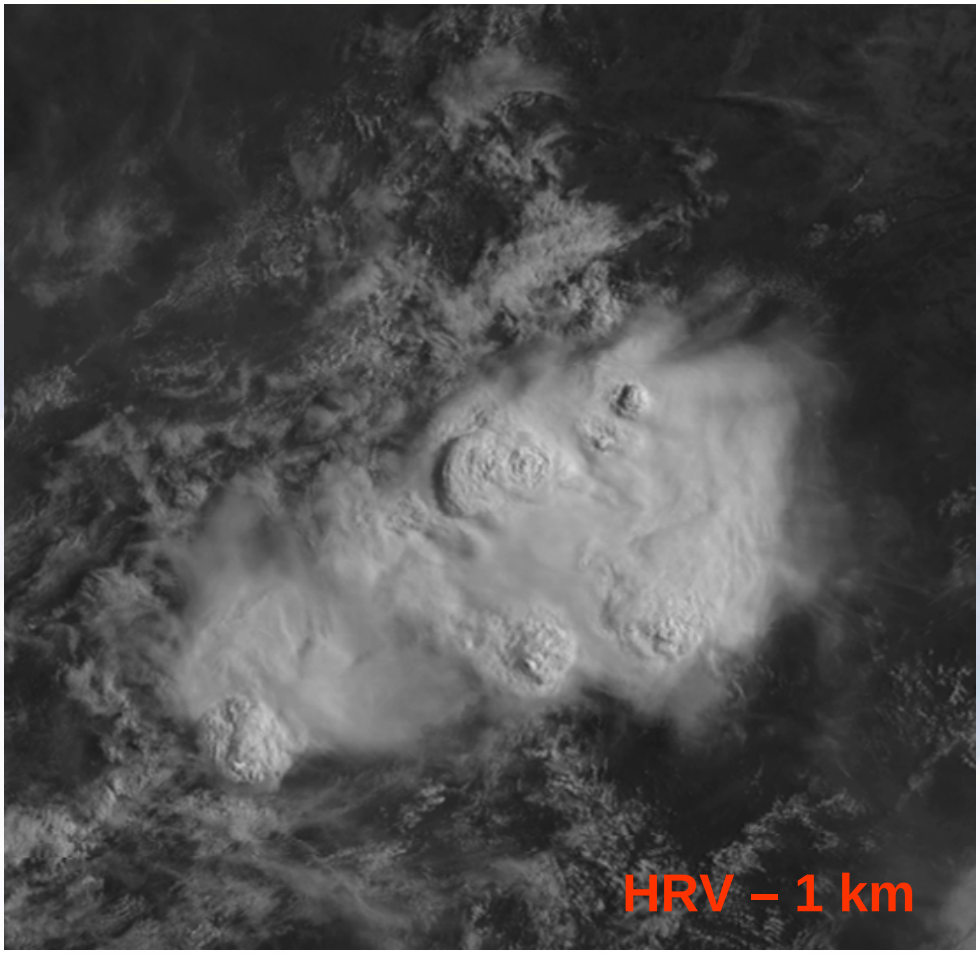
Better spatial resolution => clearer depiction of cloud tops





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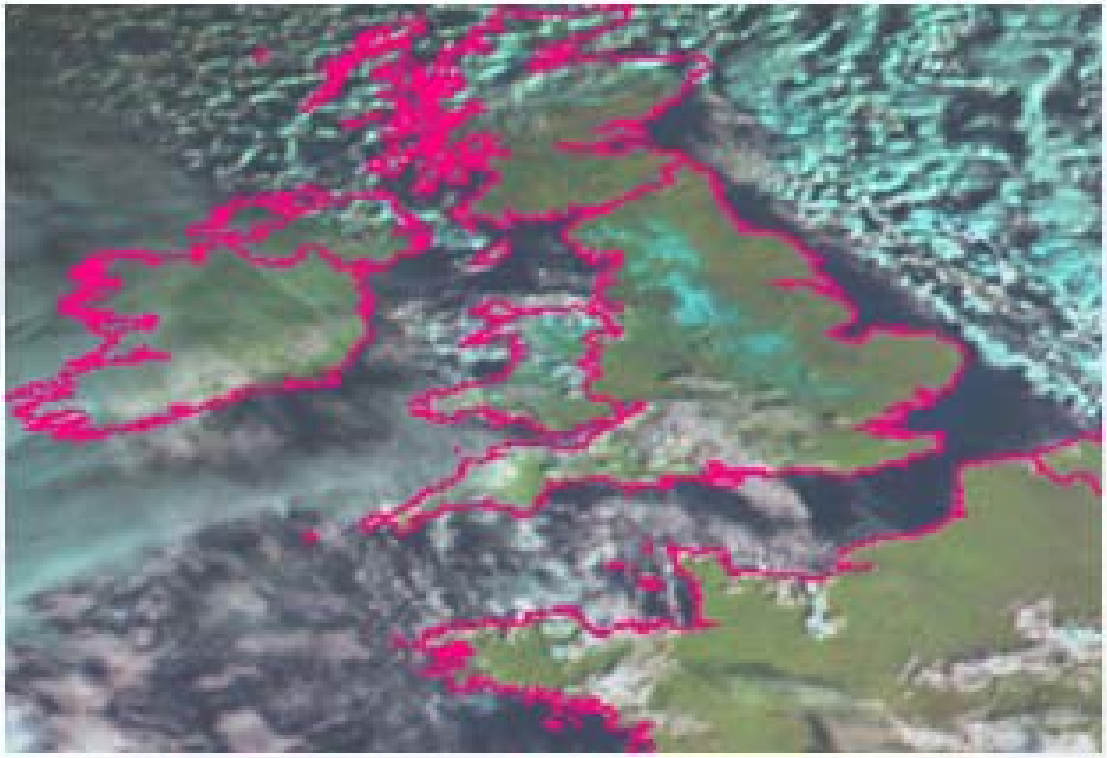
Snow and cloud: time sequencing helps to distinguish



19 Nov 2004,
0900 – 1300 UTC

NIR1.6 / VIS0.8 / VIS0.6

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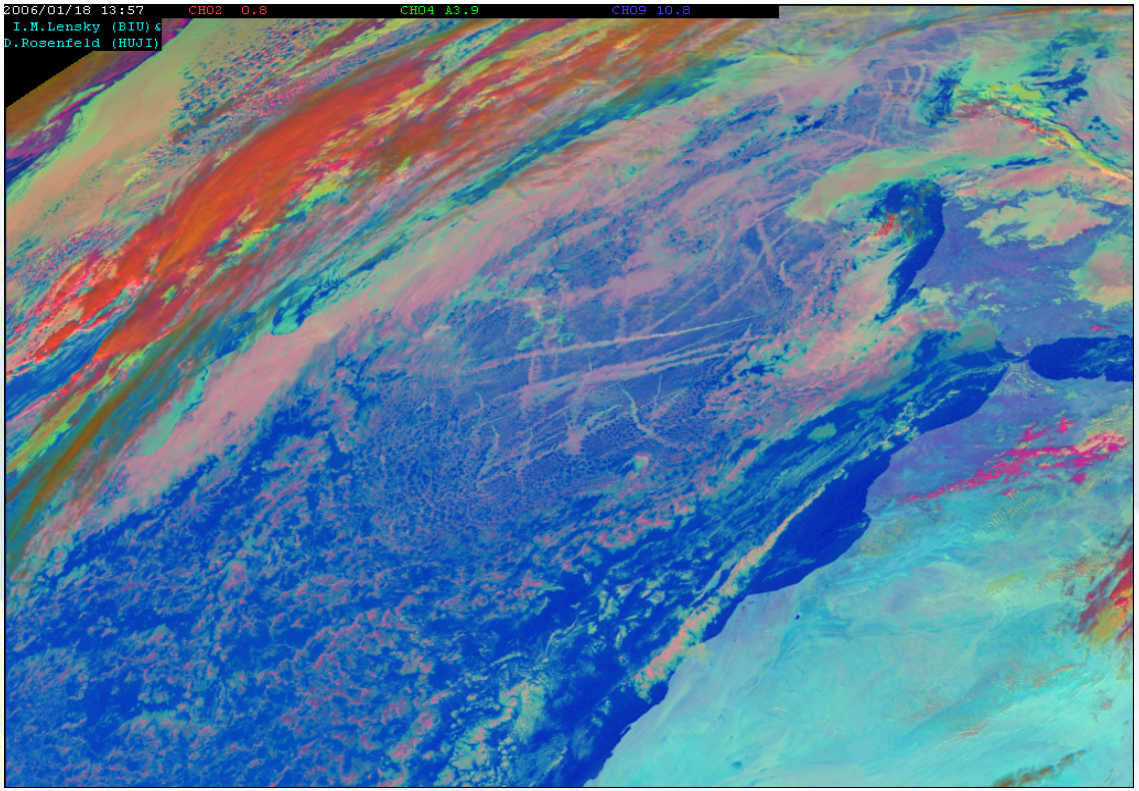
Cloud Microphysics



RGB = VIS0.8 / IR3.9 solar part / IR10.8

(courtesy D. Rosenfeld)

Visual inspection of a suitable “cloud microphysical’ RGB already shows lots of cloud details, which can be turned into quantitative information

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EUMETSAT Future Geostationary Programme

Meteosat Third Generation (MTG)

Focus is on Numerical Weather Prediction and Nowcasting.

Candidate missions:

- High Resolution Fast Imagery (HRFI)
- Full Disk High Spectral Imagery (FDHSI) => combined with HRFI
- Infrared Sounding (IRS)
- Lightning Imagery (LI)
- UV-VIS Sounding (UVS)

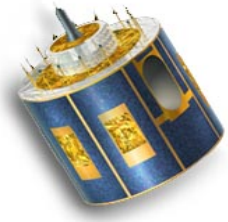
The need date is 2015/17; => technical development with ESA.

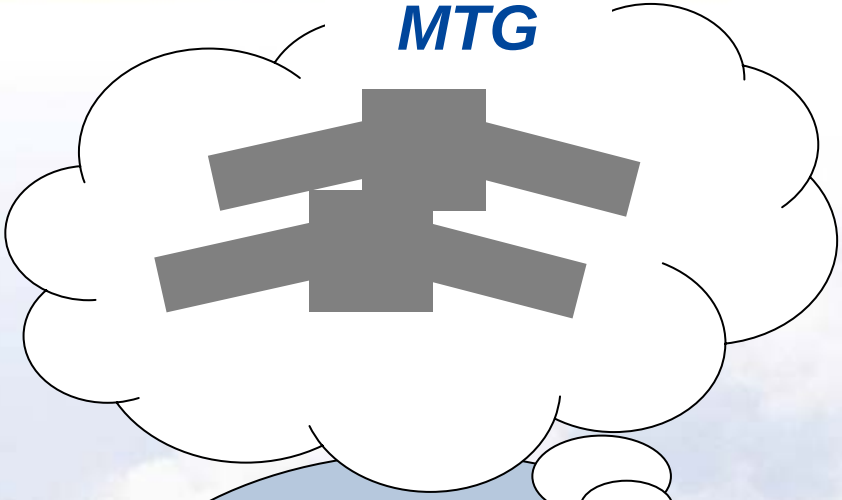
MTG will provide continuity of EUMETSAT services and innovative observations

1977 — MOP/MTP

2002 — MSG

2015 / 2017 — MTG





1 observation mission:
-MVIRI: 3 channels

-**Spinning** satellite
800 kg

x15

3 observation missions:
- SEVIRI: 12 channels
- GERB
- Rapid Scanning (~2008)

- **Spinning** satellite
Class 2-ton

x20

4 observation missions:
- Combined Imager: 16 channels
- Infra-Red Sounder
- Lightning Imager

-**3-axis stabilised** satellites
Class 3-ton

... 30 years of continuous operations ...

Chemistry UVS Mission to be coordinated with ESA for implementation via GMES Sentinel IV

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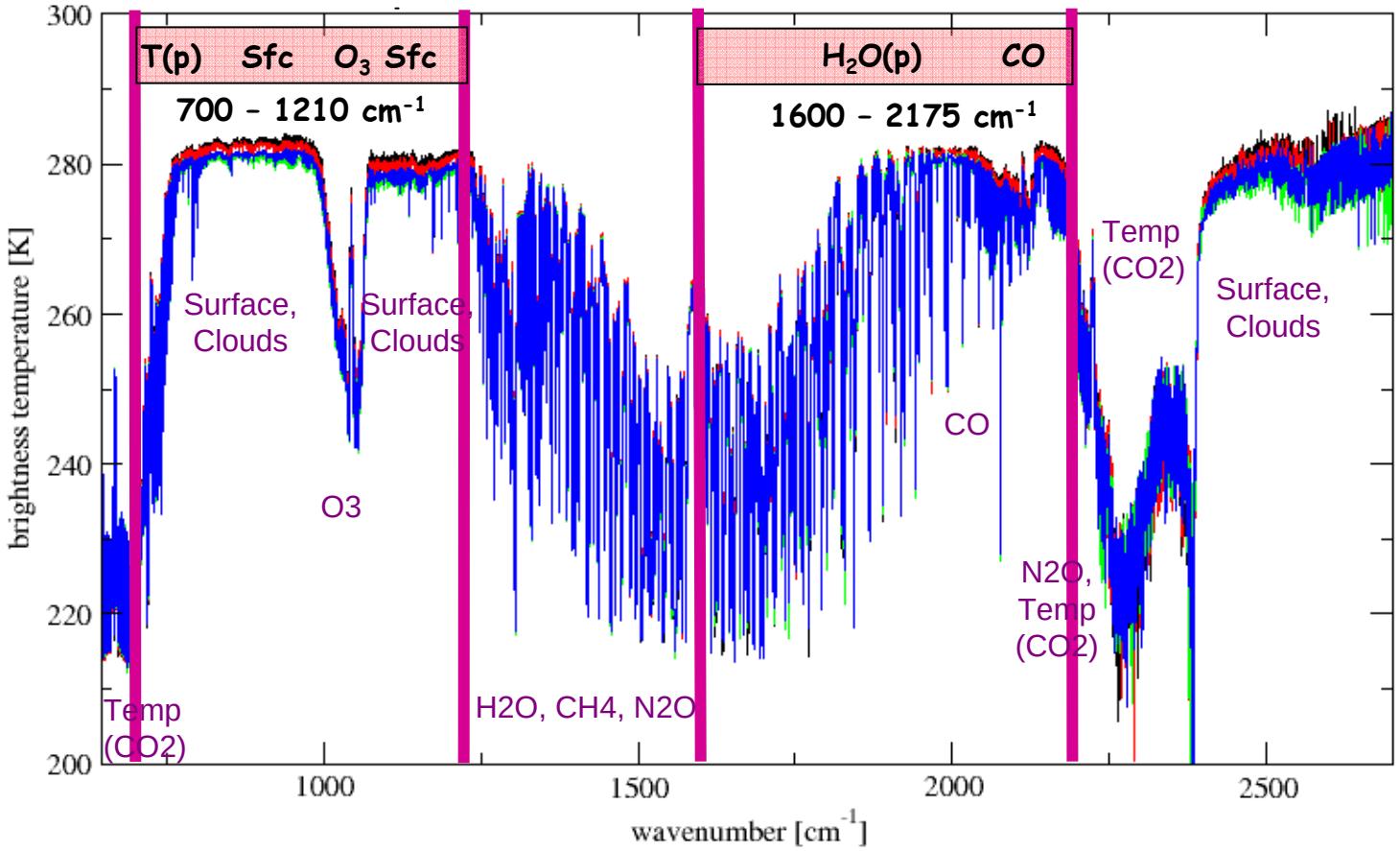
MTG-IRS (Infra-Red Sounder)

First IASI Level 1C Spectra, 29/11/2006, 13:42:11 UTC



MTG spectral coverage

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IASI

cnes

0.625cm^{-1} Spectral Sampling with 0.745cm-1 Full Width Half Mean

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MTG Preparatory Programme

- EUMETSAT Council in December 2007 approved MTG Preparatory
- Eighteen Member States voted in favour
- Two countries voted in favour ad referendum (one has lifted the ad ref)
- => Entry into Force of the Meteosat Third Generation Preparatory Programme

De-centralised applications ground segment
=> Satellite Application Facilities (SAF)

- Support to Nowcasting and Very Short Range Forecasting
- Ocean and Sea Ice
- Climate Monitoring
- Numerical Weather Prediction
- Land Surface Analysis
- Ozone & Atmospheric Chemistry Monitoring
- GRAS Meteorology
- Support to Operational Hydrology and Water Management

=> BENEFITS:

- **Makes use of European expertise,**
- **Fosters cooperation and utilisation,**
- **Maximises return on investment**

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Conclusions

- EUMETSAT satellite systems (Meteosat and Metop) are a key element of the operational space-based meteorological observing system and the GEOSS
- Continuity and serving the evolving needs of our Member States has highest priority => this will satisfy basic aspirations of the GEOSS
- EUMETSAT's Meteosat system (as the other operational systems) are coordinated within WMO and CGMS (Coordination Group for Meteorological Satellites)
- International partnership (e.g. the Joint Polar System of NOAA and EUMETSAT) ensures a European contributions to the GOS and GEOSS that are mutually consistent and also cost-effective
- Coordination of the planning of geostationary meteorological satellites would be a major leap toward enhanced satisfaction of user needs (=> e.g. hyperspectral sounders on more than one geo satellite would serve global NWP)

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