# AEROCOM-VI: Dust

- Identification of dust sources:
  - anthropogenic/natural
  - Improve characterization
  - Past and future emission
  - Improve existing inventories with new satellite instruments
- Studies realized since AEROCOM-V
  - Tegen et al.: use of SEVERI: diurnal variation
    - Freq of dust events in Sahara/month
    - Source mask over Sahara for 2006-2007
  - Mahowald et al.. : anthropogenic sources due to cultivation
  - In progress: Use of MODIS DB Level 2, 4 years of daily satellite measurement over dust sources

- Constraining emission parameters with ground-based and satellite data by minimization
  - Miller and Cakmur provide to AEROCOM IDL+fortran code
- Comparing dust sources:
  - Many different source inventories but few comparison => Proposition to develop for AEROCOM an IDL+fortran code to allow simple comparison by ingesting 2D sources+emission parameters to calculate and plot emission
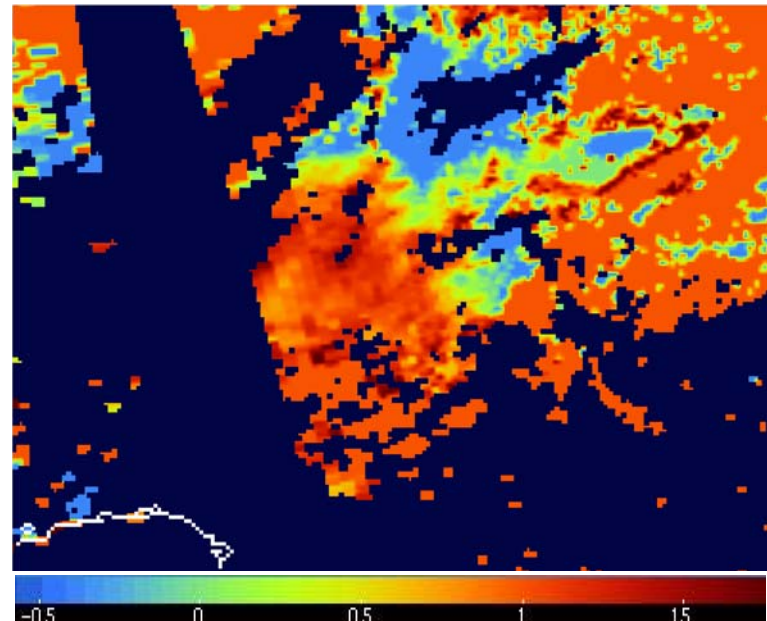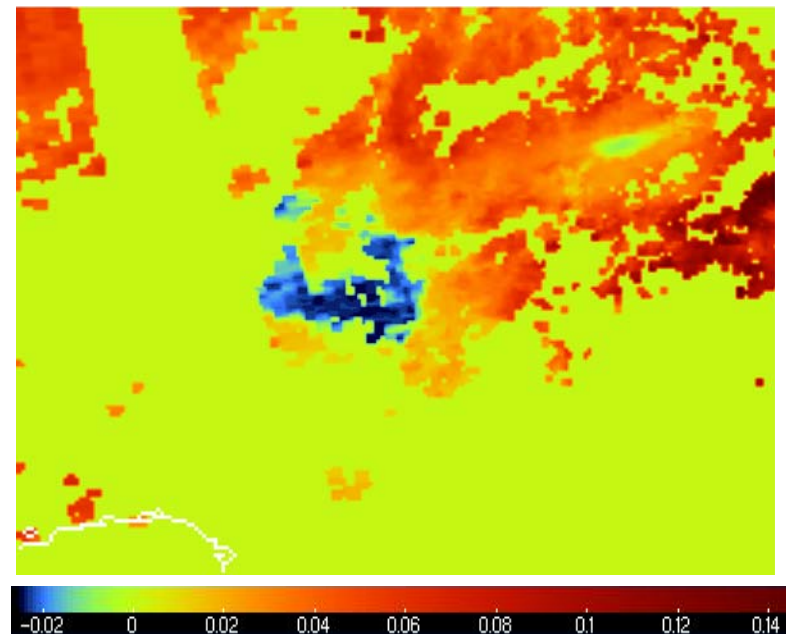 - Comparison of satellite data: TOMS, OMI, MISR, SEVERI, MODIS, CALIPSO

November 12, 2005

0-20 °E 0-15°E
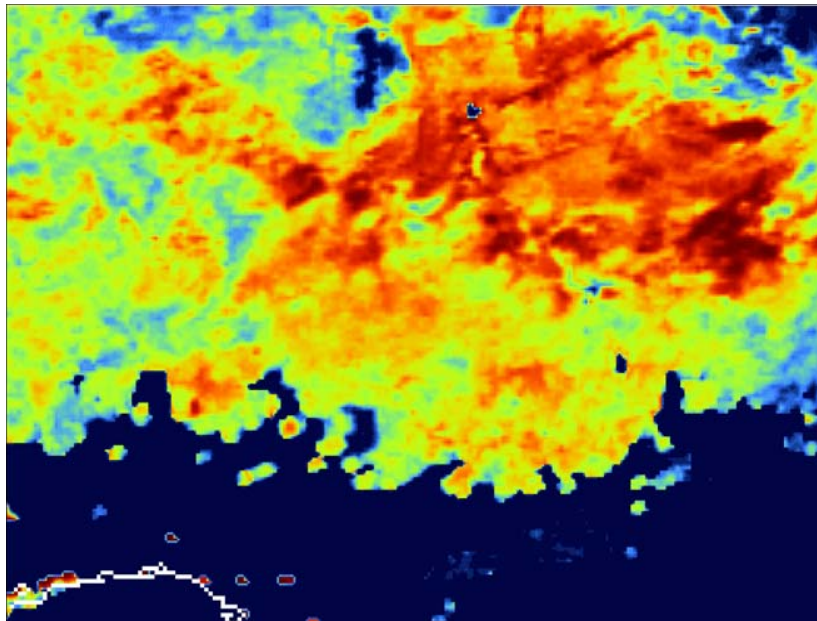
Aerosol Optical Depth 550 nm
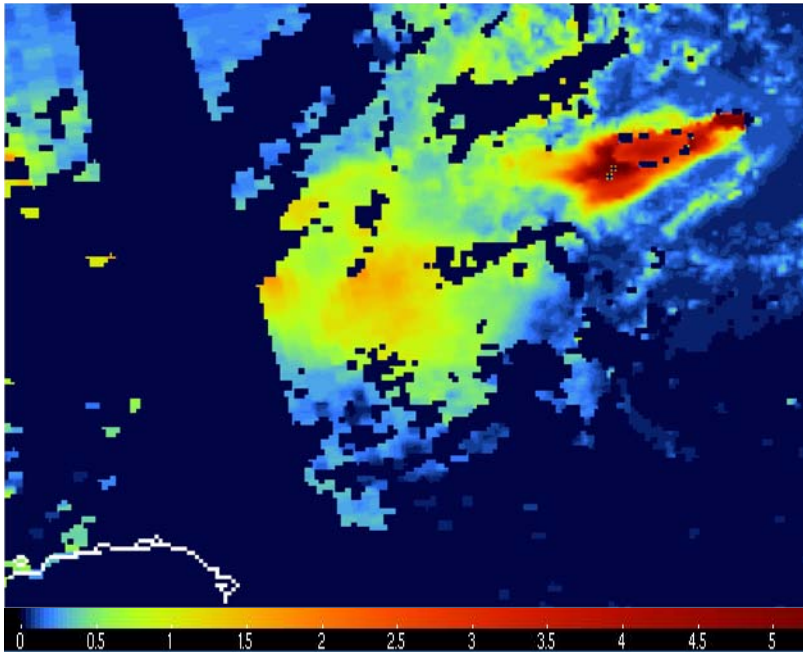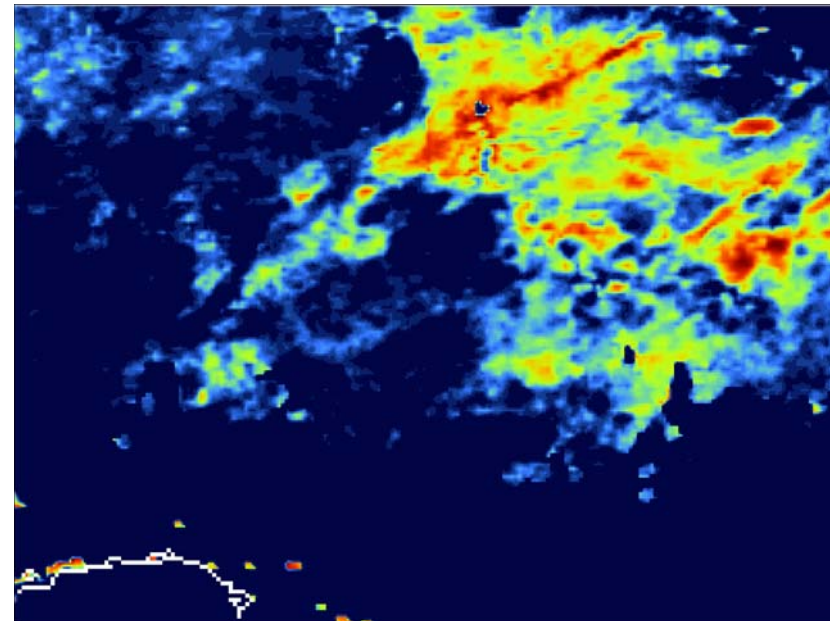
Angstrom Exponent

Single Scattering Albedo 670nm – 470nm

Frequency AOD > 0.25

2003, 0-20°E 5-20°N

no constraints on α, ω

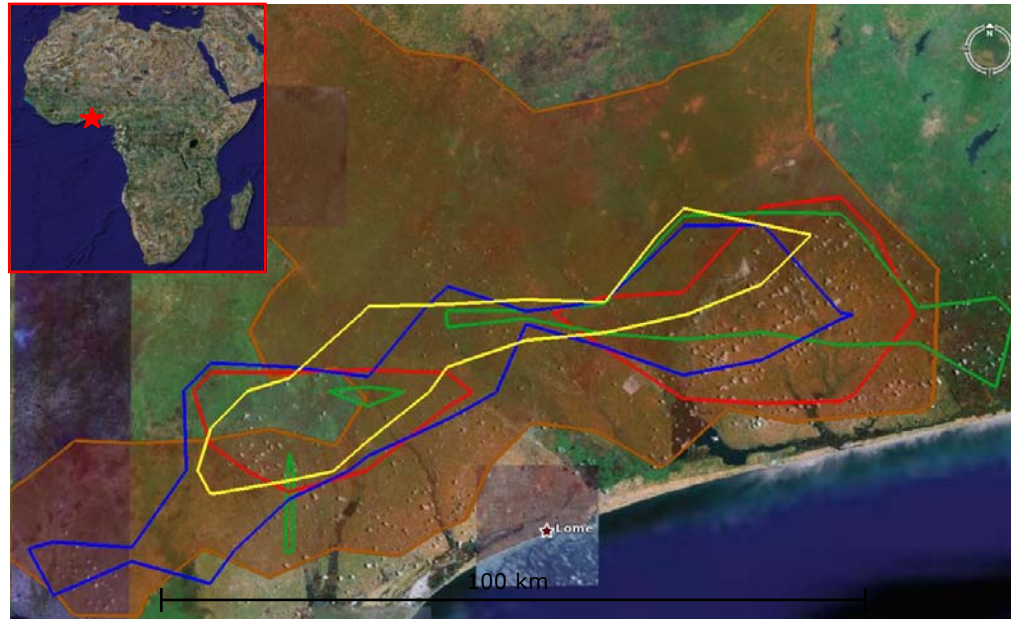α < 0.5, ω increasing with λ
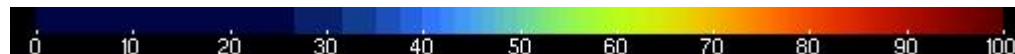
Results in Google Earth

HYDE 3.0 land use > 70

Region North of Lomé, Togo 6.1°N 1.2°E

Model	RMS (No Opt)	RMS (Optimized)
A	0.63	0.63
B	1.00	0.73
C	0.67	0.67
D	0.94	0.79
E	0.80	0.72

- Optimization increases the agreement of each model with the observations (by reducing the RMS error).

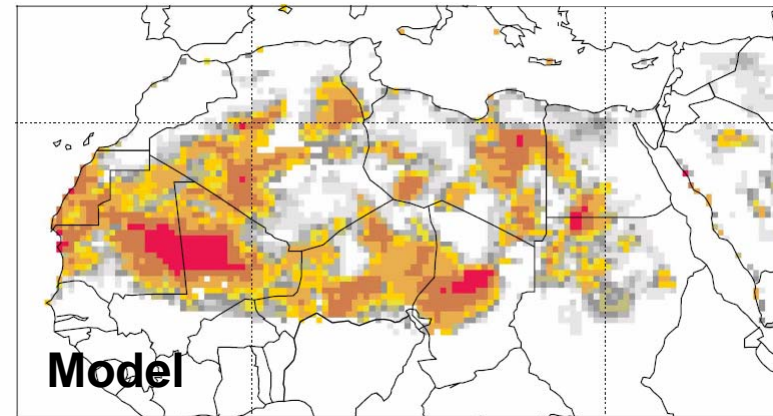- But the range of emission among the AEROCOM models is not reduced.

Global Annual Emission

No Opt   1854±1202 Tg

Optimized 1432±1011 Tg

Saharan Dust source activation (DSA) based on Meteosat-8/SEVIRI 15-min IR dust index retrievals

Schepanski et al, 2007

Observations

Tegen et al, 2004

Model
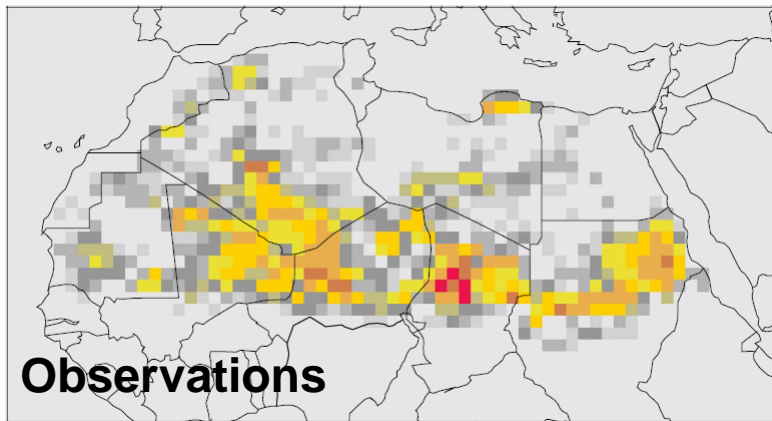
Frequency of Emission Events

2006-03-07 06:00 UTC

EUMETSAT distributes BTD based dust index

"red" = BTD(12μm,10.8μm)
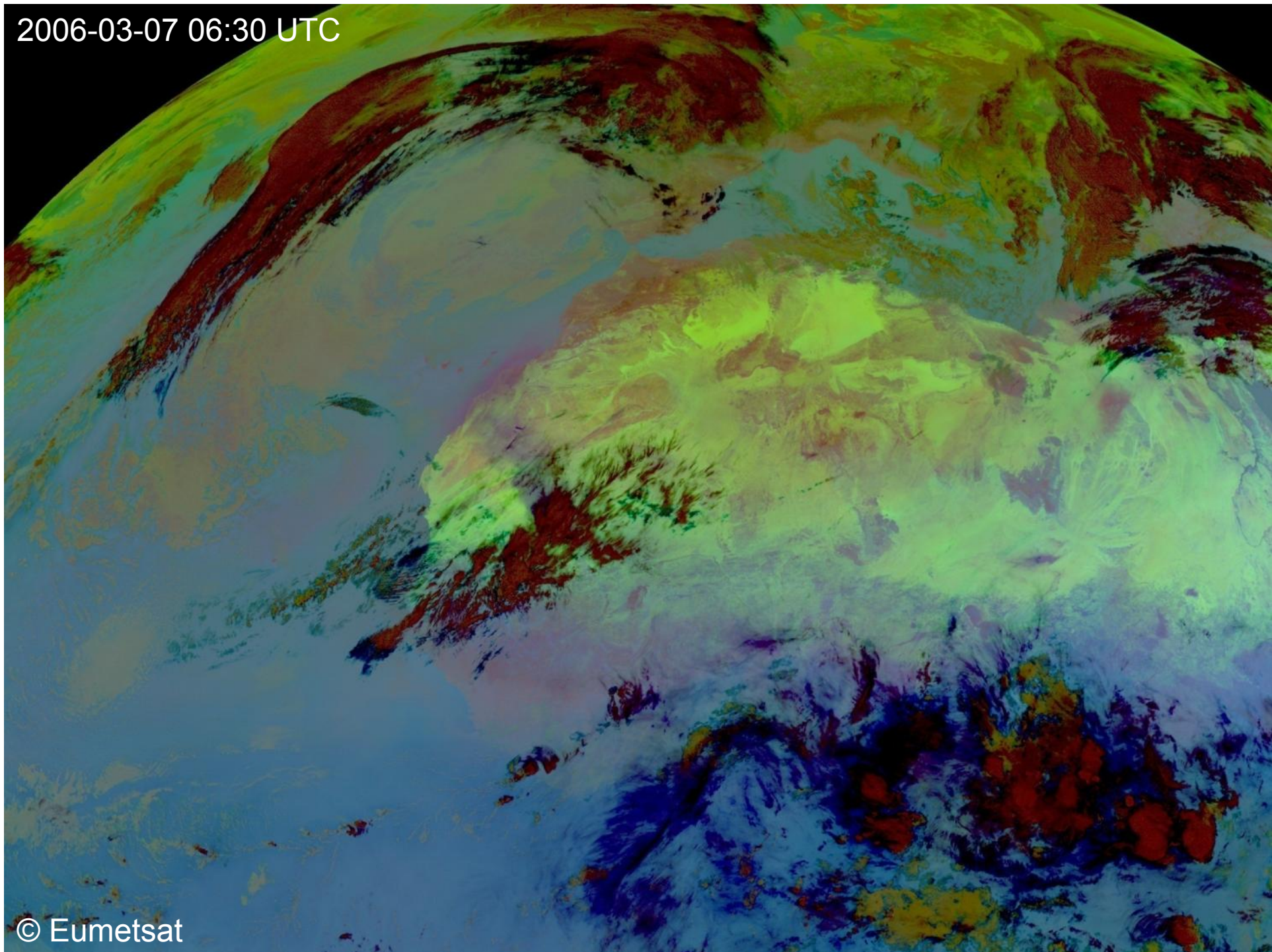"green" = BTD(10.8μm,8.7μm)
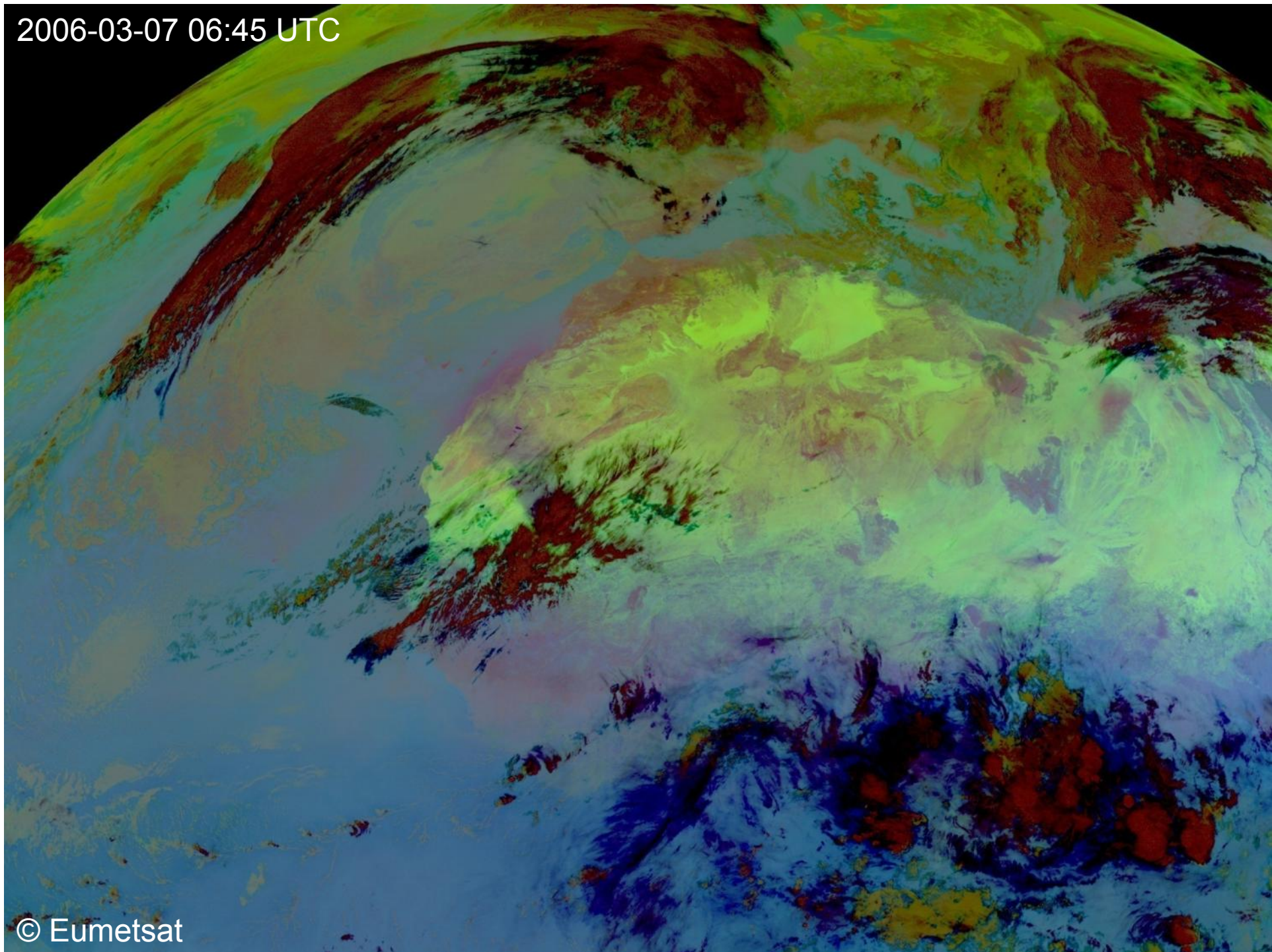"blue" = BT(10.8 μm)
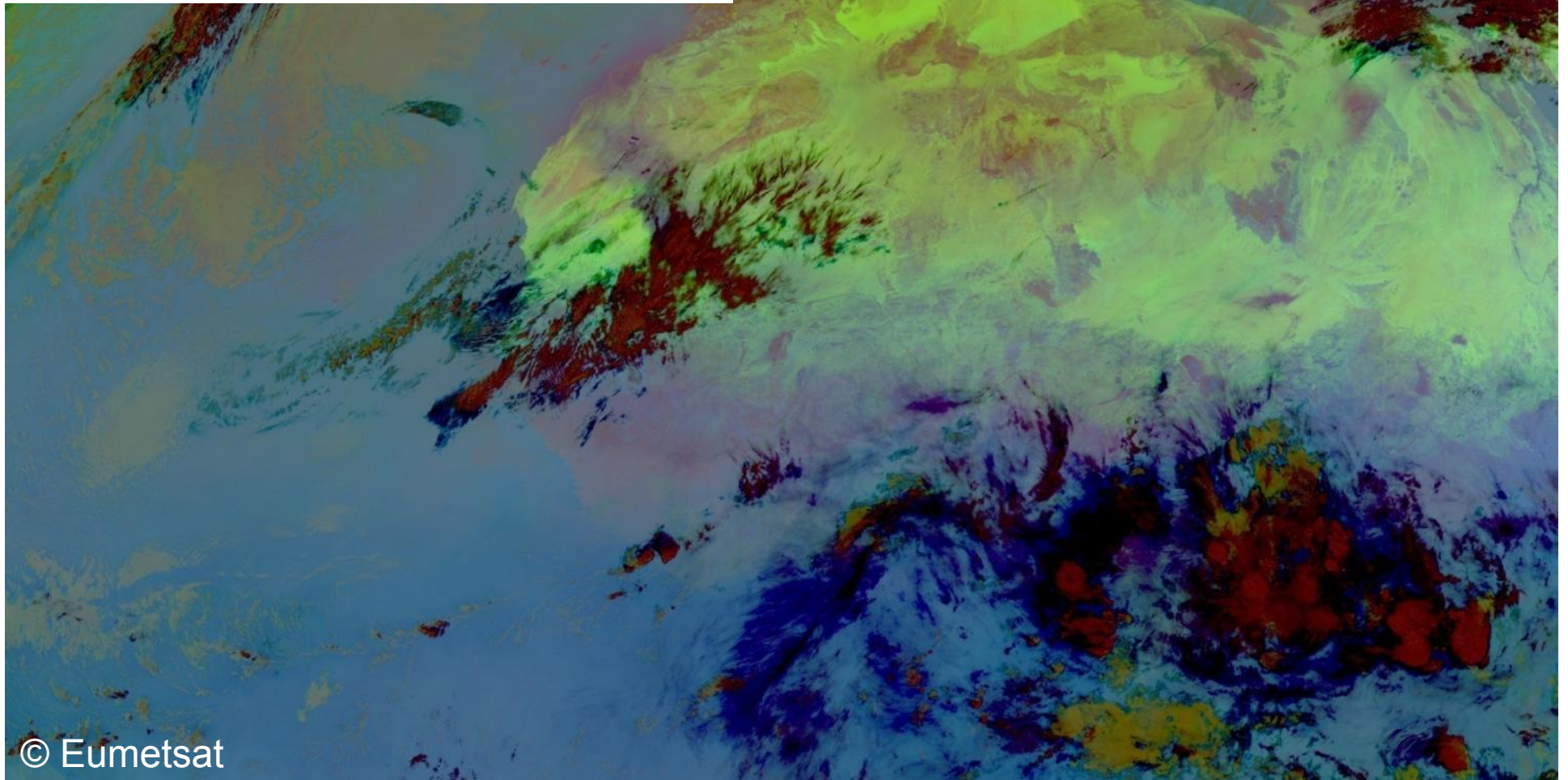
© Eumetsat
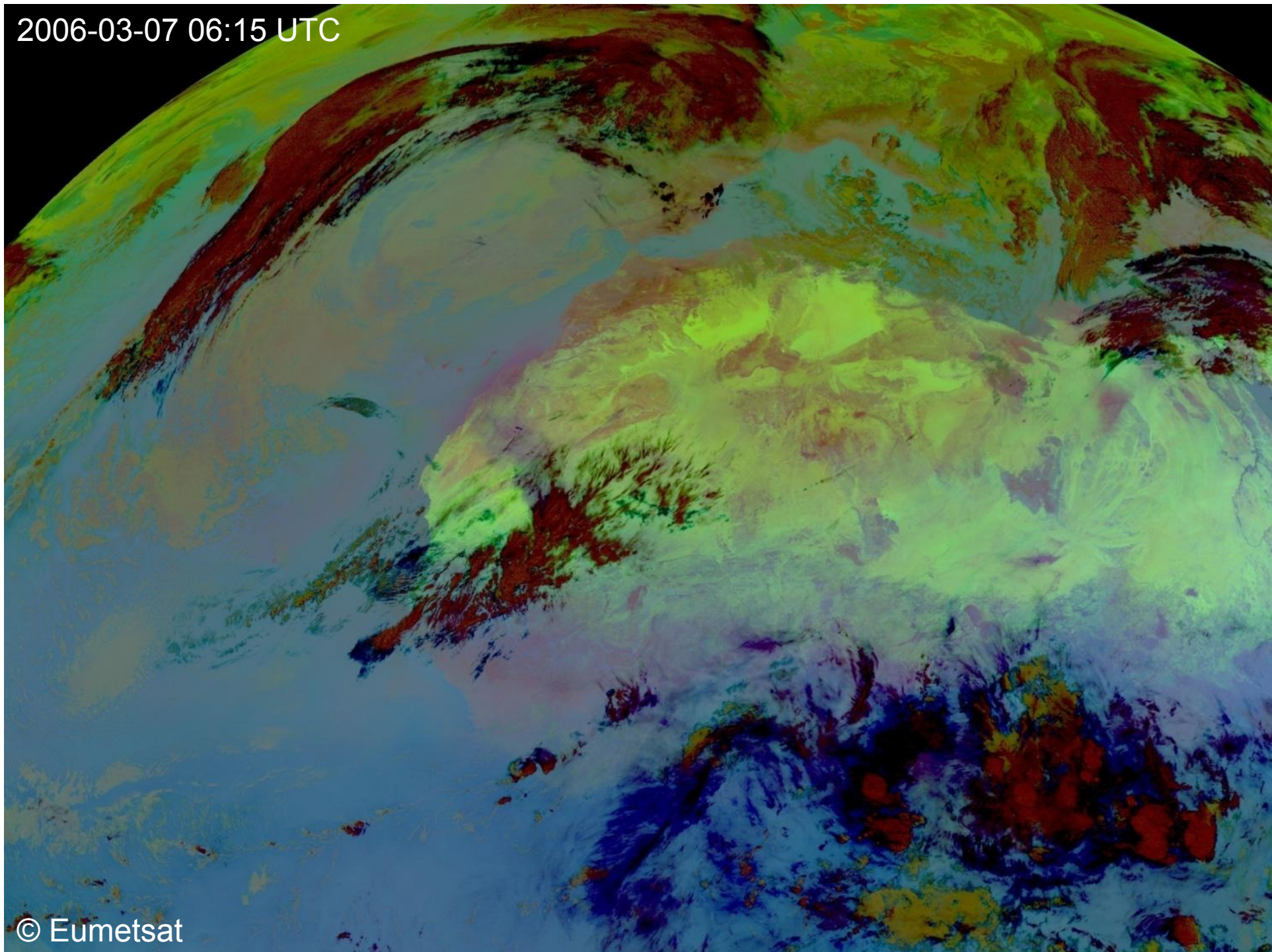
2006-03-07 06:15 UTC

© Eumetsat

2006-03-07 06:30 UTC
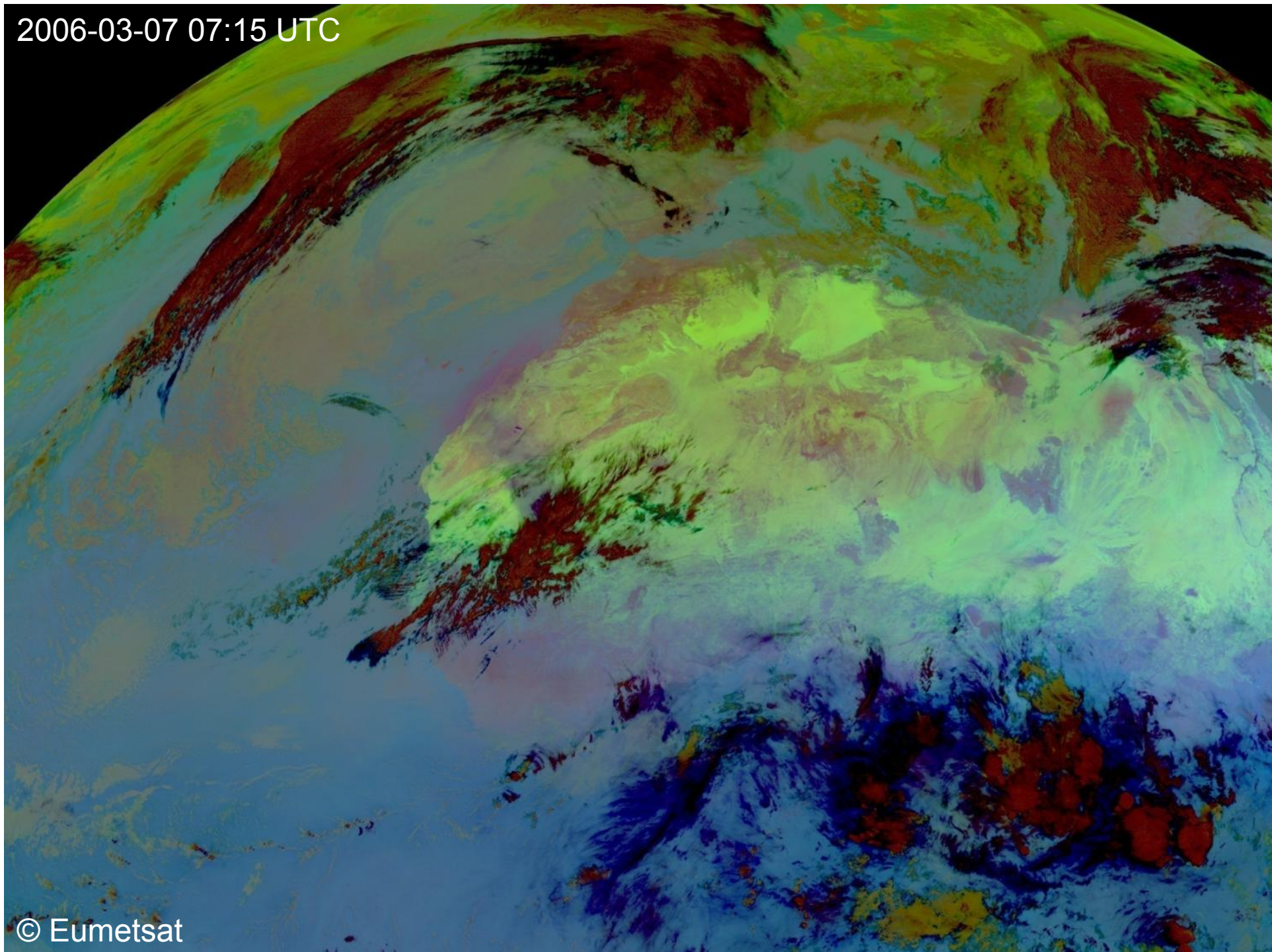
© Eumetsat

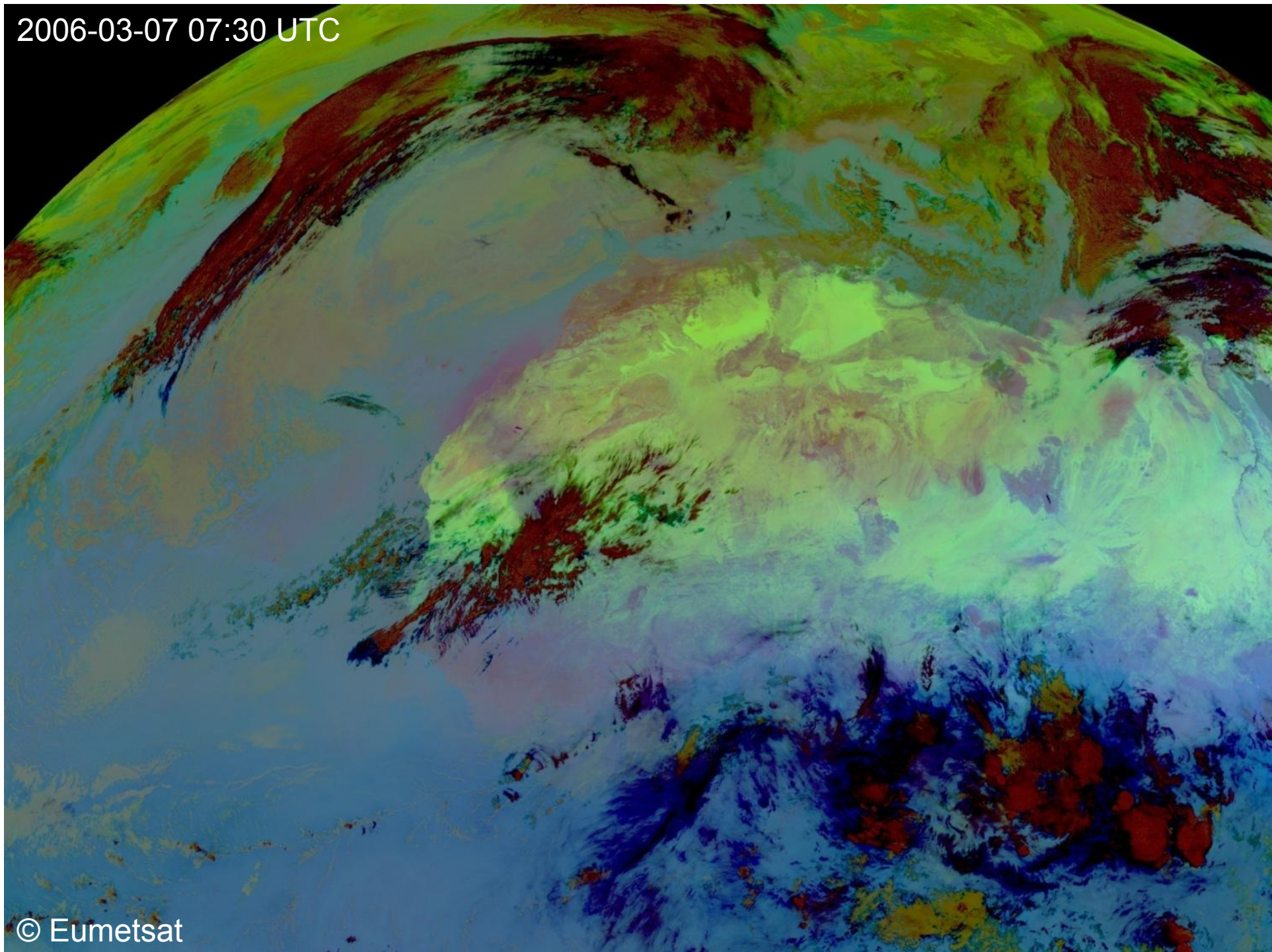2006-03-07 06:45 UTC

© Eumetsat

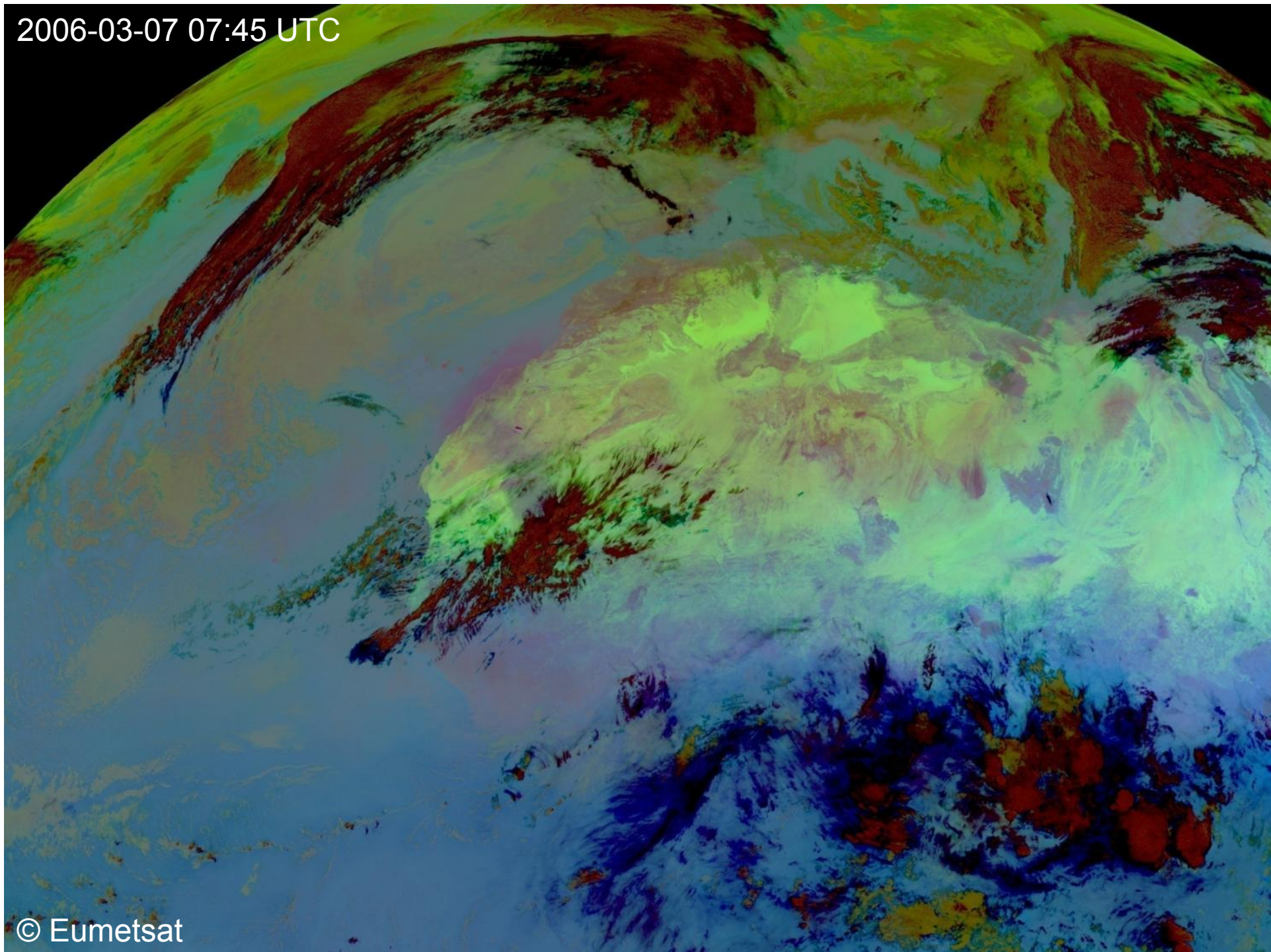2006-03-07 07:00 UTC
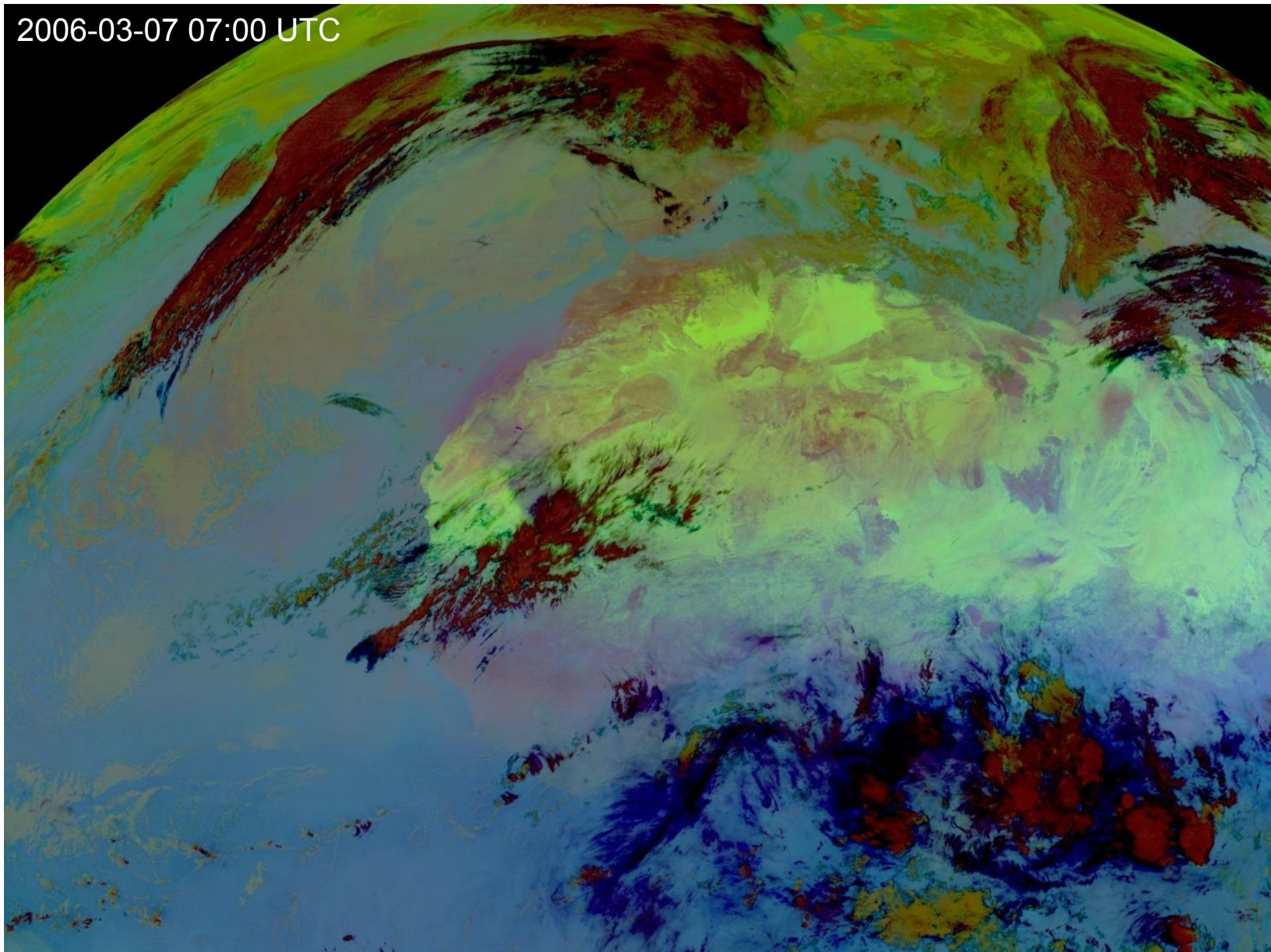
2006-03-07 07:15 UTC
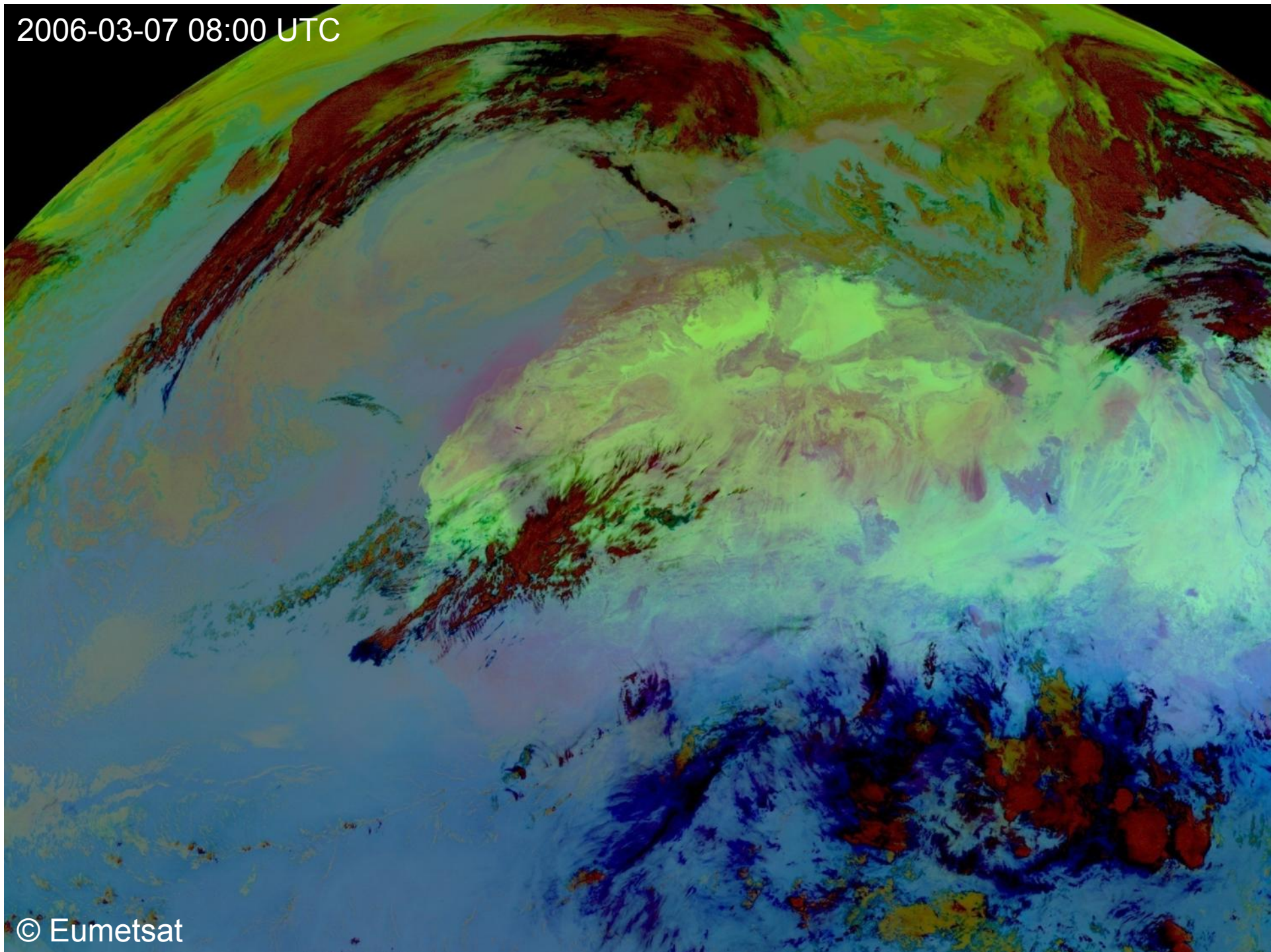
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2006-03-07 07:30 UTC

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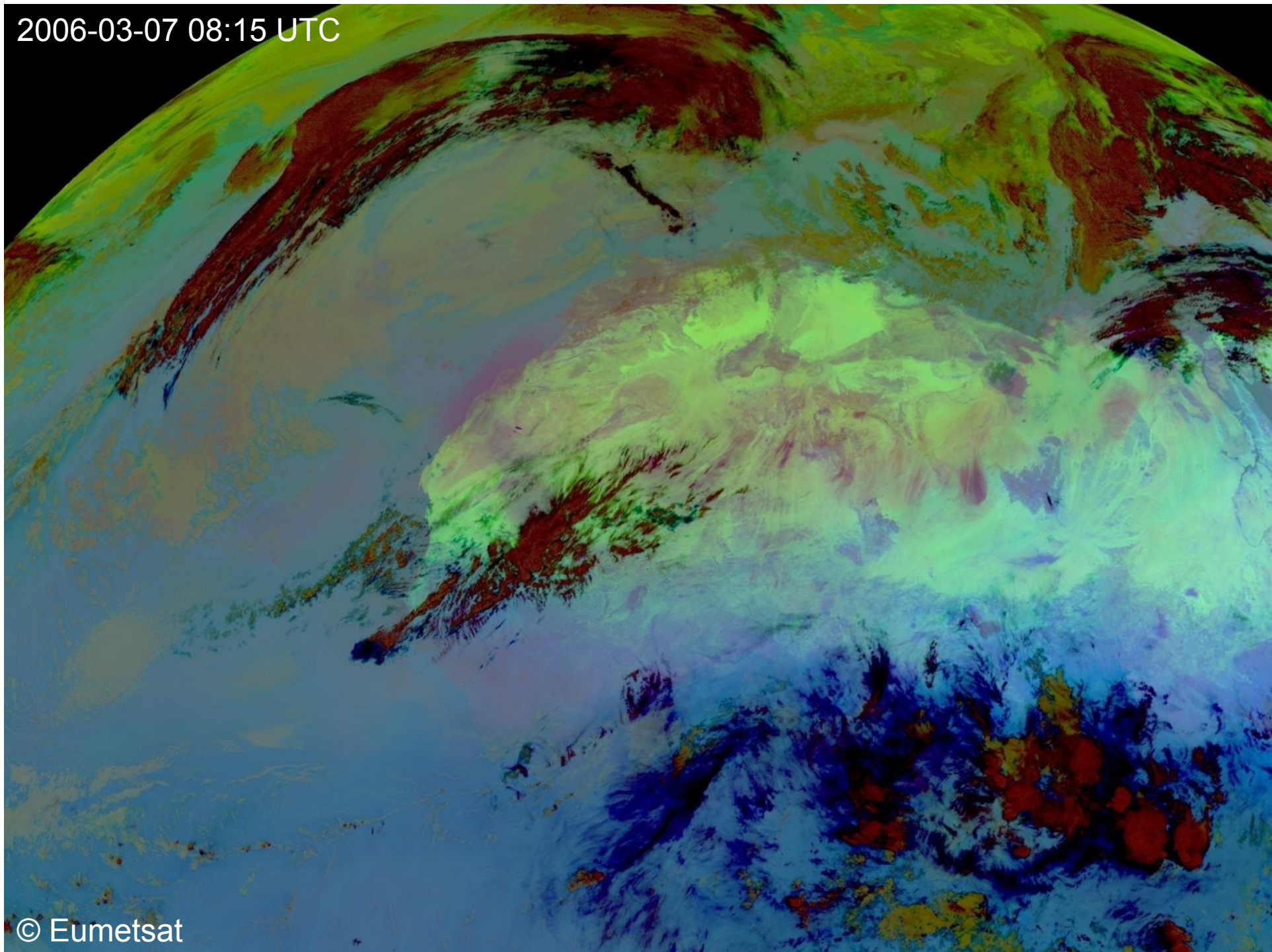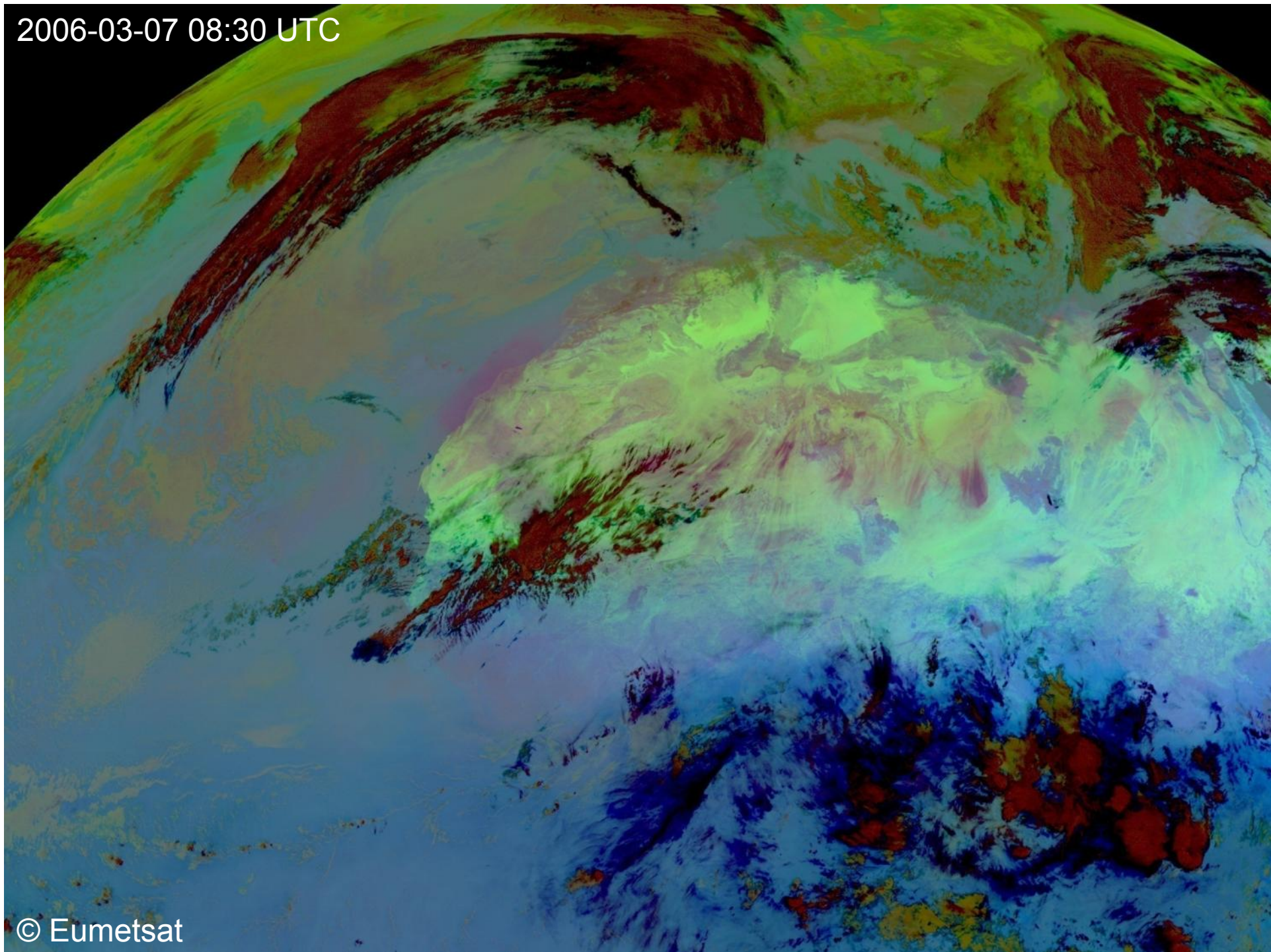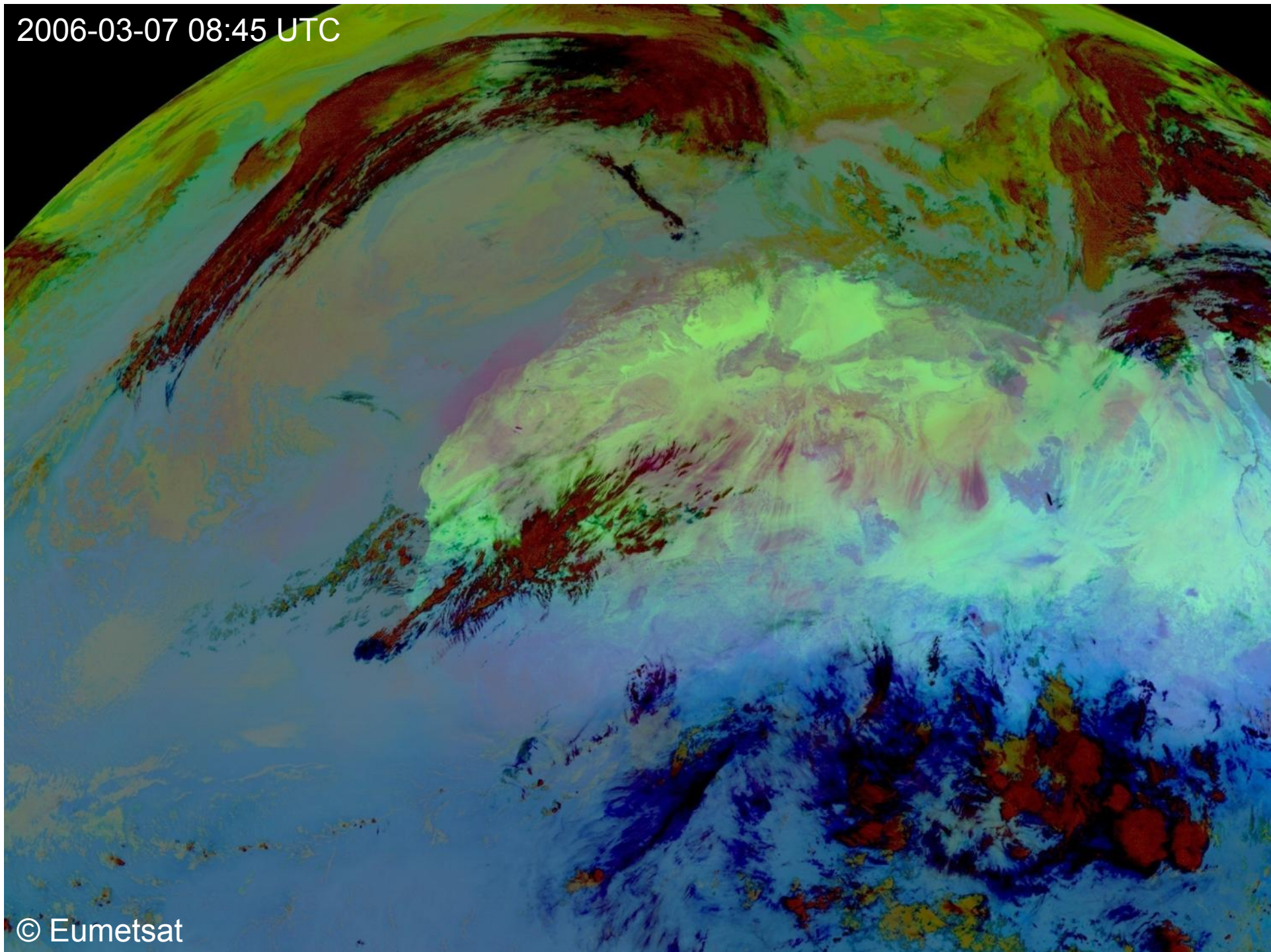2006-03-07 07:45 UTC

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2006-03-07 08:00 UTC

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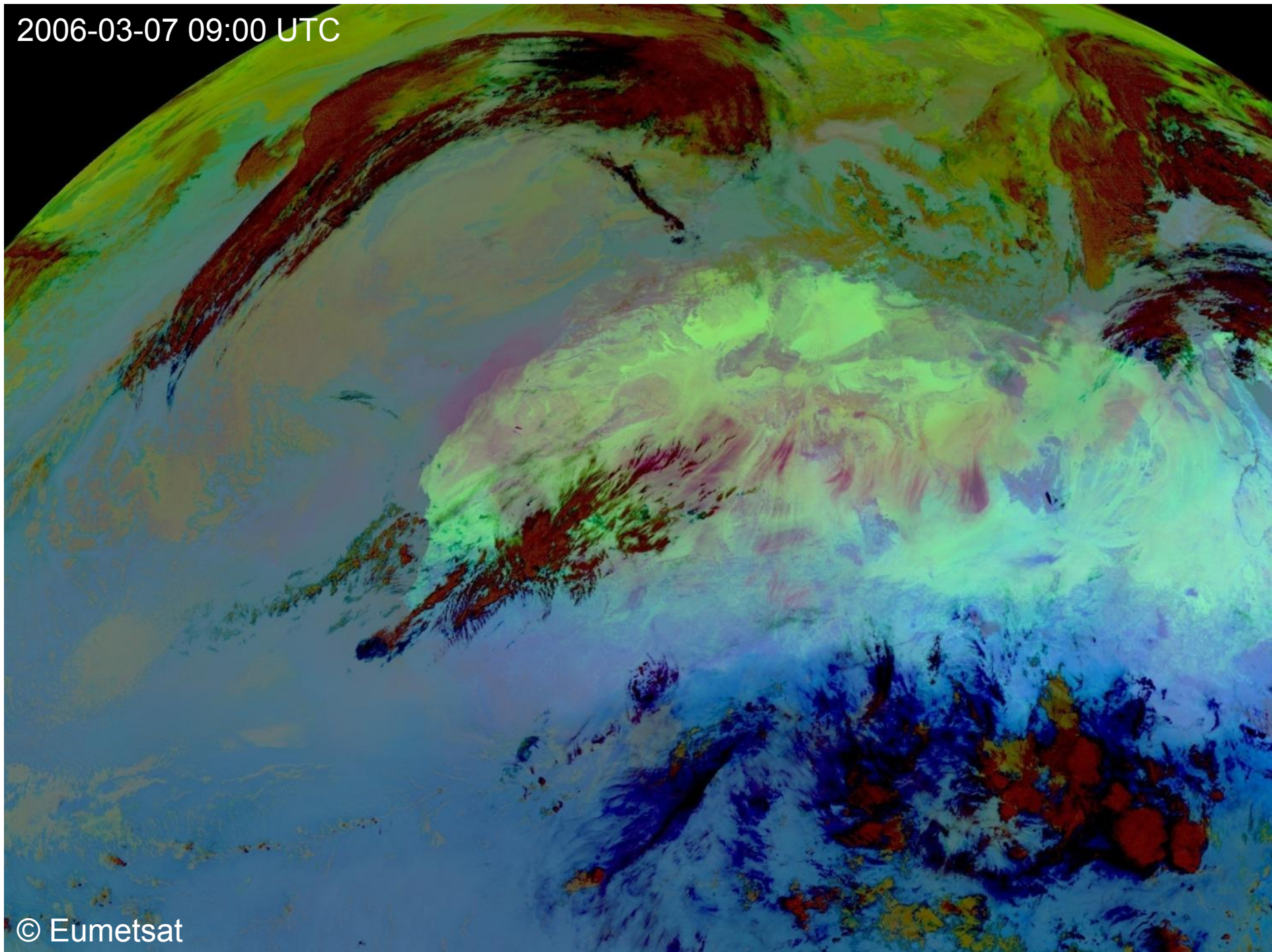2006-03-07 08:15 UTC

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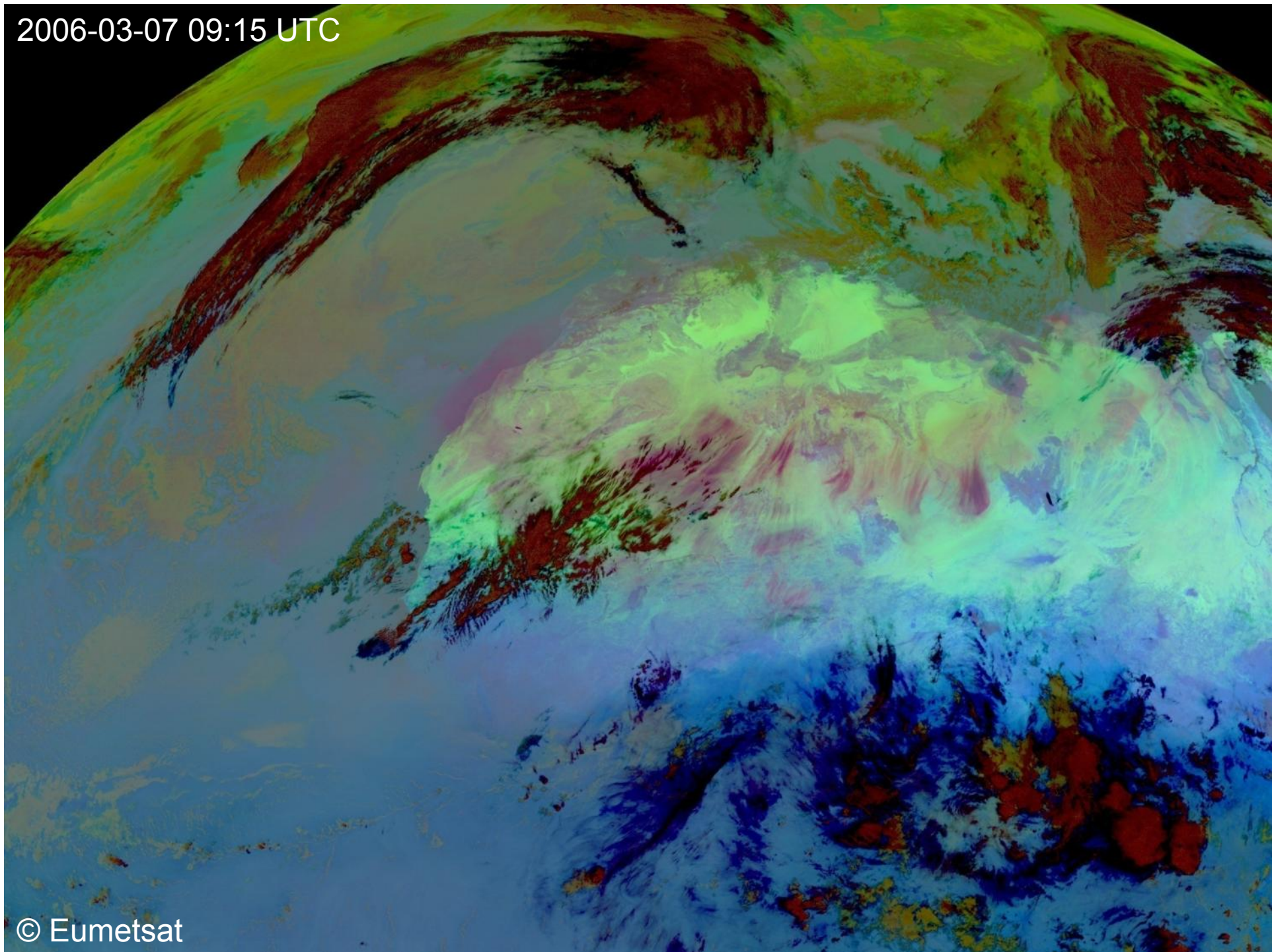
© Eumetsat

2006-03-07 08:45 UTC
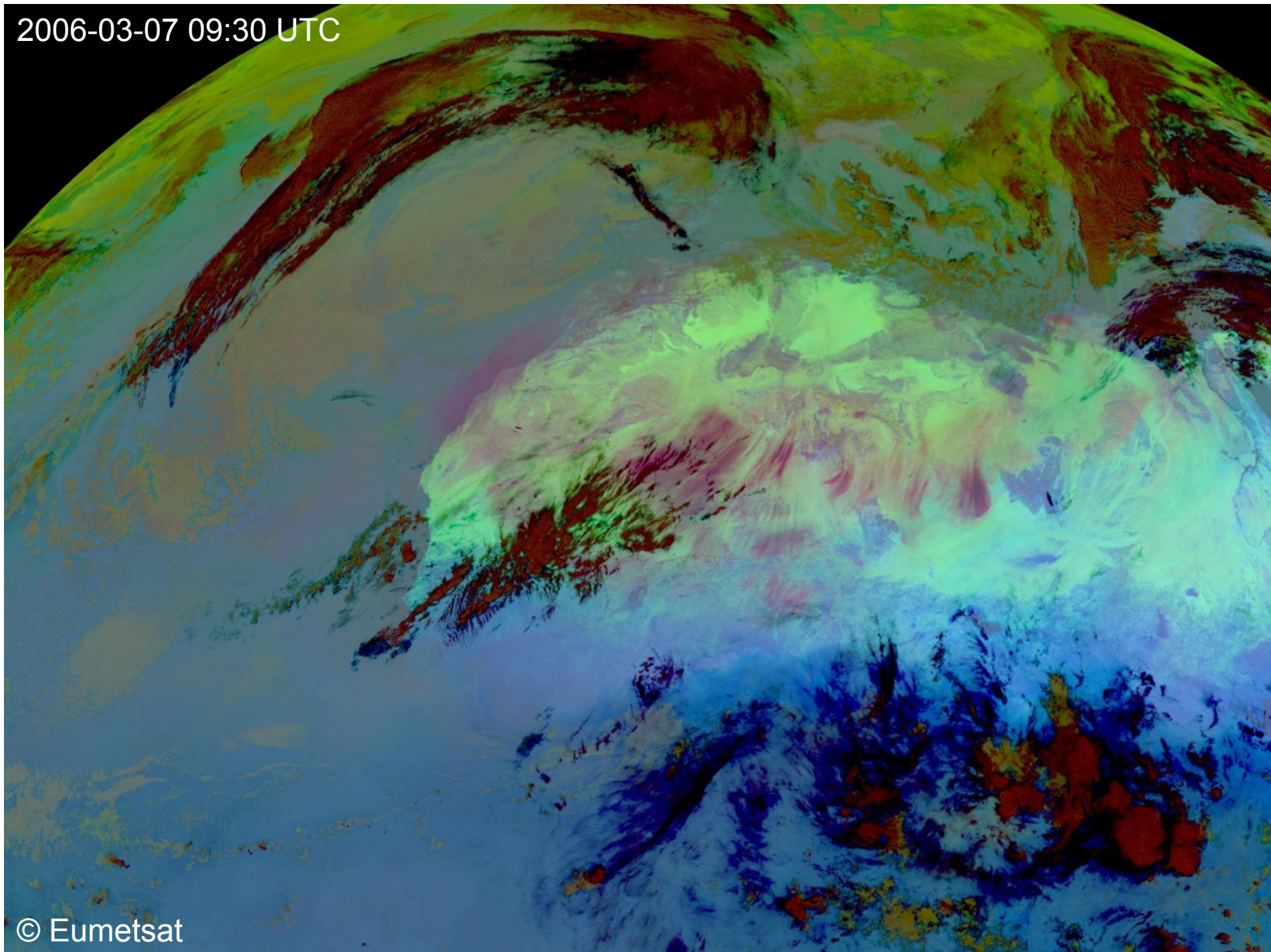
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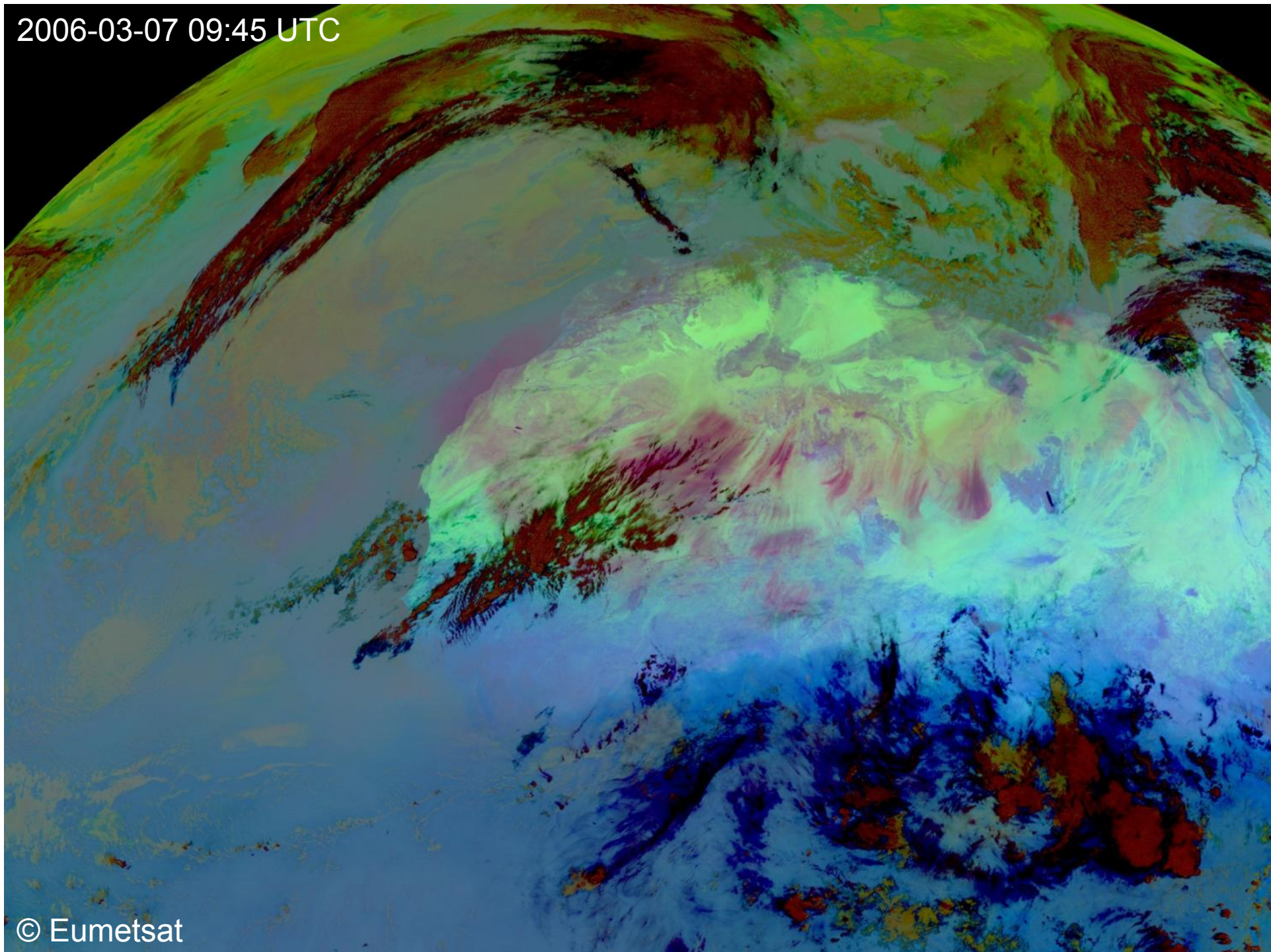
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2006-03-07 09:15 UTC

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2006-03-07 09:30 UTC
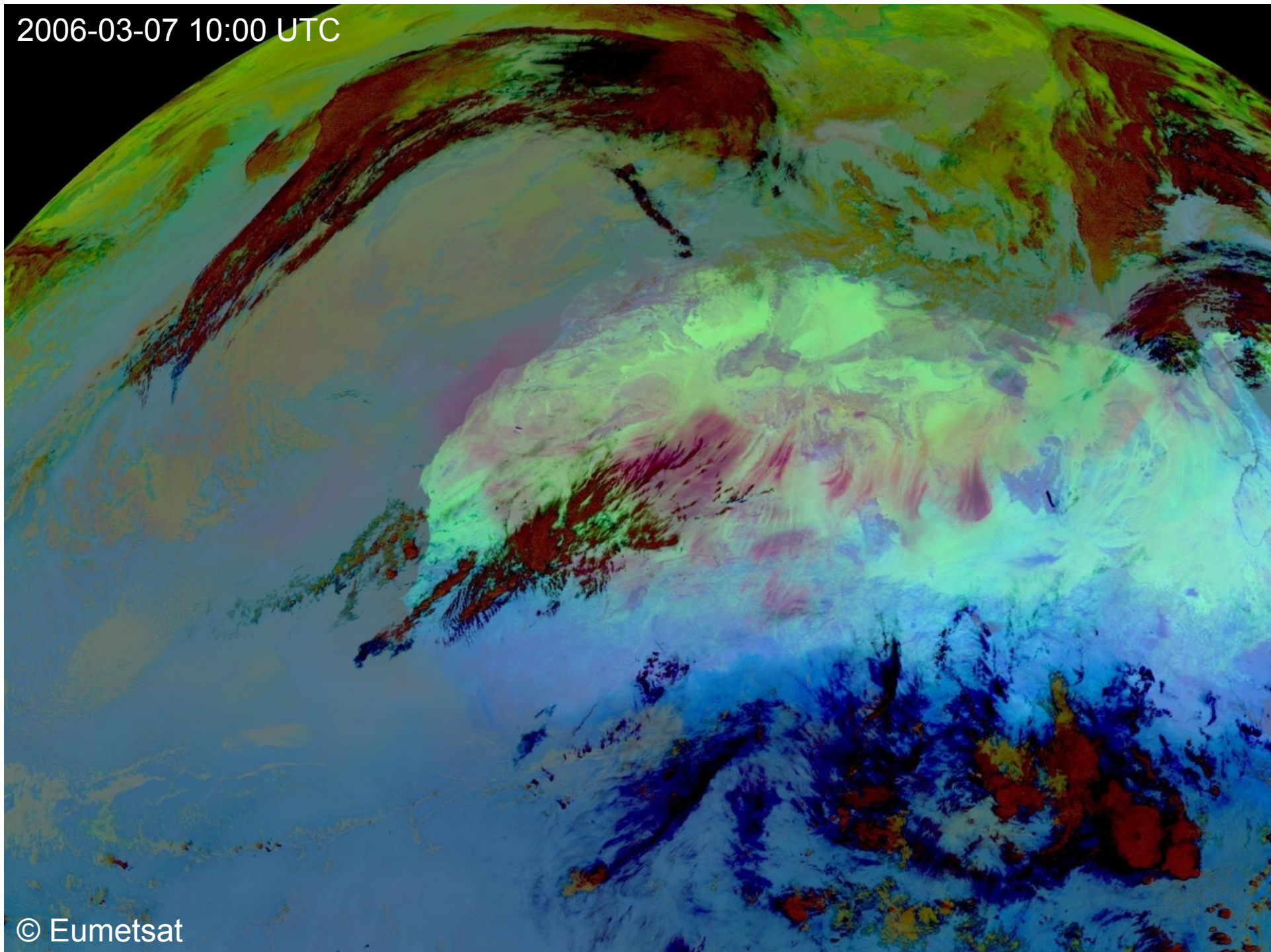
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2006-03-07 09:45 UTC

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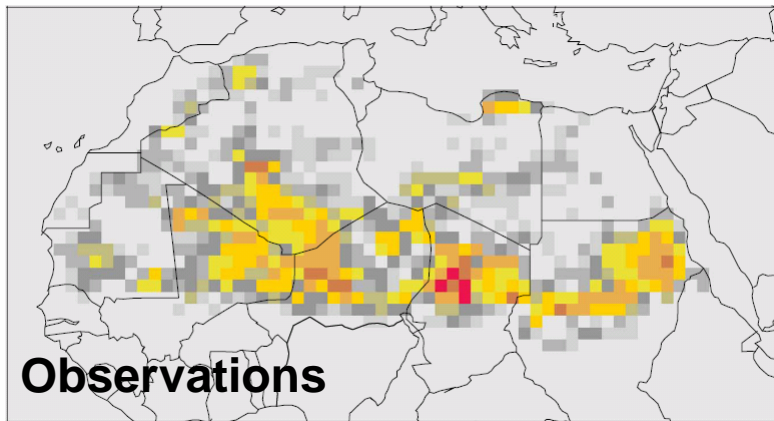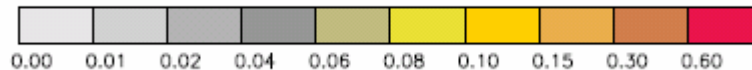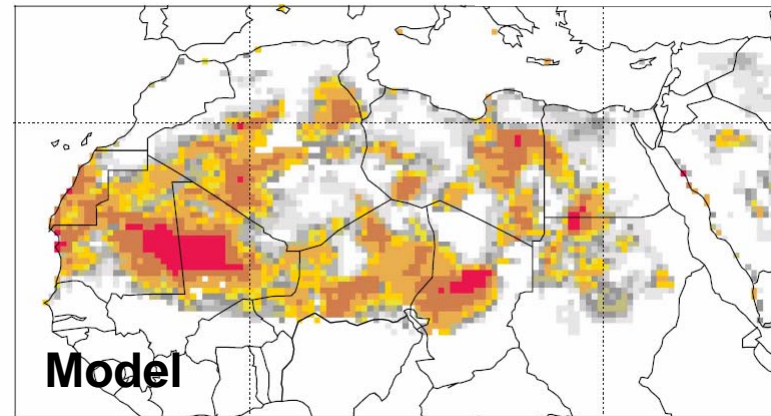
2006-03-07 10:00 UTC

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Saharan Dust source activation (DSA) based on Meteosat-8/SEVIRI 15-min IR dust index retrievals

Schepanski et al, 2007

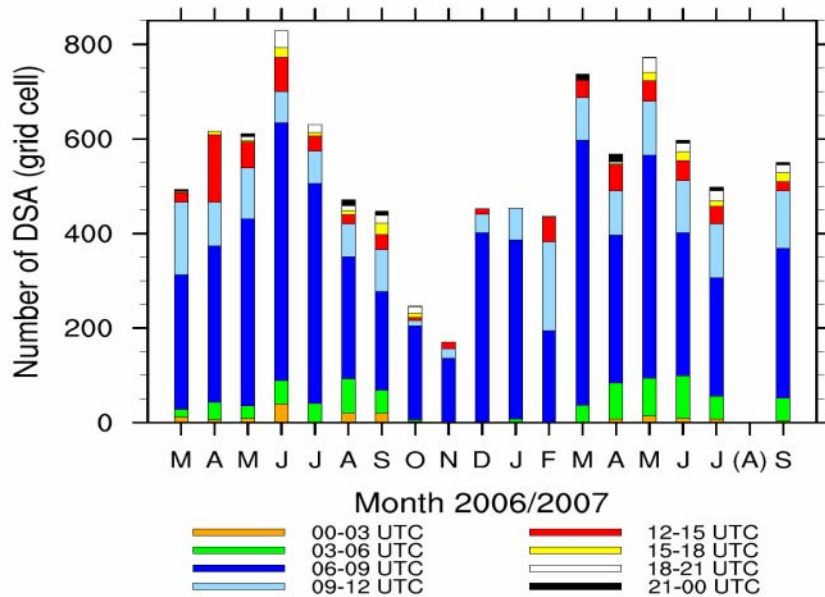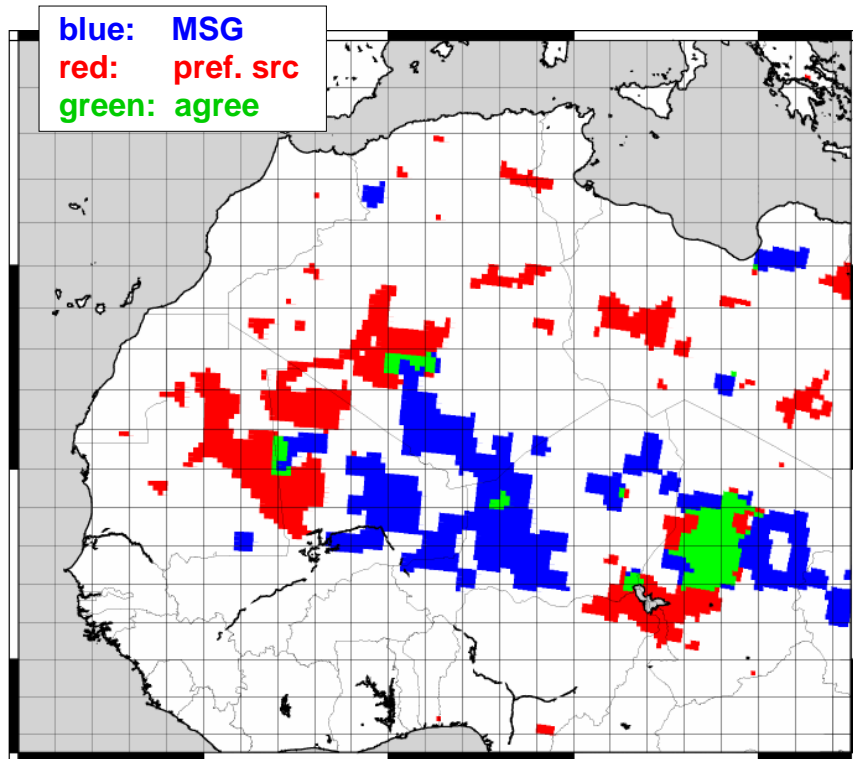*Tegen et al, 2004*

Observations

Model

Frequency of Emission Events

Comparison to surface properties

Comparison to OMI AAI (July 2006)

MSG derived <u>major</u> dust emission areas and topographic depressions [Tegen et al., 2002]

blue: MSG
red: pref. src
green: agree

Kerstin Schepanski
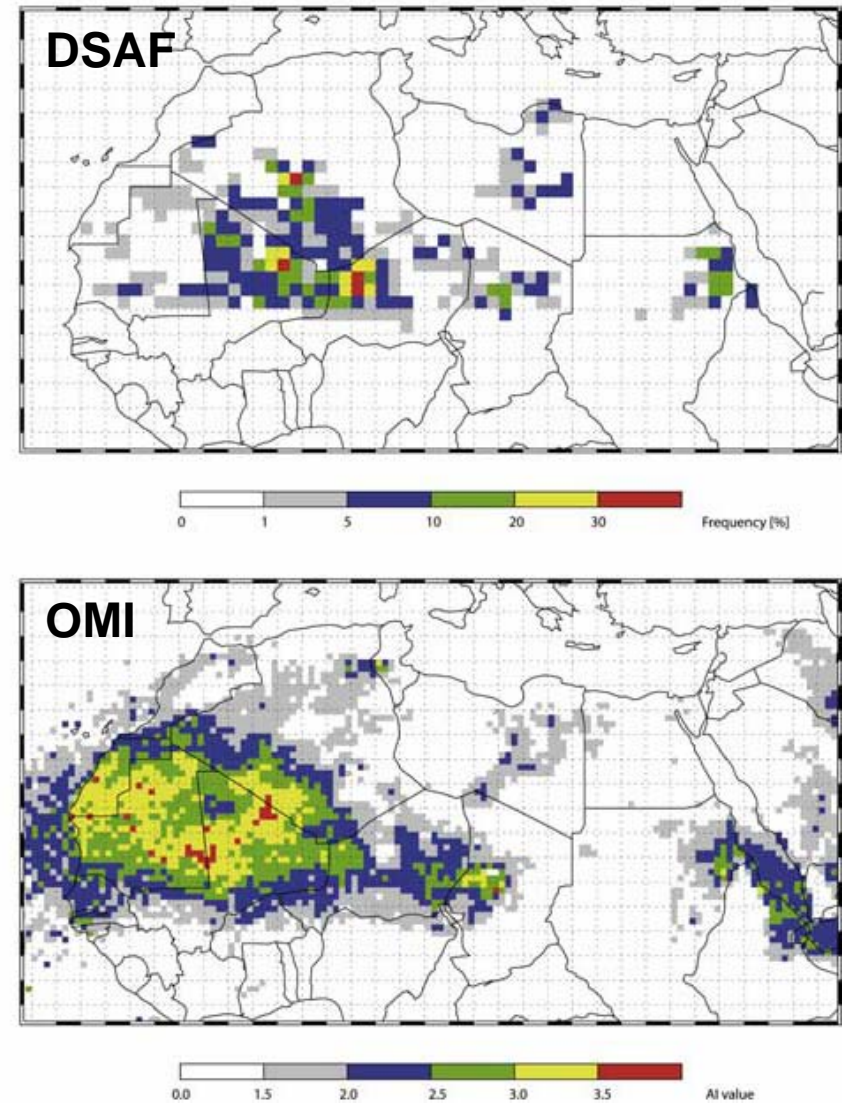
Schepanski et al., 2007, GRL

Distribution of DSAE

Kerstin Schepanski

[Schepanski et al., 2007, GRL