A satellite image of Africa, likely from the SEVIRI instrument, showing a large-scale dust event. The dust is visible as a prominent reddish-brown plume originating from the Sahel region and extending over the Atlantic Ocean. The image is color-coded, with red and orange representing high dust concentrations, and blue and green representing lower concentrations or other atmospheric features. White outlines delineate the borders of African countries.

Exemplary dust cases as viewed by imagers SEVIRI, MODIS and VIIRS

selected by HansPeter Roesli
satellite meteorology scientist
satmet.hp@ticino.com

more information about most of
the some cases may be sought
by clicking [IMAGE LIBRARY](#) on the
slides



Solar channels

Natural/true colour RGB

- Any single solar channel
- RGB from true-colour channels (MODIS, VIIRS) or VIS0.6, VIS0.8, NIR1.6 (natural colour SEVIRI)
- Best in forward/backward scattering(->SEVIRI!) and/or over dark background



Infrared channels

Dust RGB

- Triple of (dirty) IR window channels

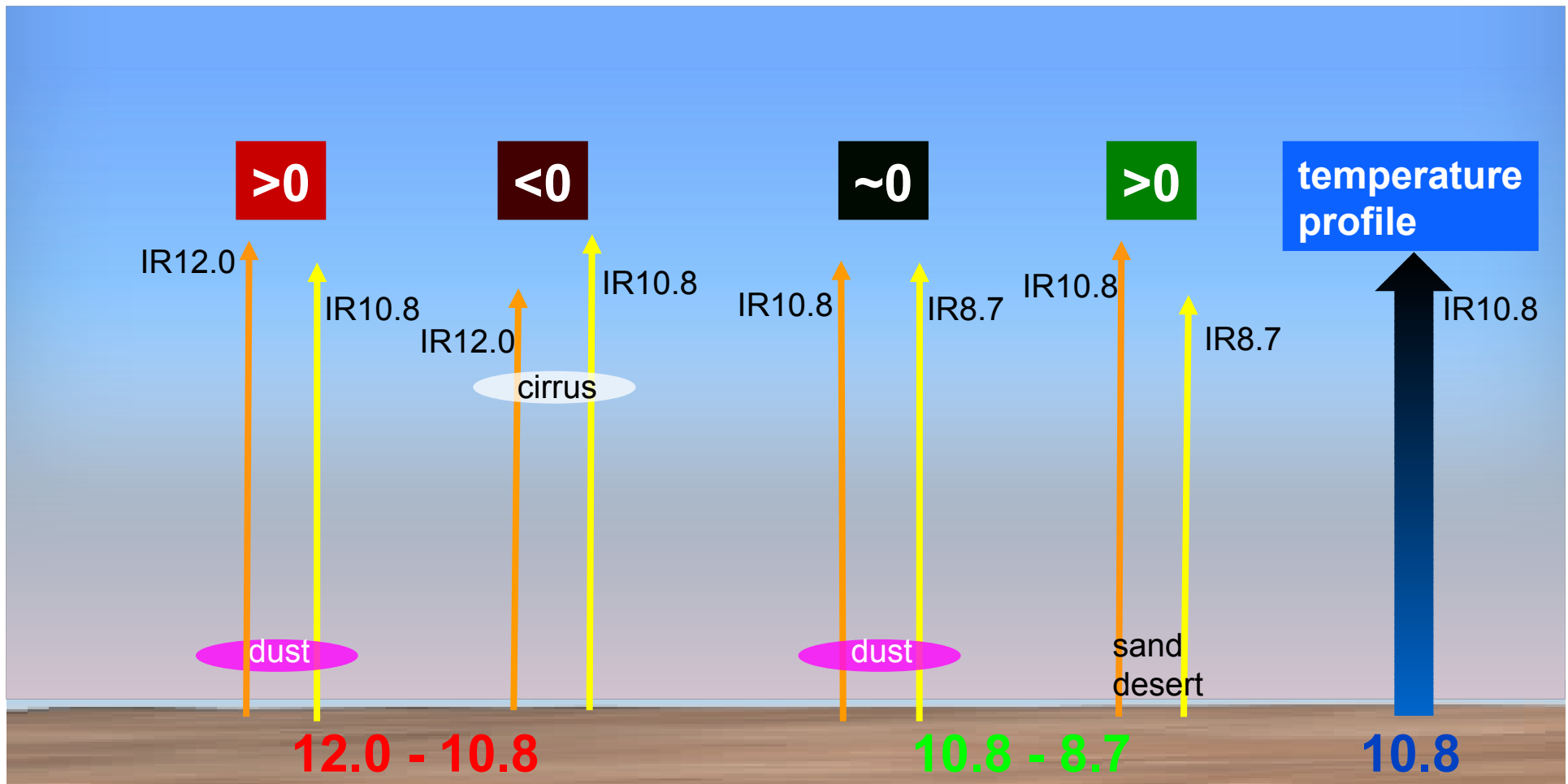
MODIS 2000: 8.40-8.70 10.78-11.28 11.77-12.27 [@1km central]

VIIRS 2012: 8.40-8.70 10.26-11.26 11.54-12.49 @750m constant

SEVIRI 2004: 8.30-9.10 9.80-11.80 11.00-13.00 @3km SSP

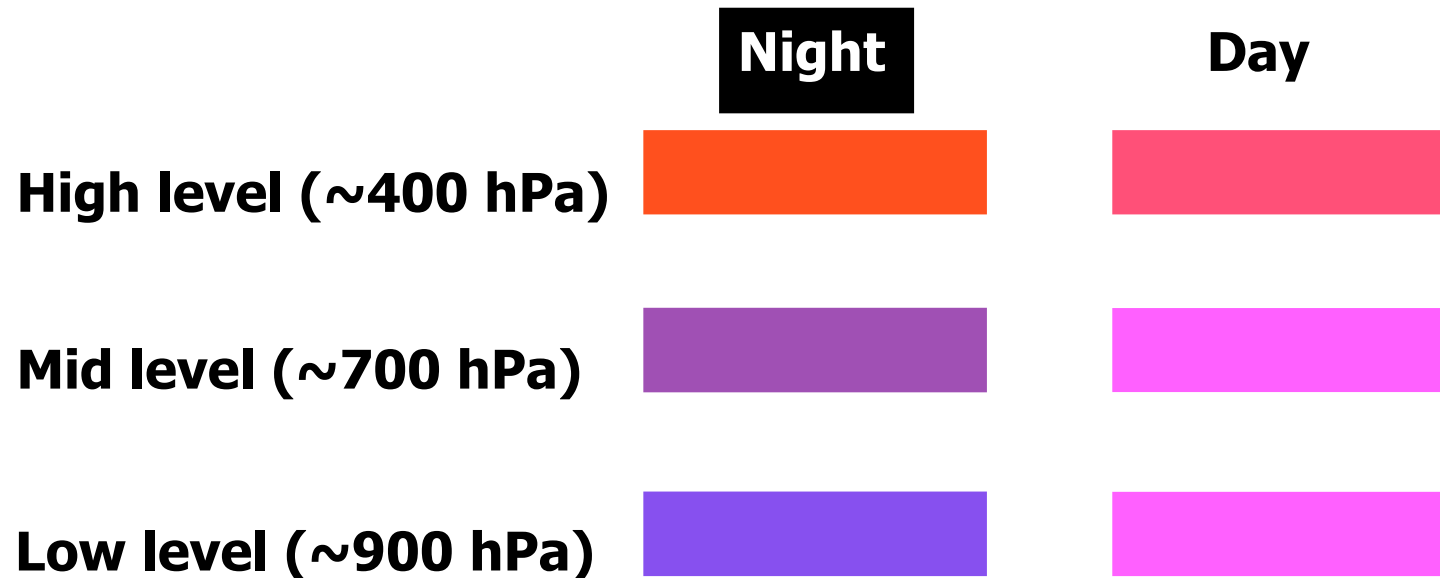
Bandwidth: MODIS<VIIRS<SEVIRI

MSG/SEVIRI dust RGB physical background

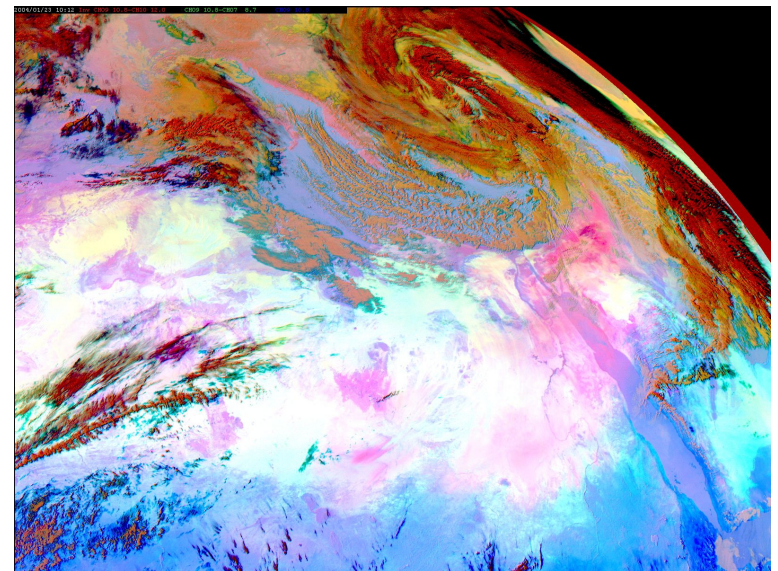
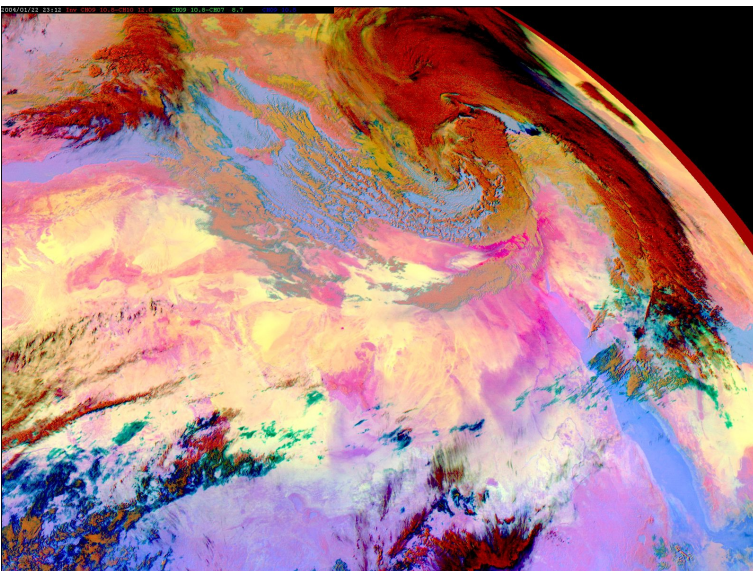
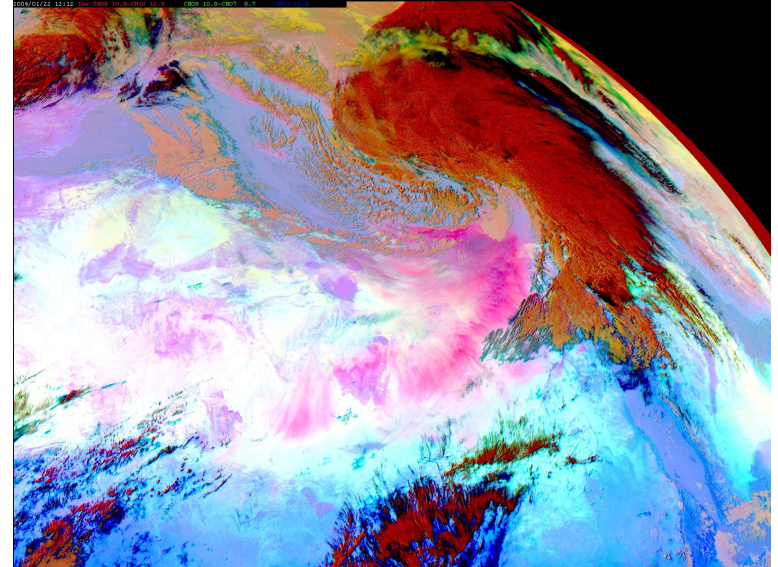
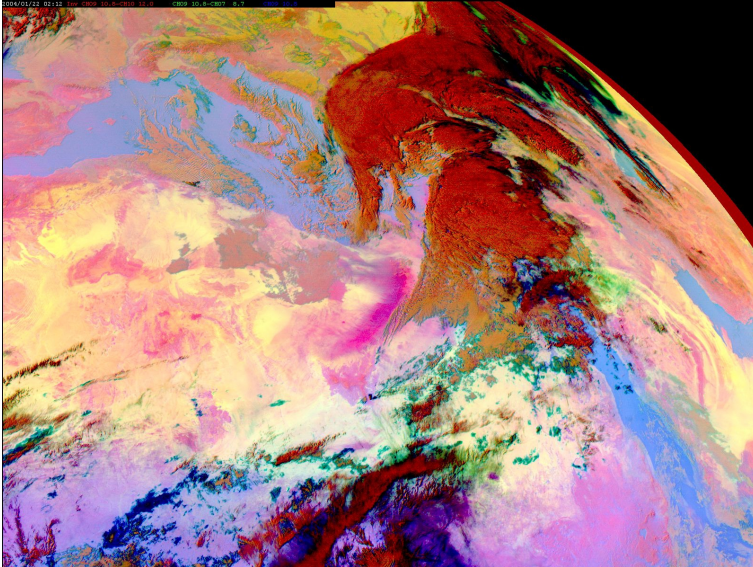


MSG/SEVIRI dust RGB tuning & typical hues

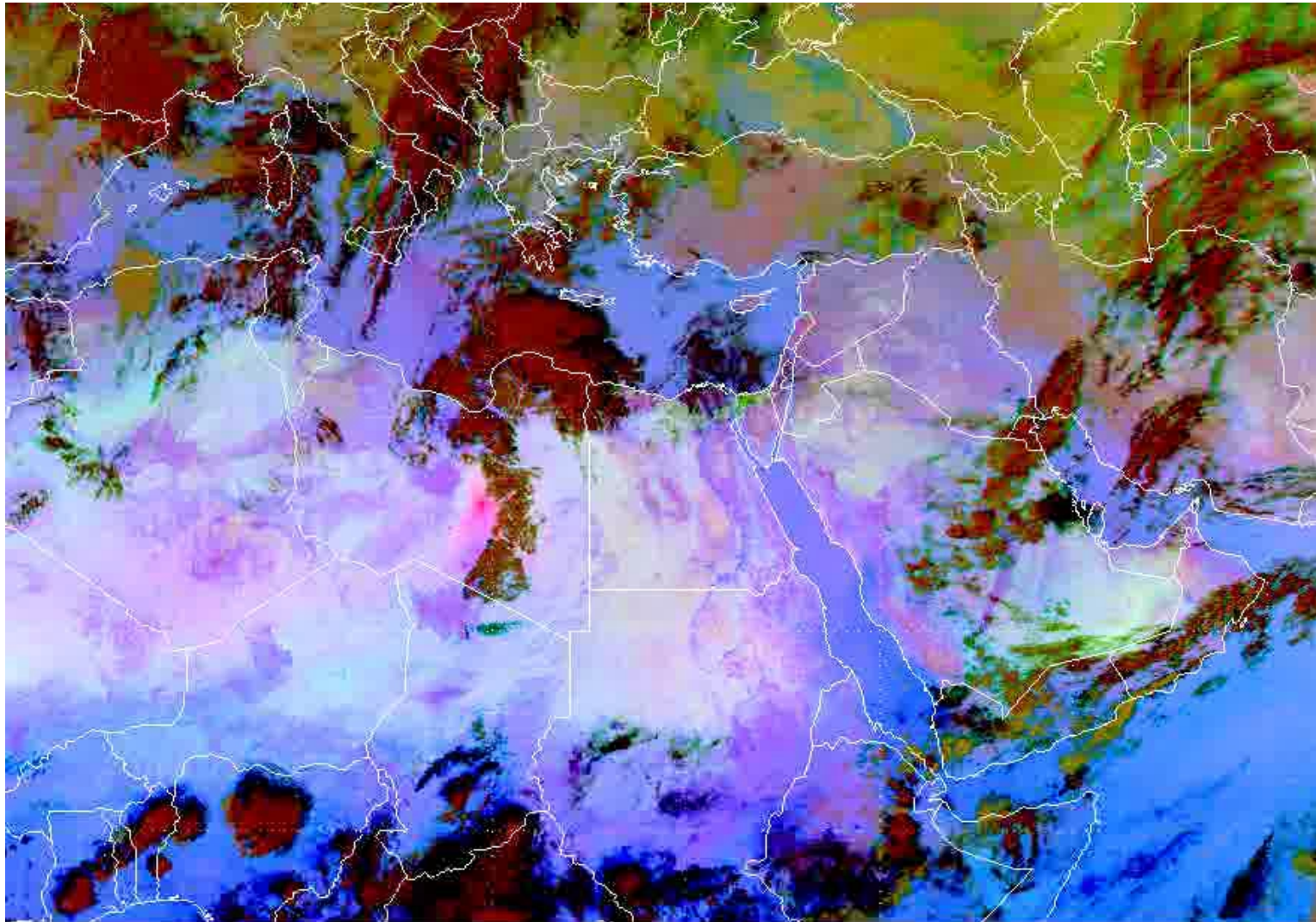
Channel(s)	Range [K]	Gamma [-]
12.0 - 10.8	- 4 .. + 2	1.0
10.8 - 8.7	0 .. +15	2.5
10.8	261 .. 289	1.0



1st dust scene documented by SEVIRI 22-23 January 2004



MSG/SEVIRI monitors dust-prone areas over Africa and Middle East

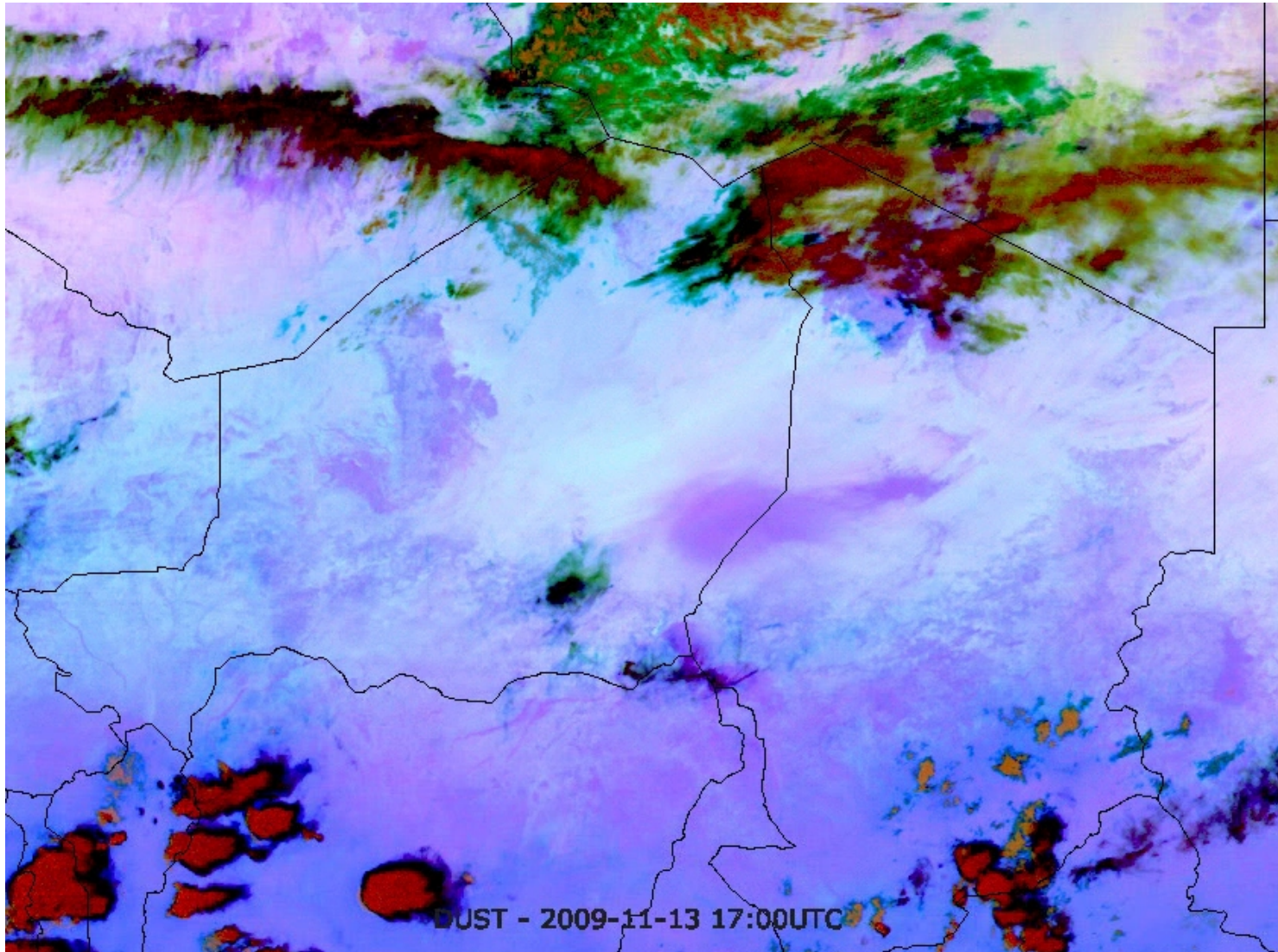


11 days

m10 DUST - 2013-03-29 20:15UTC

Globally most important dust source

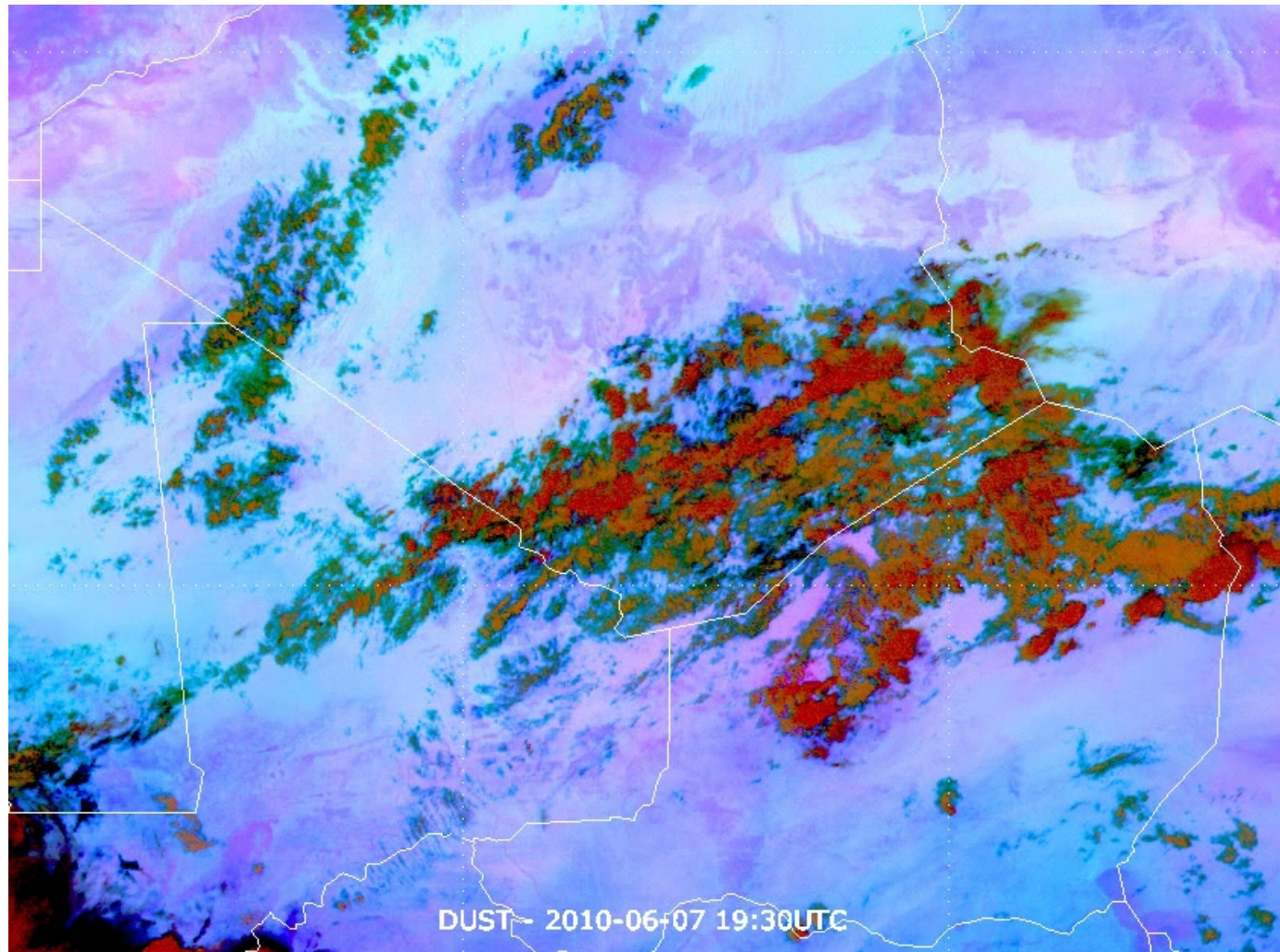
Bodélé Depression in Chad



6 consecutive
diurnal cycles

IMAGE LIBRARY

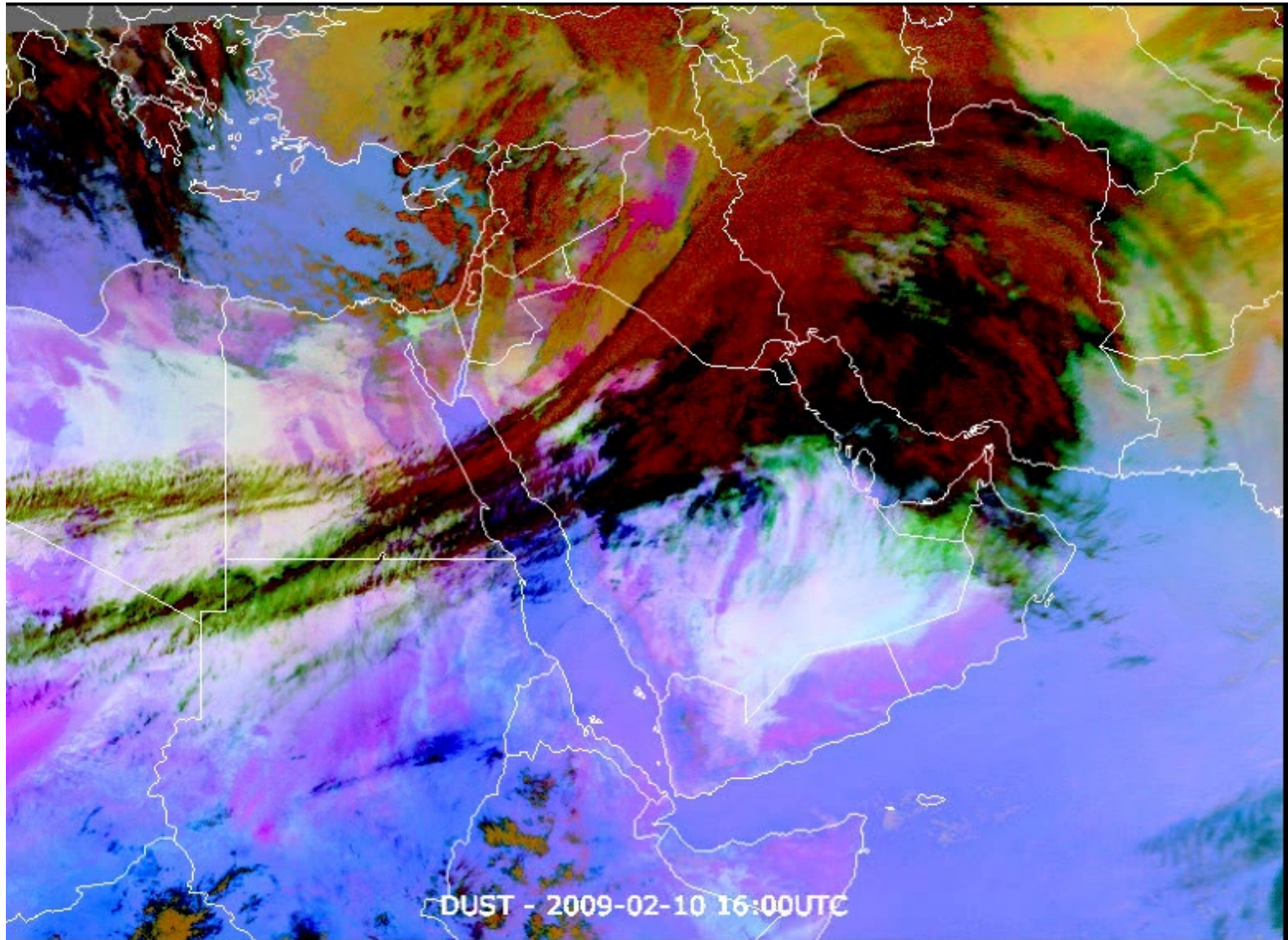
Massive dusty outflow boundaries with backflow – West Africa



6 days

IMAGE LIBRARY

Typical dust storms over Arabian Peninsula



5 days

IMAGE LIBRARY

Loess streaks – Iceland

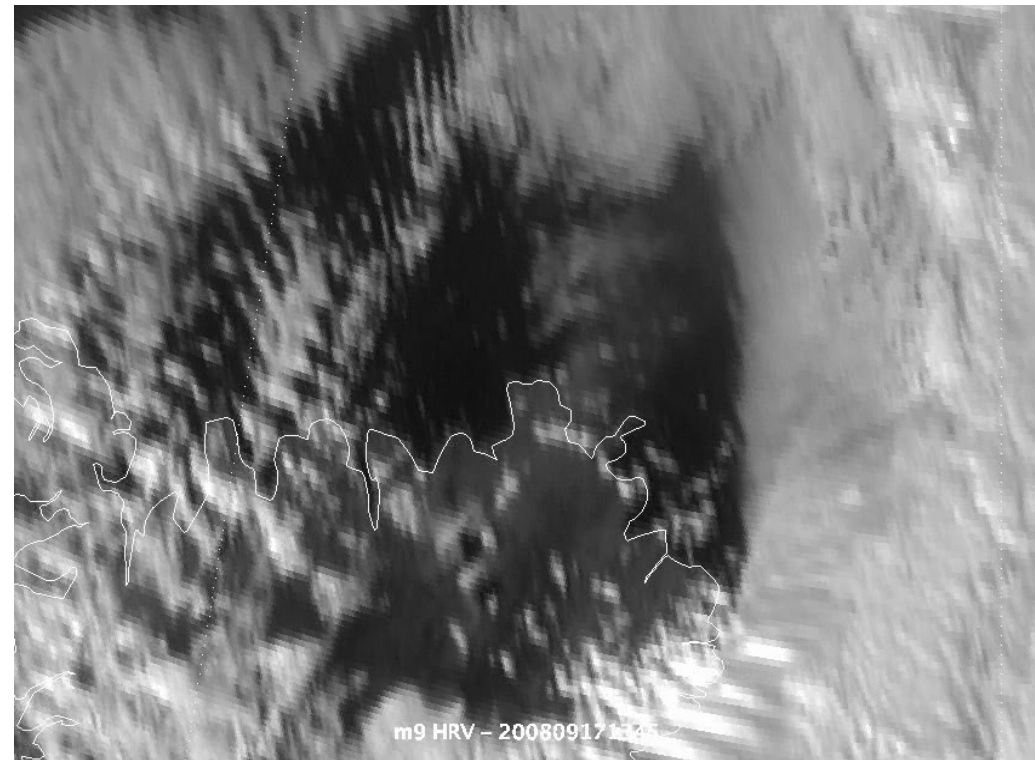
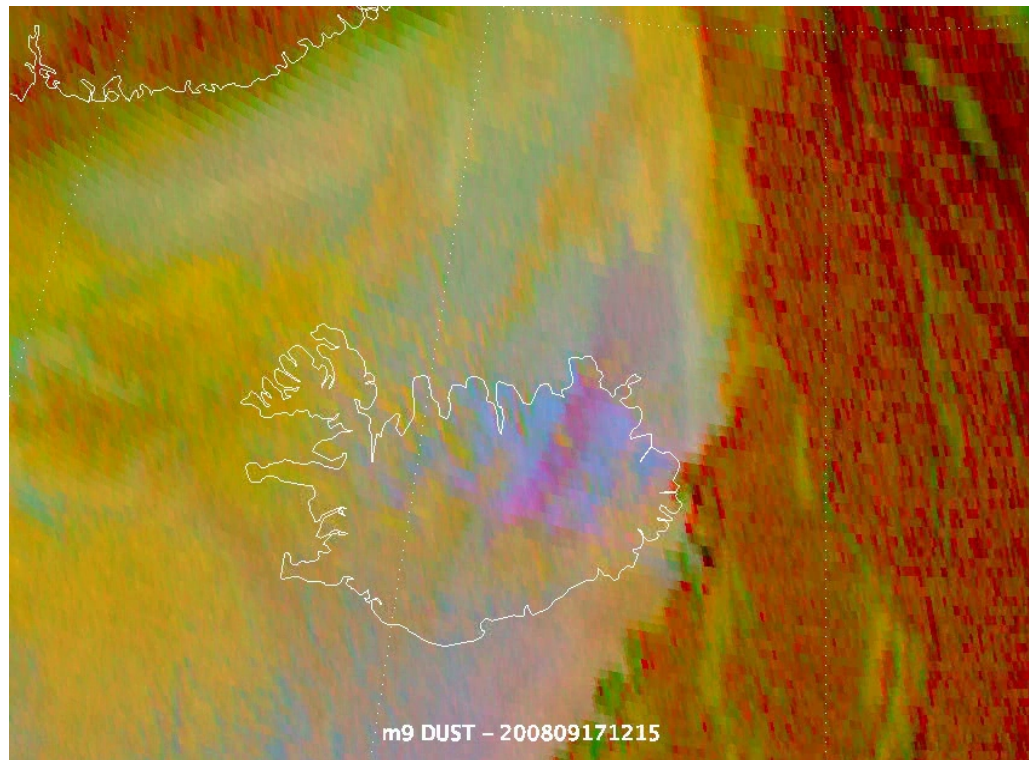
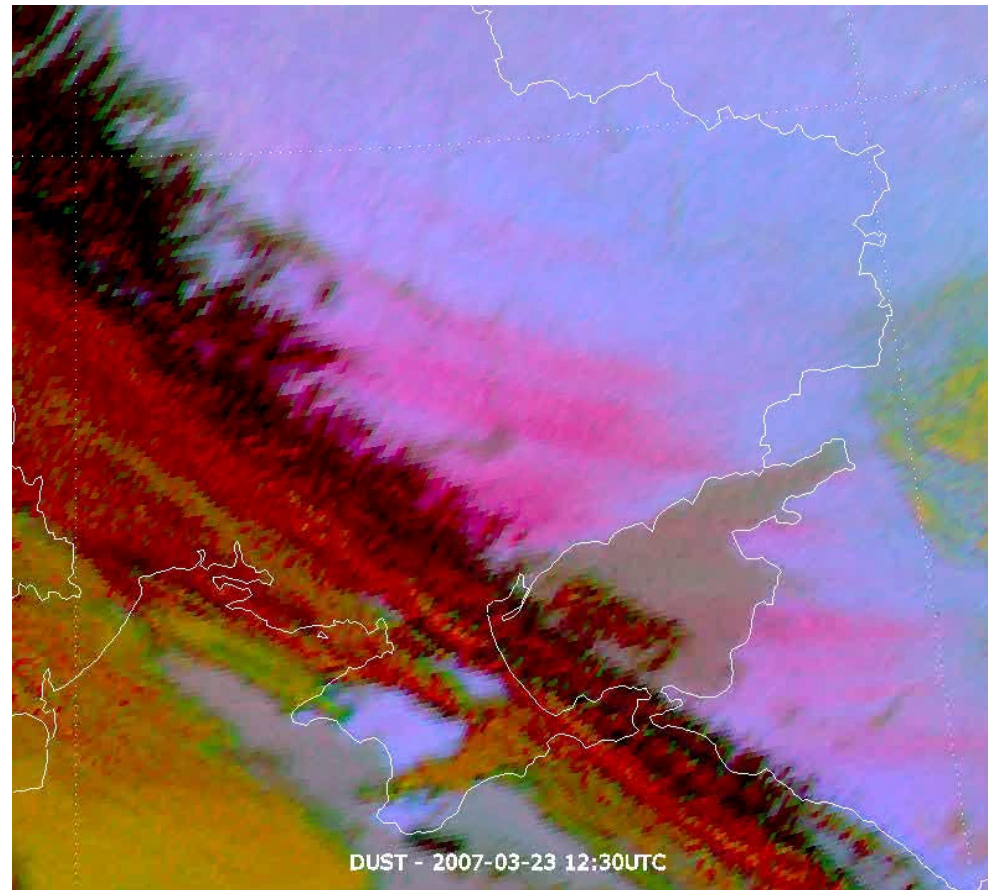


IMAGE LIBRARY

Loess streaks – southeastern Ukraine



Loess release – Turkmenistan changing colours around local noon

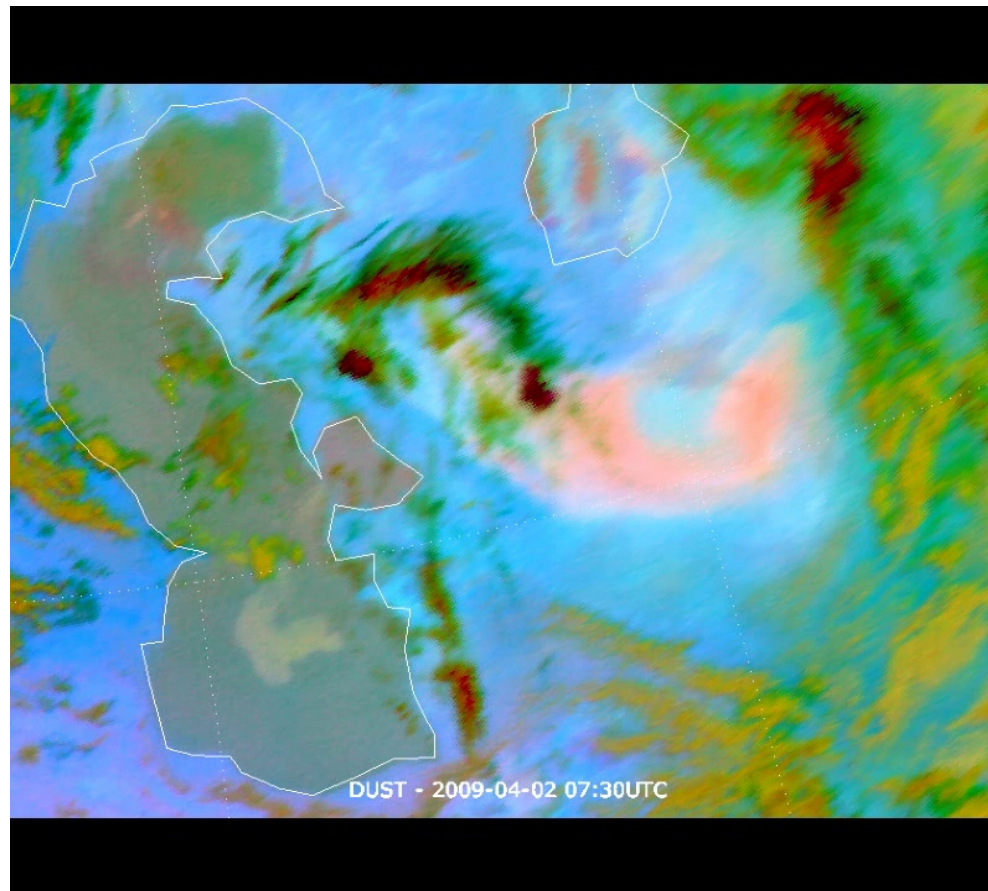
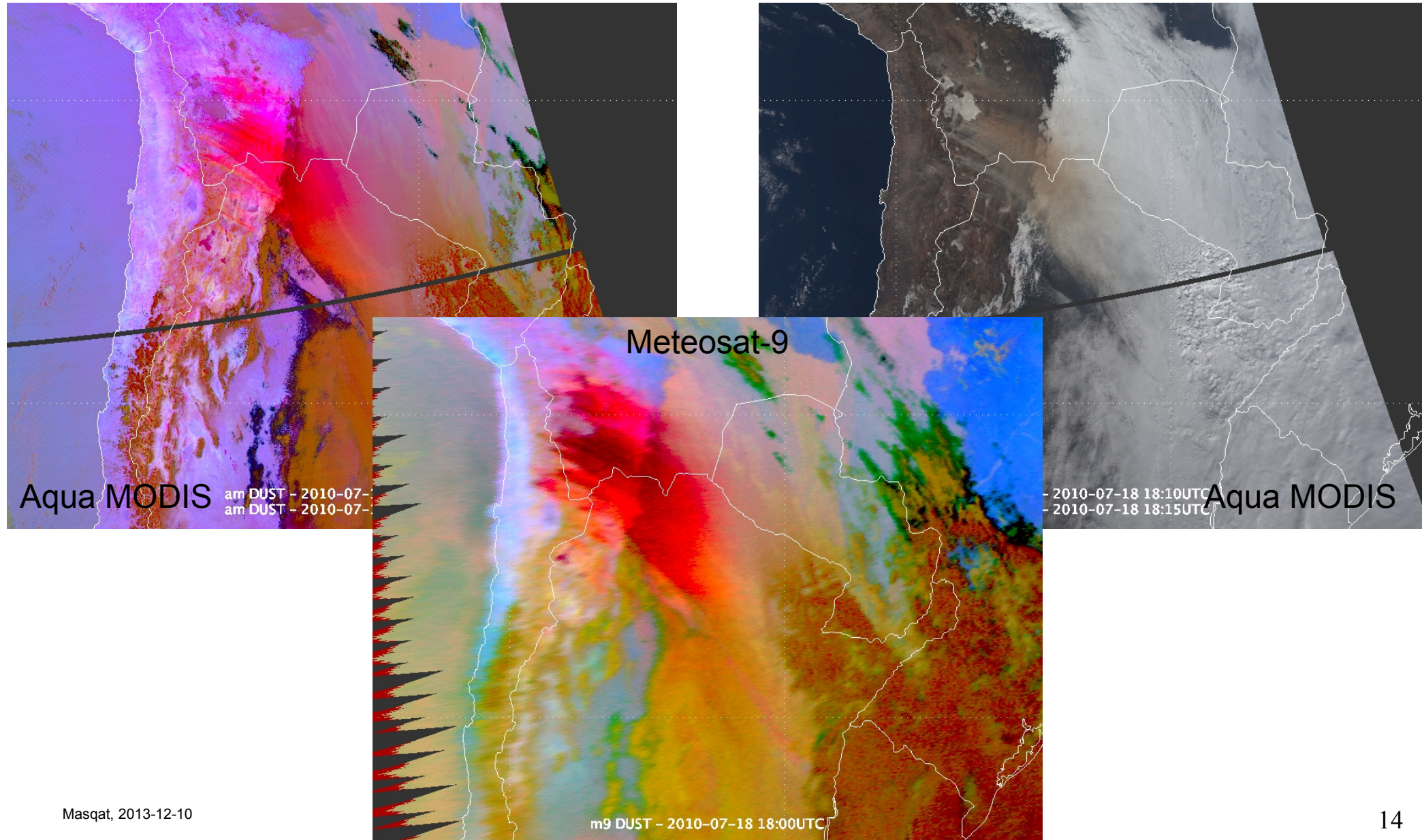


IMAGE LIBRARY

Zonda-driven loess – Bolivian Andes MODIS & SEVIRI



Zonda-driven loess – Bolivian Andes

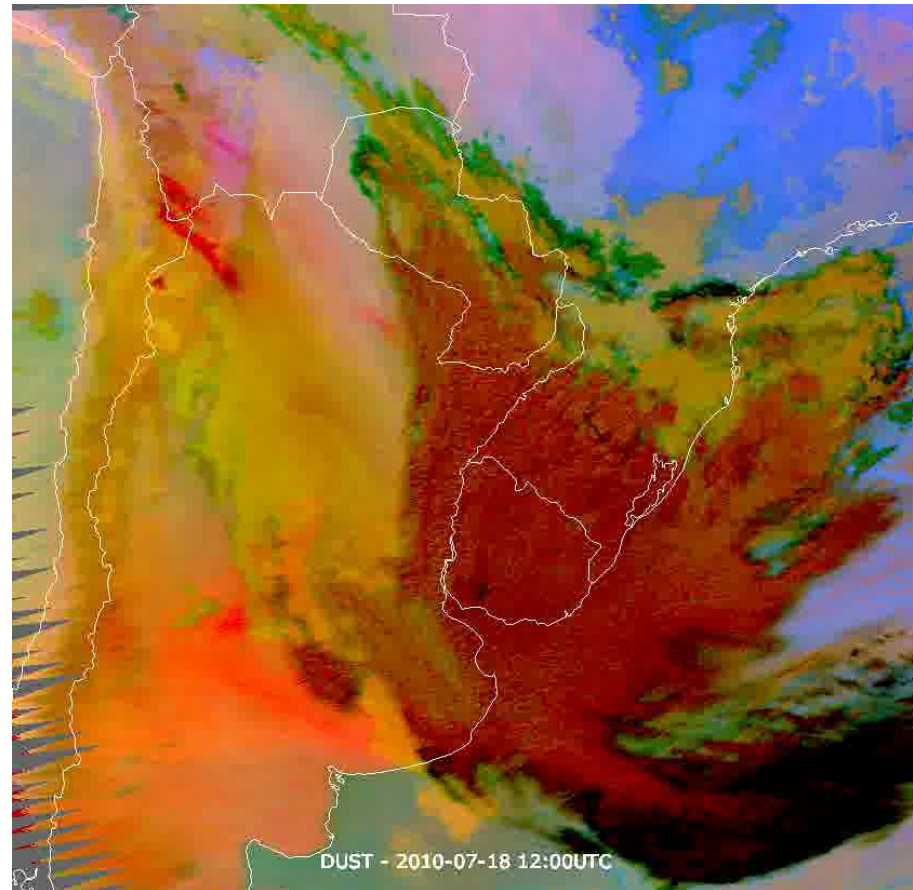
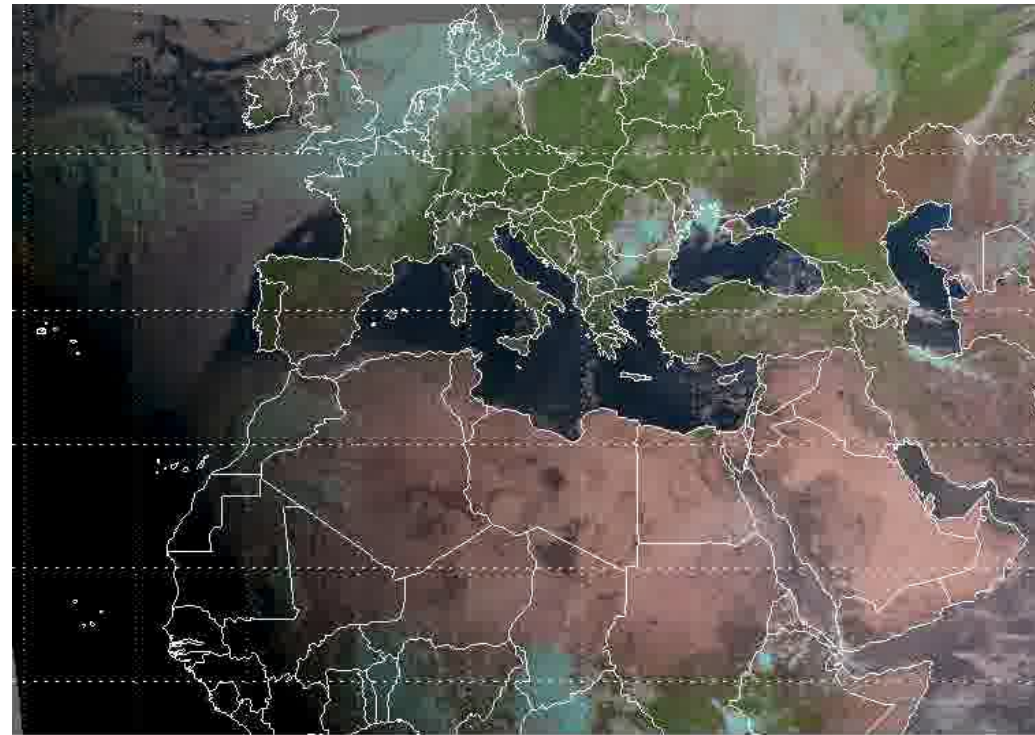


IMAGE LIBRARY

Dust from convective outflow in Niger to western Europe – anticyclonic track



m9 DUST - 2012-06-22 07:30UTC

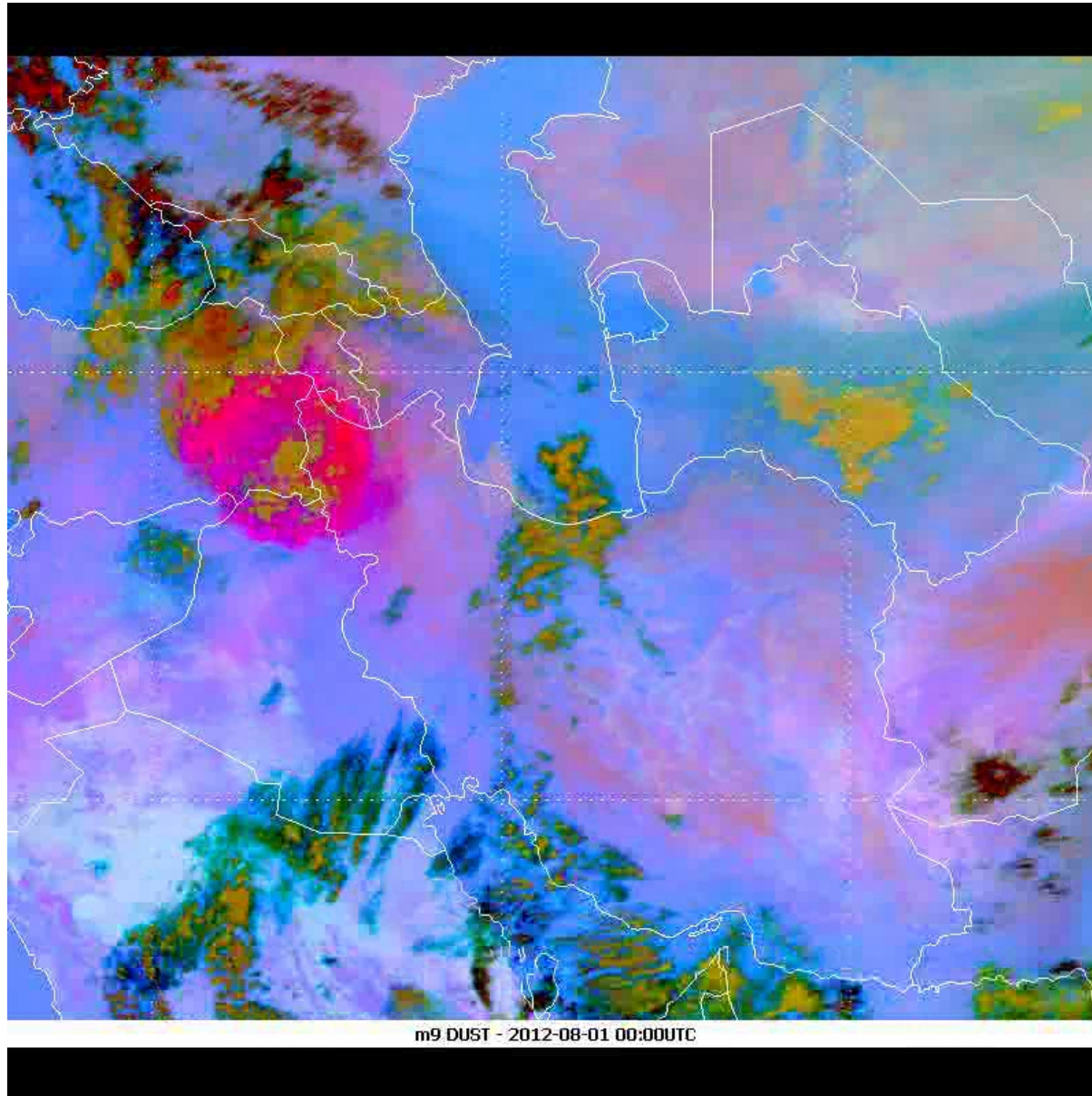


m9 NCOL - 2012-06-24 06:00UTC

11 days

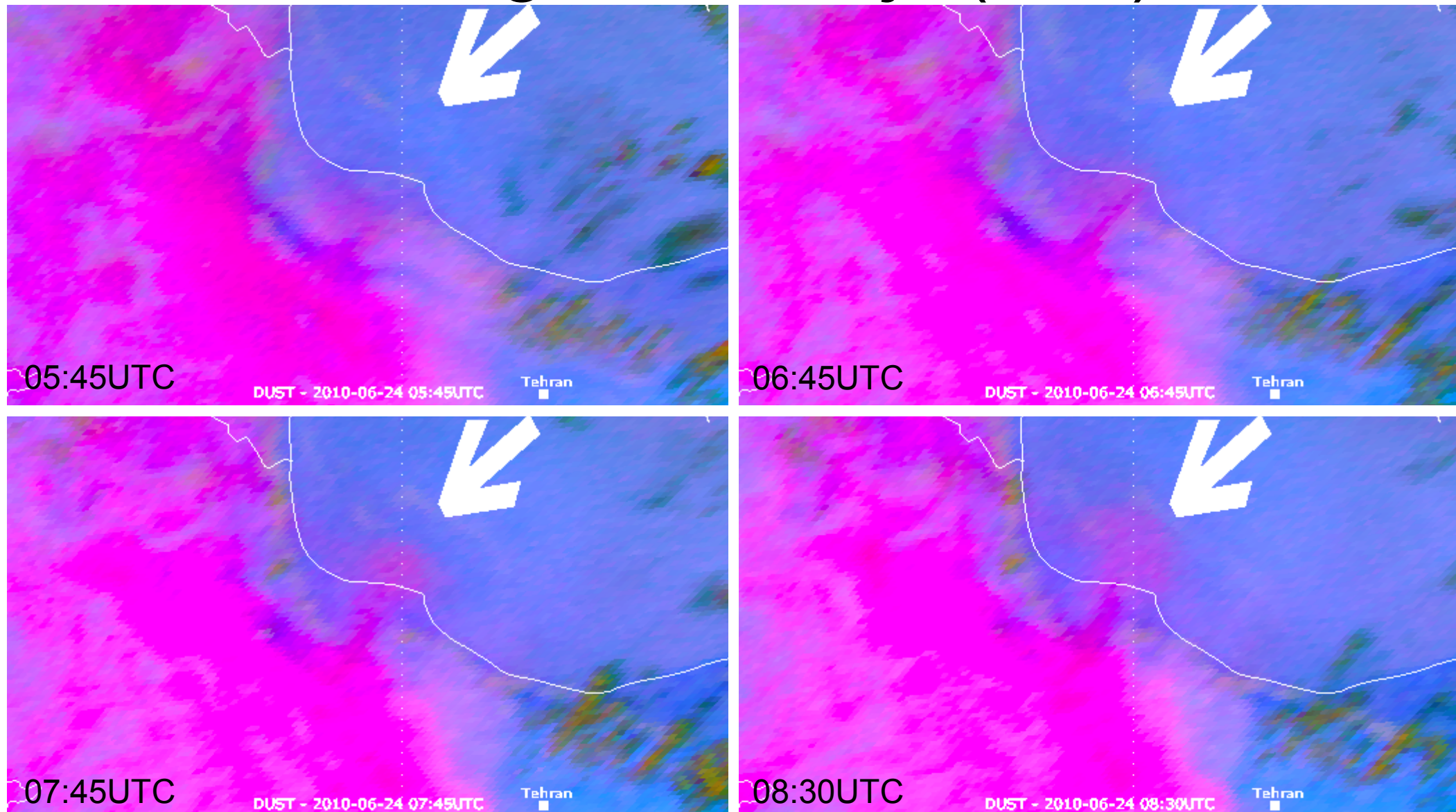
IMAGE LIBRARY

Anticyclonic dust path – Middle East



4 days

Gap flow through Alborz mountain range – Mandjil (Iran)



Gap flow – the movie

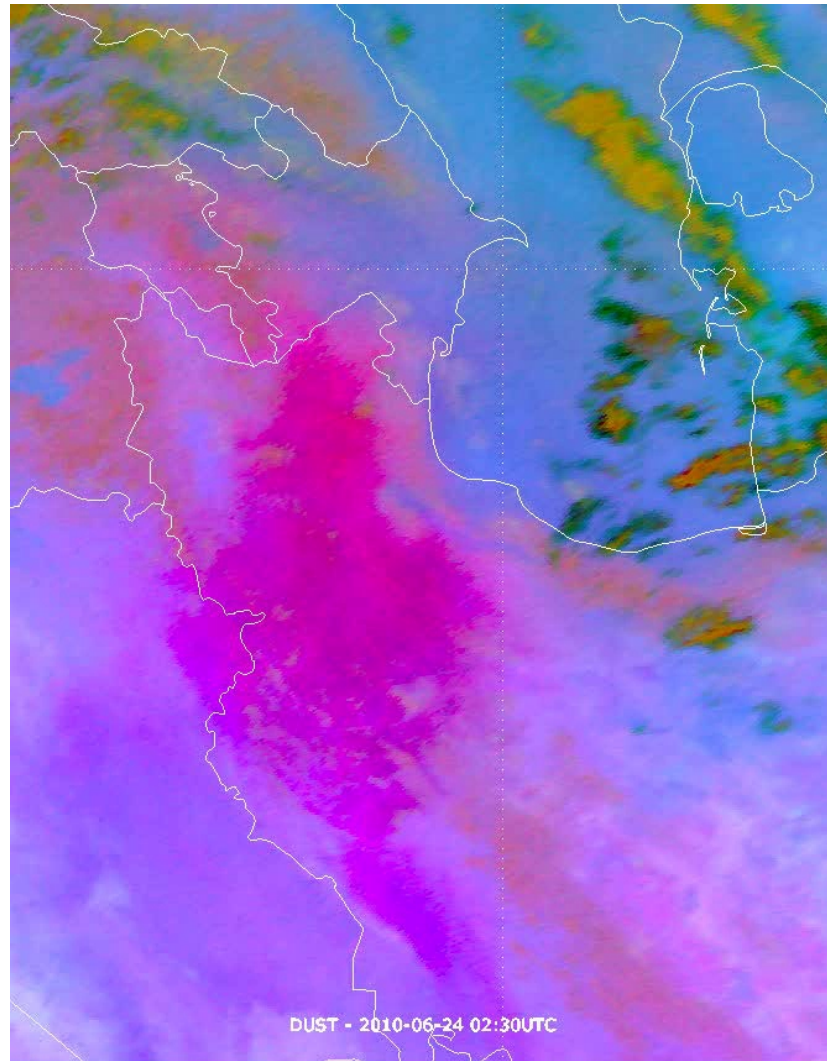
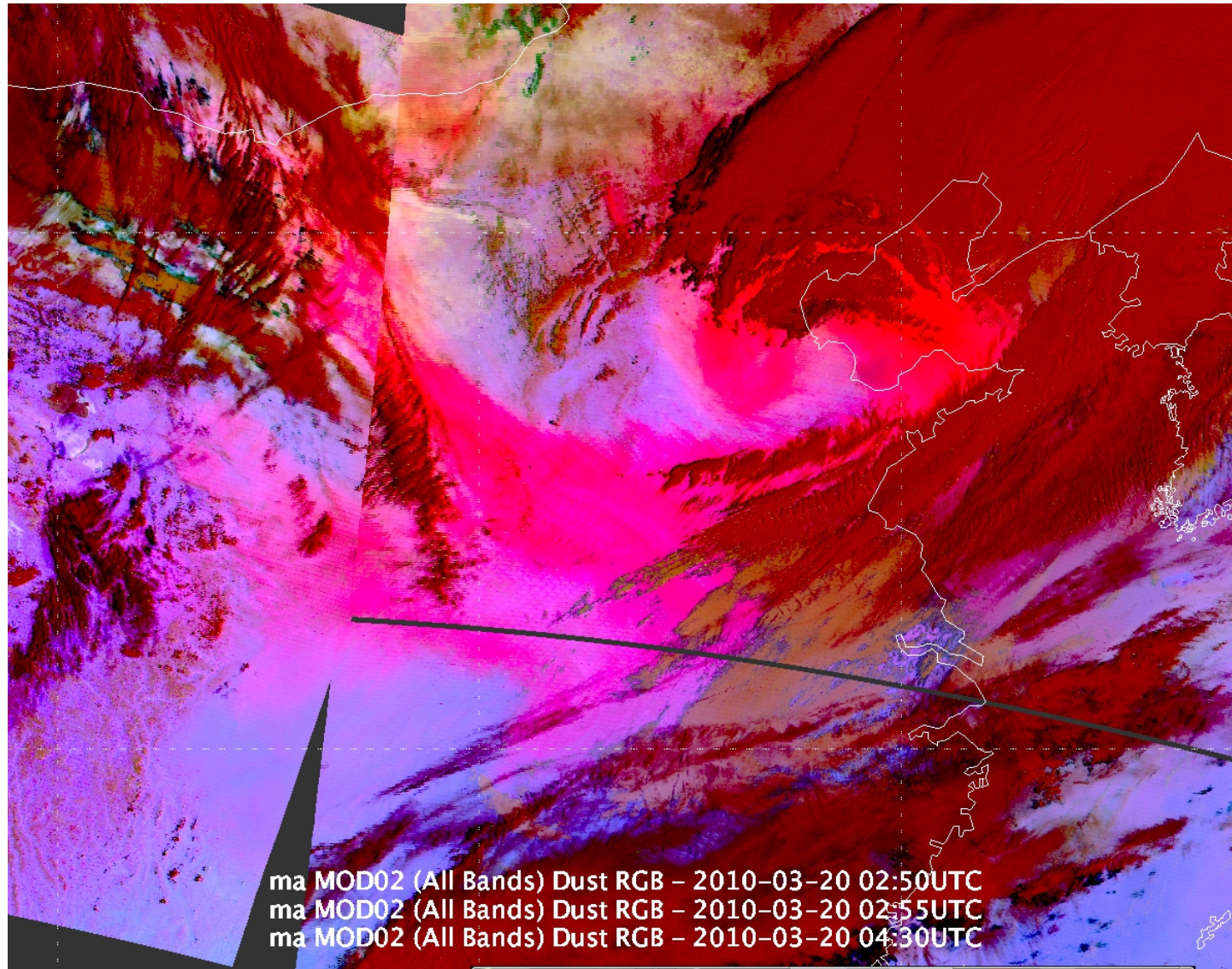


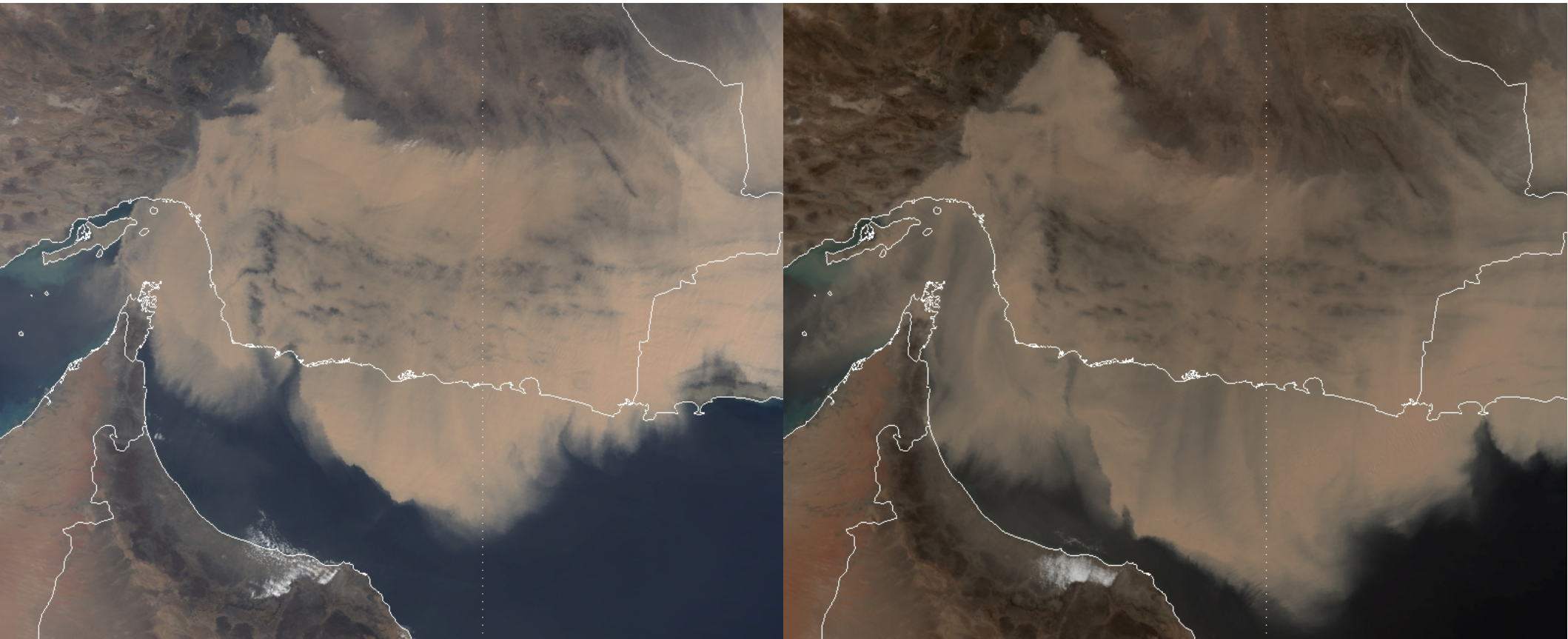
IMAGE LIBRARY

Dust from Gobi Desert – eastern China

3 MODIS granules

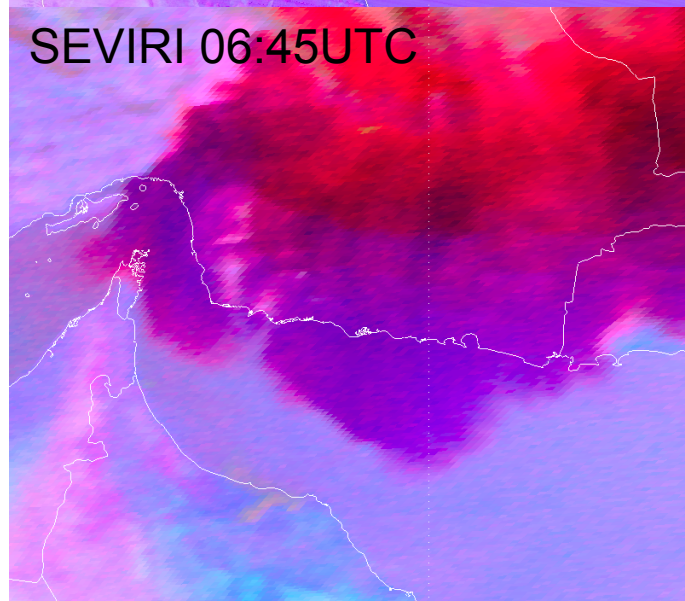
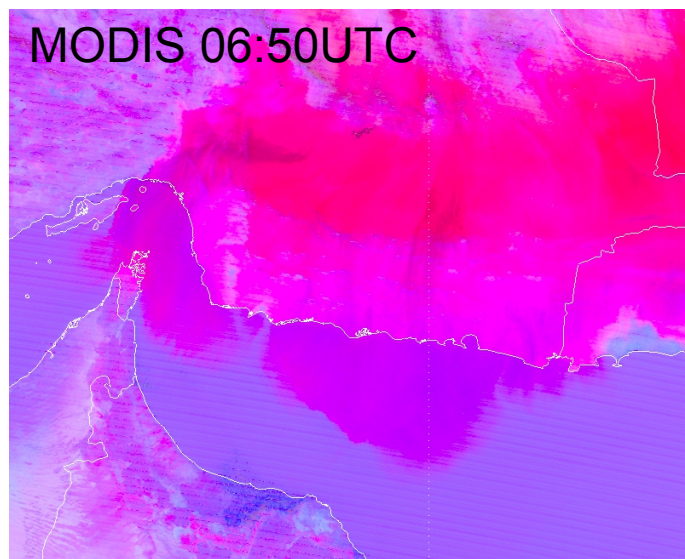


Dust squall line – Sea of Oman true-colour RGB: MODIS / VIIRS

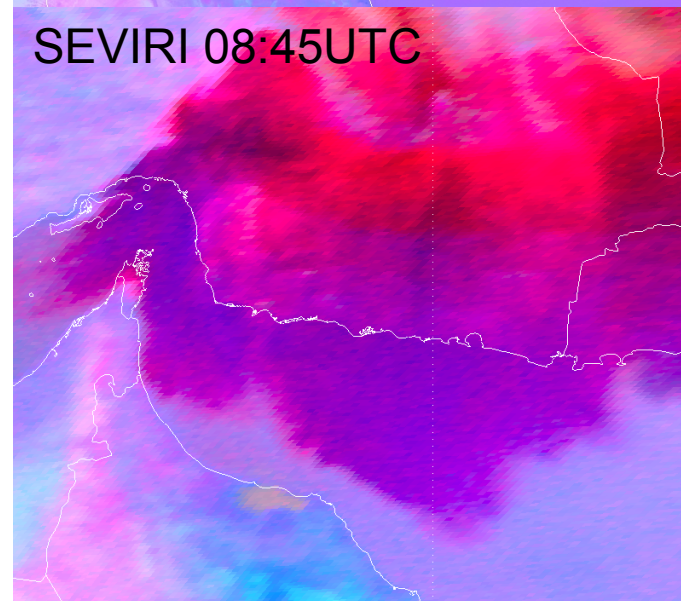
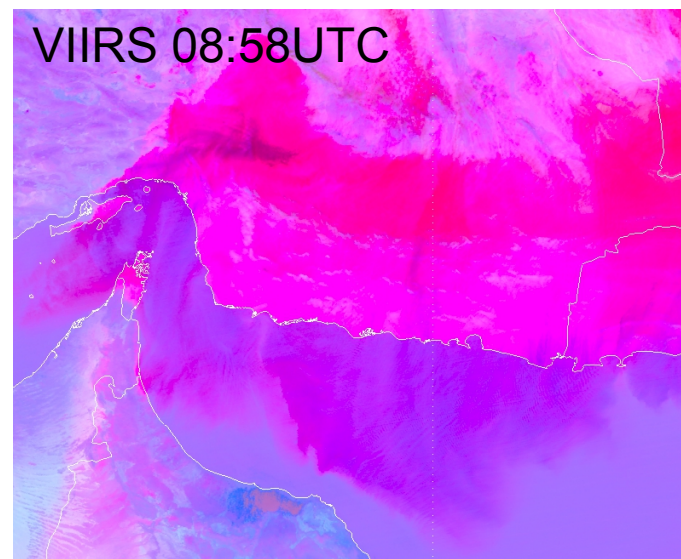


Dust squall line – Sea of Oman

dust RGB: MODIS / VIIRS / SEVIRI



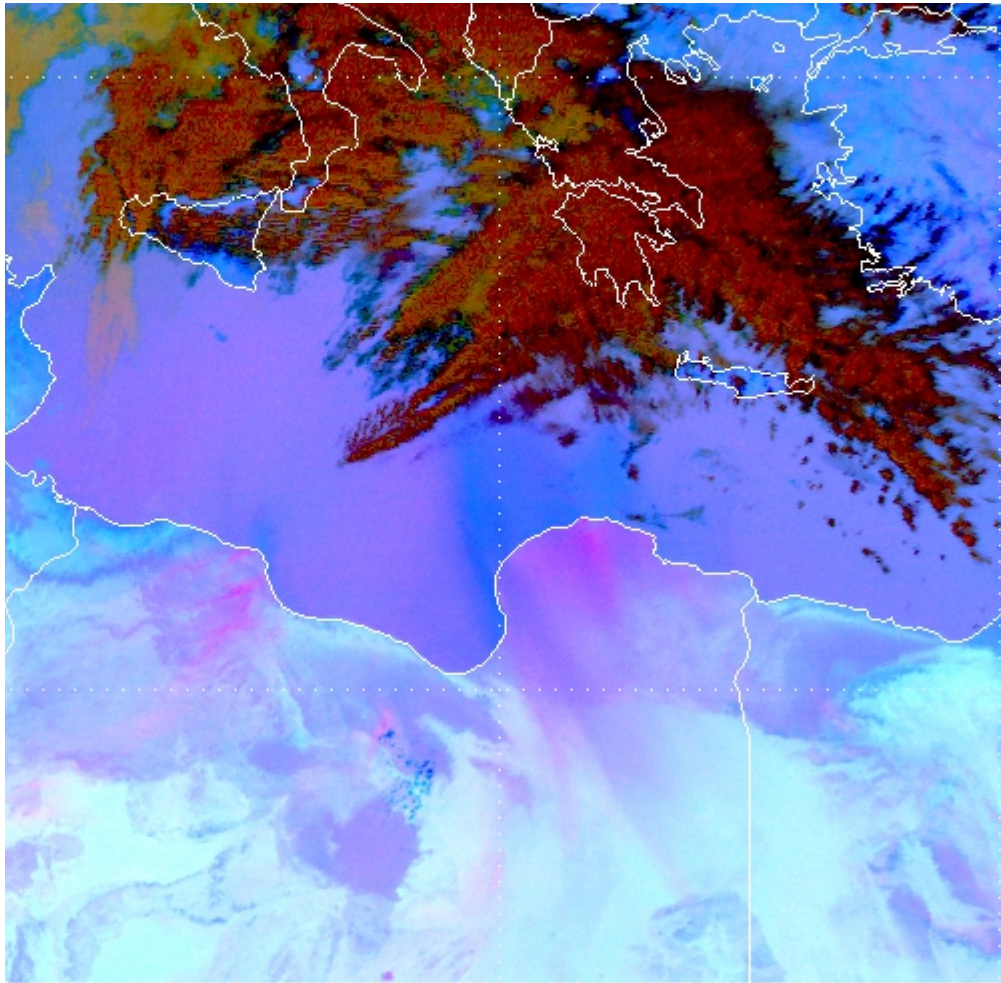
m09 DUST - 2012-03-19 06:45UTC



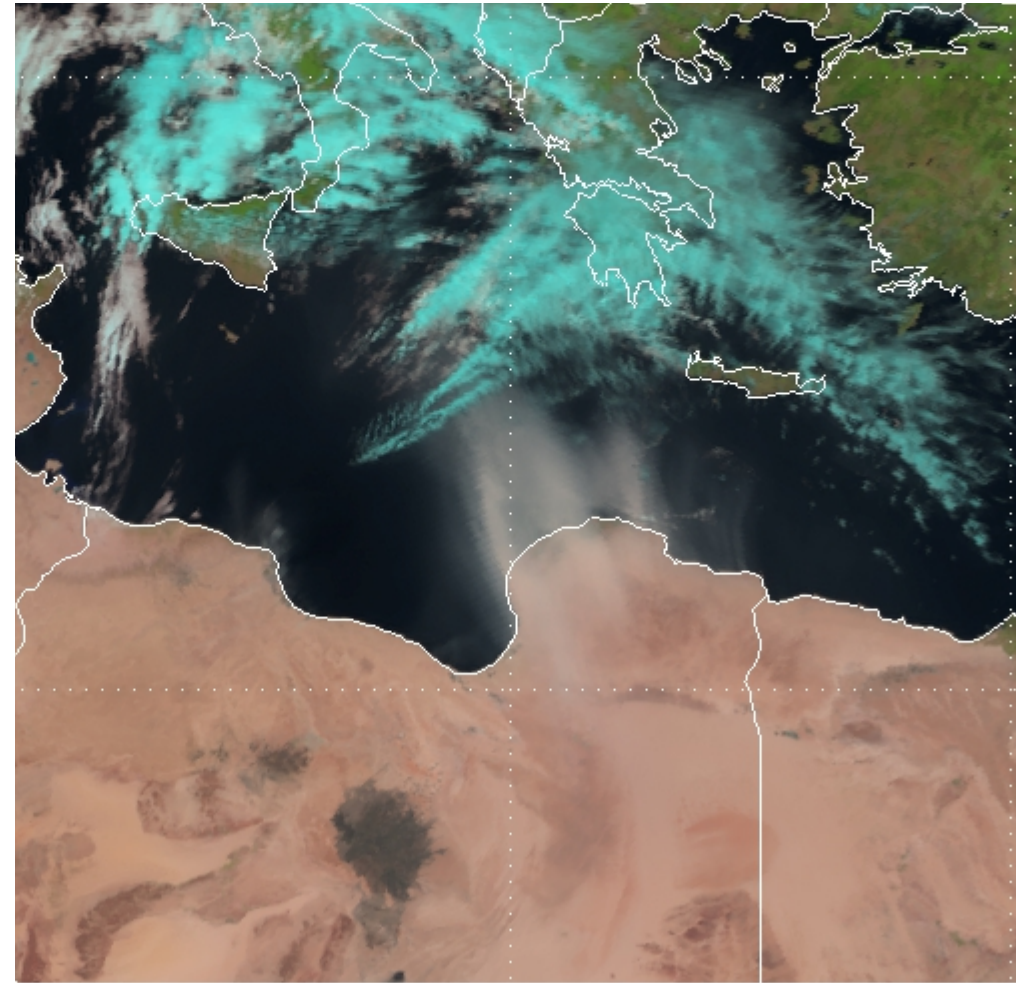
m09 DUST - 2012-03-19 08:45UTC

IMAGE LIBRARY

Low-level dust veils over land/water bluish over water in IR bad contrast over land in solar

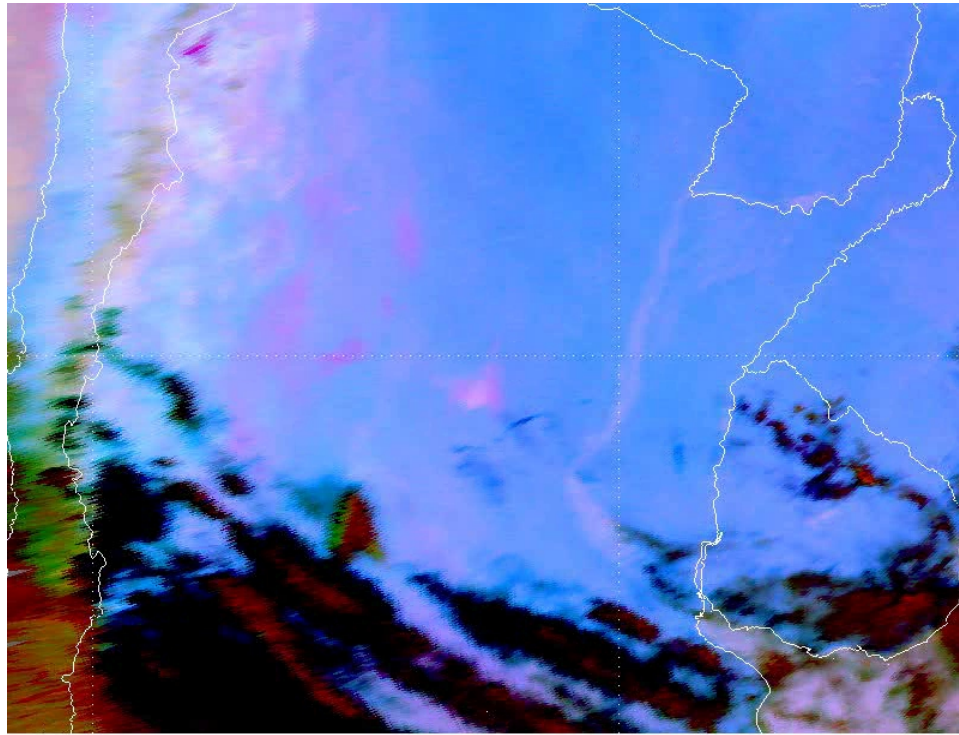


m10 DUST - 2013-05-28 11:15UTC

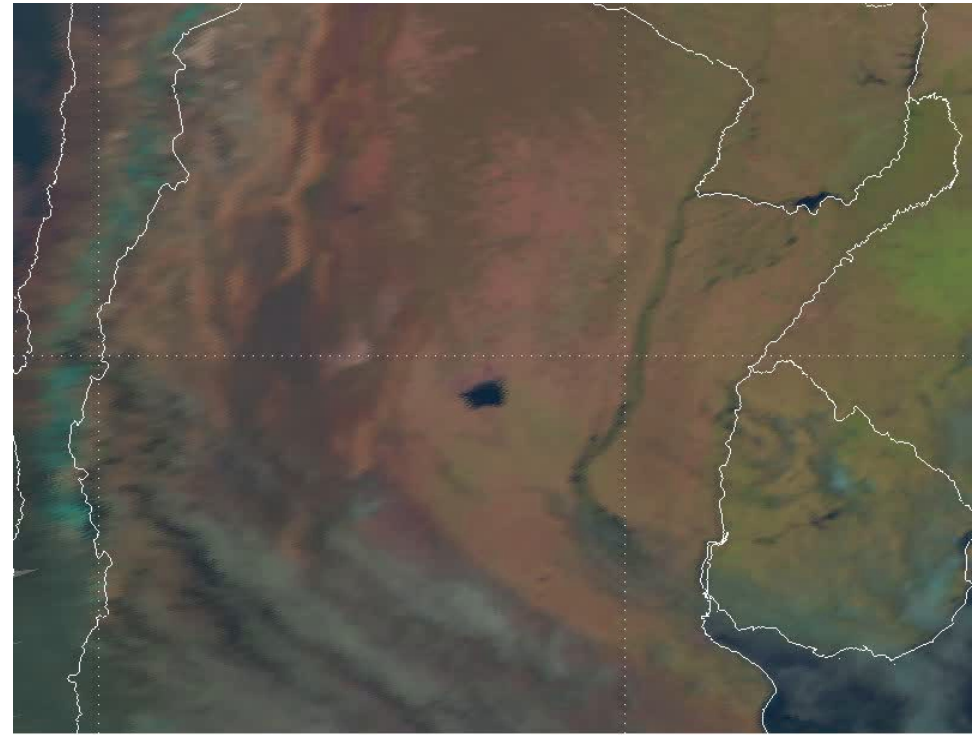


m10 NCOL - 2013-05-28 11:15UTC

Dust and smoke – Argentina



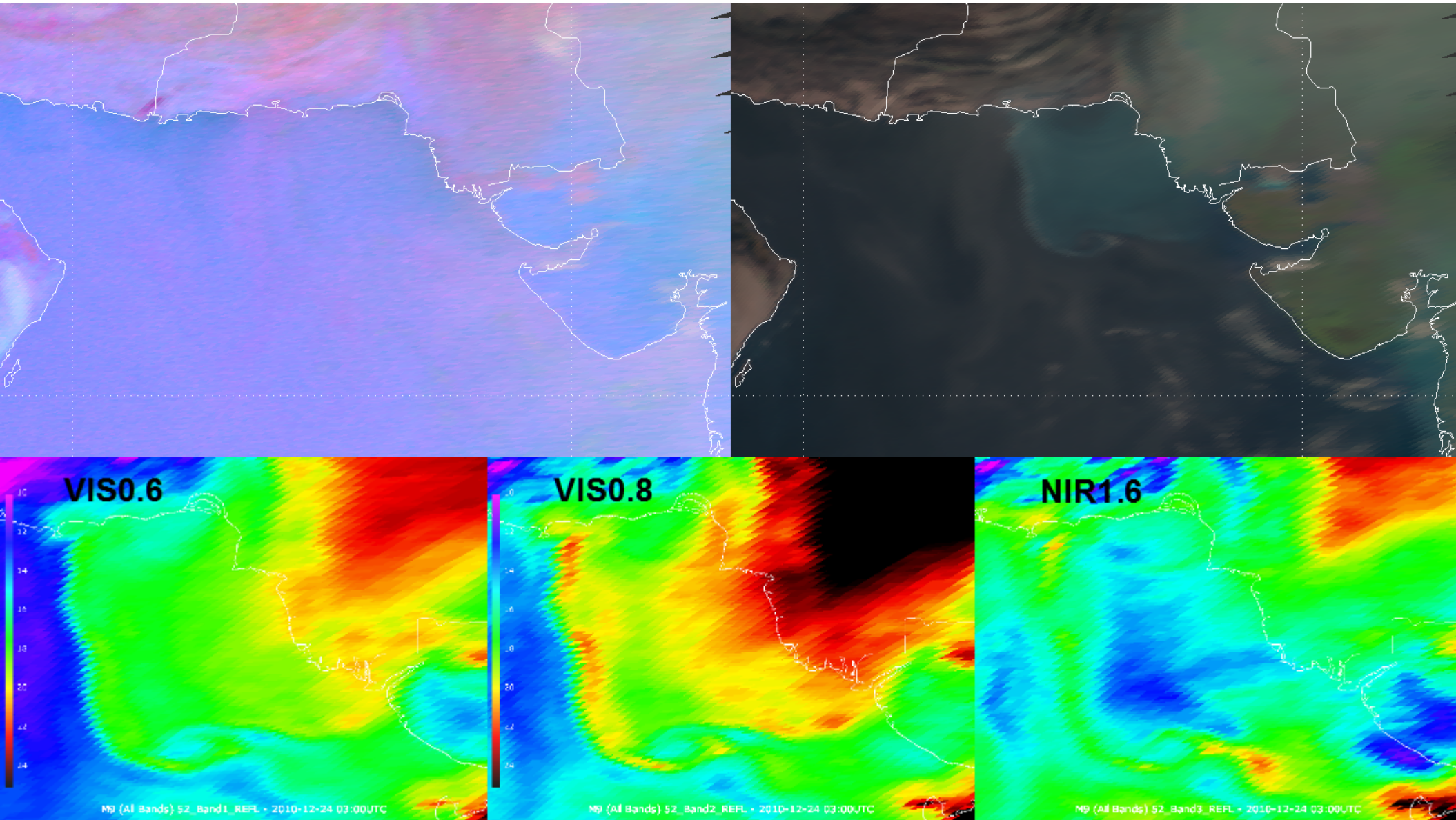
m10 DUST - 2013-09-10 13:00UTC



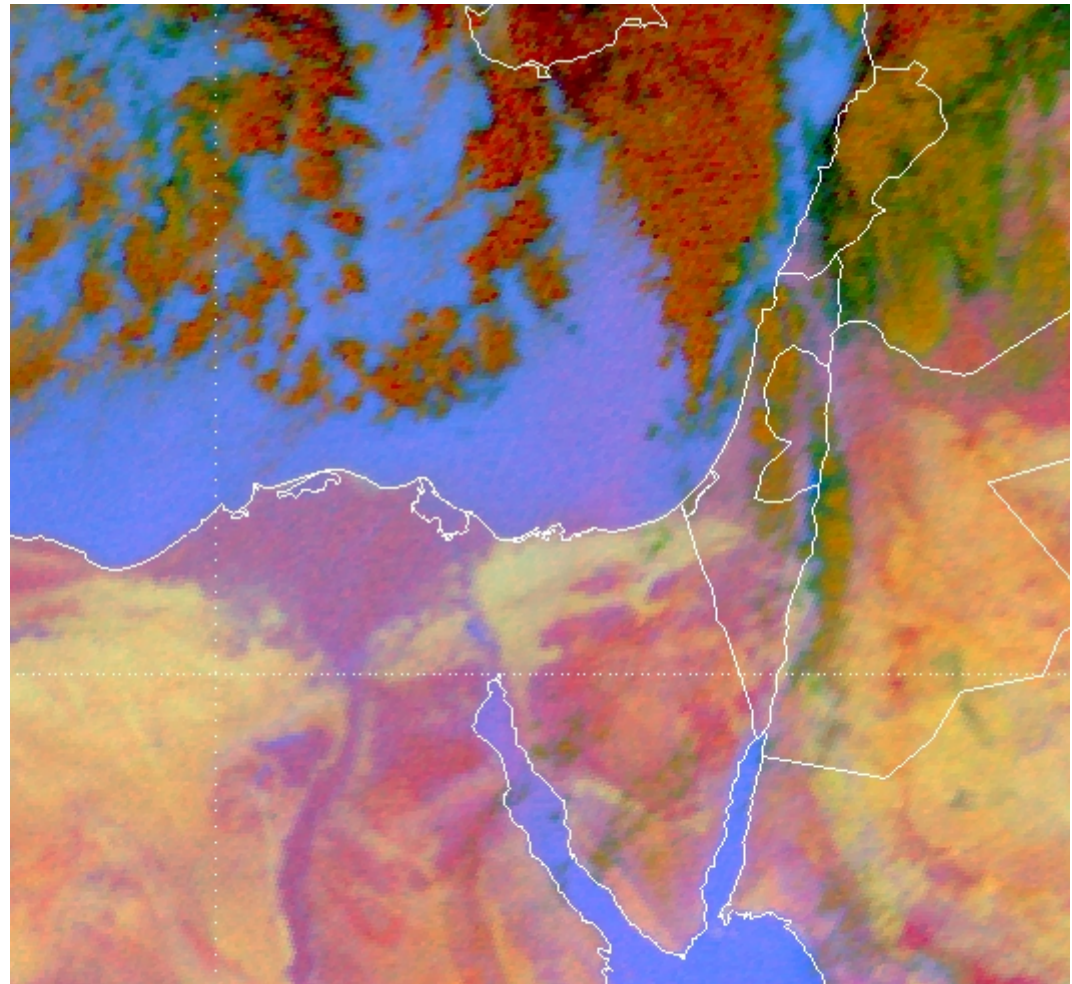
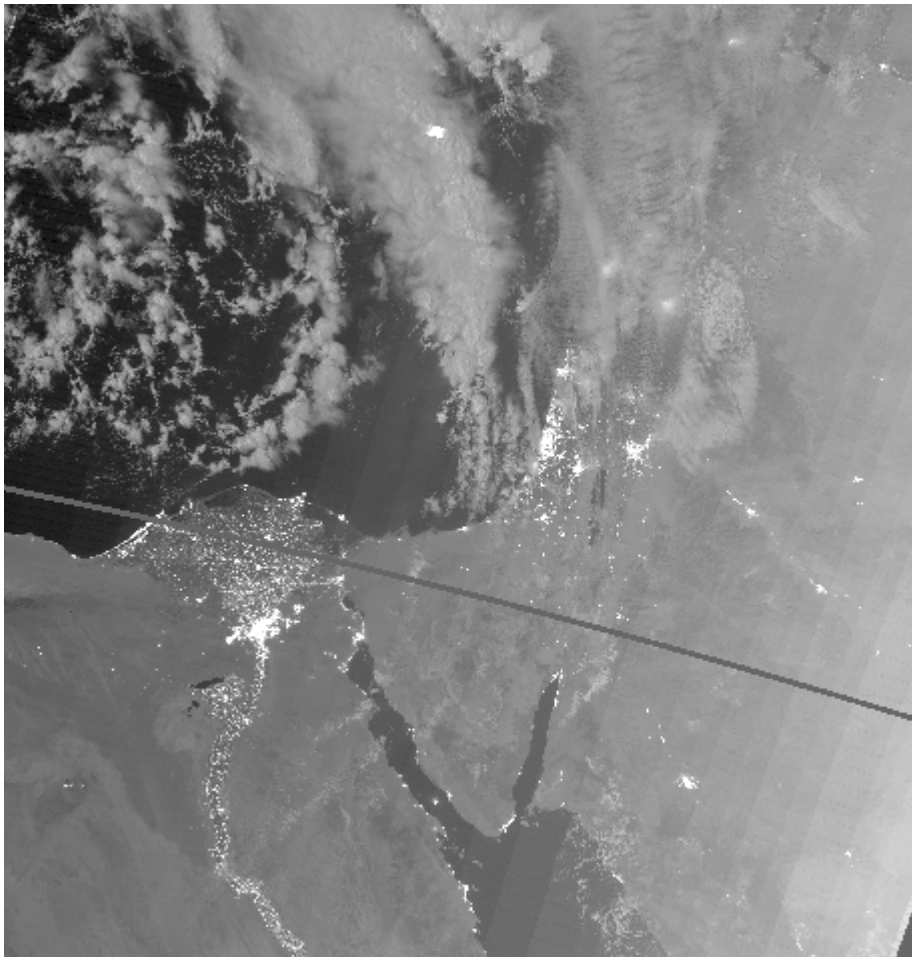
m10 NCOL - 2013-09-10 11:15UTC

IMAGE LIBRARY

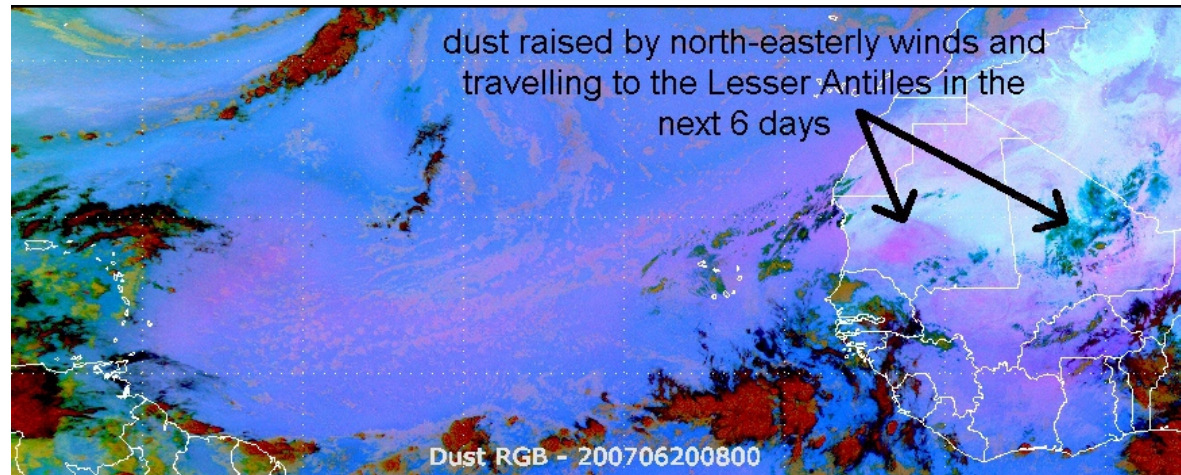
Not dust but soot – Arabian Sea



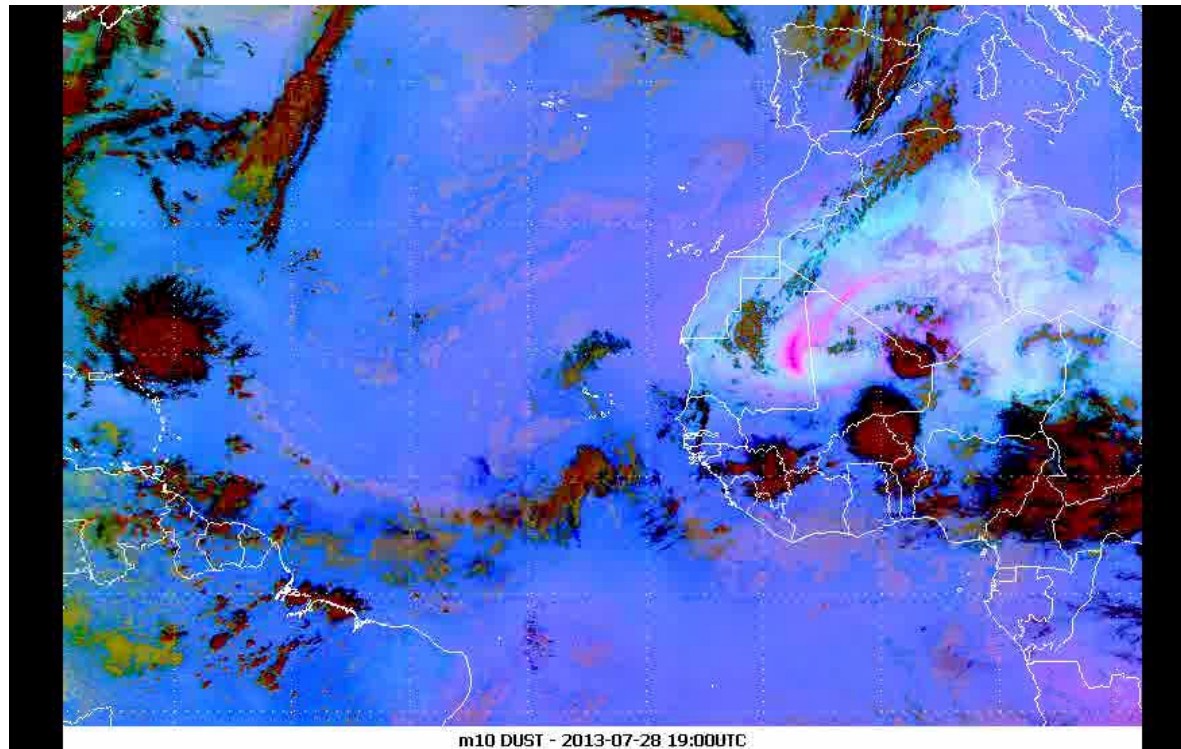
Faint nightly dust in VIIRS/DNB – off Egypt-Gaza



Saharan dust transport across Atlantic



6 days



10 days

IMAGE LIBRARY