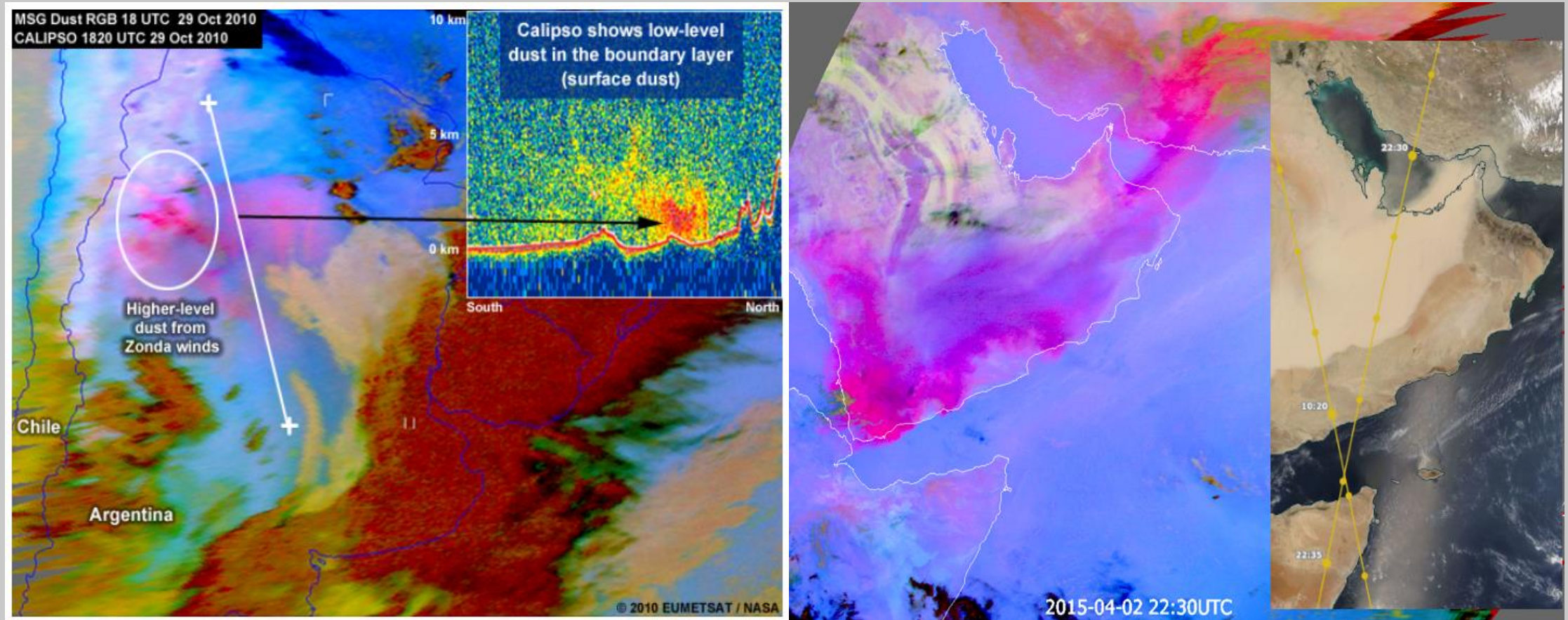
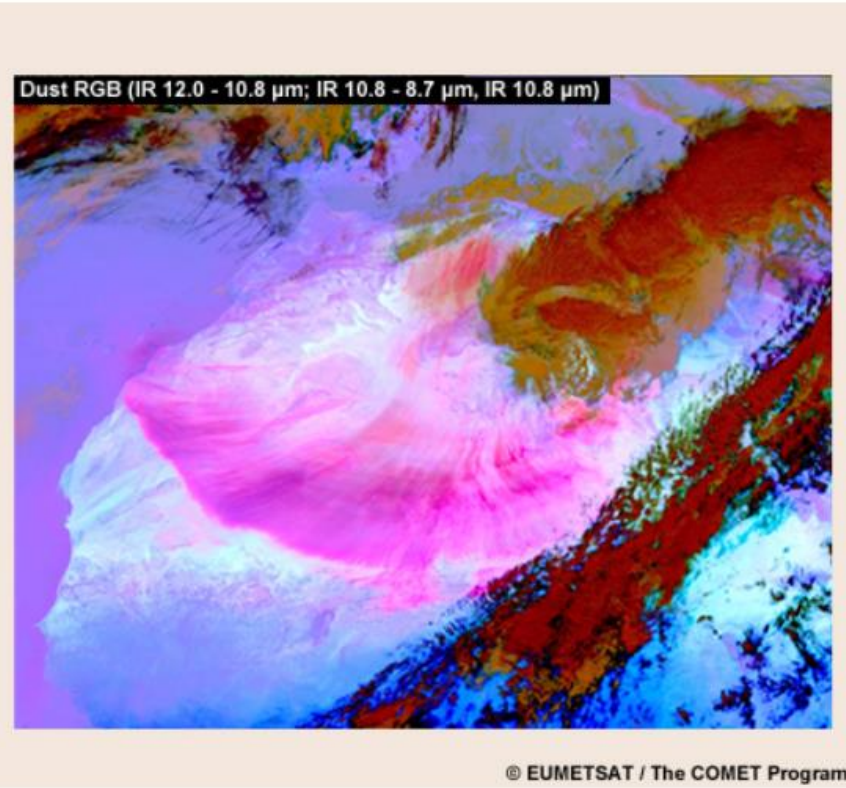
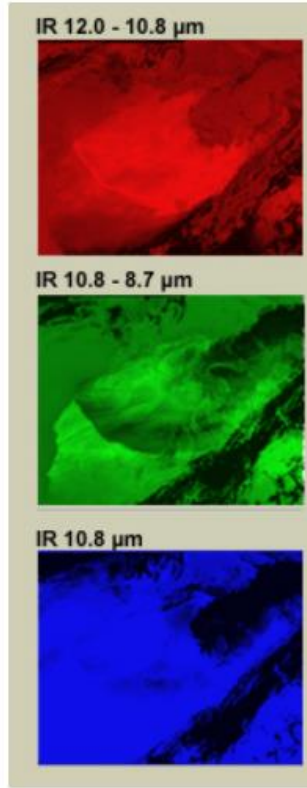
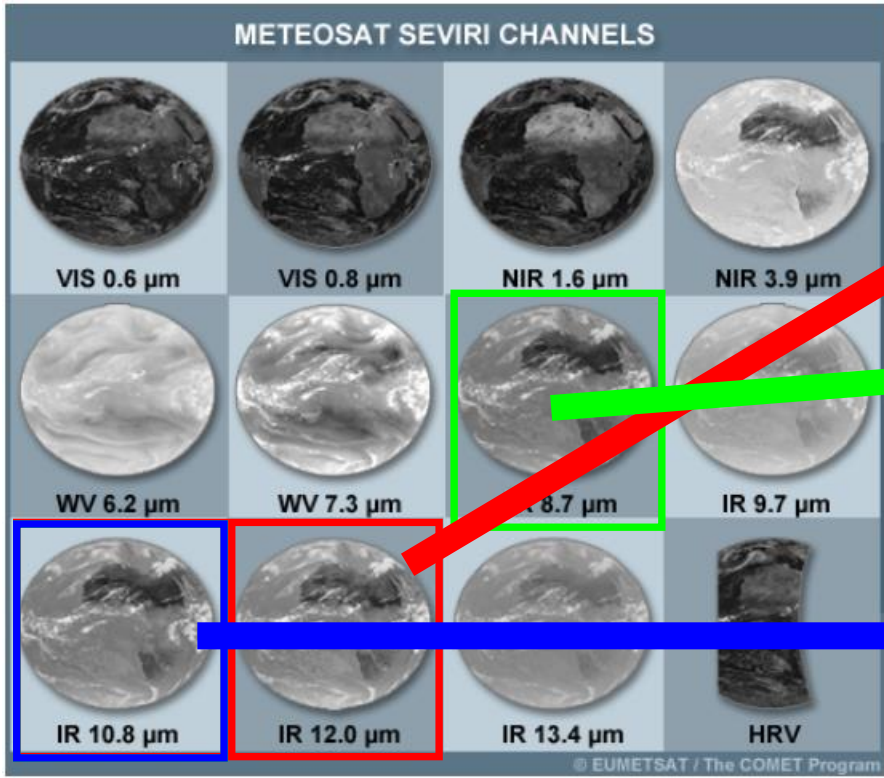
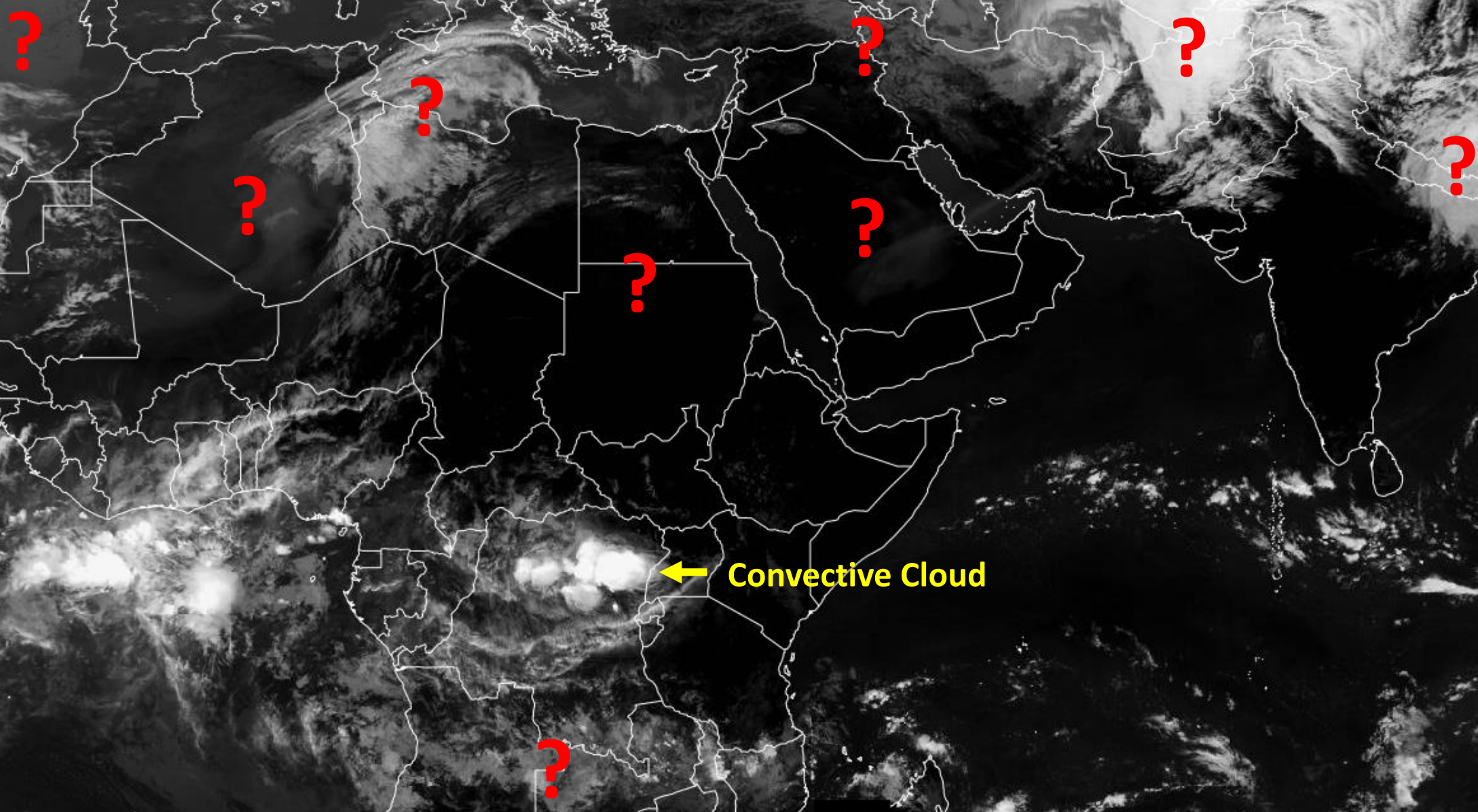


Case Studies Using Dust RGB and CALIPSO

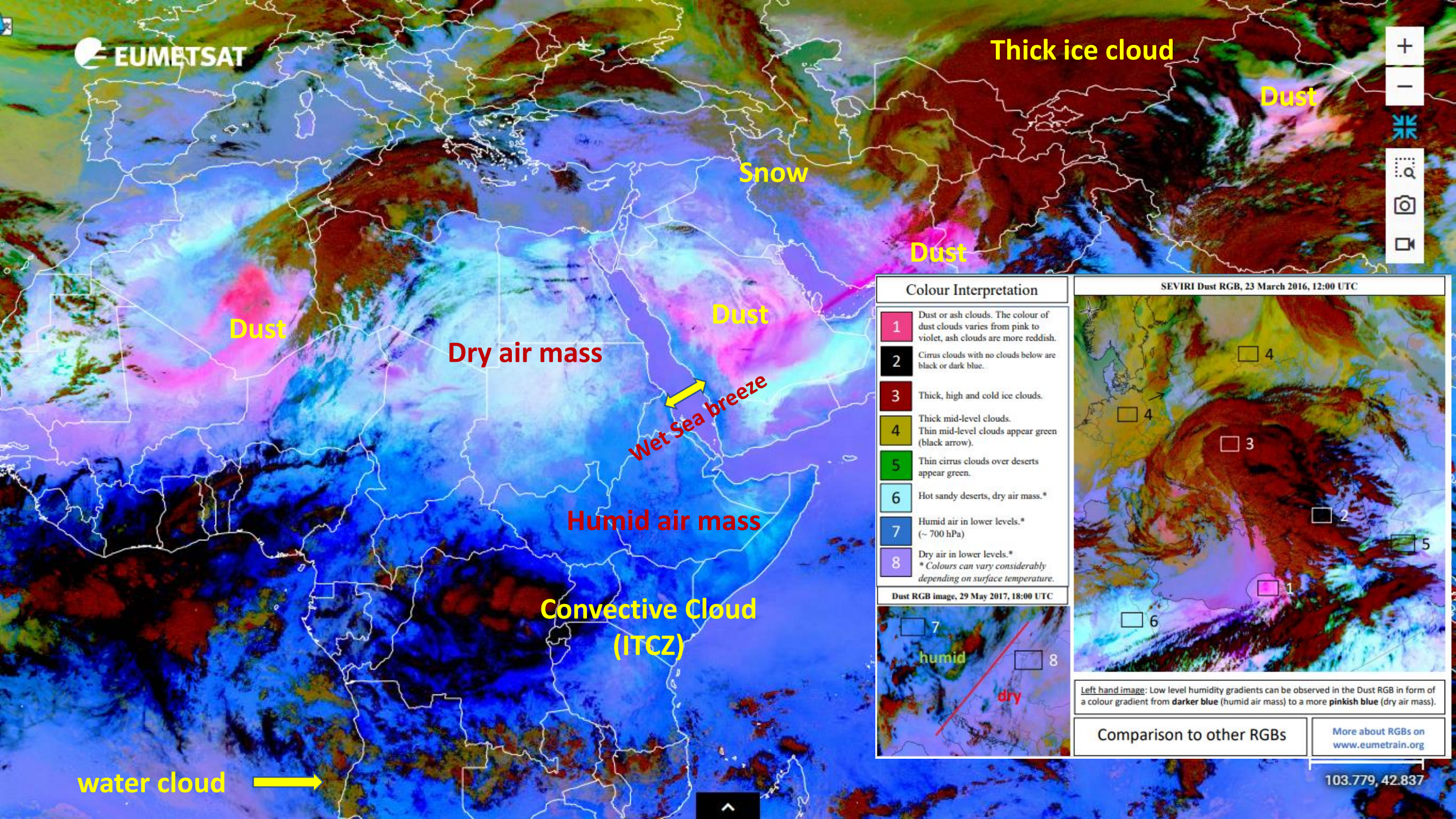


*Ibrahim Al Abdulsalam
Meteorologist
Directorate General of Meteorology/Oman*





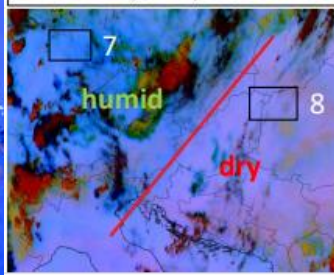
← Convective Cloud



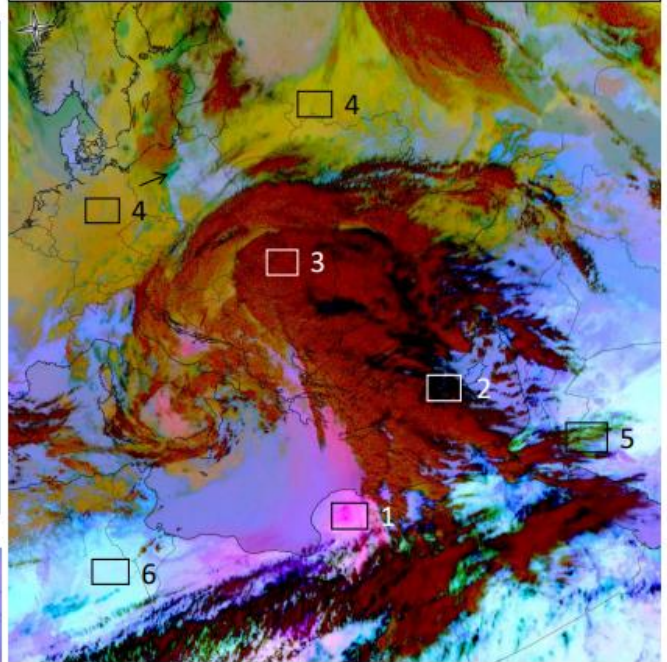
Colour Interpretation

- 1 Dust or ash clouds. The colour of dust clouds varies from pink to violet, ash clouds are more reddish.
 - 2 Cirrus clouds with no clouds below are black or dark blue.
 - 3 Thick, high and cold ice clouds.
 - 4 Thick mid-level clouds. Thin mid-level clouds appear green (black arrow).
 - 5 Thin cirrus clouds over deserts appear green.
 - 6 Hot sandy deserts, dry air mass.*
 - 7 Humid air in lower levels.* (~ 700 hPa)
 - 8 Dry air in lower levels.*
- * Colours can vary considerably depending on surface temperature.

Dust RGB image, 29 May 2017, 18:00 UTC



SEVIRI Dust RGB, 23 March 2016, 12:00 UTC

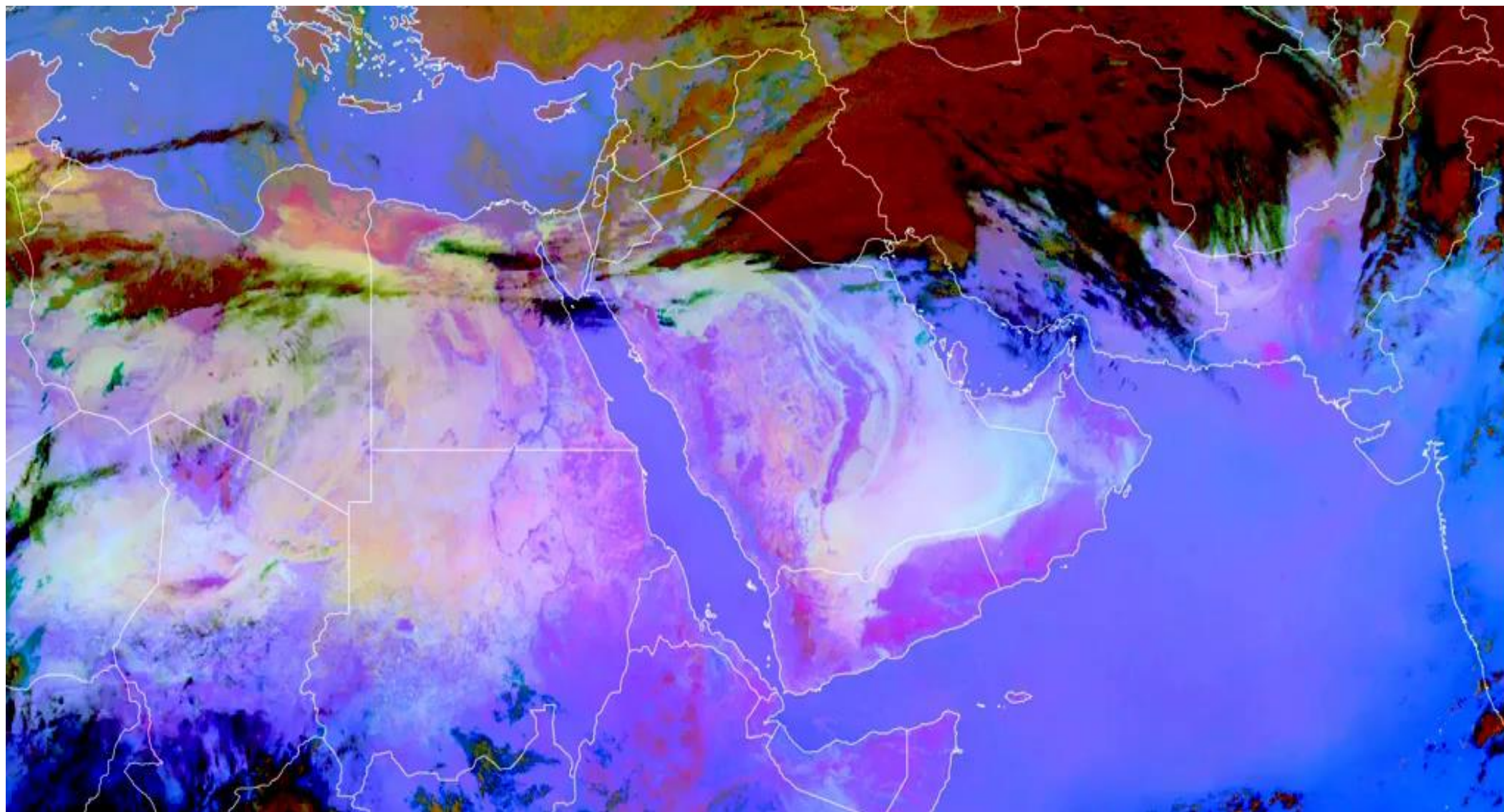


Left hand image: Low level humidity gradients can be observed in the Dust RGB in form of a colour gradient from darker blue (humid air mass) to a more pinkish blue (dry air mass).

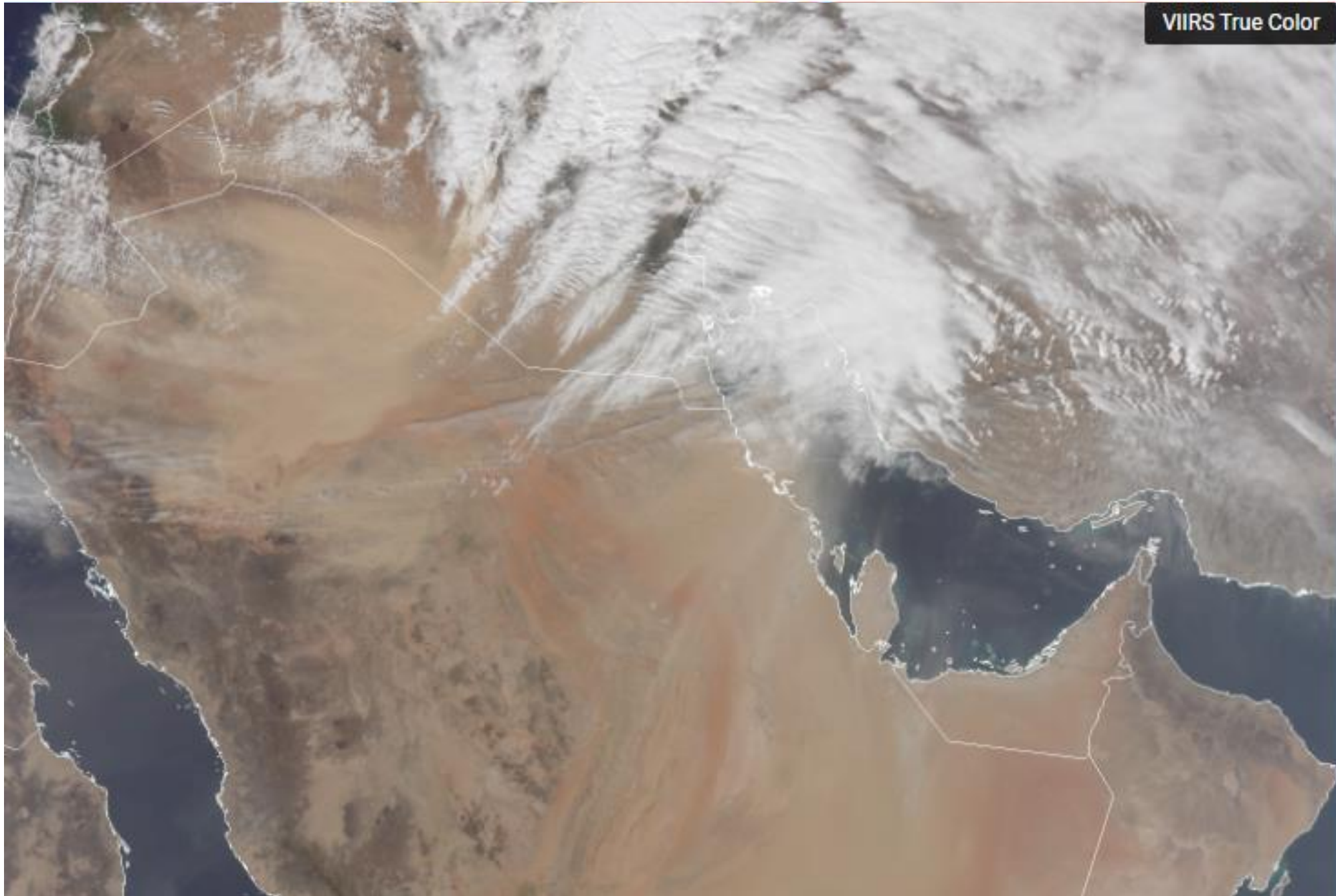
Comparison to other RGBs

More about RGBs on www.eumetrain.org

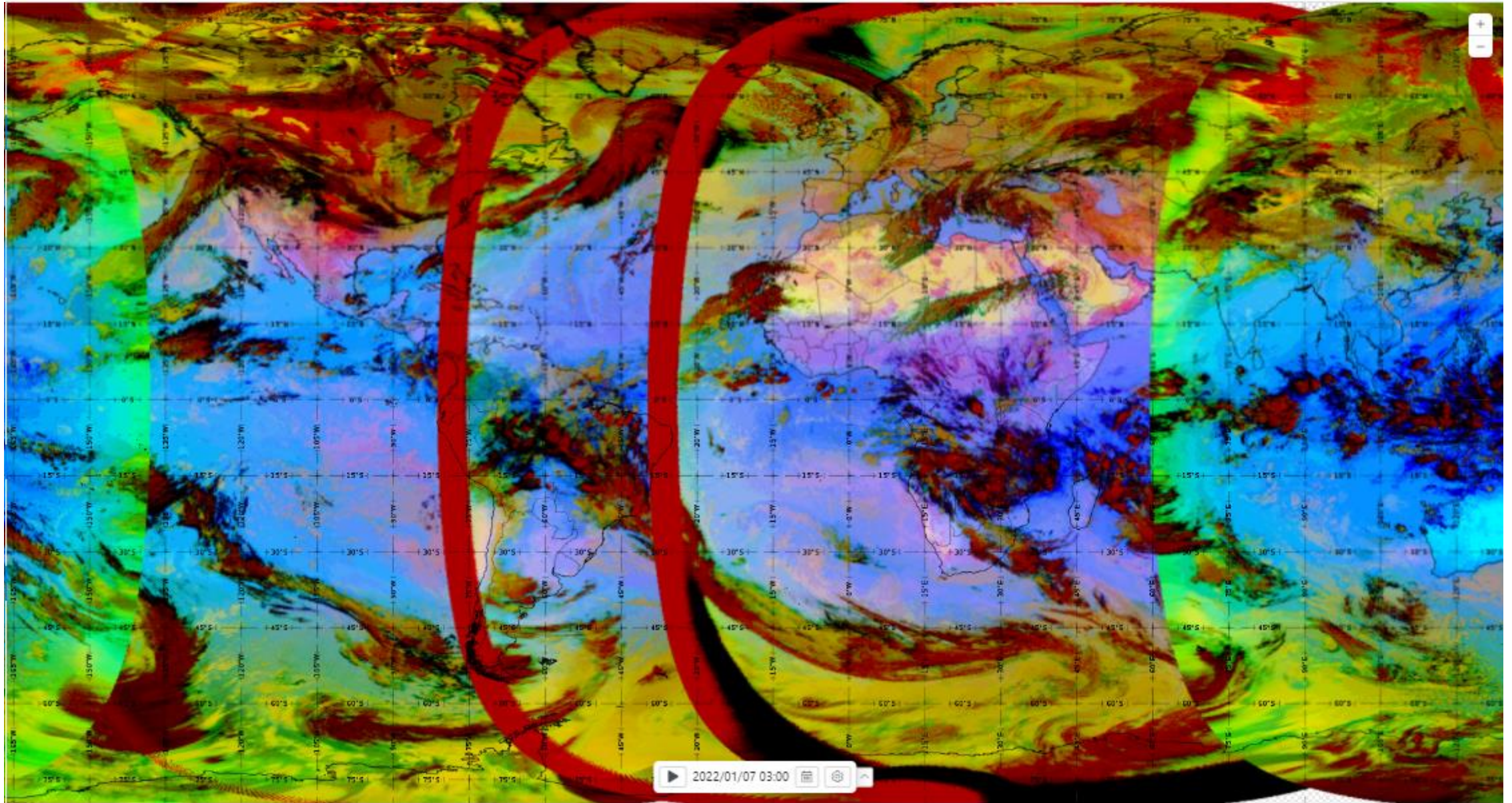
Dust RGB



VIIRS True Color



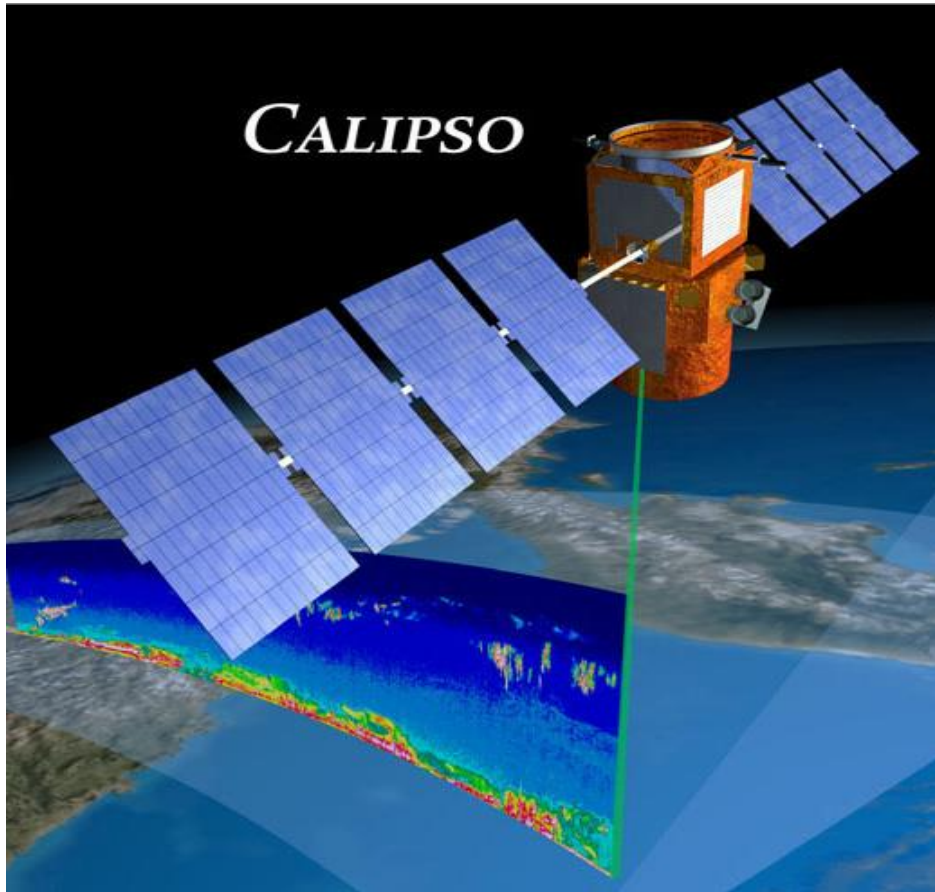
Covering the Whole Earth



CALIPSO (Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations)

Light detection and ranging

Radar = Radio detection and ranging



Home

About CALIPSO

OVERVIEW

A-TRAIN CONSTELLATION

SCIENCE OBJECTIVES

CALIPSO PAYLOAD

OVERVIEW

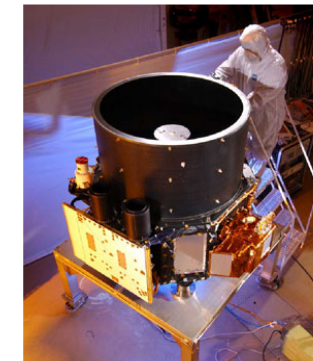
Aerosols are small particles suspended in the atmosphere. They have natural sources such as desert dust, sea salt, volcanic eruptions, and smoke from forest fires. They are also produced from the burning of coal, oil, and other fossil fuels; manufacturing chemicals; and driving cars and trucks.

When aerosol concentrations become high enough, they can pose serious health risks, especially to individuals with asthma and other respiratory problems. Airborne aerosols can also transport fungal and viral microbial pathogens, which can lead to disease outbreaks in other parts of the world.

Aerosols can affect weather and climate. They have complex properties. Depending upon their shapes, sizes and composition they can reflect sunlight back to space and cool the atmosphere, they can also absorb sunlight and warm the atmosphere. Aerosols can even change the lifetimes of clouds, how much rainfall can occur, and how they reflect sunlight. They further can enable chemical reactions to occur on their surfaces and influence the composition of the atmosphere.

Measurements from satellites and ground stations show that many aerosols remain in the environment for long periods and can be carried by the winds hundreds of miles from their origin. In other words, the air we breathe is strongly affected by other countries' stewardship of the atmosphere — and vice versa.

To better predict the ultimate fate of aerosols, to help devise strategies for limiting pollution and to improve forecasts of harmful air quality conditions, we need better information on aerosol sources and how they enter the atmosphere and interact with weather patterns.



A key piece of information that is not provided by currently operating observational satellites is the altitude of aerosol layers in the atmosphere.

Aerosols confined to the lowest part of the atmosphere are likely to be removed quickly by rain. On the other hand, those that are transported to higher altitudes are much more likely to travel long distances and affect air quality in distant countries. CALIPSO provides this vital missing piece of information.

Obtaining better information on the height of clouds is also needed. At present, weather prediction and climate models have considerable difficulty predicting the coverage, water and ice content and altitude of clouds. Inaccuracies in these parameters can lead to large errors in estimates of precipitation and the strength of the circulation. Observations from CALIPSO provide valuable new information that will help to improve weather and climate forecasts.

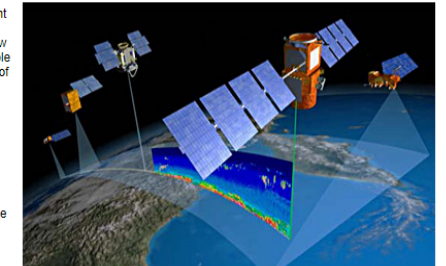
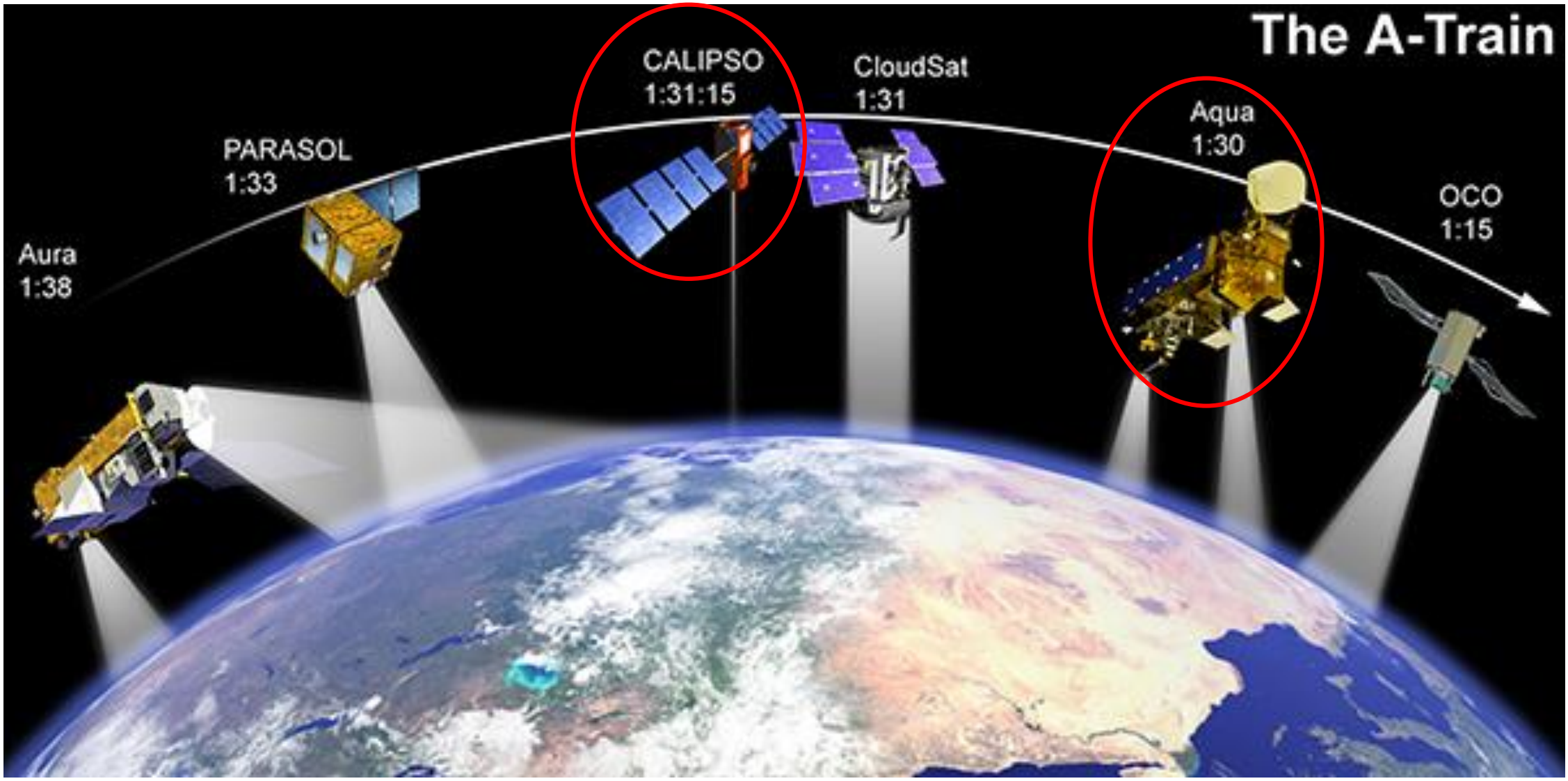


Image above: In 2006, CALIPSO was launched into orbit around the Earth as part of the "A-Train," a constellation of Earth observing satellites. CALIPSO provides the next generation of climate observations, including an advanced study of clouds and aerosols, drastically improving our ability to predict climate change and to study the air we breathe.

The A-Train



Dust Storm 2015.04.02

worldview.earthdata.nasa.gov/?v=28.258952482919078,8.868241199694902,64.9834958191123,24.999

NASA WORLDVIEW

Layers Events Data

Coastlines © OpenStreetMap contributors

BASE LAYERS

- Corrected Reflectance (True Color) NOAA-20 / VIIRS
- Corrected Reflectance (True Color) Suomi NPP / VIIRS
- Corrected Reflectance (True Color) Aqua / MODIS
 - Ascending/Day
- Corrected Reflectance (True Color)

Group Similar Layers

+ Add Layers Start Comparison

2015 APR 02 1 DAY

MAR 2015 APR 2015 MAY 2015

10:18 10:19 10:20 10:21

200 km 200 mi

Google Earth Pro

Search

Places

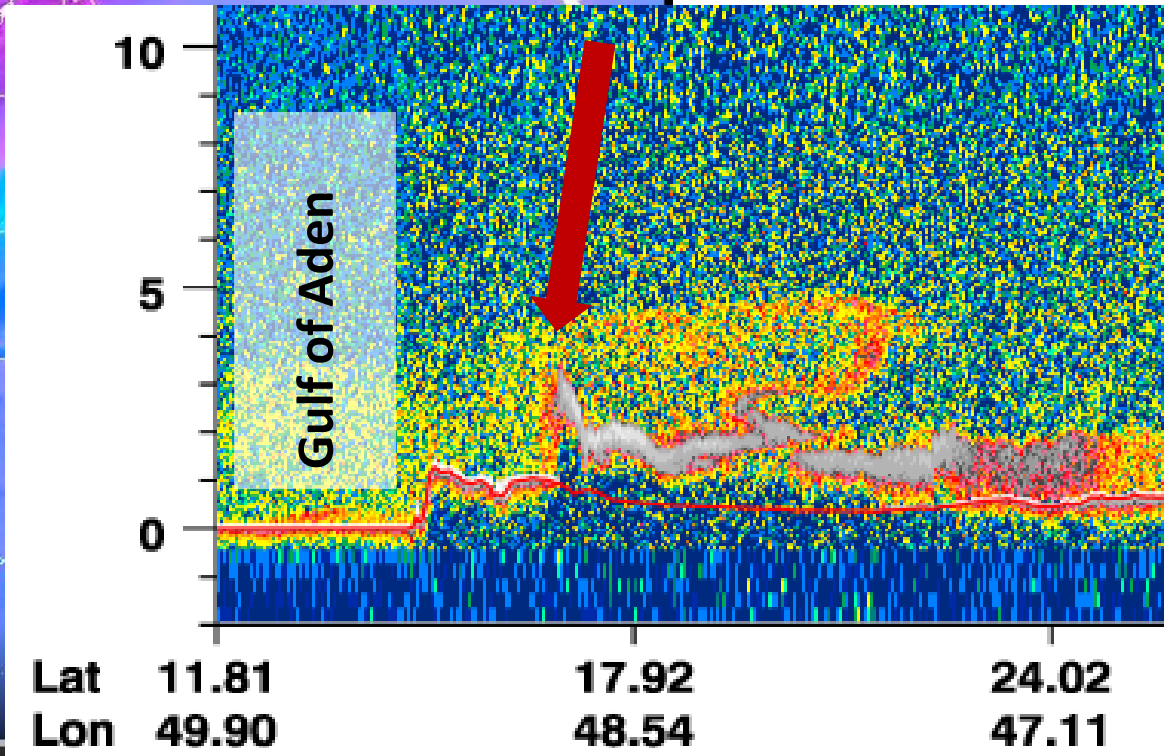
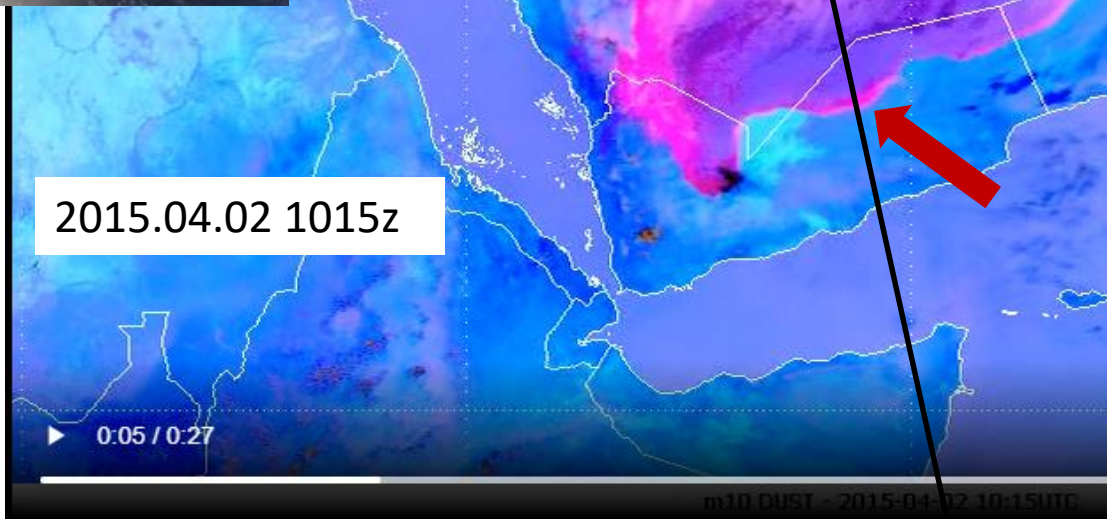
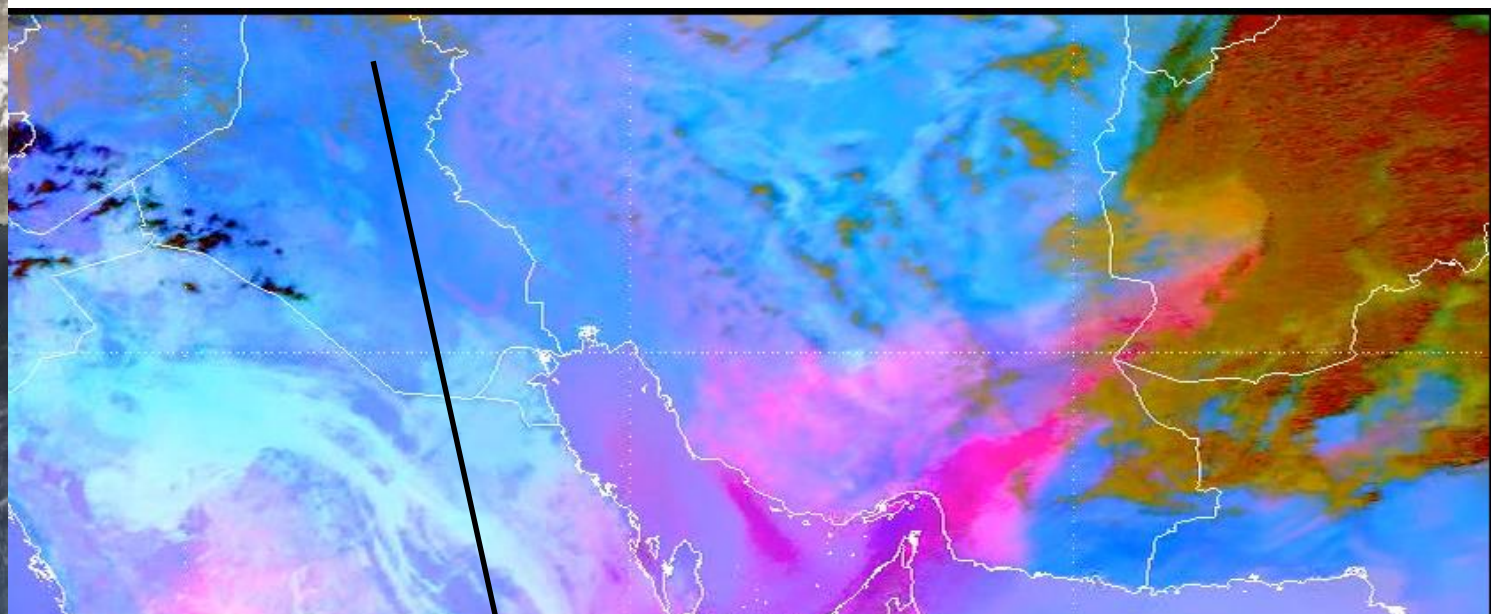
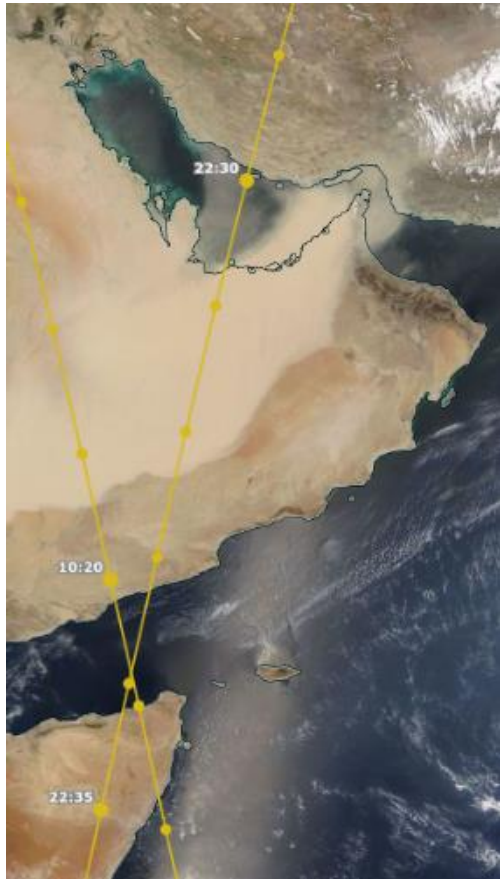
- My Places
- Sightseeing Tour
- Temporary Places
- Worldview Snapshot
- my_name

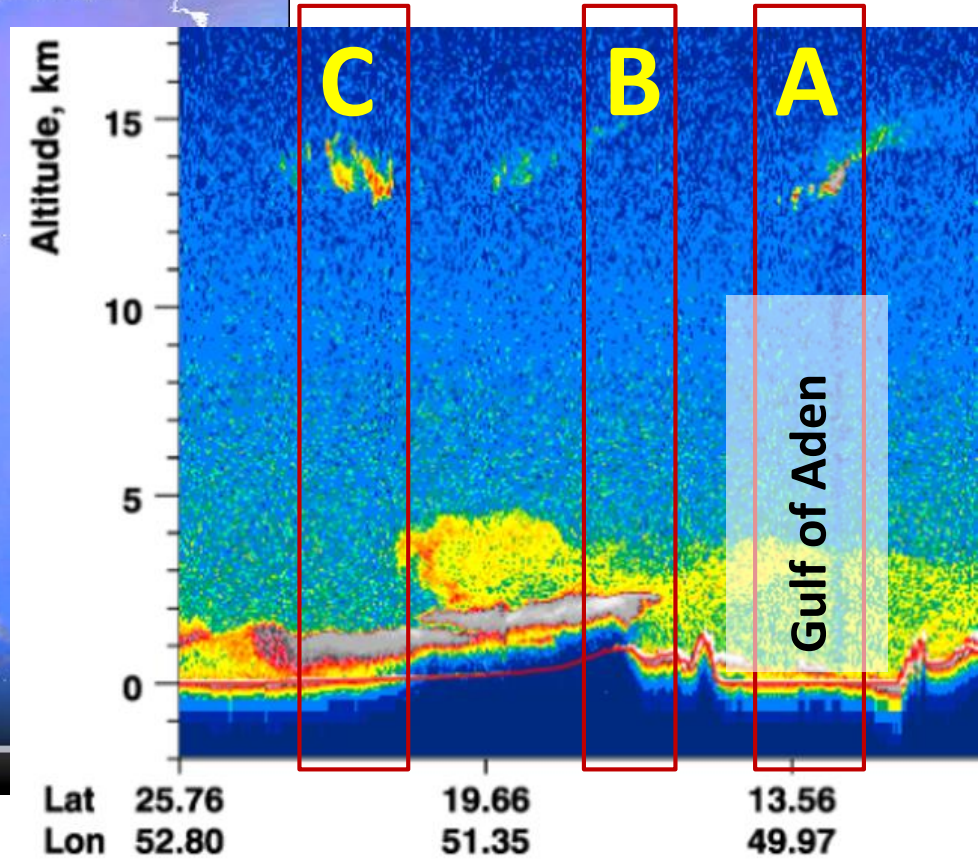
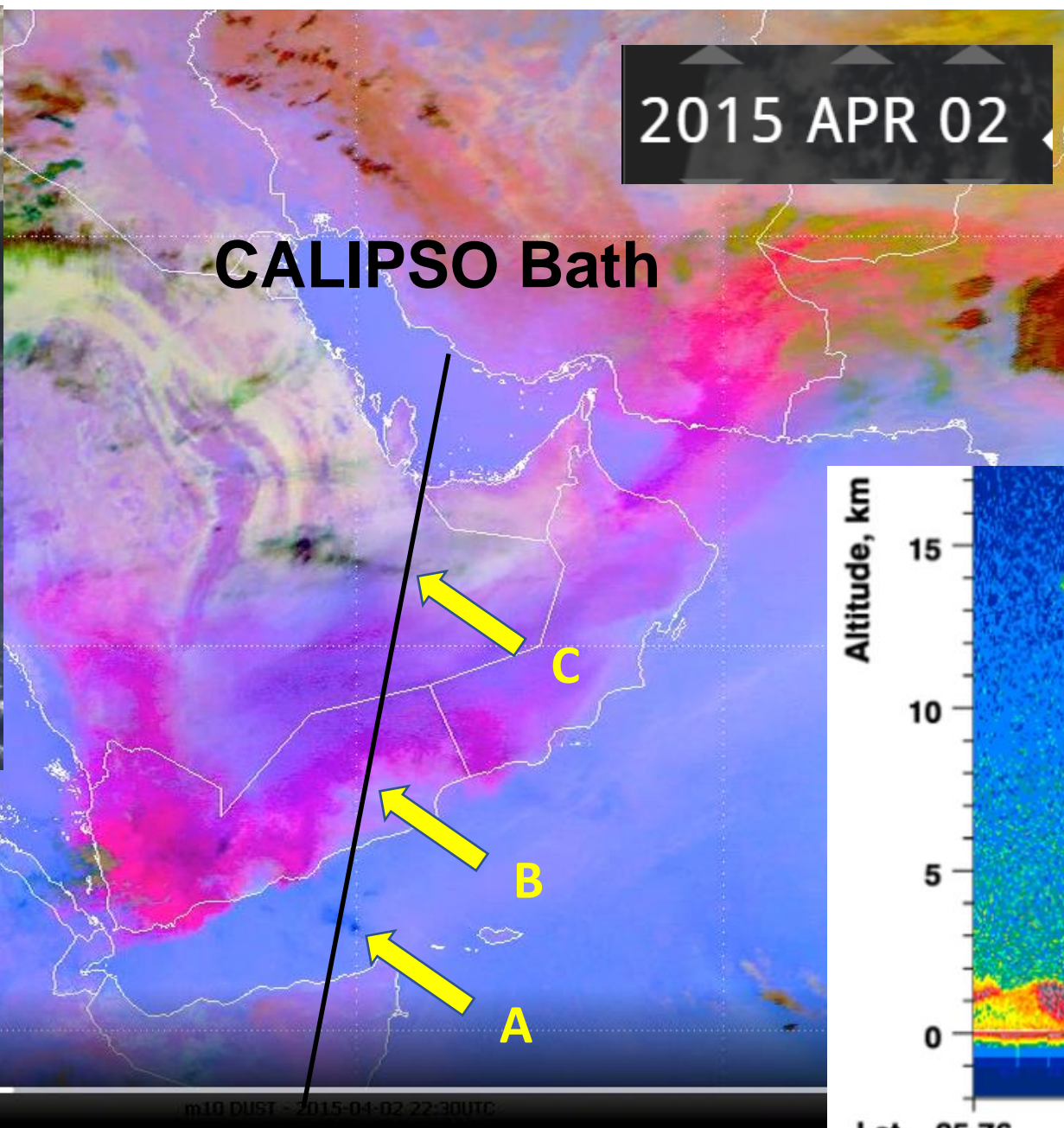
Layers

- Primary Database
- Announcements
- Borders and Labels
- Places
- Photos
- Roads
- 3D Buildings
- Weather
- Gallery
- More
- Terrain

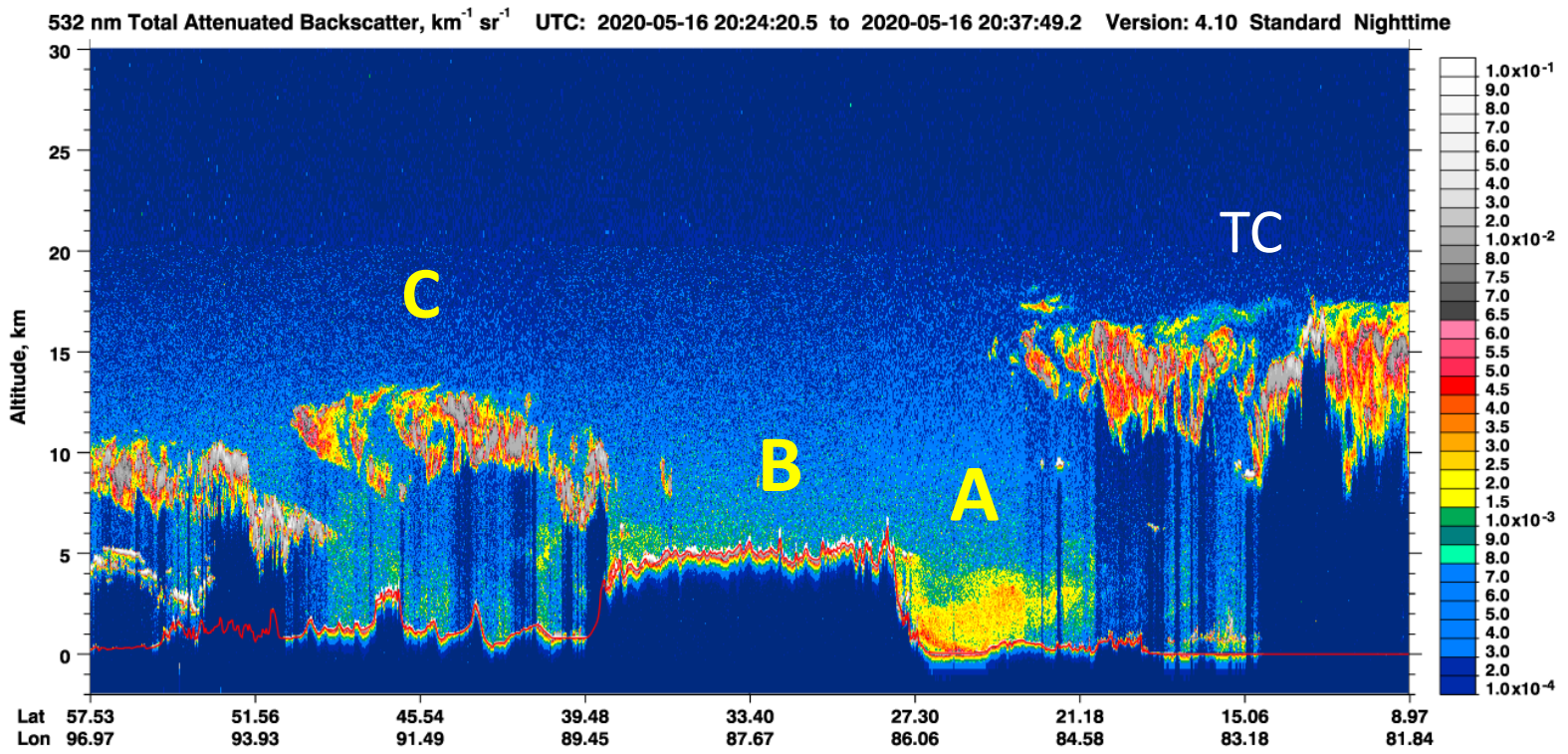
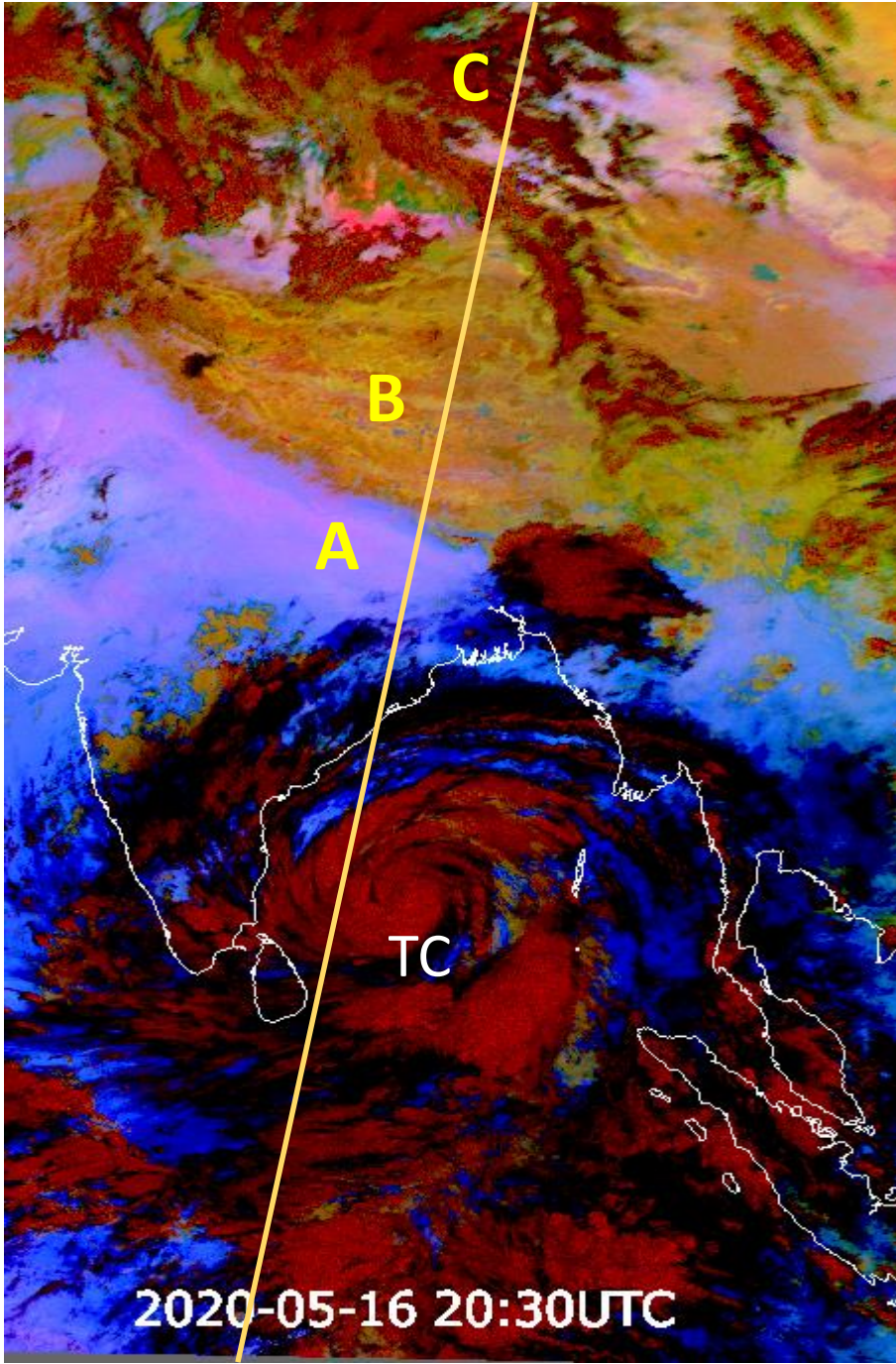
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

Let try do it !

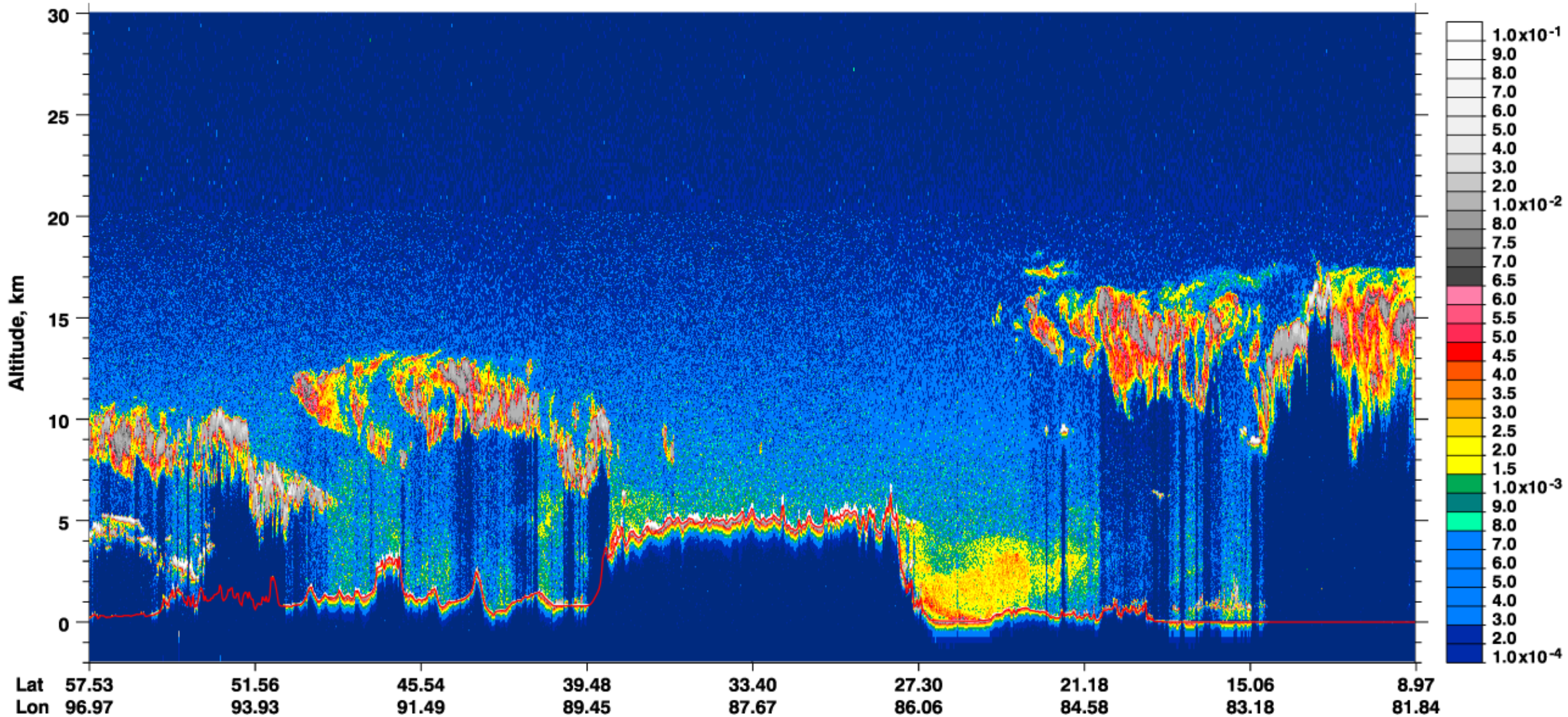




m10 DUST - 2015-04-02 22:30UTC

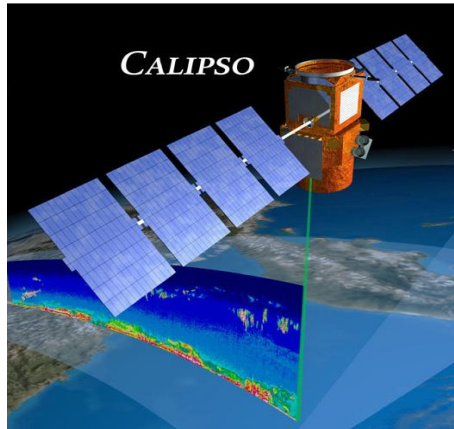
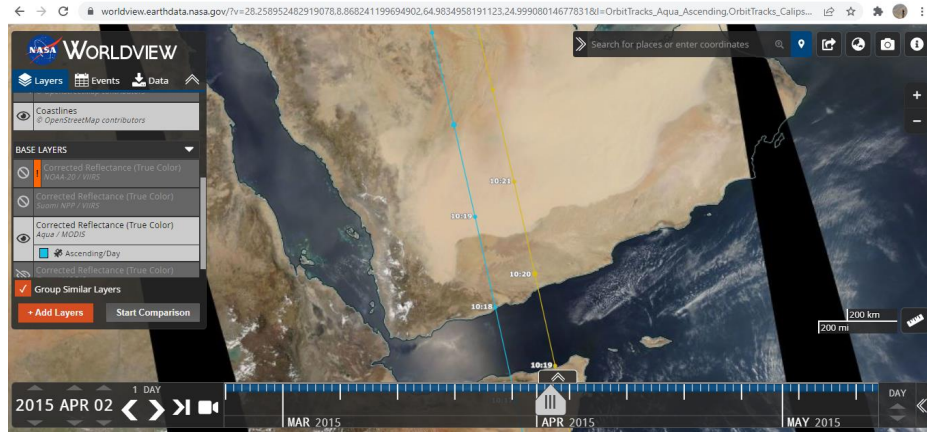


532 nm Total Attenuated Backscatter, $\text{km}^{-1} \text{sr}^{-1}$ UTC: 2020-05-16 20:24:20.5 to 2020-05-16 20:37:49.2 Version: 4.10 Standard Nighttime

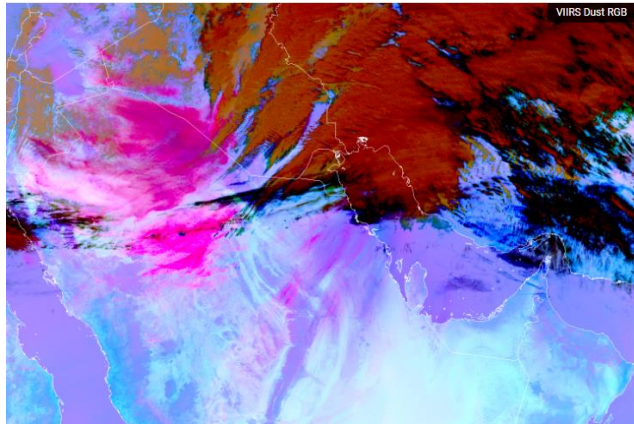
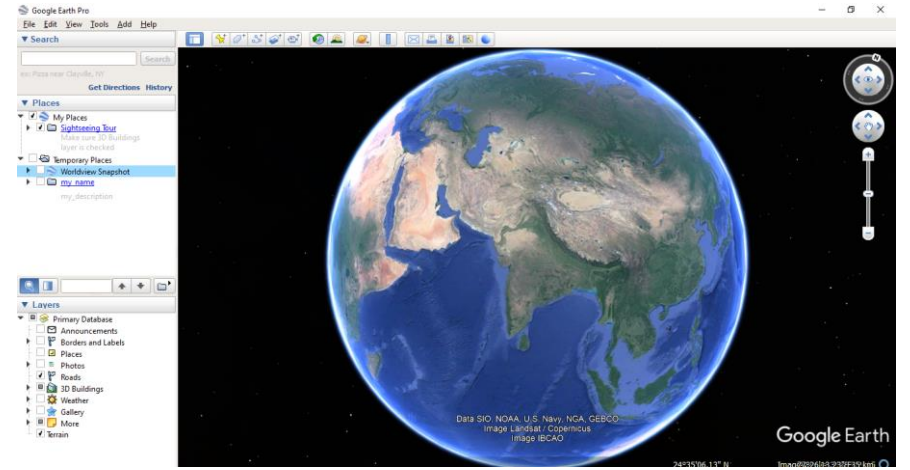


Using Google Earth

[https://worldview.earthdata.nasa.gov/?v=15.408516006218086,3.175729580863475,83.21415046401614,38.37638903180629&l=OrbitTracks_Aqua_Descending\(hidden\),OrbitTracks_Aqua_Ascending,OrbitTracks_Calipso_Descending\(hidden\),OrbitTracks_Calipso_Ascending,Reference_Labels_15m\(hidden\),Reference_Features_15m\(hidden\),Coastlines_15m,VIIRS_NOAA20_CorrectedReflectance_TrueColor\(hidden\),VIIRS_SNPP_CorrectedReflectance_TrueColor\(hidden\),MODIS_Aqua_CorrectedReflectance_TrueColor,MODIS_Terra_CorrectedReflectance_TrueColor\(hidden\)&lg=true&t=2015-04-02-T03%3A36%3A00Z](https://worldview.earthdata.nasa.gov/?v=15.408516006218086,3.175729580863475,83.21415046401614,38.37638903180629&l=OrbitTracks_Aqua_Descending(hidden),OrbitTracks_Aqua_Ascending,OrbitTracks_Calipso_Descending(hidden),OrbitTracks_Calipso_Ascending,Reference_Labels_15m(hidden),Reference_Features_15m(hidden),Coastlines_15m,VIIRS_NOAA20_CorrectedReflectance_TrueColor(hidden),VIIRS_SNPP_CorrectedReflectance_TrueColor(hidden),MODIS_Aqua_CorrectedReflectance_TrueColor,MODIS_Terra_CorrectedReflectance_TrueColor(hidden)&lg=true&t=2015-04-02-T03%3A36%3A00Z)

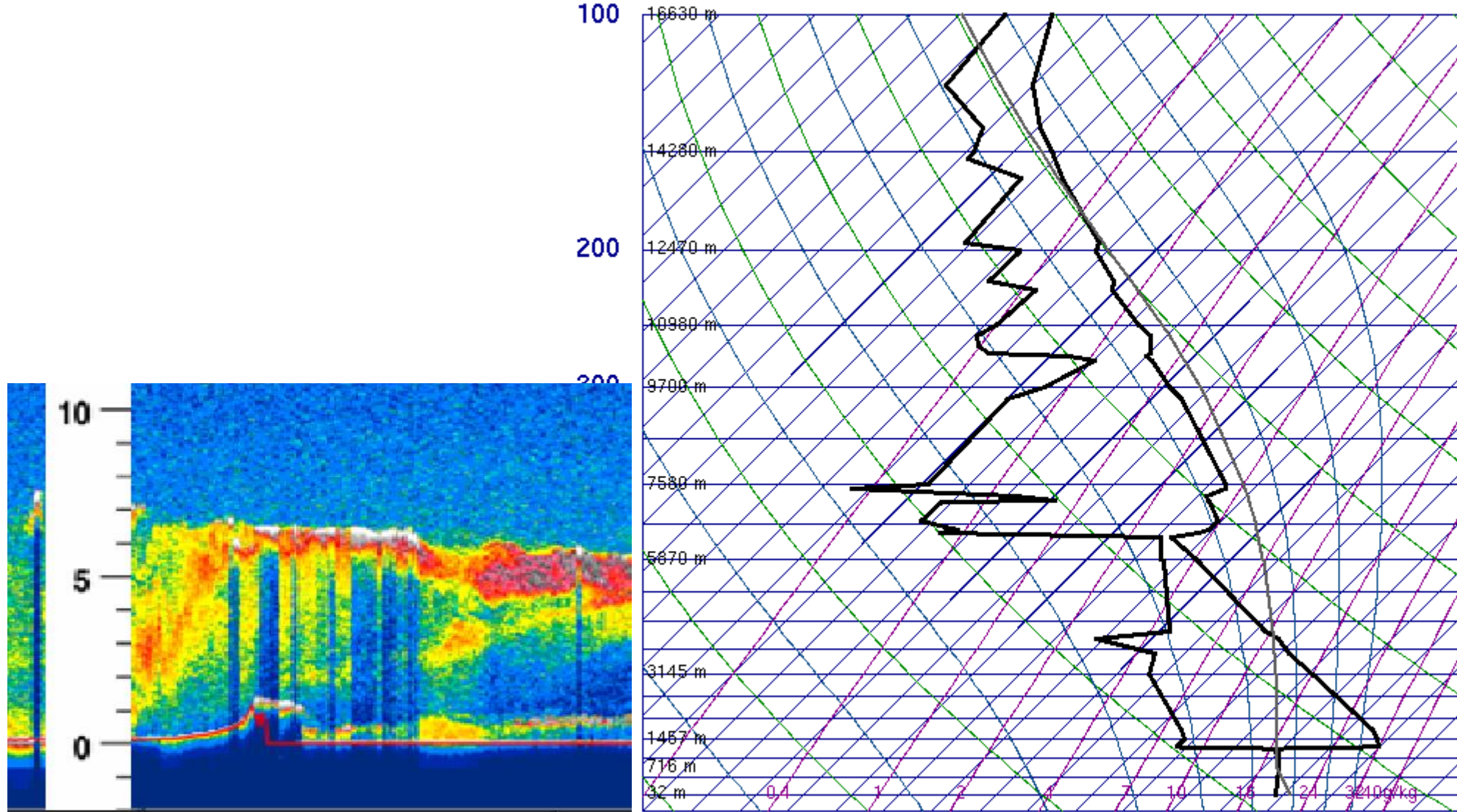


https://www-calipso.larc.nasa.gov/products/kmz_exp/



A colorful, abstract map of the United States, rendered in a rainbow gradient from blue to red. The map is overlaid with the text "Thank You" in a large, bold, black font. The text is centered horizontally and vertically across the map. The background is a vibrant, multi-colored map of the United States, with the colors transitioning from blue on the left to red on the right, and yellow in the center. The text "Thank You" is written in a large, bold, black font, centered over the map. The overall image has a soft, ethereal quality with a slight blur.

41316 OOSA Salah



SLAT	17.03
SLON	54.08
SELV	20.00
SHOW	-3.11
LIFT	-6.92
LFTV	-7.57
SWET	272.9
KINX	29.50
CTOT	17.50
VTOT	37.50
TOTL	55.00
CAPE	1090.
CAPV	1232.
CINS	-539.
CINV	-423.
EQLV	176.9
EQTV	175.7
LFCT	626.4
LFCV	652.1
BRCH	97.44
BRCV	110.1
LCLT	296.5
LCLP	973.4
LCLF	354.3
MLTH	298.8
MLMR	18.99
THCK	5838.
PWAT	45.83

00Z 02 Aug 2018

University of Wyoming

500 nm Total Attenuated Backscatter, $\text{km}^{-1} \text{sr}^{-1}$ UTC: 2018-08-02 22:07:43.7 to 2018-08-02 22:30:02.1 Version: 3.40 Expedited

