



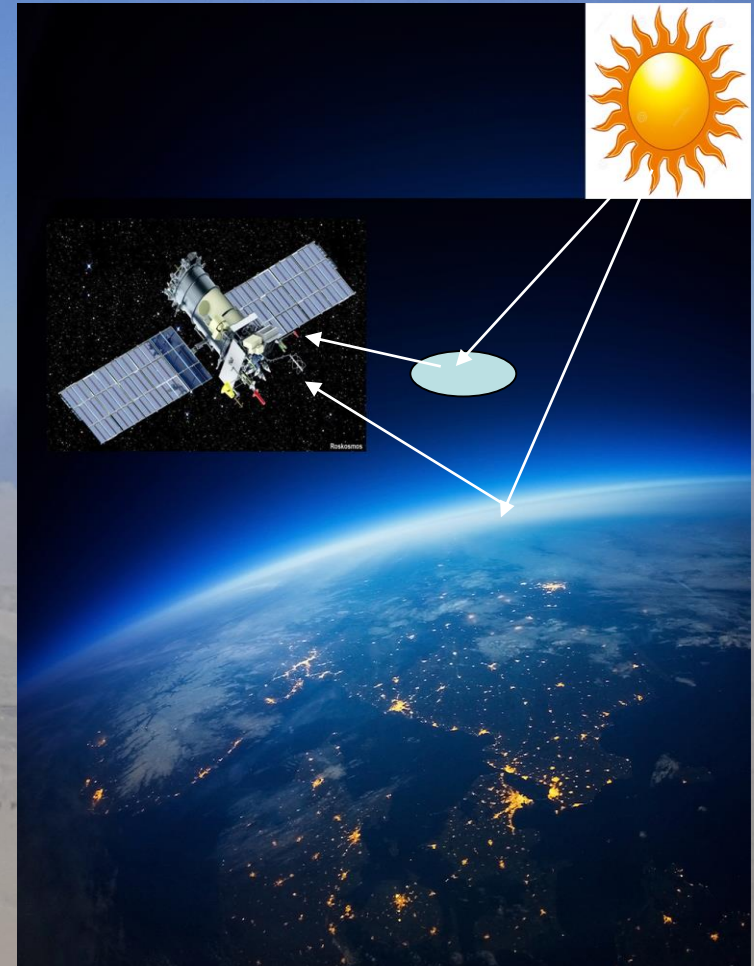
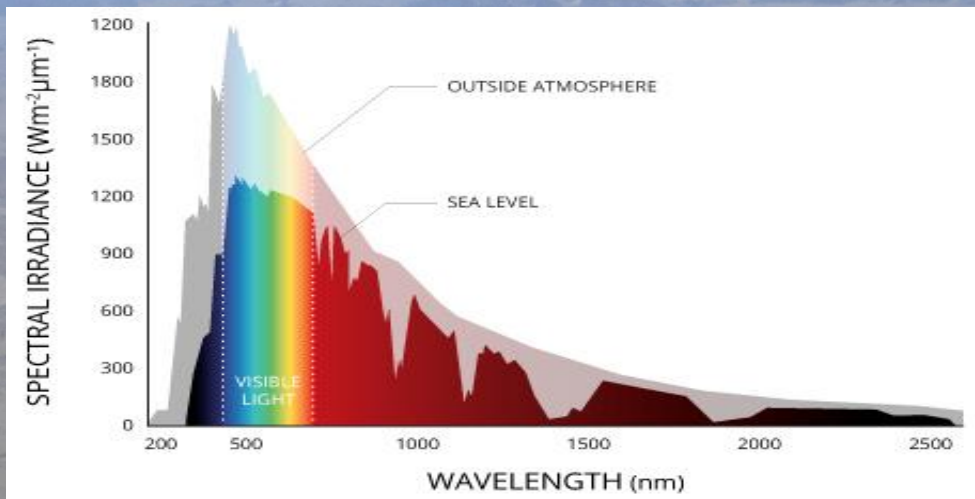
Studies on Saharan Dust intrusions at SRTI-BAS

M. Dimitrova, SRTI-BAS

Satellite data

Elements of remote sensing with passive sensors:

- EM wave
- opacity of the atmosphere
- reflectivity of ground objects
- sensor



Satellite data selection

Depends of the studied objects:

- spatial resolution
- spectral bands
- temporal resolution

Dust plumes extend in the atmosphere over thousands of kilometers, and can persist for several days

Desert dust transport is an atmospheric process and extends at different heights in the atmosphere



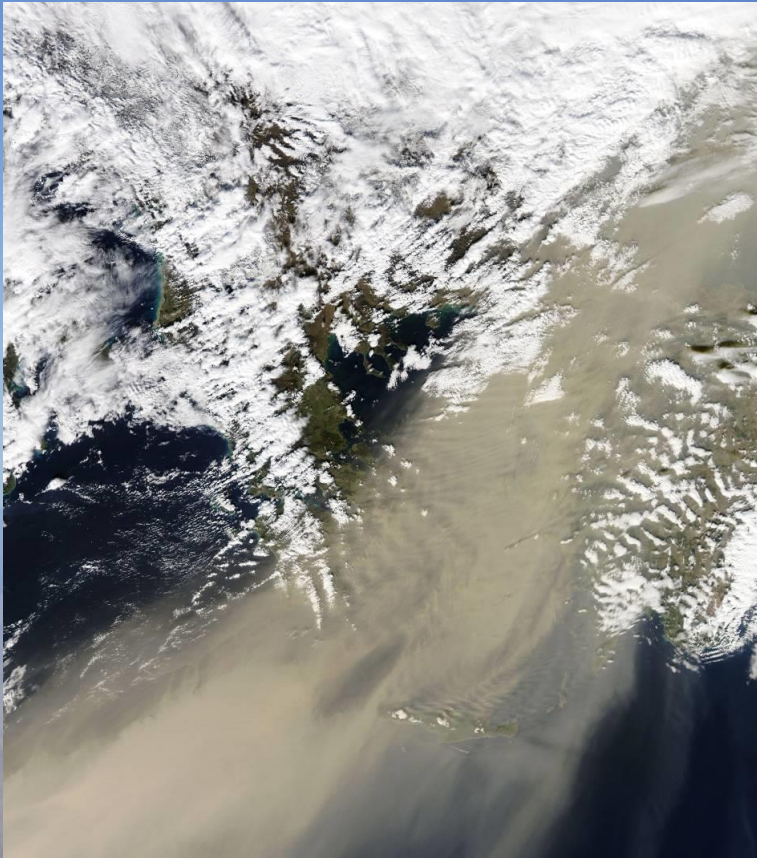
Selection of satellite data

Remote sensing is suitable for the monitoring of large desert dust plumes which exhibit high temporal and spatial variability. Using satellite data we can observe event in its full vertical scale

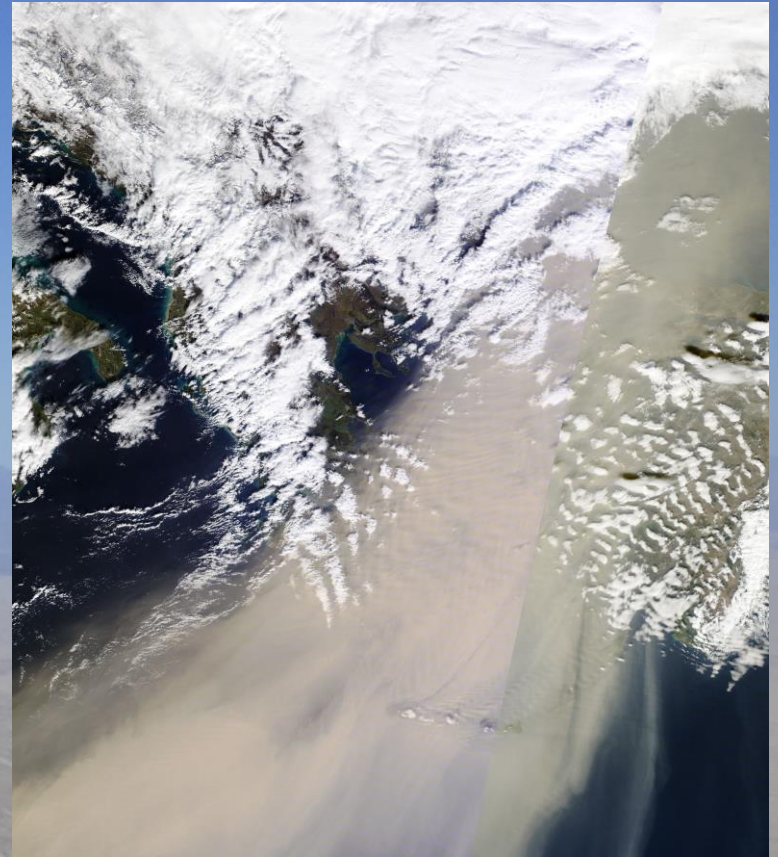
In the Space Research and Technology Institute for desert dust studying we use two main types of satellite data :

- Multispectral satellite data (with middle spatial resolution) MODIS
 - Terra
 - Aqua
- Data for aerosol presence from meteorological satellites – UV sensors:
 - GOME
 - SHIAMACHY
 - OMI
 - OMPS
 - GOME-2

Data from multispectral optical sensors



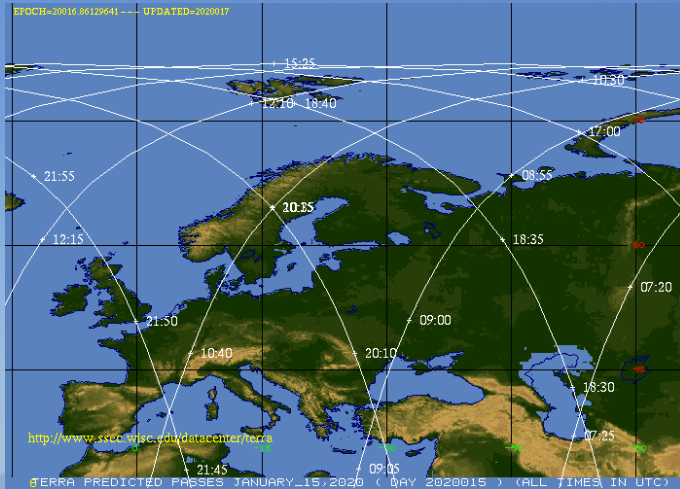
Terra



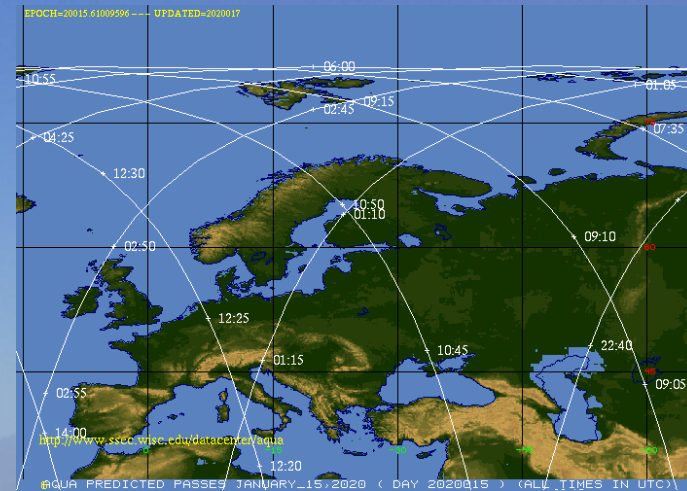
Aqua

MODIS 1.02.2015

Data from multispectral optical sensors



Terra every day from 2000 till now

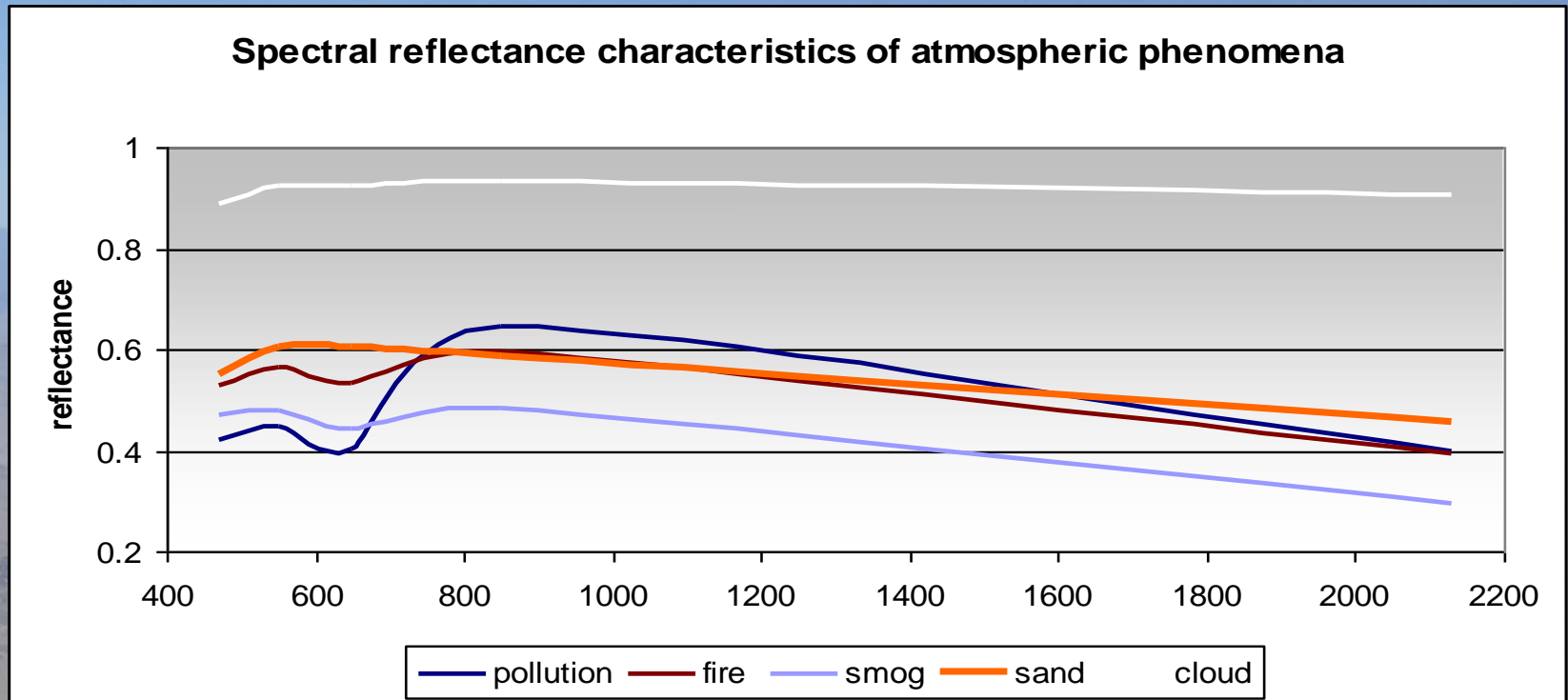


Aqua every day from 2004 till now

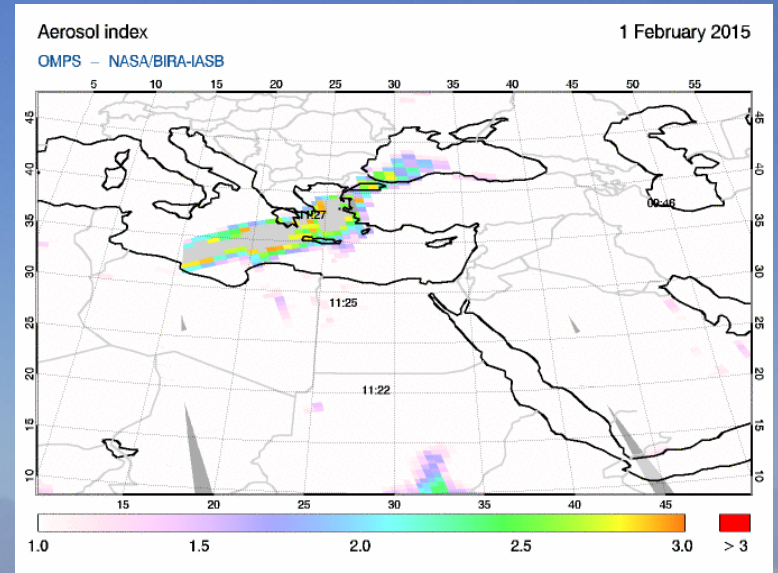
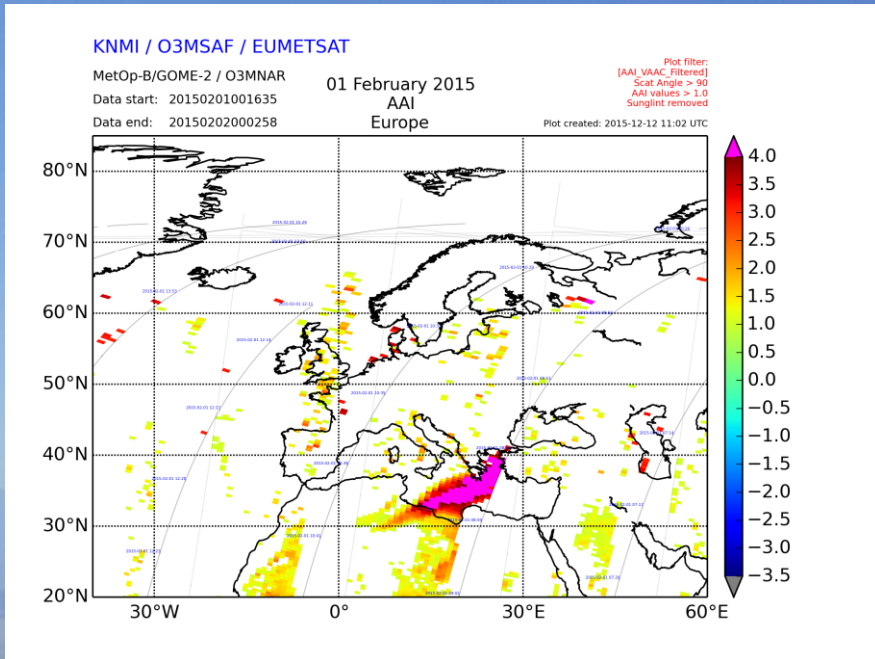
Time difference around 2-3 hours

Spectral curves of some atmospheric phenomena

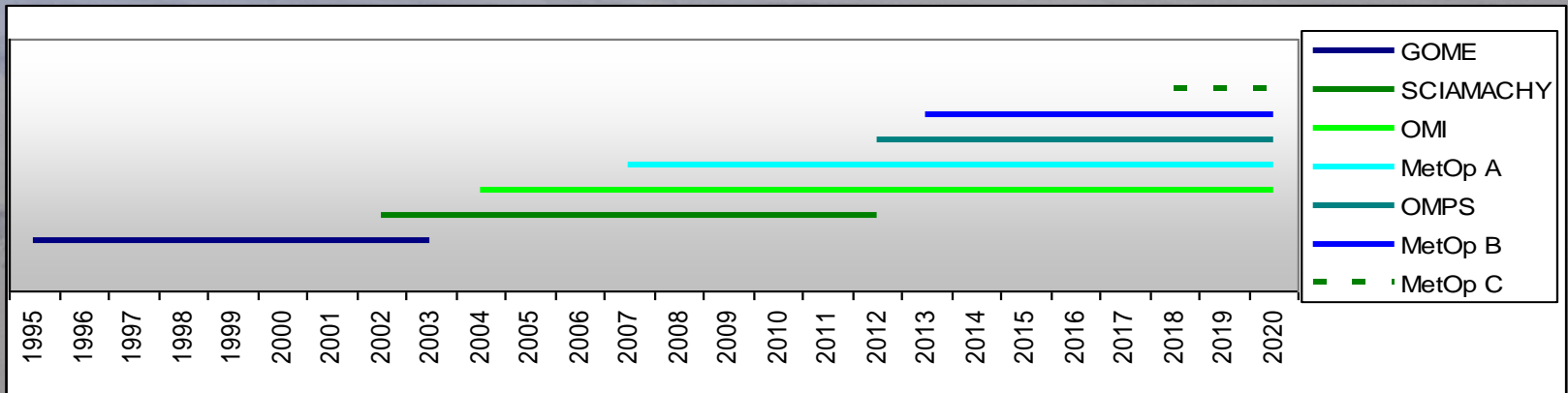
- Recognizing
- Measurement
- Studying



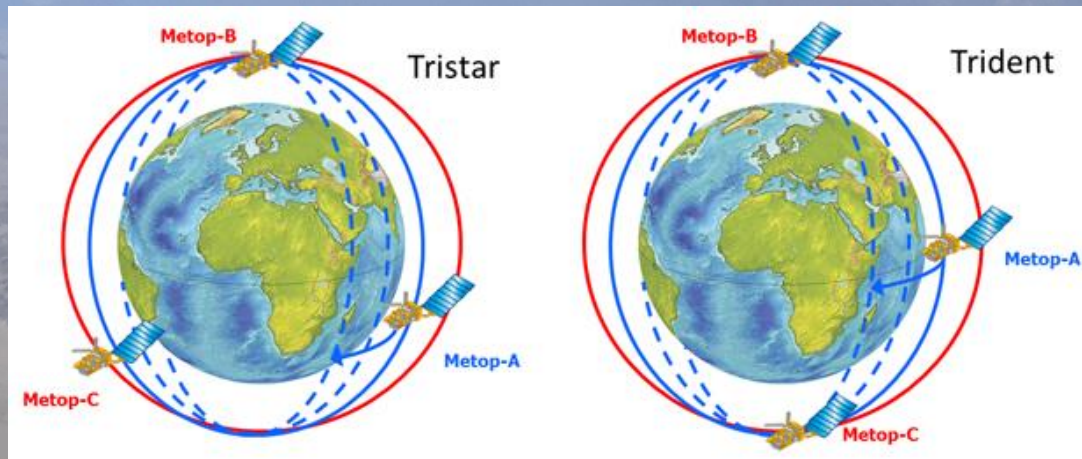
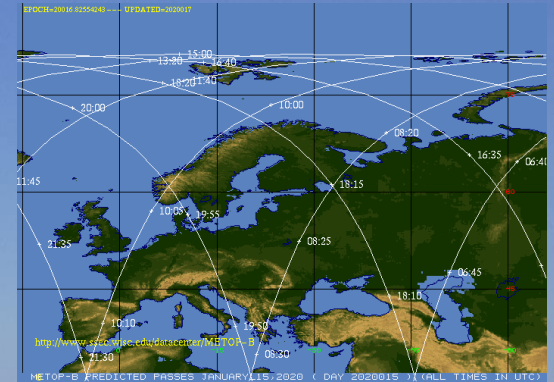
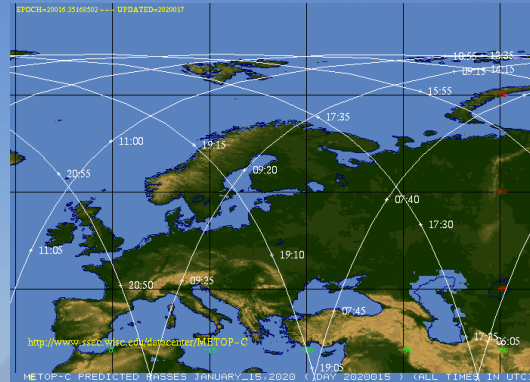
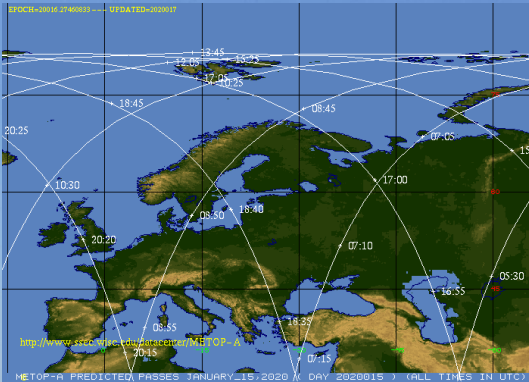
Data from meteorological satellites



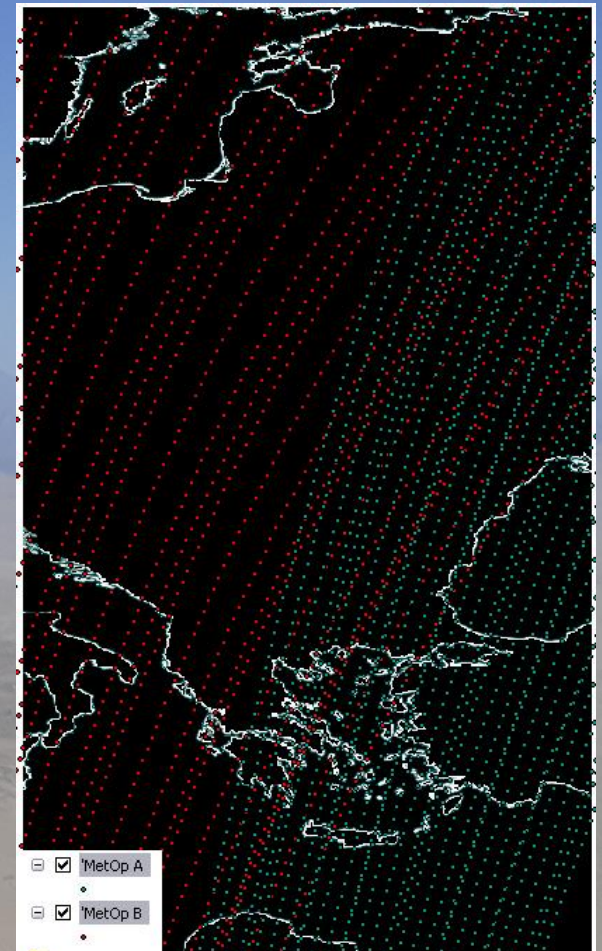
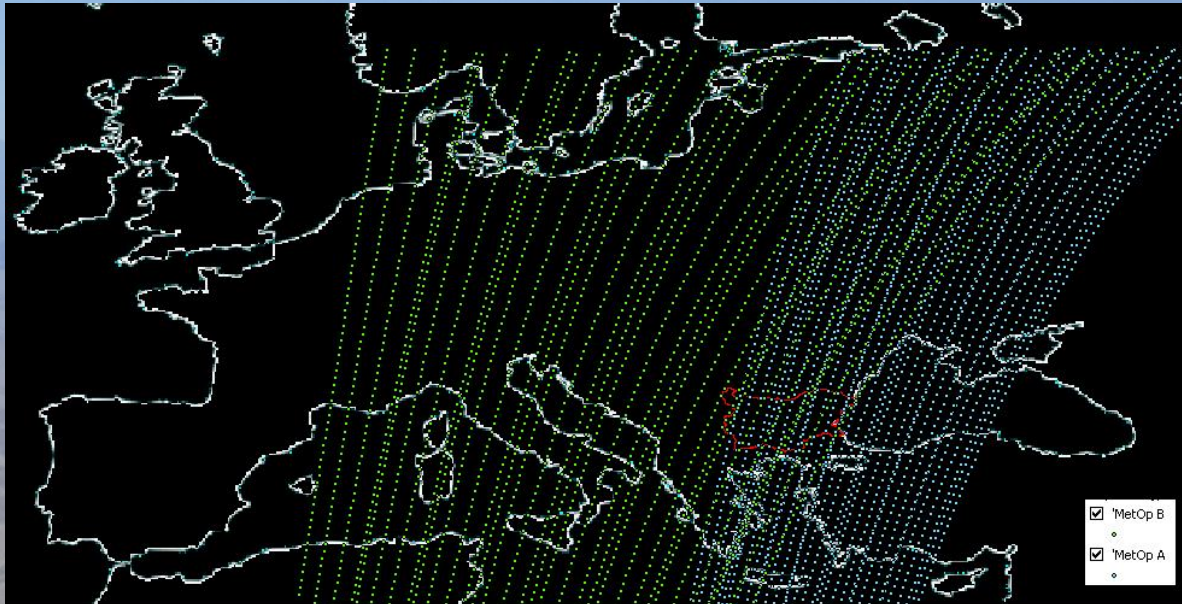
1.02.2015



Data from meteorological satellites



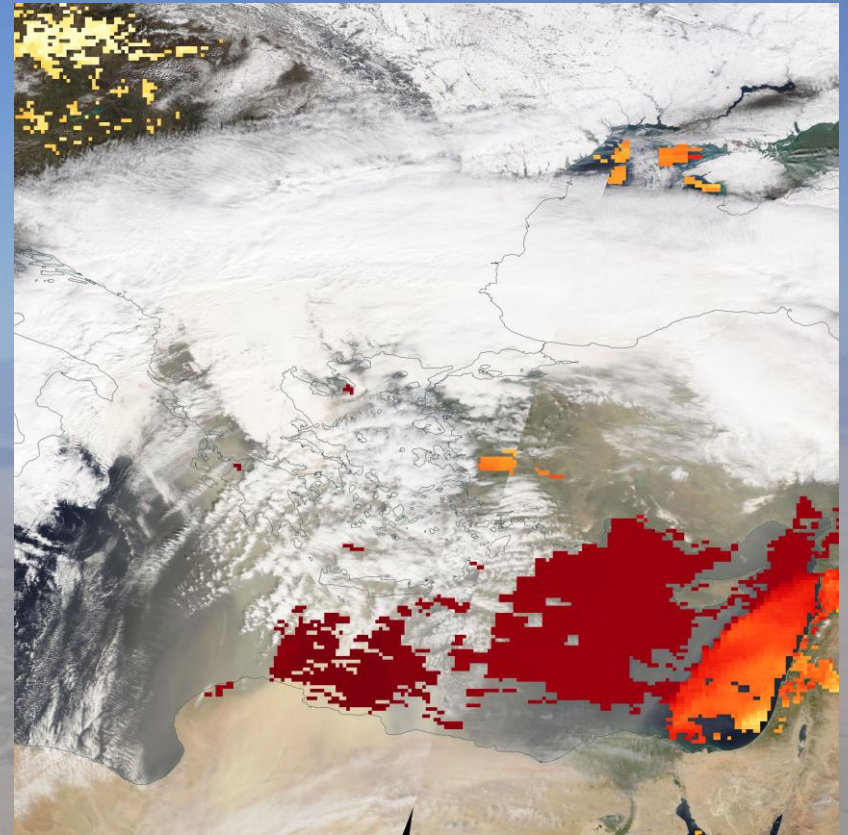
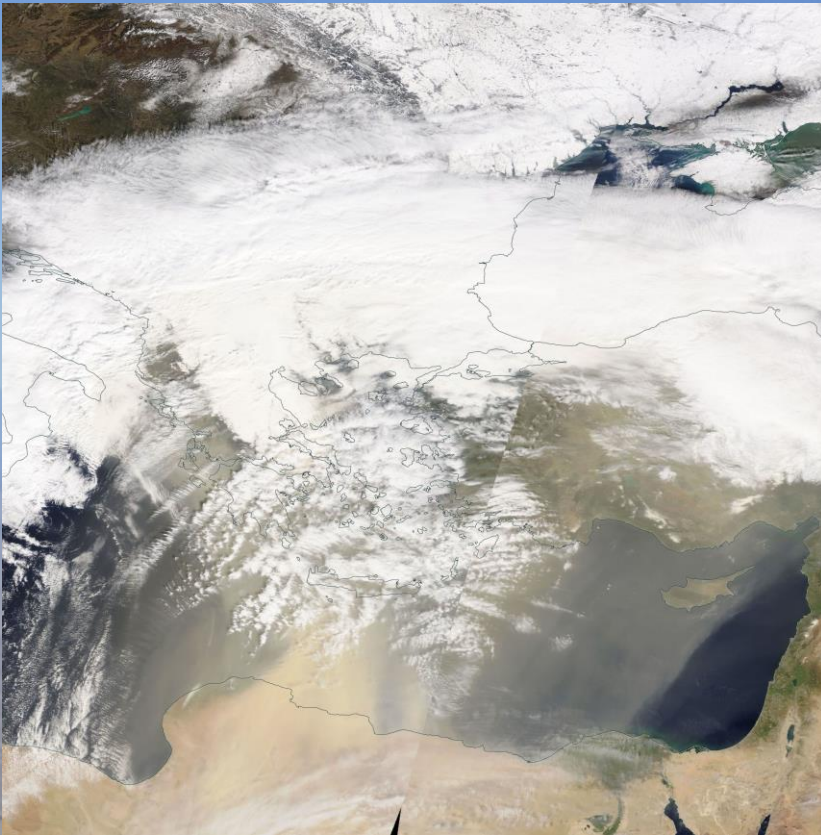
Spatial resolution of MetOp A and B



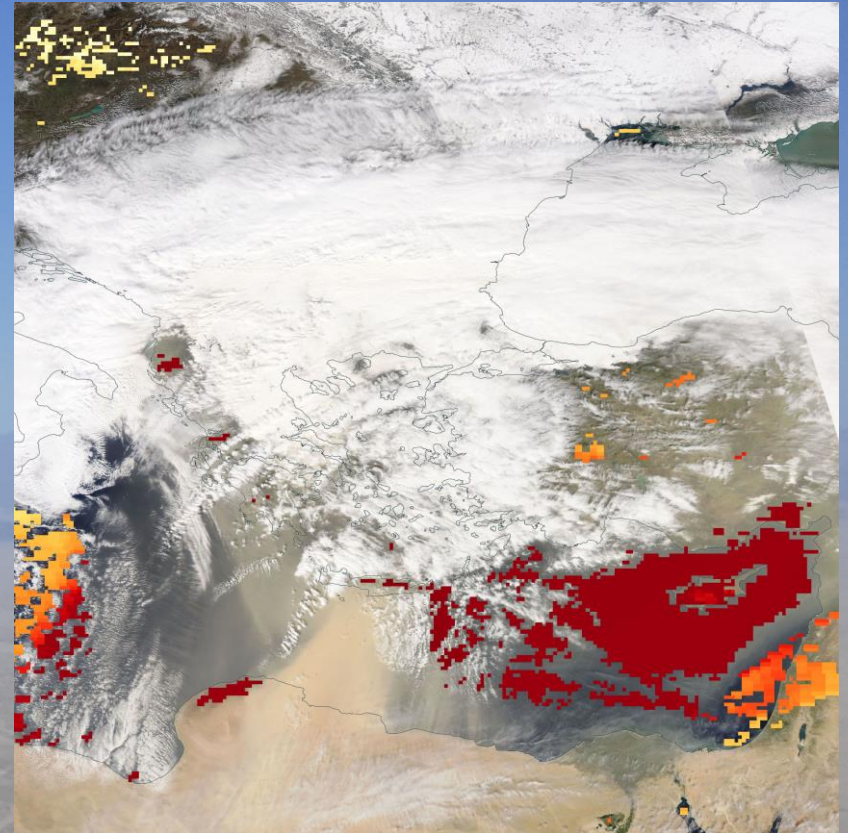
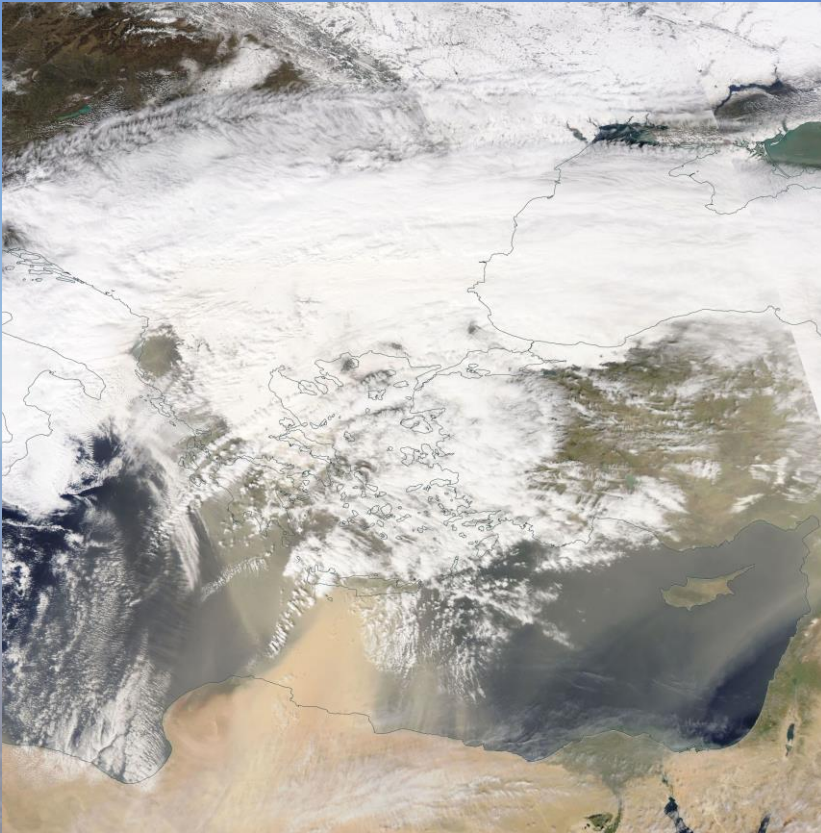
Measurements

- **AOD** (AOT) - Aerosol optical depth (thickness) is a measure of the extinction of the solar beam by dust and haze. In other words, particles in the atmosphere (dust, smoke, pollution) can block sunlight by absorbing or by scattering light. It depends of the wavelength in one spectral channel of the instrument. For MODIS – around 550 nm
- **AAI** - Aerosol Absorbing Index, or Aerosol Absorbing Indicator is an index that detects the presence of uv-absorbing aerosols such as dust and soot. UVAerosol index (AI) is based on a spectral contrast method in a UV region where the ozone absorption is very small. It depends on the wavelength in two different UV spectral channel of the instrument. Usually between 300 – 400 nm

Terra + AOD (22.03.2018)



Aqua + AOD (22.03.2018)

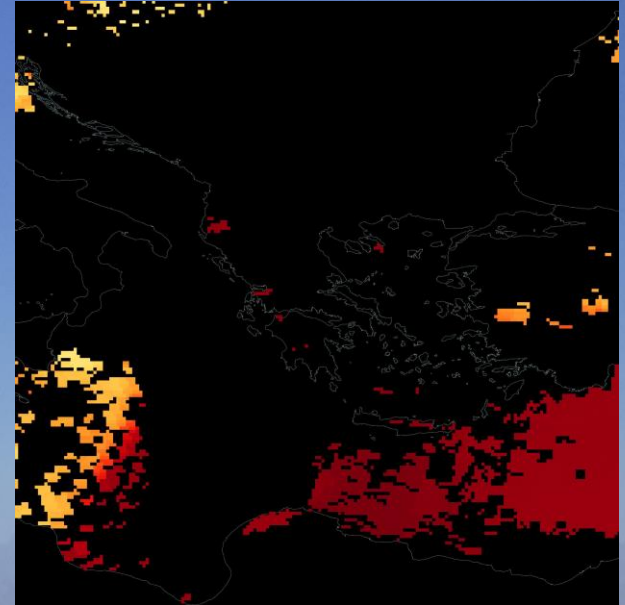


AAI и AOD (22.03.2018)

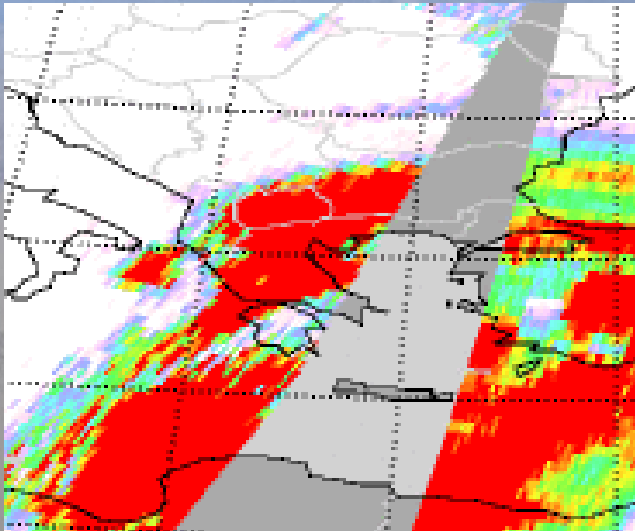
Aqua



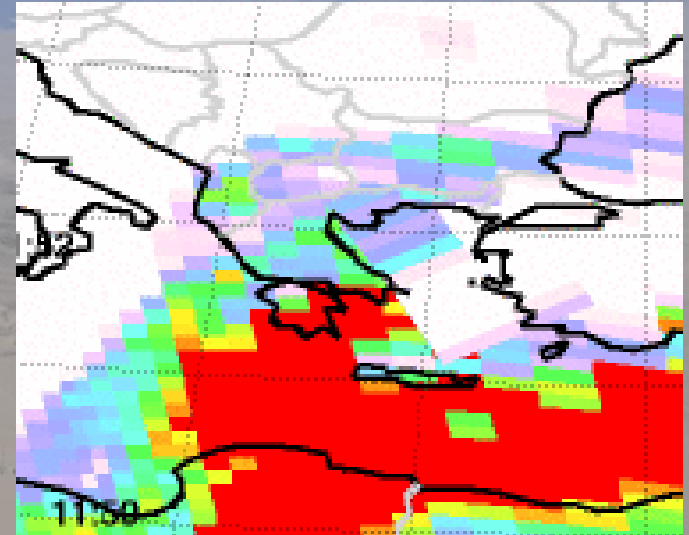
Terra & Aqua AOD



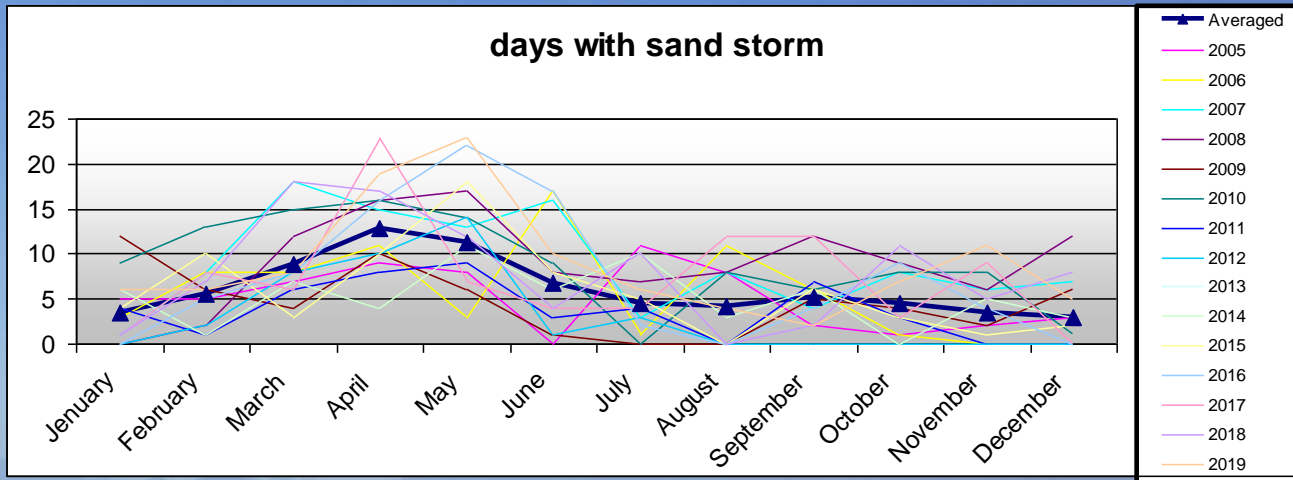
GOME-2
MetOp B



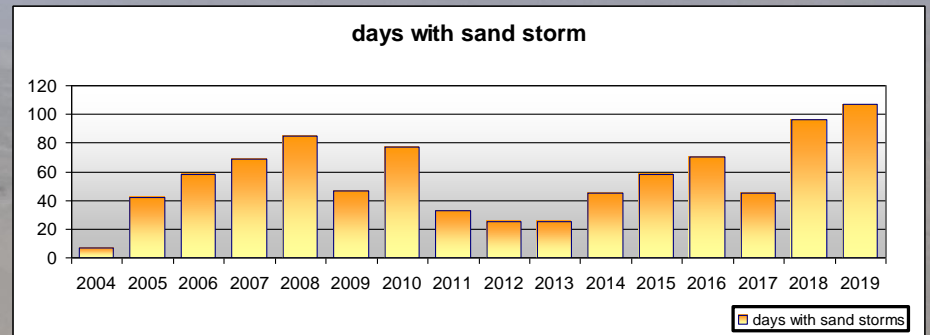
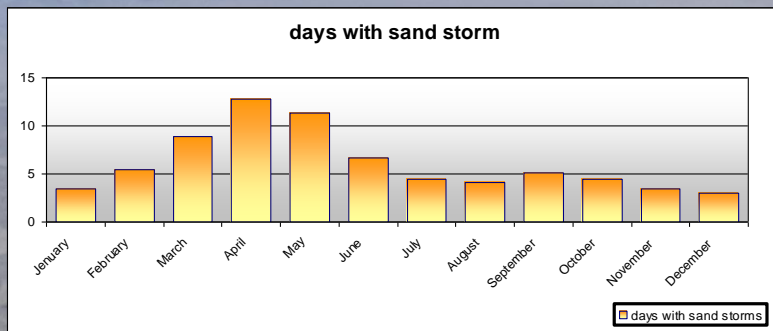
OMPS



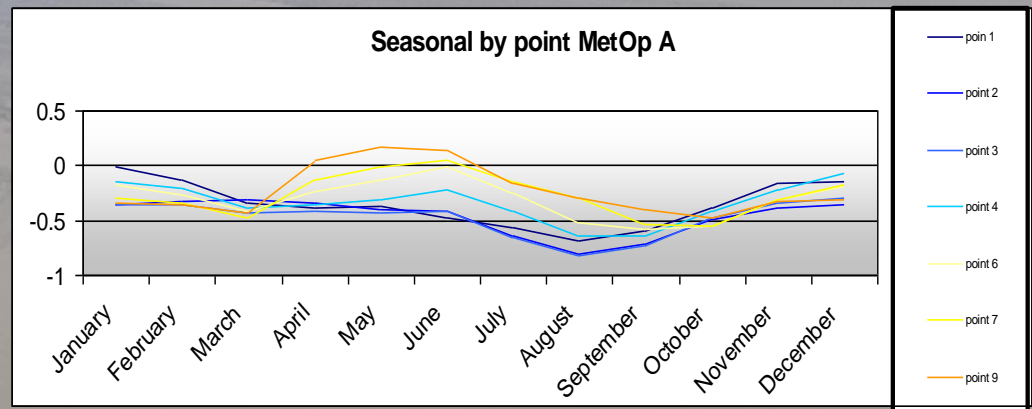
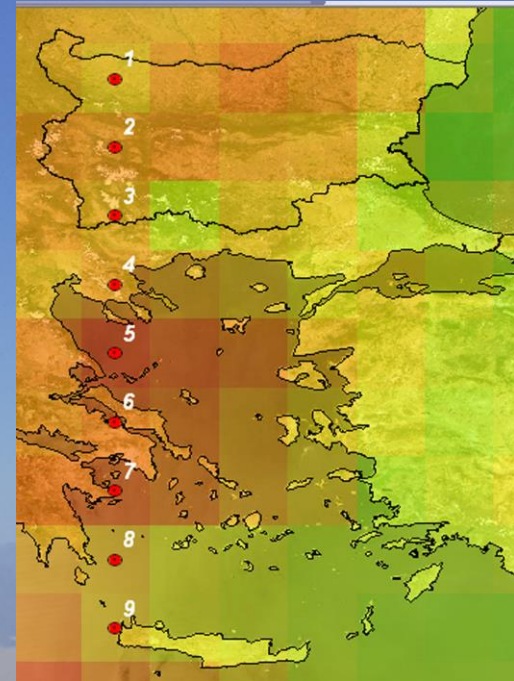
Temporal and seasonal behavior



GOME-2
and MODIS



Spatial seasonal behavior



Conclusions

- The satellite data gives us the ability to study the whole picture of desert dust transport for the period of more than 25 years.
- There are 3 steps in studying desert dust transport – recognizing, measurement and describing behavior
- There are two main values that can measure the total aerosol column – AAI and AOD
- Dust transport in the Balkans shows a maximum during months from March till May
- Dust affects directly south part of the Balkans (Greece and mostly Mediterranean islands), while other parts are affected indirectly (sand particles becomes water condensation origins and causes rains)

Thank you for attention!

- ***Acknowledgments***

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SIDUAQ
SATELLITE INFORMATION
DOWNSCALED TO URBAN AIR QUALITY