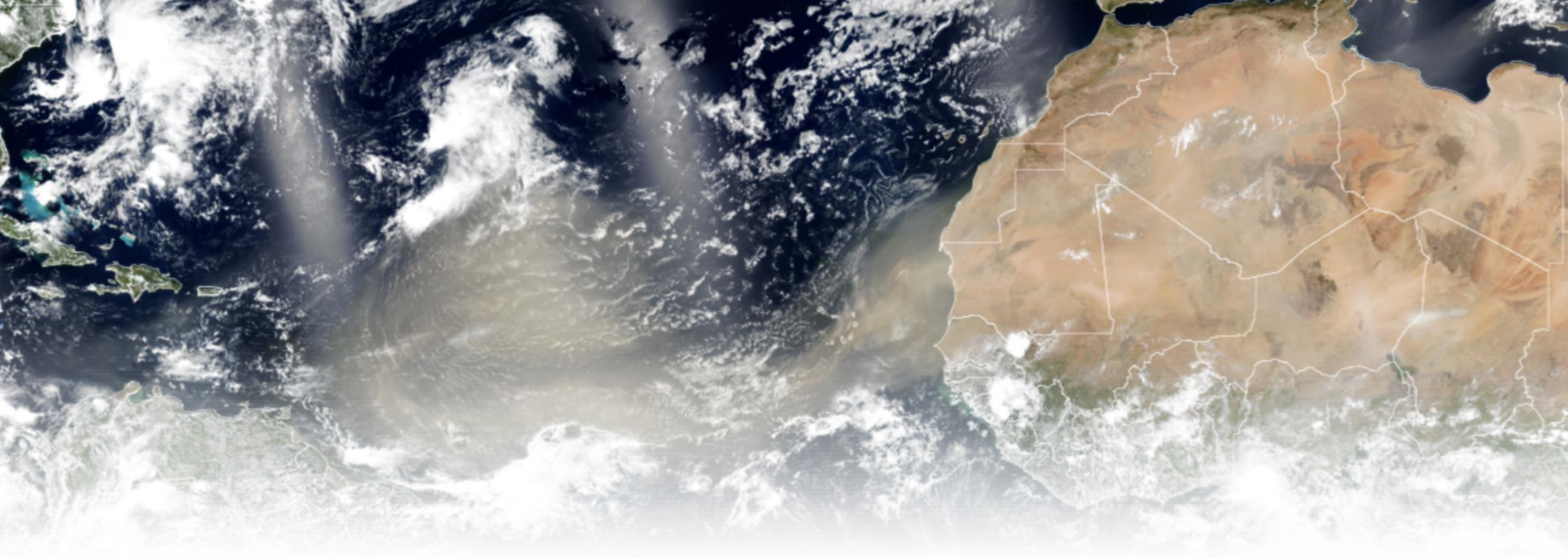

Introduction to satellite data

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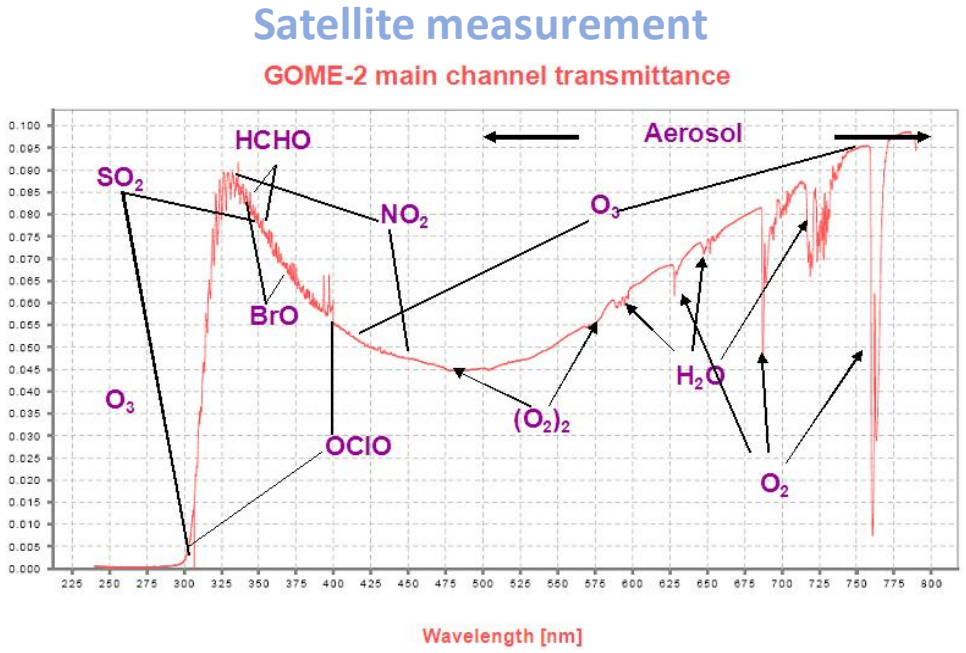
EUMETSAT AC SAF
ATMOSPHERIC COMPOSITION MONITORING

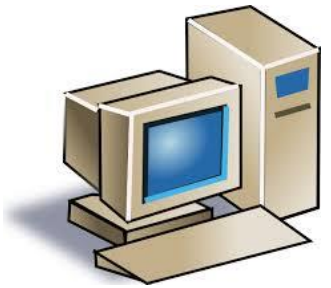
Basic principle of a passive satellite measurement

- Passive satellite instruments measure reflected radiation at selected wavelengths
- The key is the “fingerprint” that different gases and aerosols leave on the measured radiation
  - By selecting different wavelengths channels, different gases / aerosols can be observed.

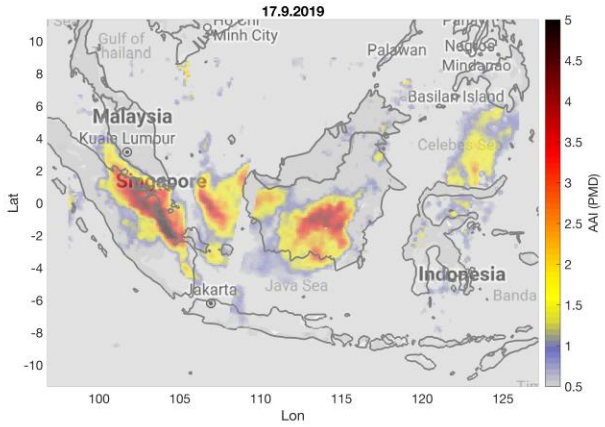


Level 1 data

Retrieval algorithm



Satellite observations of atmospheric components

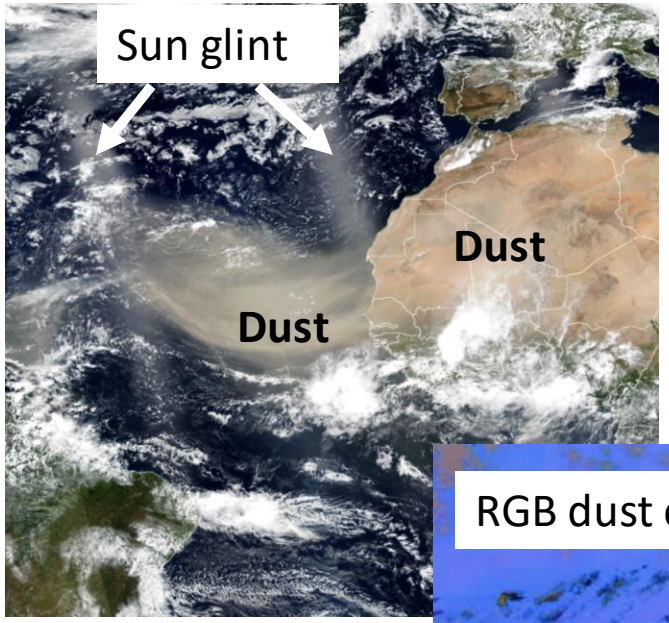


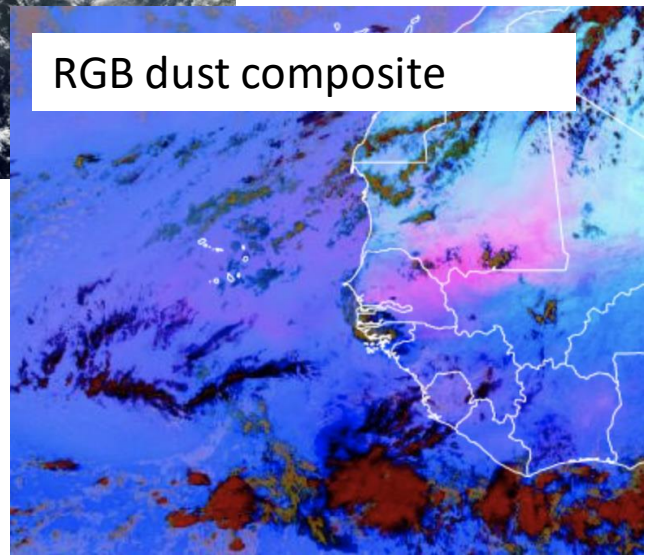
Level 2 data

Summary of dust related products from passive satellite instruments

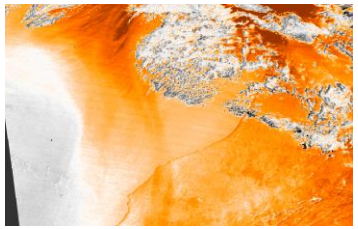
Level 1

RGB



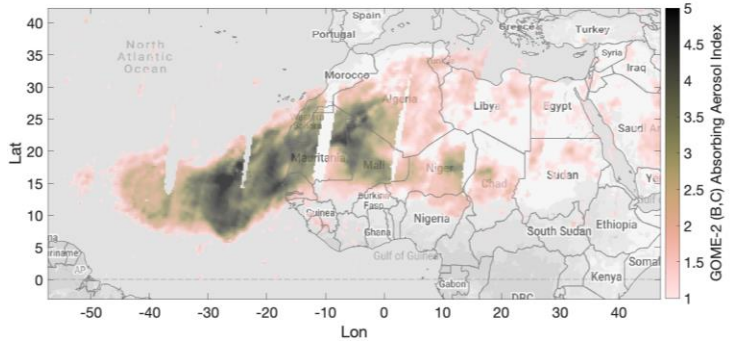


Brightness temperature difference

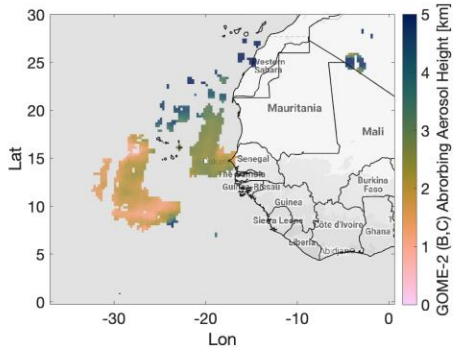


Level 2

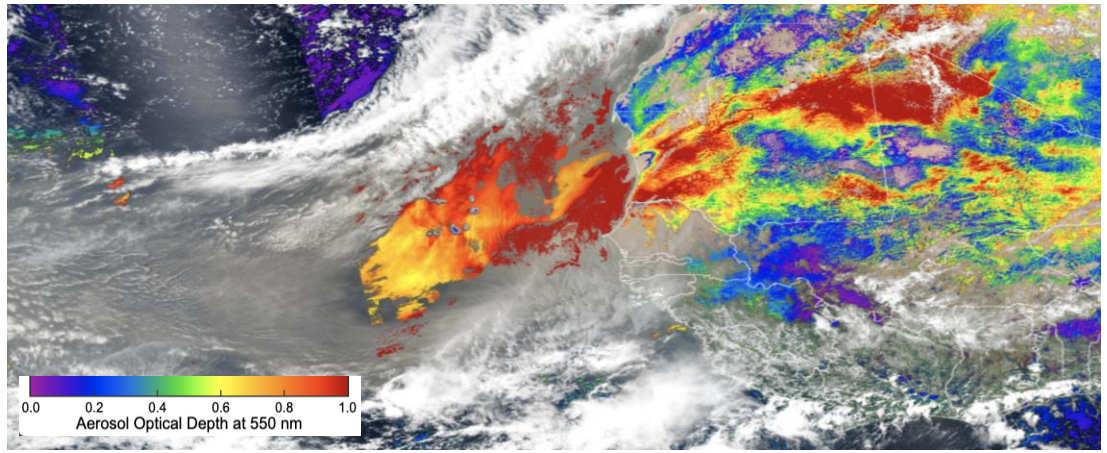
Absorbing aerosol index



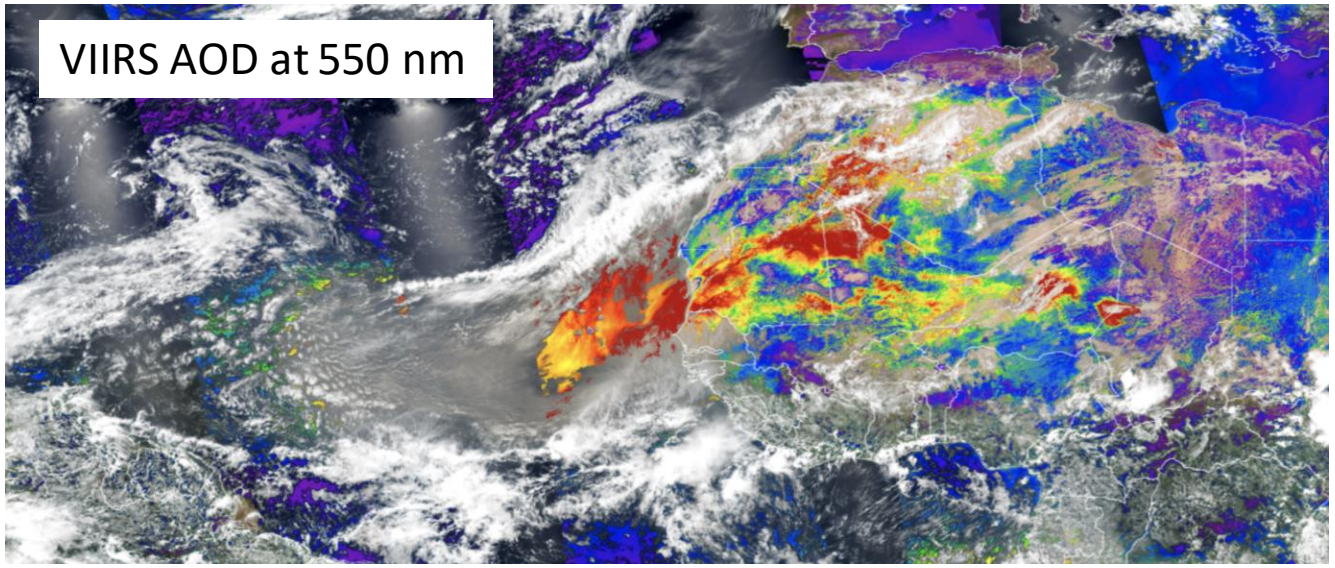
Absorbing aerosol height

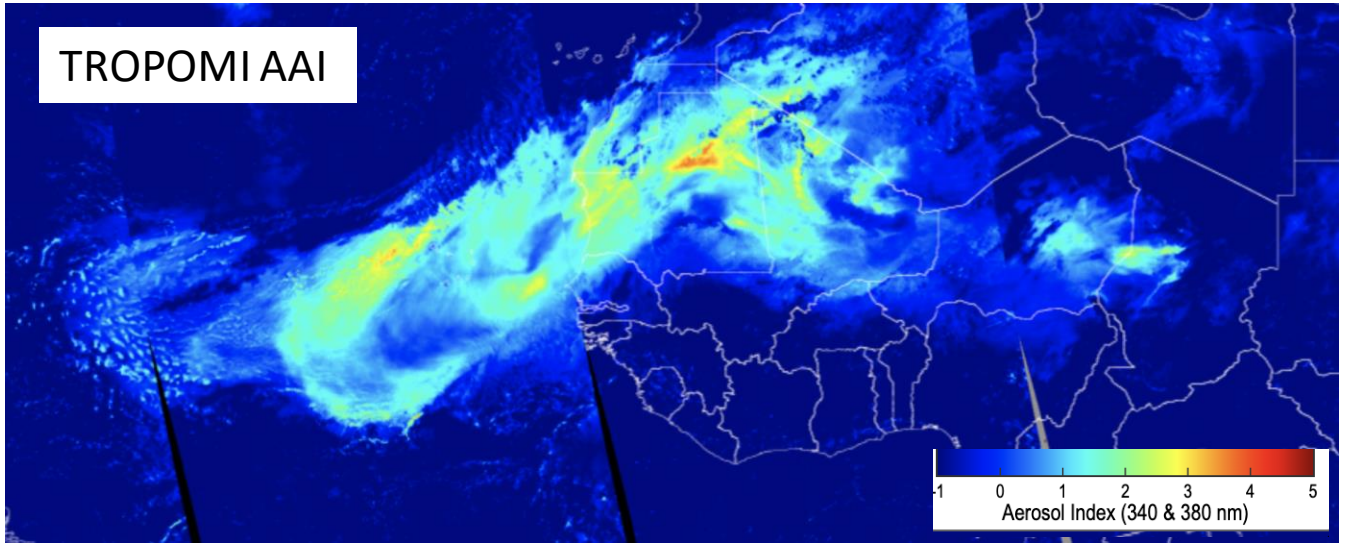


Aerosol optical depth



Comparison of TROPOMI AAI and VIIRS AOD 7.6.2021





- Combining information from AOD and AAI can give more detailed view on the dust plume
- AOD gives more detailed info on spatial variation of aerosol loading, also for places where dust is close to surface
- AOD "misses" parts of the plume, also cloudy/ partly cloudy scenes
- AAI gives more complete view of the extent of the plume, also for cloudy/partly cloudy scenes, but does not directly indicate the amount of aerosols.

(images from NOAA Jstar mapper service)

- Passive satellite observations can:
  - provide a global /large scale view on dust episodes and long range transport
  - provide information on dust in a total atmospheric column
  - be useful for “quicklooks” (Level 1 indexes), to get the first look on an episode
  - be used to estimate dust plume characteristics on a large scale; e.g. aerosol loading, plume height
- Passive satellite observations can’t:
  - give information about the surface concentrations (PMs)
  - see below clouds
- Satellite observations are a good source of information, but often the best view of an episdode is obtained when combined observations from several sources (in situ, model, satellite)