

MINISTRY OF IRRIGATION, ELECTRICITY AND WATER RESOURCES

SUDAN METEOROLOGICAL AUTHORITY

**Dust and Sand Storms Over
Sudan**

ITS ENVIRONMENTAL IMPACTS AND THEIR CLIMATE IMPORTANCE



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Sudan location



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Sudan Map

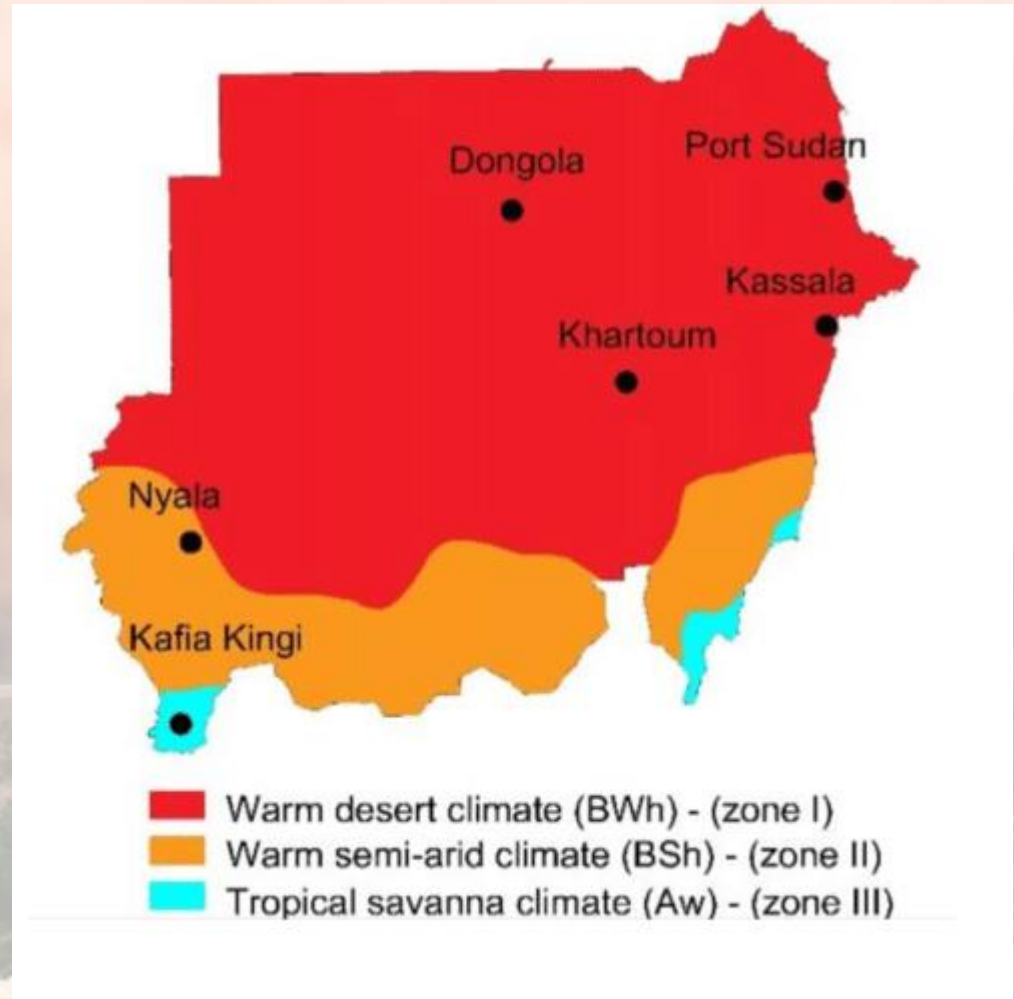


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Sudan Climate

Introduction:

- Sudan, is one of Africa largest countries, with an area about 1,882 square kilometers and is located in north east of Africa.
- Sudan has a tropical, sub-tropical climate, which is characterized by a wide range of variation extending from the desert climate in the north, through a belt of varying summer rainy season climate to the equatorial type of climate in the south, with exception of the Red Sea hills.
- The annual rainfall ranges between 25 mm in the dry North and over 1000 mm in the South. The mean annual temperature ranges from 30°C to 40°C in summer and from 10°C to 25°C in winter. The rainy season is generally short extending for three to four months in most parts of the country.

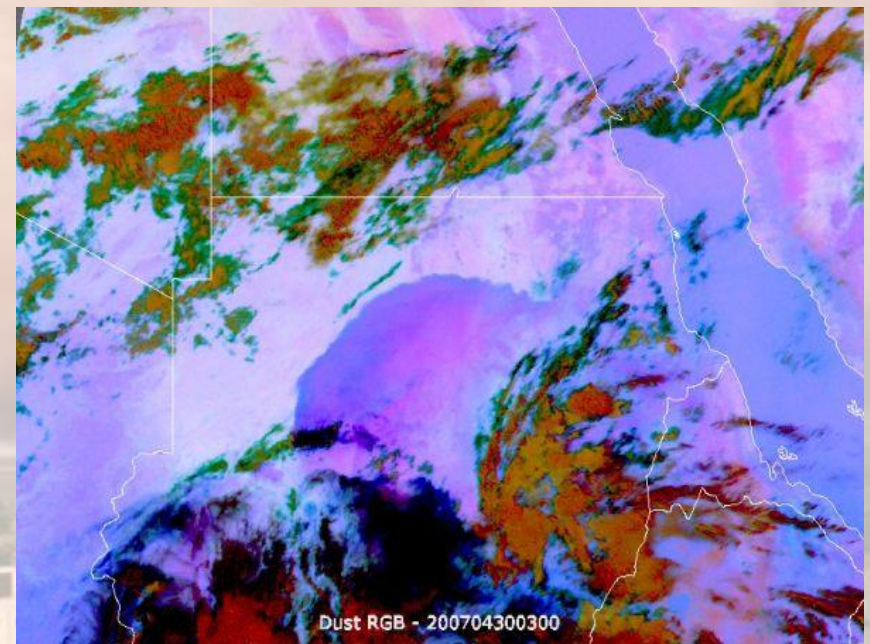
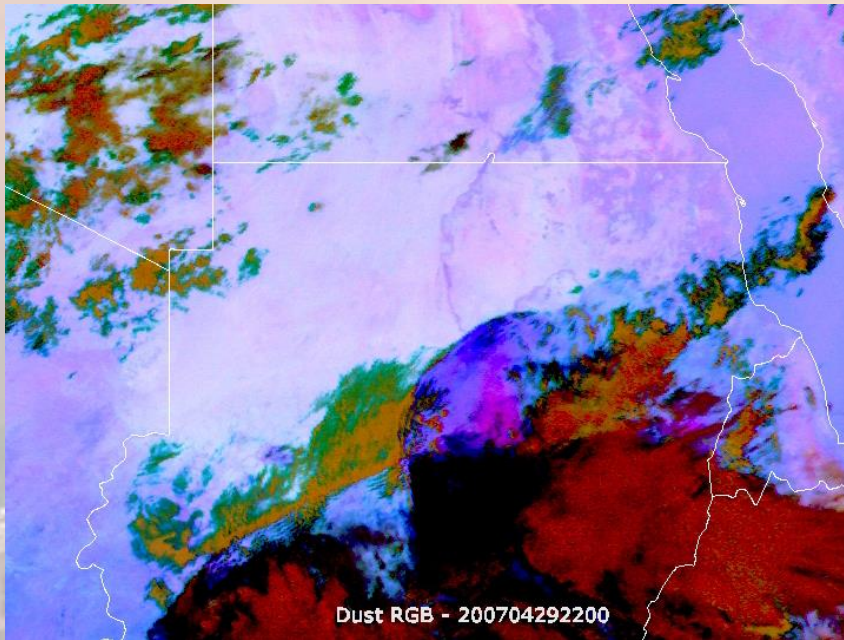


Dust and Sand Storms

- A dust or sandstorm is a common weather phenomenon in arid and semi -arid regions. There are many meteorological reasons favorable to make dust or sand storm to arises particularly in Sudan, such as:
 - The Strong Downdraft Caused by CB Cloud, happens at early rainy season.
 - The Inter-Tropical Convergence Zone (ITCZ) movement, happens at mid rainy season.
 - The excessive heating process, happens at mid summer (locally).
 - Frontal systems, happens at winter season.



The Strong Downdraft Caused by CB Cloud



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Microburst

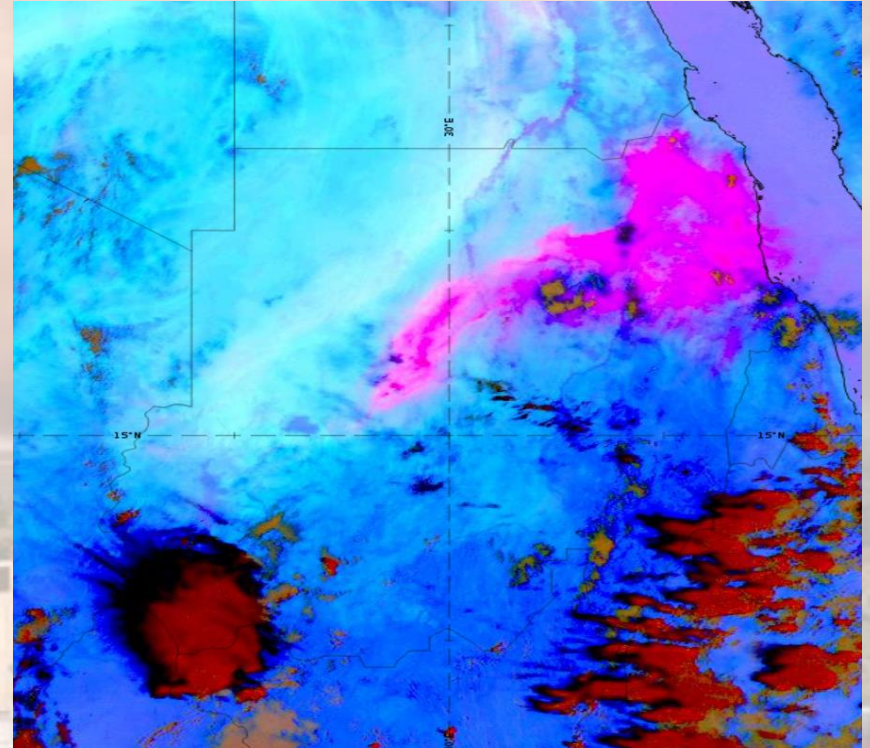
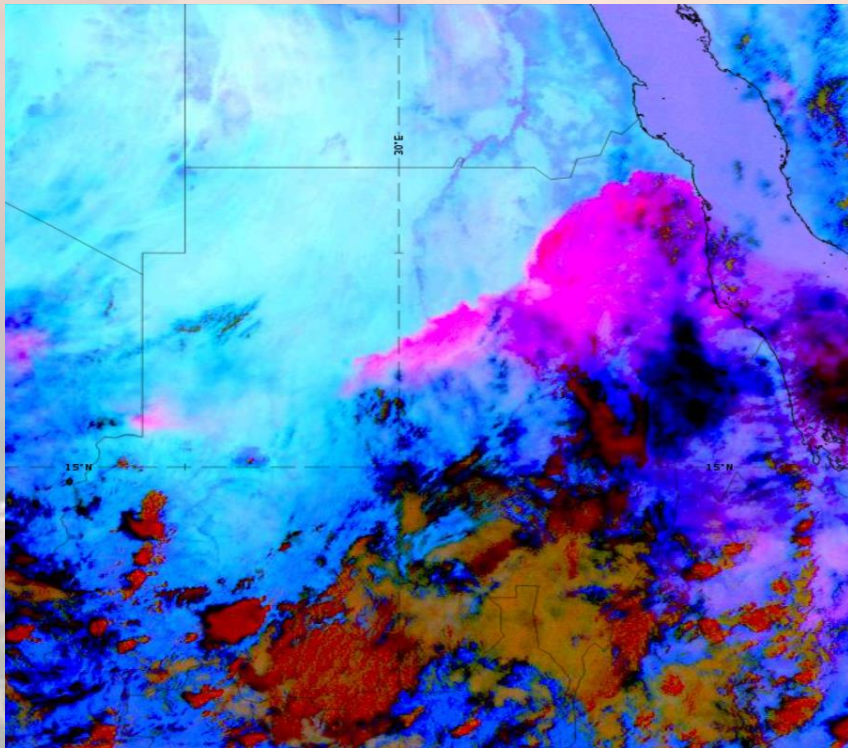
- A microburst is an intense small scale downdraft produced by a thunderstorm or rain shower
- They go through tree stages in their cycle ,the downburst , outburst and cushion stages



The Inter-Tropical Convergence Zone Movement

29 June 2018

26 June 2018



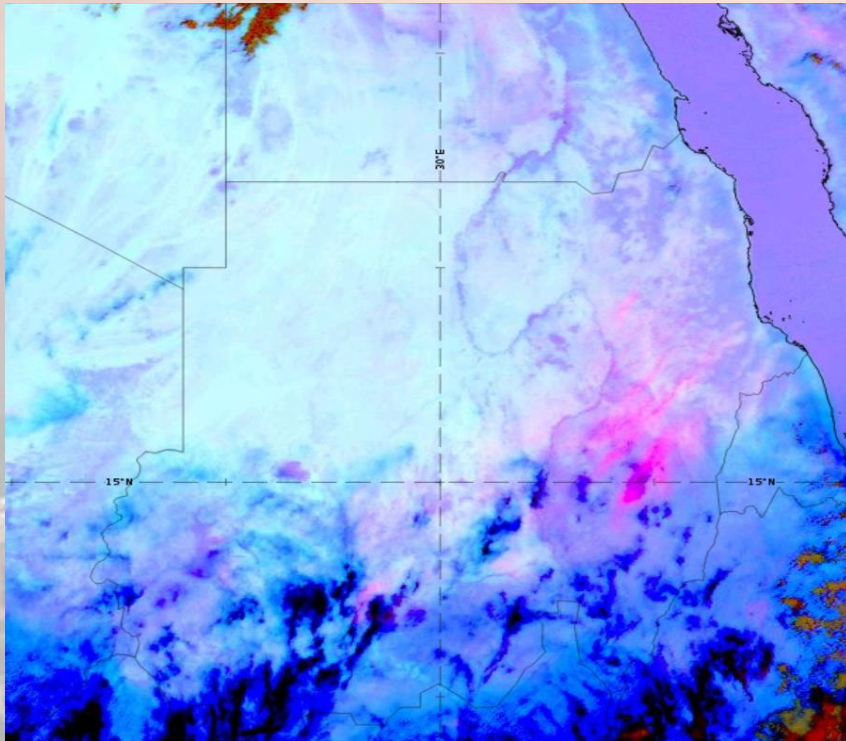
The Inter-Tropical Convergence Zone (ITCZ)

- **The zone where the dry Harmattan meet the moist southwesterly flow is known as the Inter-Tropical Convergence Zone (ITCZ).**
- **It is associated with convergence in the low level wind field and a sharp moisture gradient.**

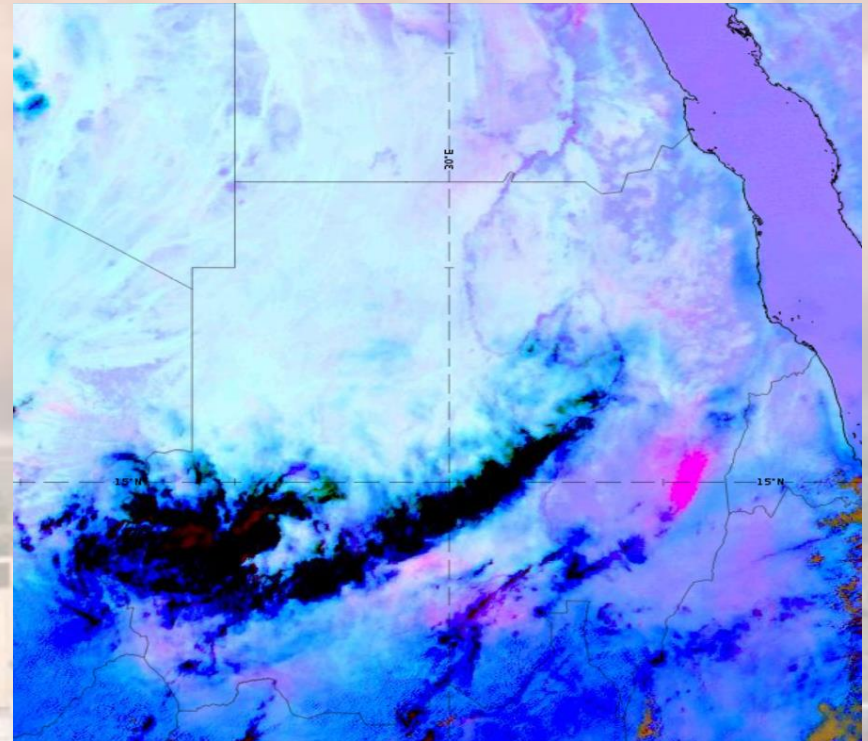


Excessive Heating Process

14 April 2018



14 April 2018



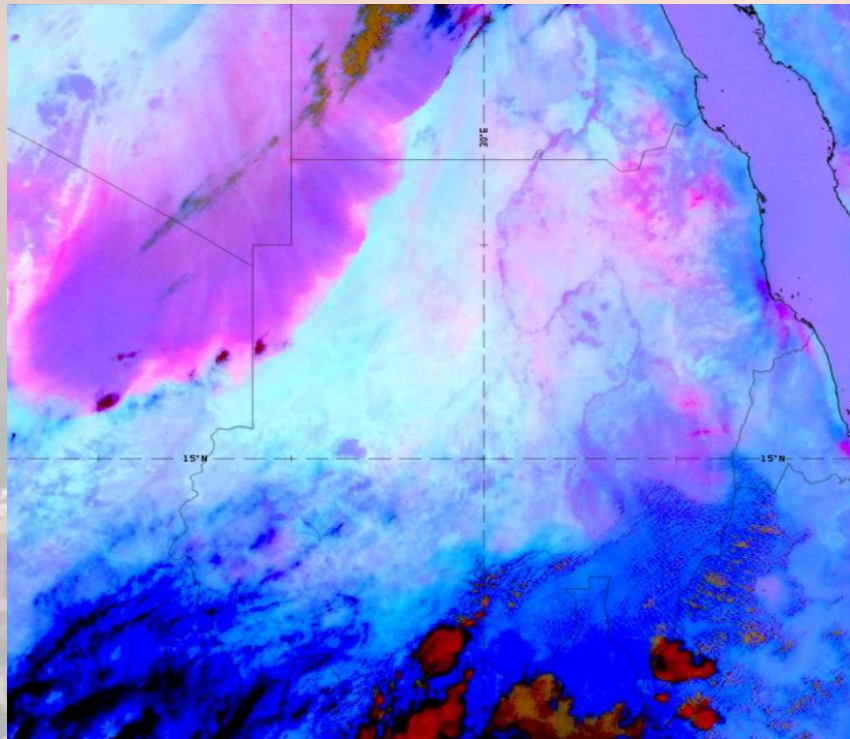
Haboob

- The haboob is a sandstorm prevalent in the region of Sudan around Khartoum.
- storms are very common around Khartoum every summer.
- When it happens you can't see anything but a wall of sand covering your view.

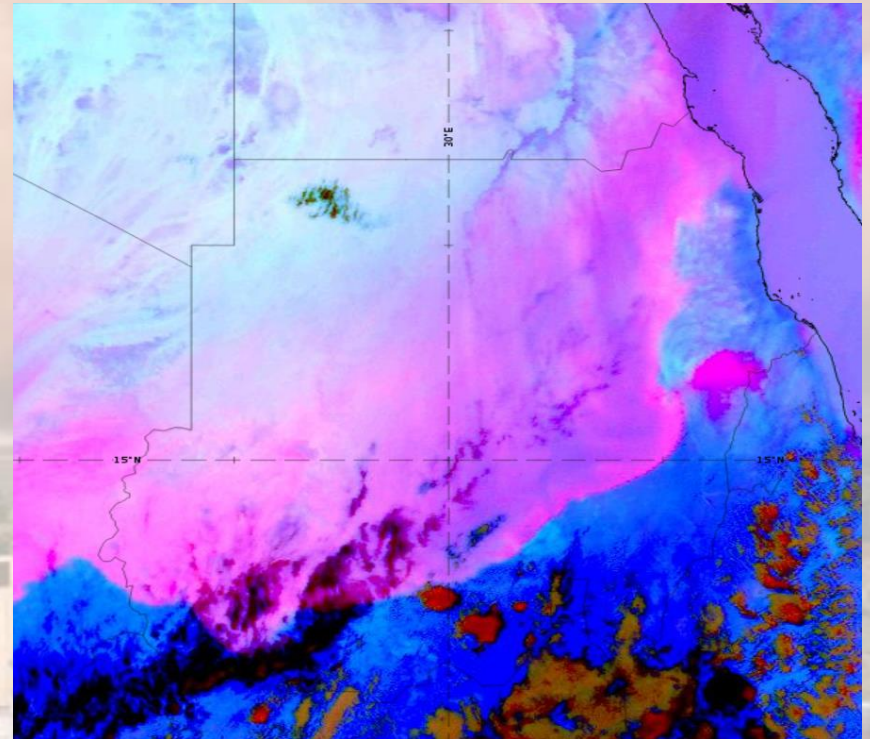


Frontal systems

28 March 2018



28 March 2018



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Frontal Systems

- Synoptic systems are frontal that cover great distances to 1500 miles (998 to 2414 kilometers) across.
- dust storms are created when these fronts sweep onto hot arid surface



ENVIRONMENTAL IMPACTS

There are three environmental aspects that dust and sandstorm are impact it :-

Entrainment

- Soil loss.
- Nutrient, seed and fertilizer loss.
- Crop root exposure.
- Undermining structures.

Transport

- Sand-blasting of crops.
- Radio communication problems.
- Microwave attenuation.
- Transport disruption.
- Local climatic effects.
- Air pollution.
- Respiratory problems and eye infections.
- Disease transmission (human).
- Disease transmission (plants and animals).



❑ Deposition

- Salt deposition and groundwater salinization.
- Reduction of reservoir storage capacity.
- Drinking-water contamination.
- Burial of structures.
- Crop growth problems.
- Machinery problems.
- Reduction of solar power potential.
- Electrical insulator failure.
- Disruption to power supplies.



CLIMATE IMPORTANCE

There are many important roles that can dust and sandstorms play it to enhance weather and climate system :-

- Dust particles, especially if coated by pollution, act as condensation nuclei for warm cloud formation and as efficient ice nuclei agents for cold cloud generation.
- Modification of the microphysical composition of clouds changes their ability to absorb solar radiation, which indirectly affects the energy reaching the Earth's surface.
- Dust particles also influence the growth of cloud droplets and ice crystals, thus affecting the amount and location of precipitation.

Airborne dust functions in a manner similar to the greenhouse effect:-

- It absorbs and scatters solar radiation entering Earth's atmosphere, reducing the amount reaching the surface, and absorbs long-wave radiation bouncing back up from the surface, re-emitting it in all directions.
- Again, the ability of dust particles to absorb solar radiation depends on their size, shape and mineralogical and chemical composition.
- The vertical distribution of dust in the air (vertical profile) and the characteristics of the underlying surface are also required to quantify this impact.



conclusion

- Dust and sand storms are very challenged weather phenomenon in Sudan
- They are sources of risks at all levels



Recommendation

- Training
- Support technical and logistical research
- Exchange of information
- The necessity of establishing a regional research center that includes all the affected countries



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• thanks



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