

# Changes of Particle Concentration and Size During Dust Events: Measurements from AEROS

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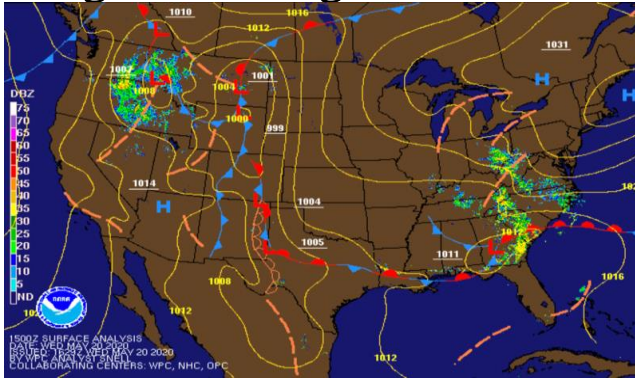
# Strong winds associated with dust storms are a result of two different meteorological disturbances

## Dust storm vs Haboob (Synoptic vs. Convective)

Synoptic – scale used in meteorology that ranges from hundred of kilometers

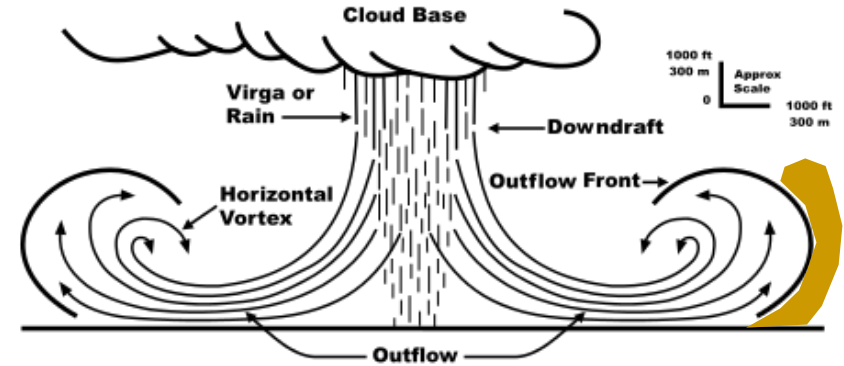
(AMS Glossary, 2012)

- Front (warm and cold)
- Cyclones (low and high)
- Troughs and ridges



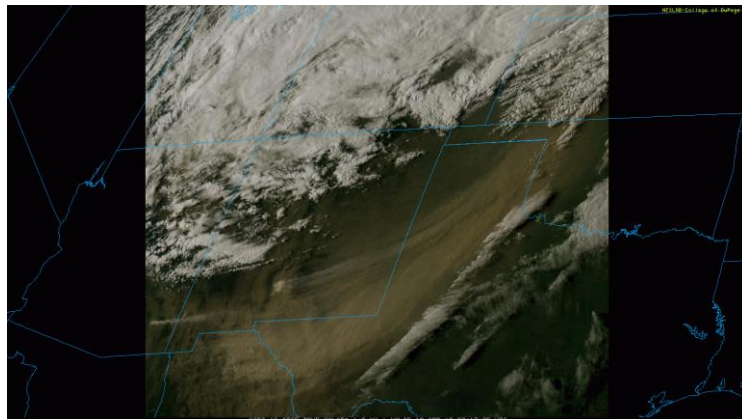
Convective – quick increase of winds as a result of a thunderstorm

- Outflows
- Micro- and macroburst
- Downburst



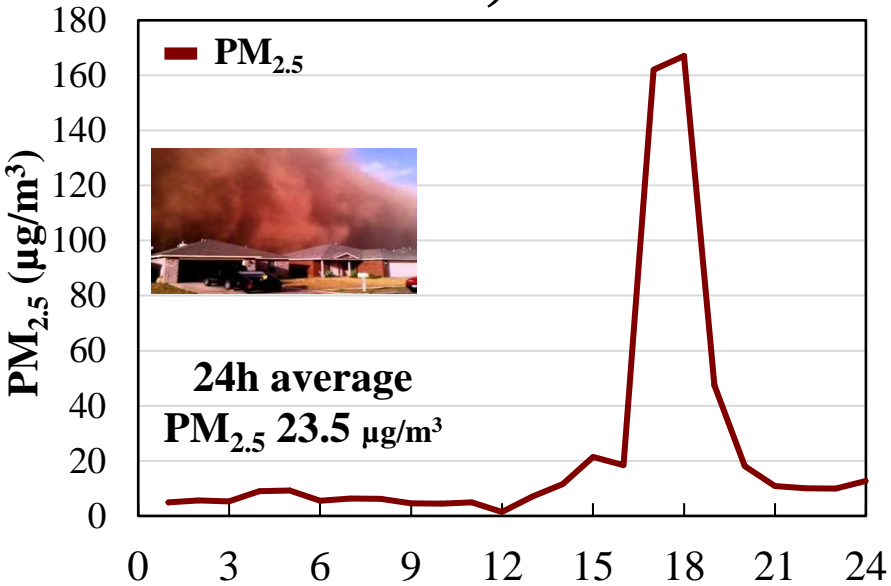
wikipedia

NOAA NWS Archive, 2020



Gitbay.com

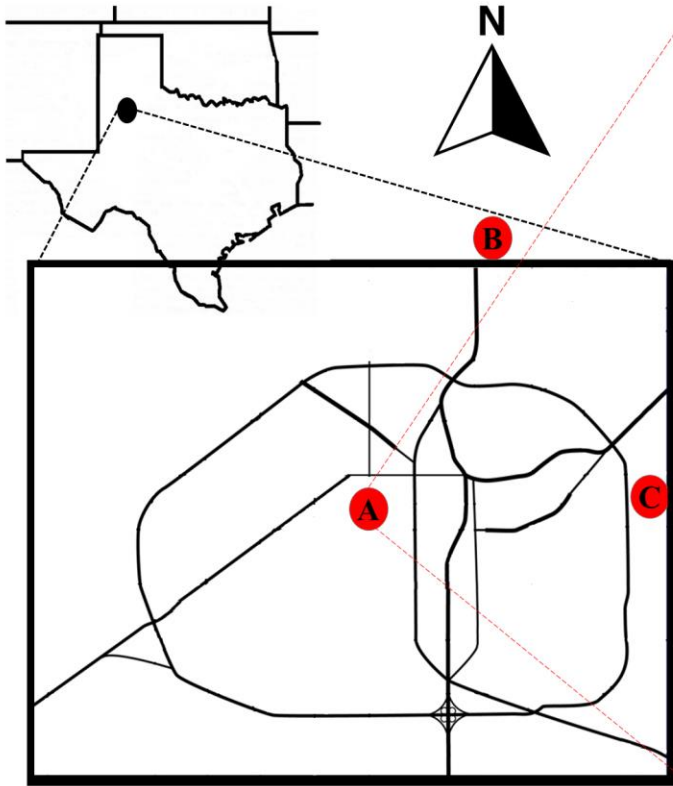
# October 17, 2011



WHO Guidelines	24h mean	EPA	Annual mean
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	25	35	12
PM <sub>10</sub> (µg/m <sup>3</sup> )	50	150	50



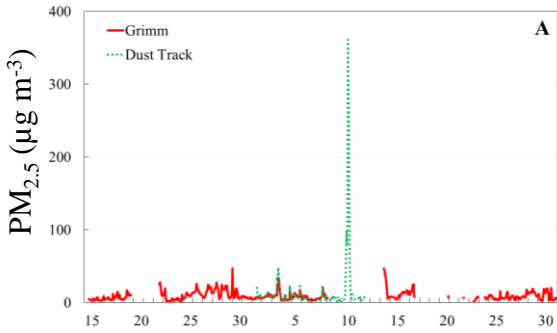
# Aerosol Research Observation Station (AEROS)



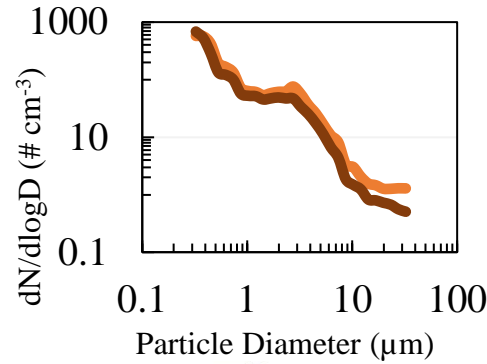
# Aerosol Research Observation Station (AEROS)



### PM<sub>1</sub>, PM<sub>2.5</sub> & PM<sub>10</sub>



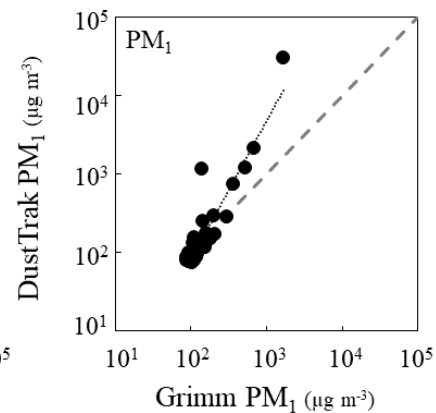
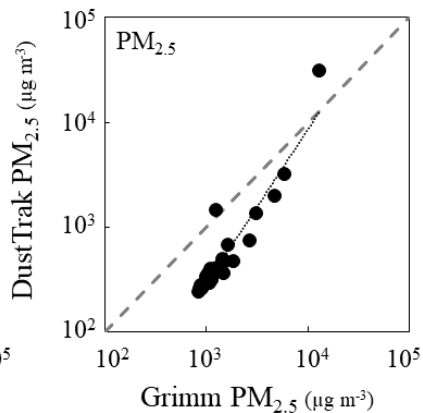
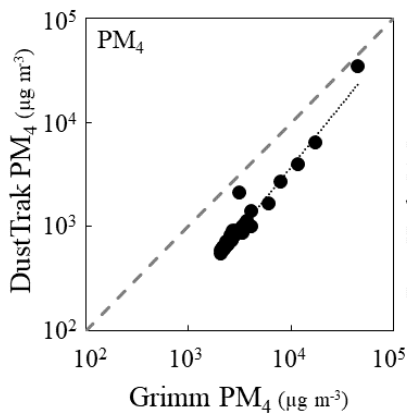
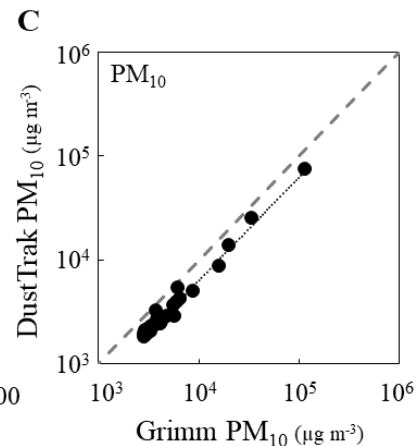
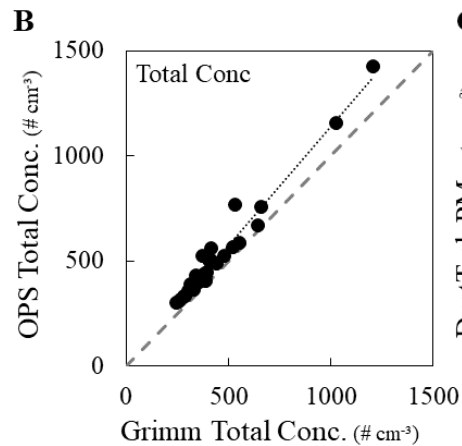
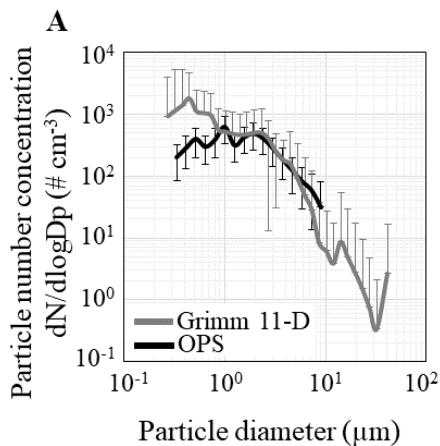
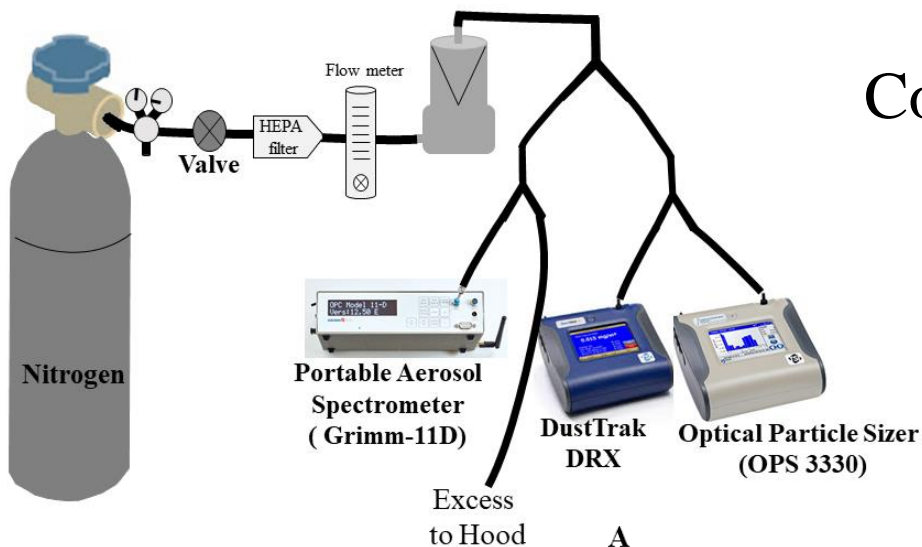
### Total Particle Concentration & Size Distribution

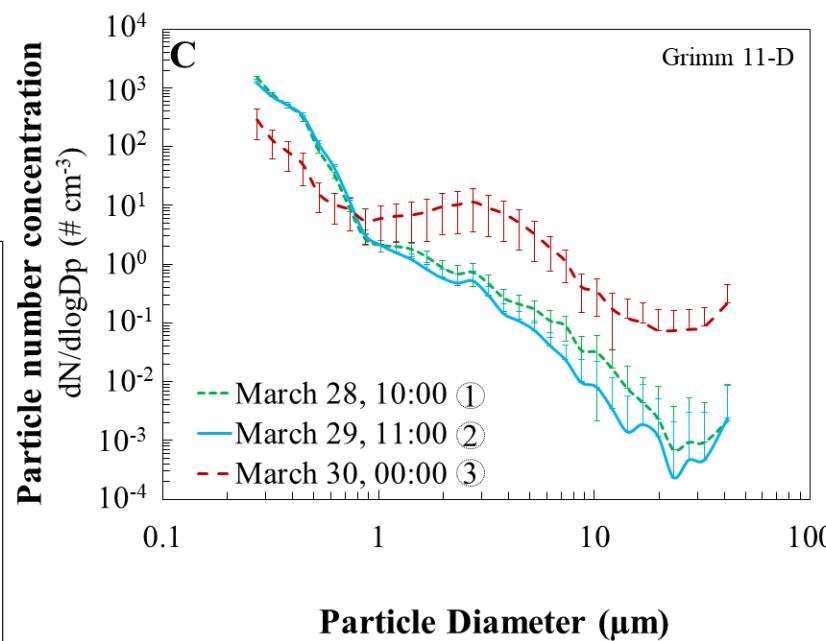
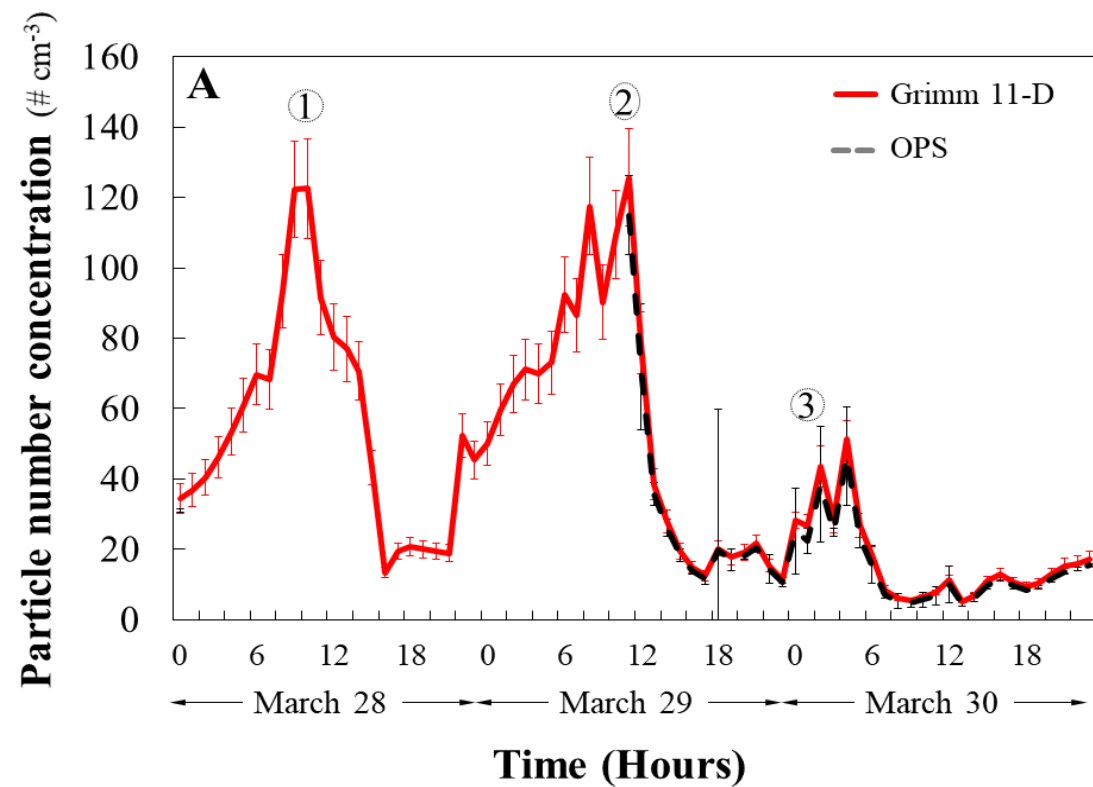
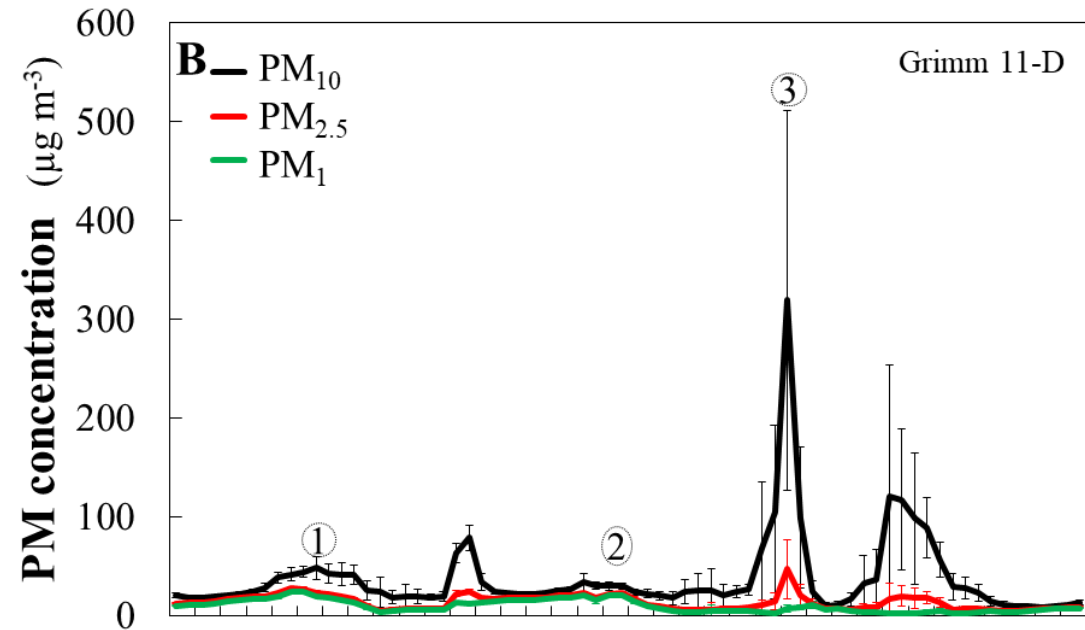


- Optical Particle Sizer (OPS 3330 - TSI)
- DustTrak DRX aerosol monitor (8533EP - TSI)
- Portable Aerosol Spectrometer (PAS, Grimm-11D)
- Harvard Impactor system
- Filter holder A Davis Vantage Vue® meteorological station



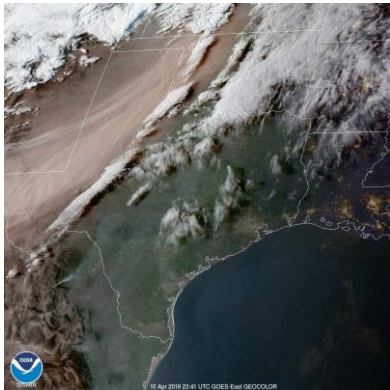
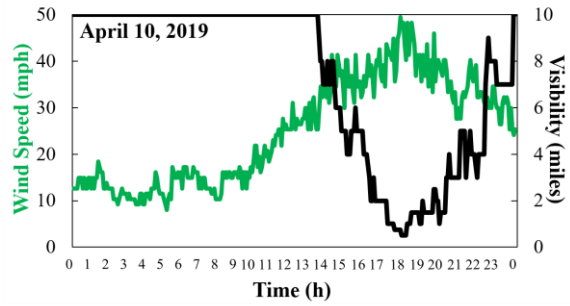
# Comparison of instrument in the lab





# April 10, 2019

## Synoptic event



# April 10, 2019

Synoptic event



# June 5, 2019

Convective events



# June 21, 2019



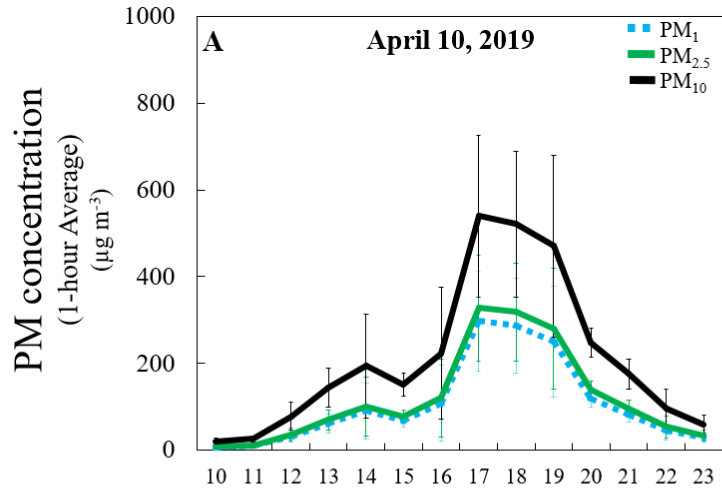
## PM Mass Concentration - Daily average

Dust Track	April 10	June 5	June 21	PM ( $\mu\text{g}/\text{m}^3$ )	WHO 24h	EPA 24h
PM <sub>2.5</sub>	72.6 $\pm$ 122.8	22.2 $\pm$ 126.4	27.7 $\pm$ 98.7	PM <sub>2.5</sub>	25	35
PM <sub>10</sub>	128.6 $\pm$ 194.5	29.5 $\pm$ 184.4	37.8 $\pm$ 128.9	PM <sub>10</sub>	50	150
Duration of event	12h	20 min	30 min			

# PM mass concentration - ( $\mu\text{g m}^{-3}$ )

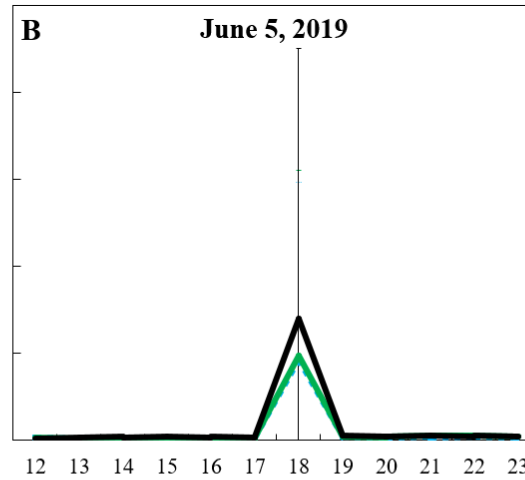
Synoptic event

12h

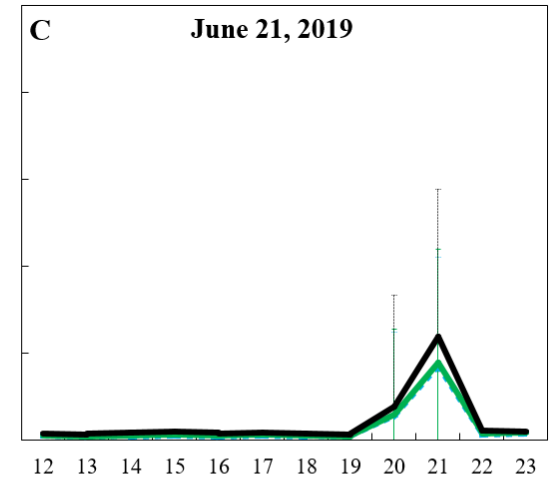


Convective events

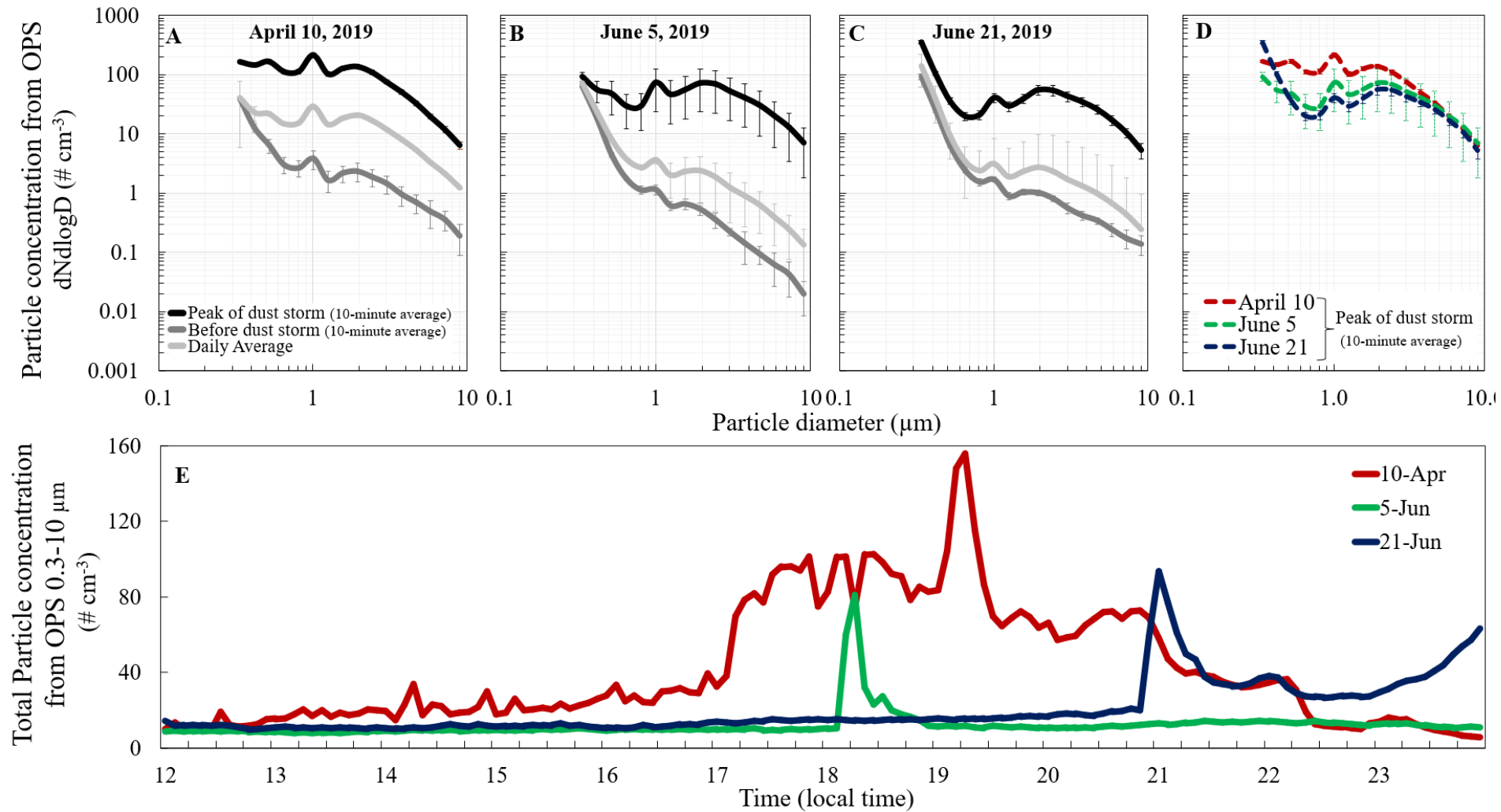
20 min



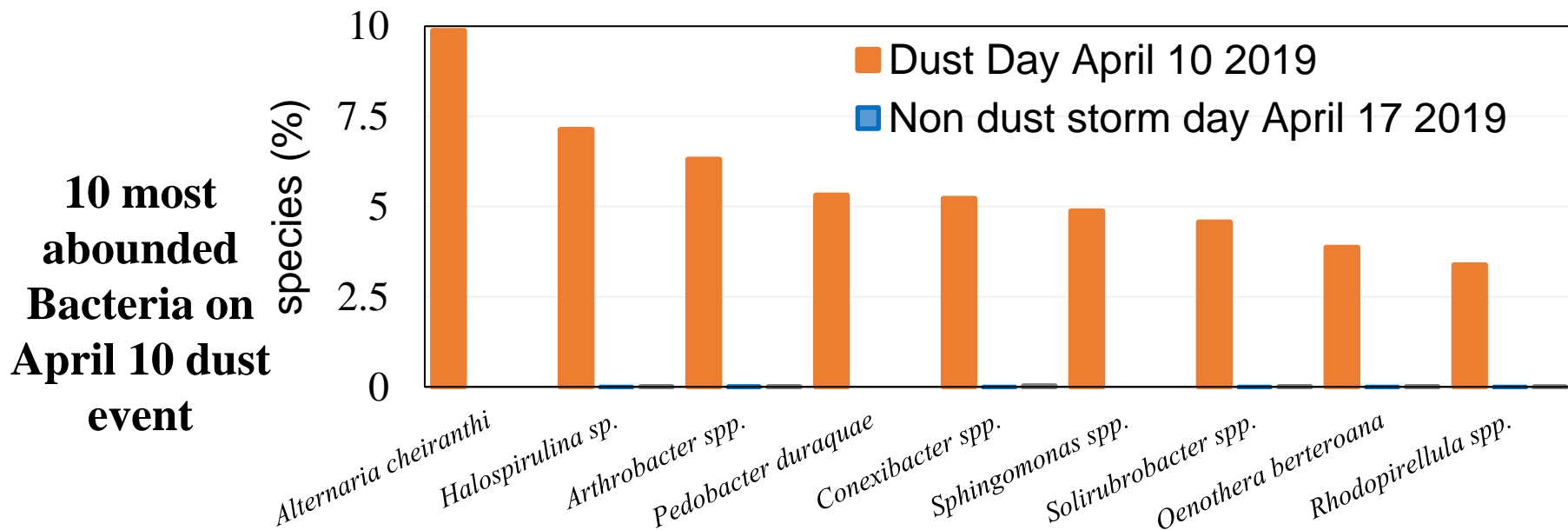
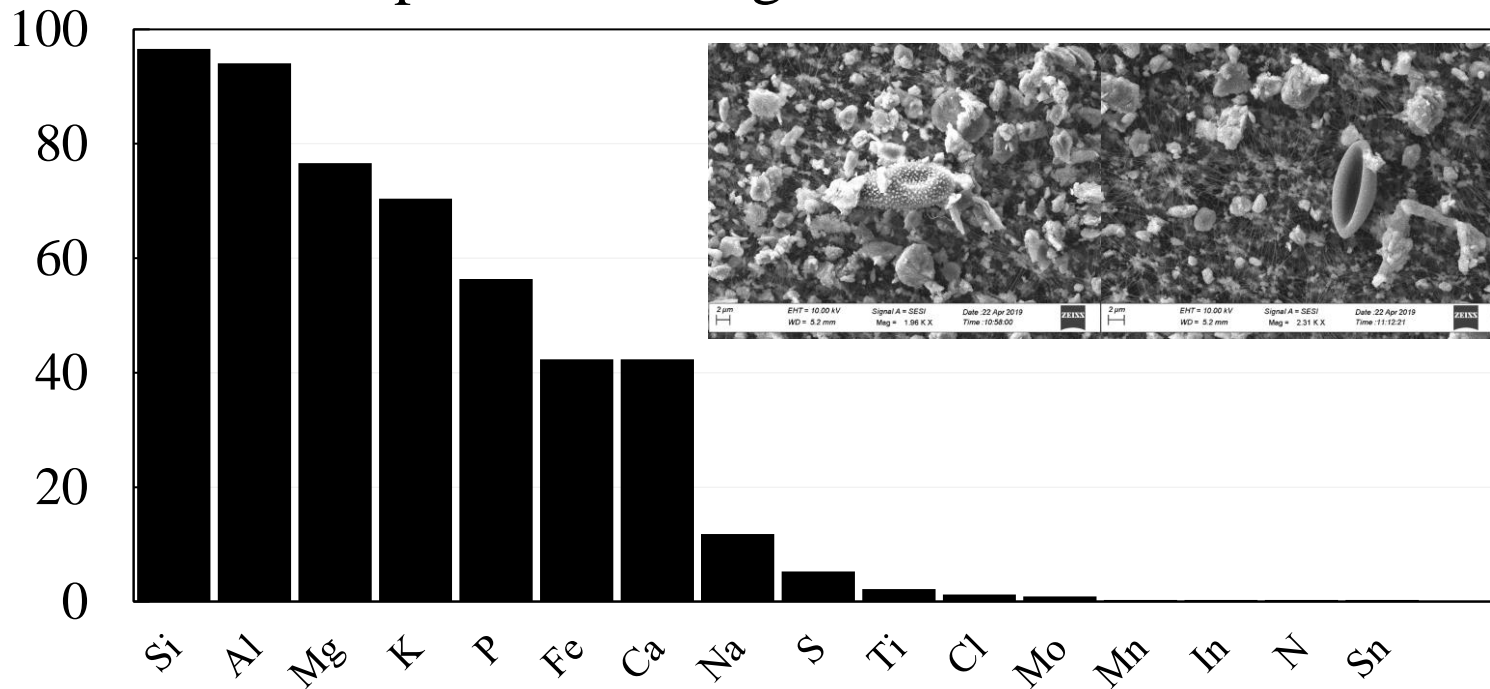
30 min



**A significant difference between the dust particle concentrations when comparing measurements from before the dust storm and at its peak. The dust storms contain a high concentration of smaller particles.**



# Elemental composition during dust event



# Thank you for your attention



*Please contact me for potential collaborations  
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