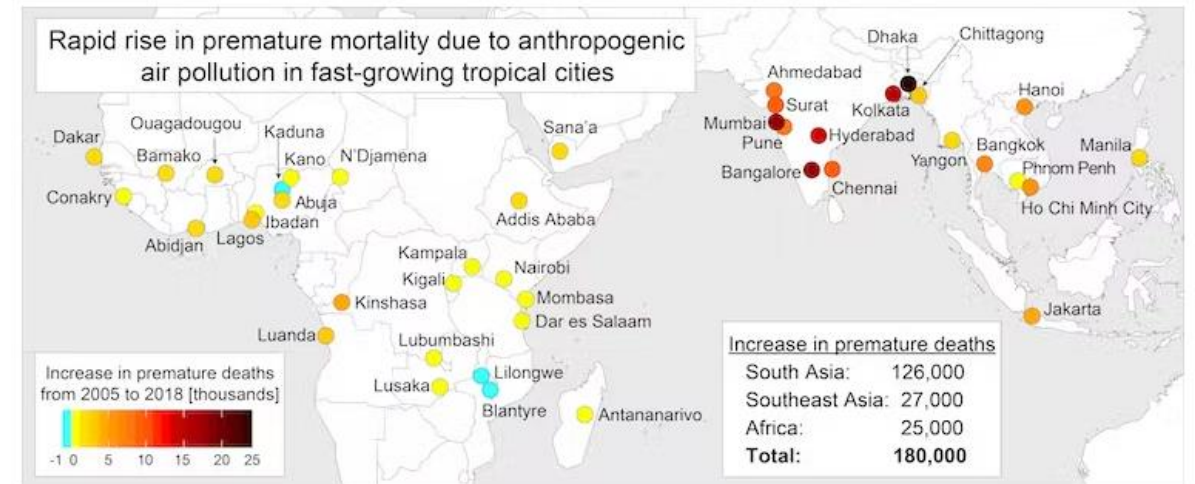
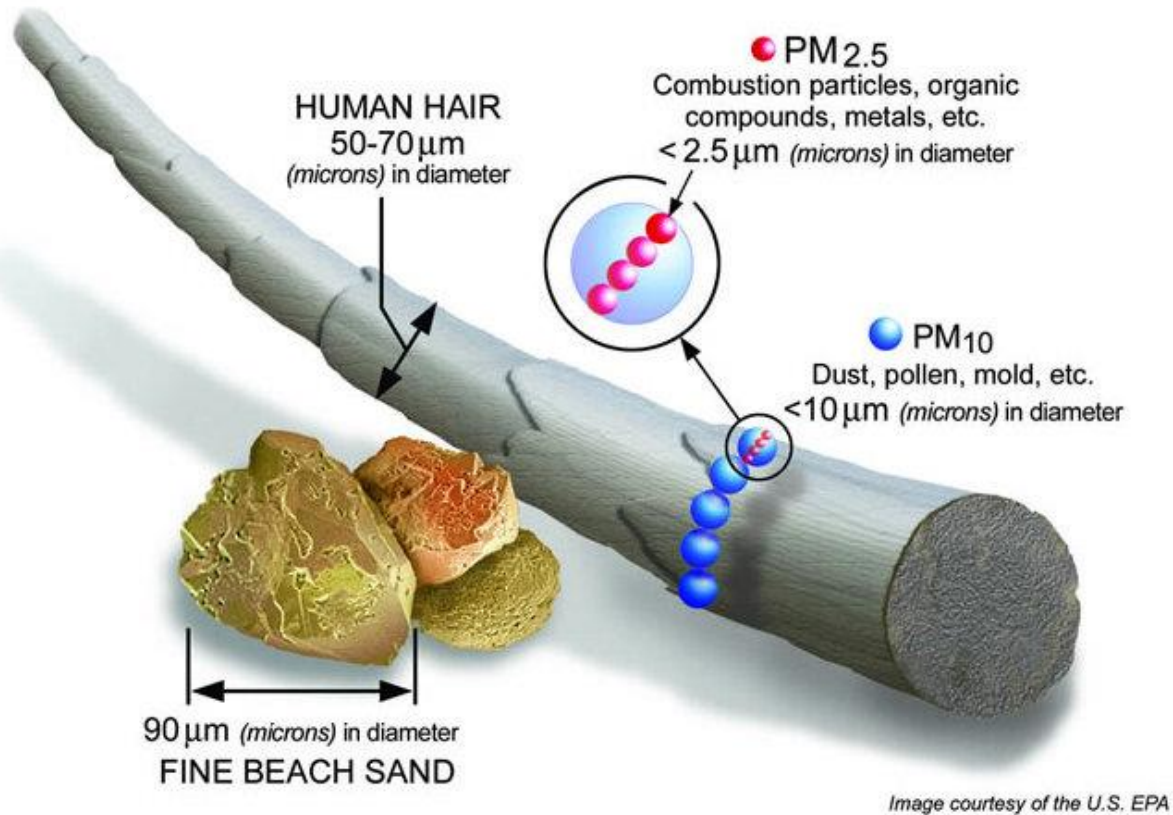


# Leveraging shared knowledge – Regional and national air quality monitoring data streams

Anderson Kehbila

SEI-Africa

# Air Quality : Growing concern in tropical cities

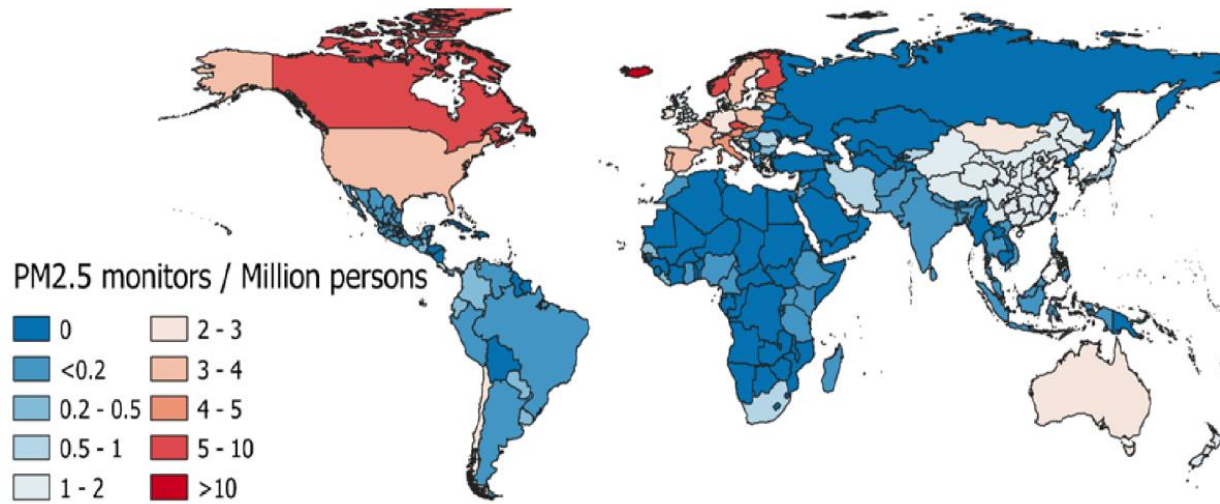


Of most concern is PM<sub>2.5</sub>, as these particles are about 30 times smaller than the diameter of a strand of human hair. PM<sub>2.5</sub> penetrate deep into our lungs and go on to have a range of effects on health, leading to premature death.

Health risk assessment and atmospheric chemistry models, along with the satellite data, to **estimate that premature mortality** from sustained exposure to these small particles has steadily increased in **21 of the fastest growing cities in Africa**. **It's risen from 84,000 in 2005 to 110,000 in 2018. This is on average about 2,000 avoidable deaths each year.**

# Filling the gaps of Air Quality Data Across Africa

Density of Long-Term PM<sub>2.5</sub> Monitoring Sites



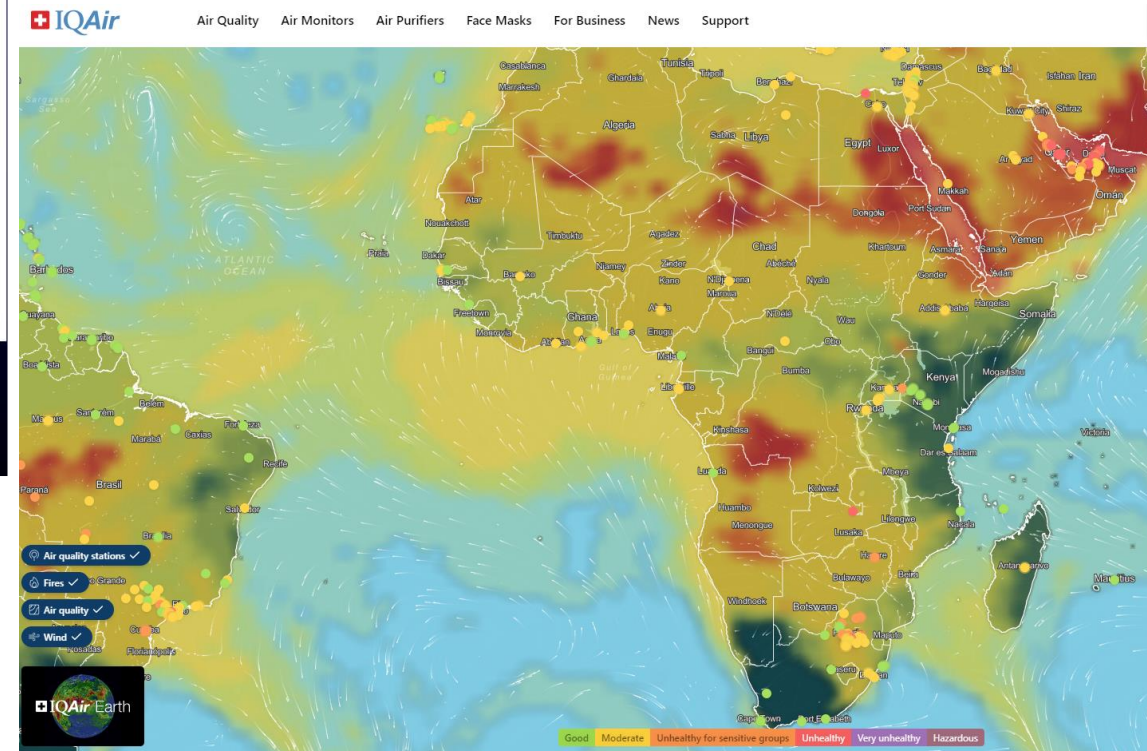
Number of PM<sub>2.5</sub> monitors per million inhabitants by country for any of the years 2010-2016.

Most countries have no PM<sub>2.5</sub> monitoring

Michael Brauer

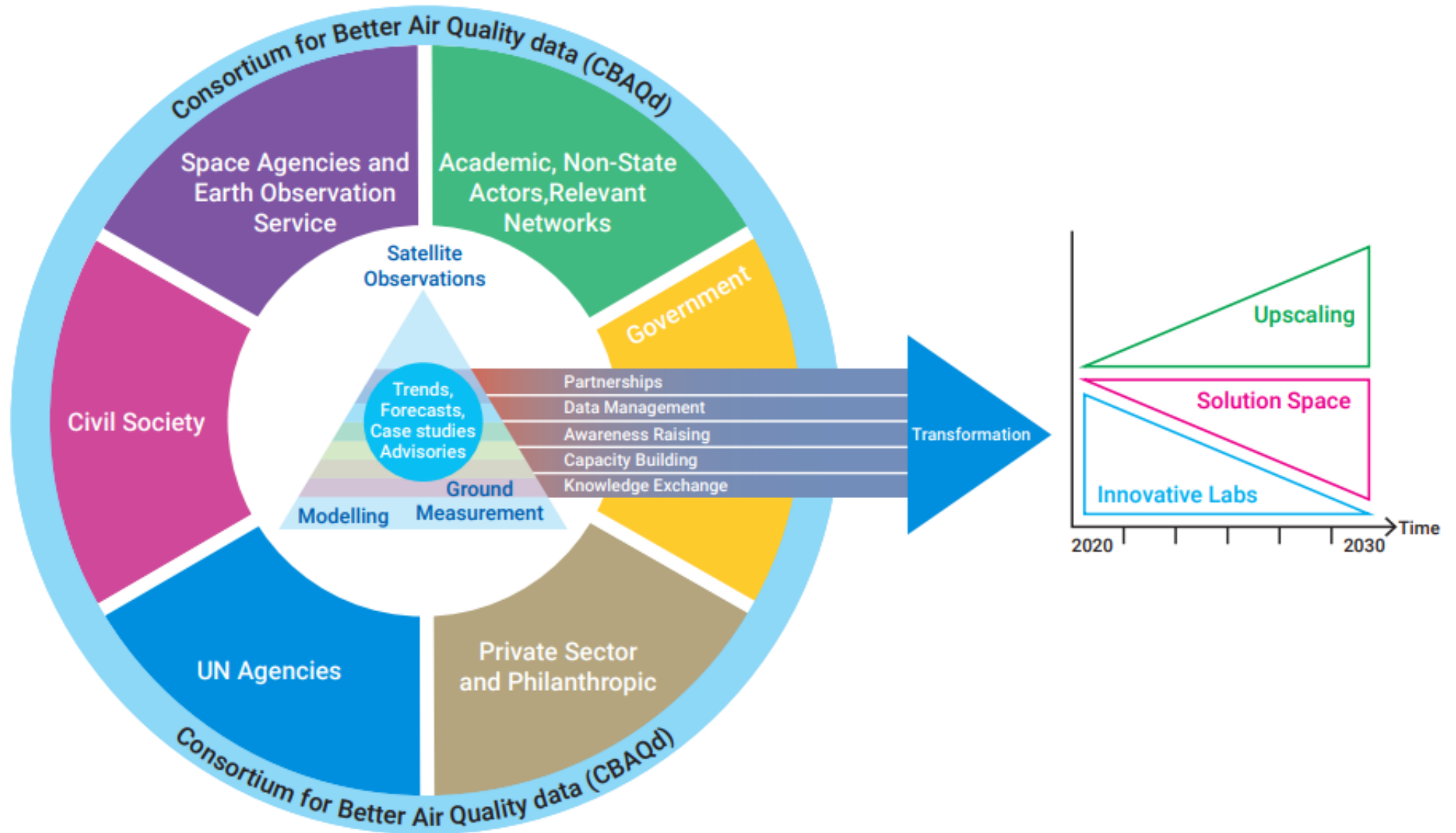
Martin et al. submitted

Efforts have been made to close the air quality monitoring gap.....



Lack of air quality monitoring infrastructure. In Western Africa, there is approximately 1 reference-grade PM<sub>2.5</sub> (PM with an aerodynamic diameter less than 2.5 micrometers) monitor per 10 million people.

# Strategy for Air Pollution and Climate Change Mitigation for Decision Making





# Air quality sensor deployment across Africa by UNEP-SEI

**DAKAR, Senegal:** 2 AQ Sensors deployed and 18 additional sensors to be deployed in Sept 2023

**KAMPALA, Uganda:** 12 Air Quality Sensors to be installed in September 2023

**KENYA:** 43 Air Quality Sensors installed in Kenya (30 in Nairobi, 8 Sensors in Nakuru, 3 sensors in Eldoret and 2 Sensors in Kilifi. )

**Djibouti:** 4 Air Quality Sensors deployed in Djibouti

**ADDIS ABABA, Ethiopia:** 11 Air Quality Sensors deployed in Addis ABABA

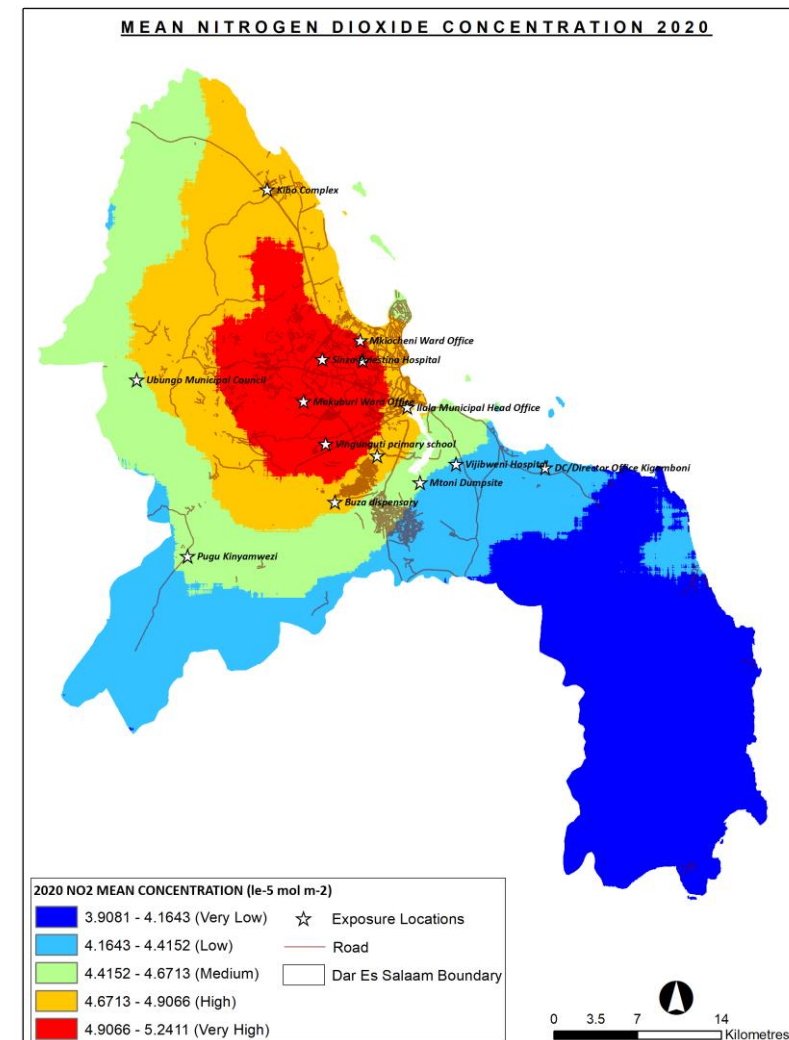
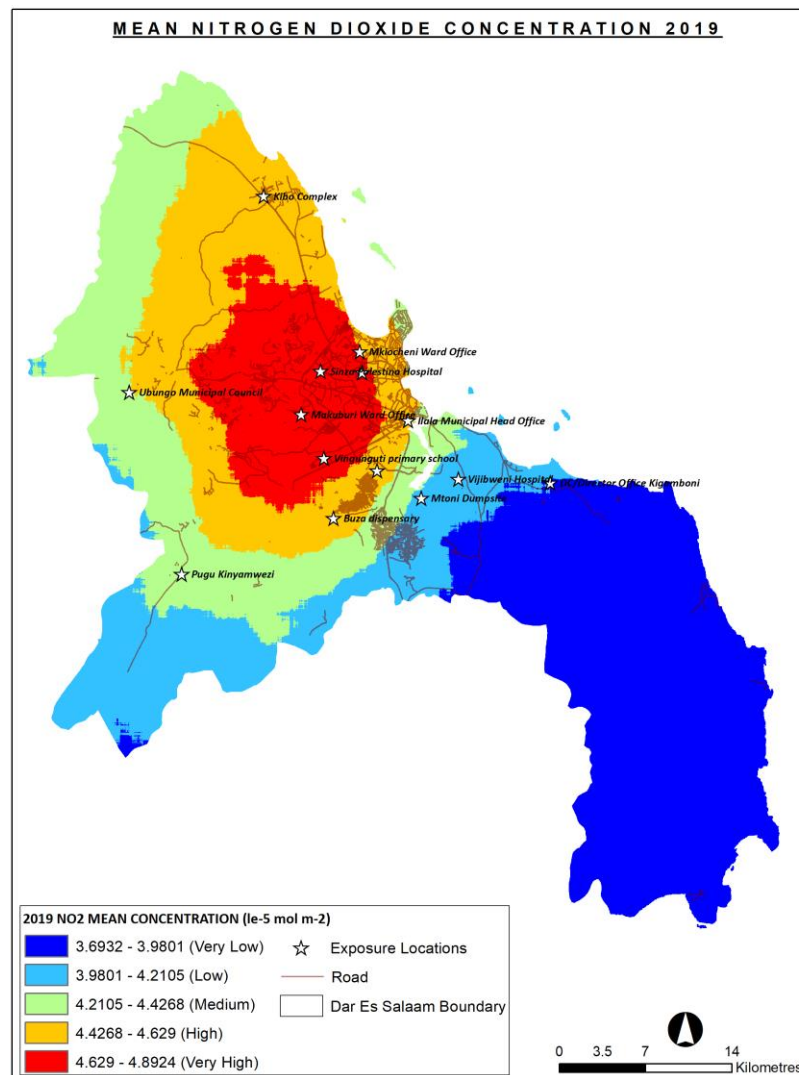
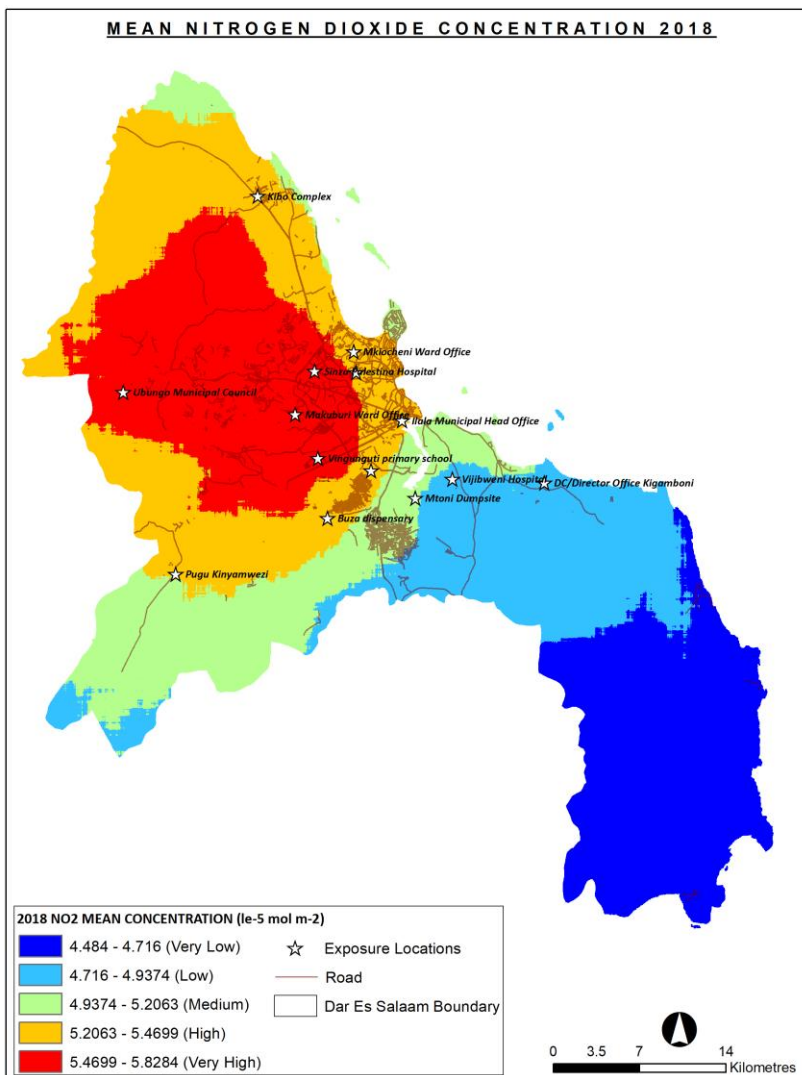
**TANZANIA:** 25 Air Quality Sensors deployed in Dar-es Salaam and Zanzibar.

**ZAMBIA:** 3 Air Quality Sensors deployed in Ndola and Lusaka.



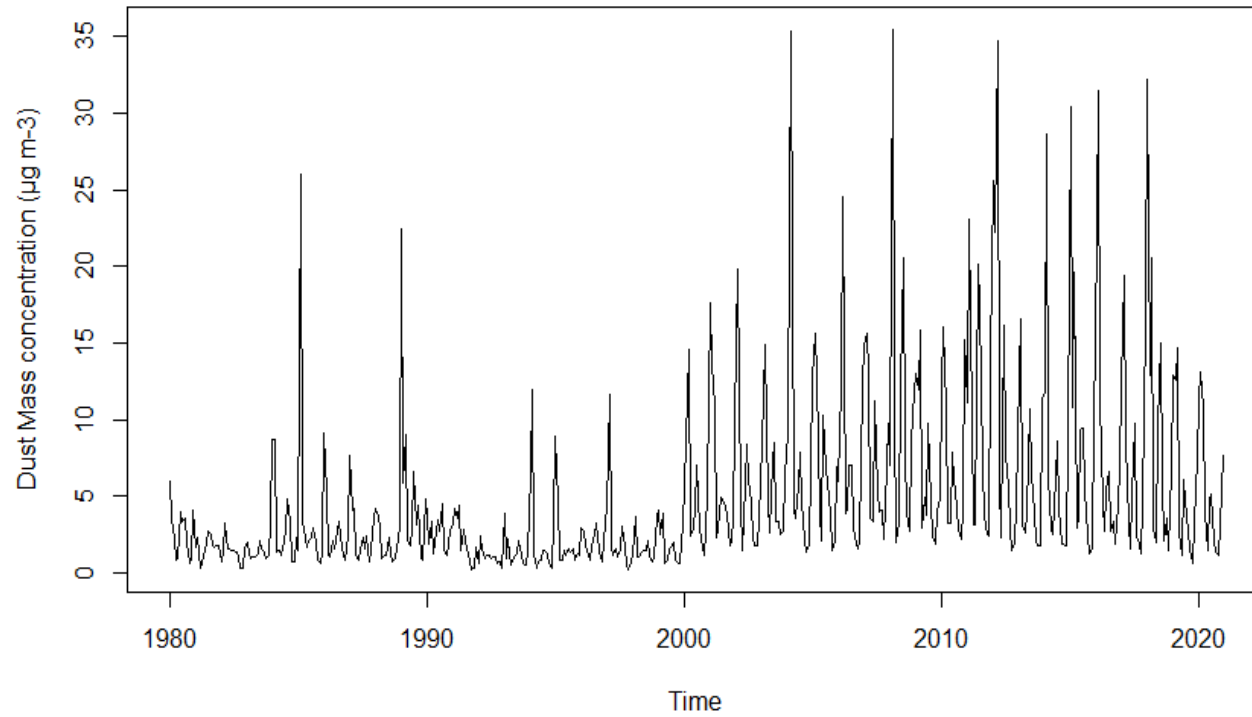
**Case Study I:  
Dar es Salaam Air Quality Monitoring  
Programme**

# Mean Satellite Nitrogen Dioxide (NO<sub>2</sub>) Concentration in Dar es Salaam

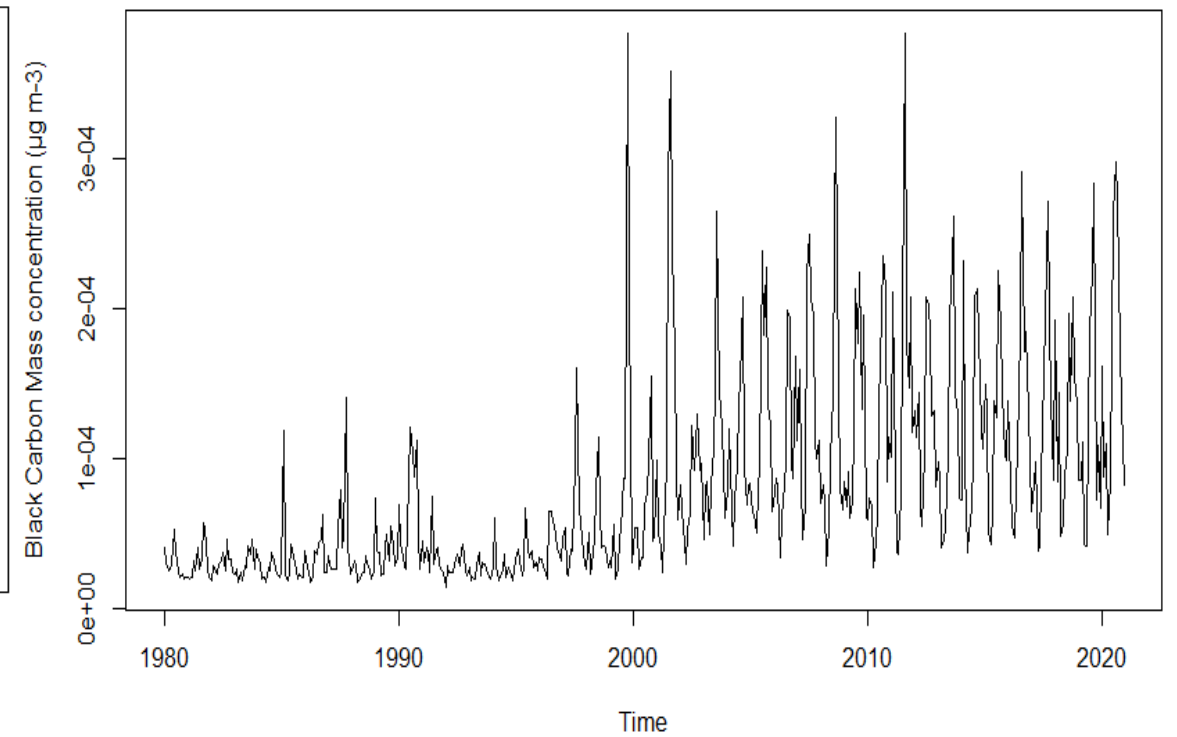


# Mean Satellite Annual Particulate Matter Concentration in Dar es Salaam

Area-Averaged of Dust Surface Mass Concentration - PM 2.5, Dar Es Salaam  
(Monthly 1980-Jan - 2021-Jan)

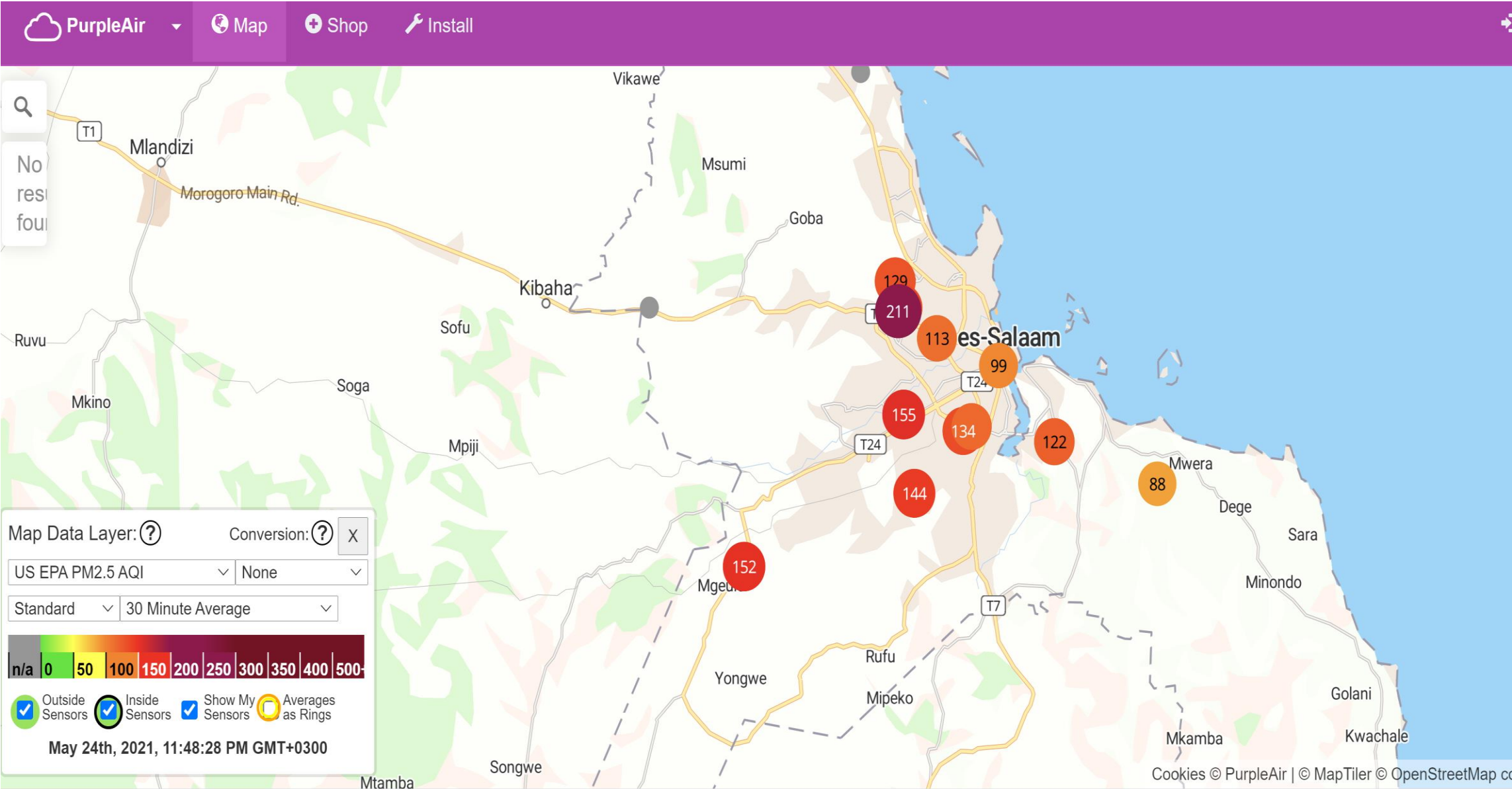


Area-Averaged of Black Carbon Surface Mass Concentration - PM 2.5, Dar Es Salaam  
(Monthly 1980-Jan - 2021-Jan)

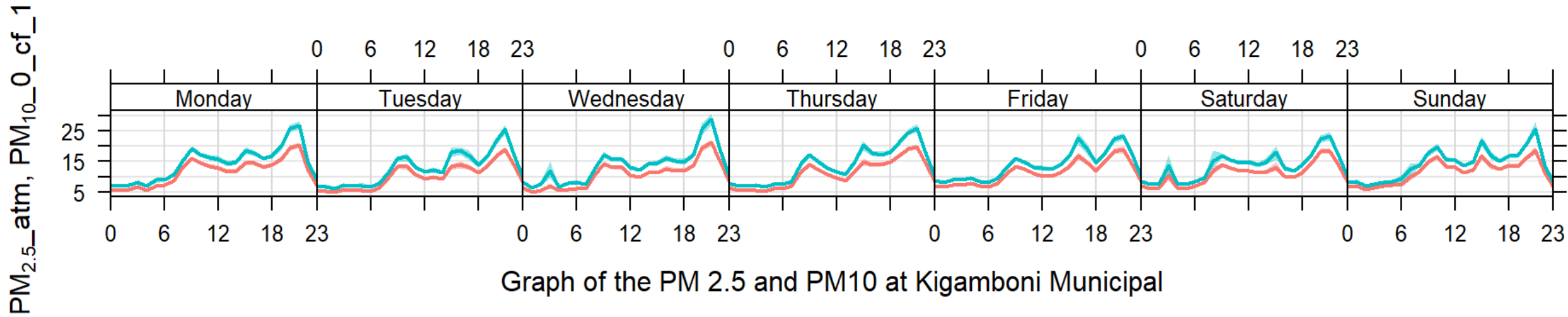




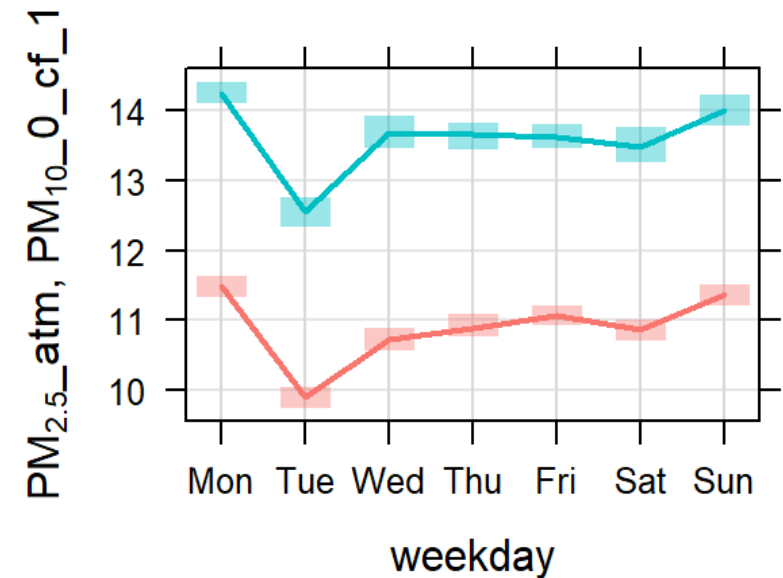
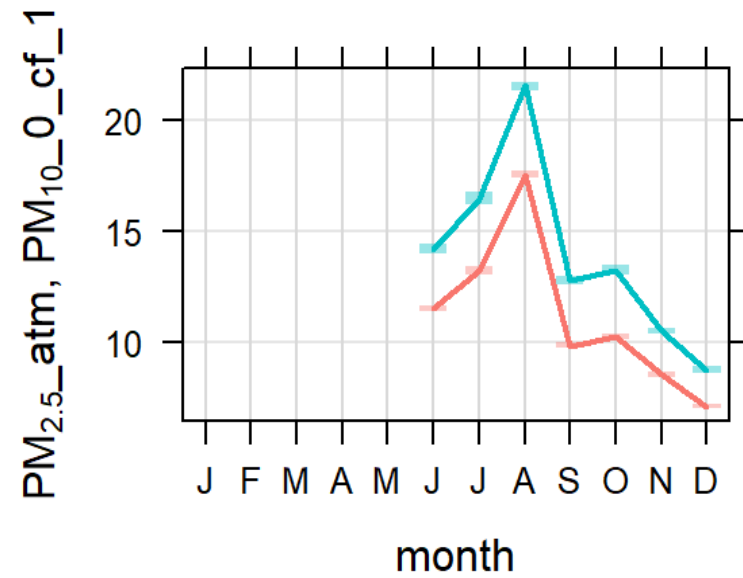
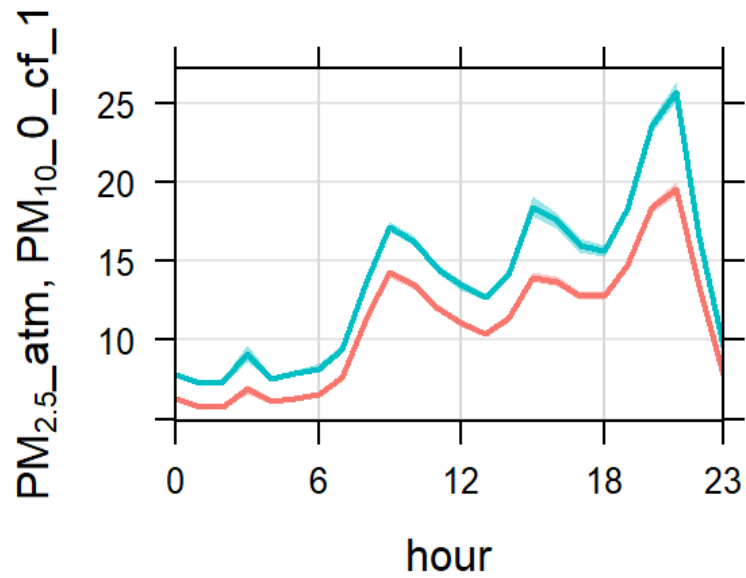
# Dar es Salaam Air Quality Network Map



# Mean PM2.5 Ground Monitoring Concentration in Dar es Salaam



■ PM<sub>2.5\_atm</sub>
■ PM<sub>10\_0\_cf\_1</sub>

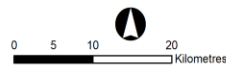
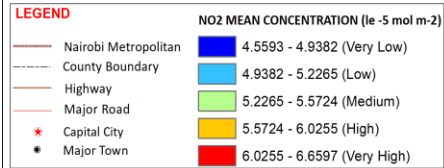
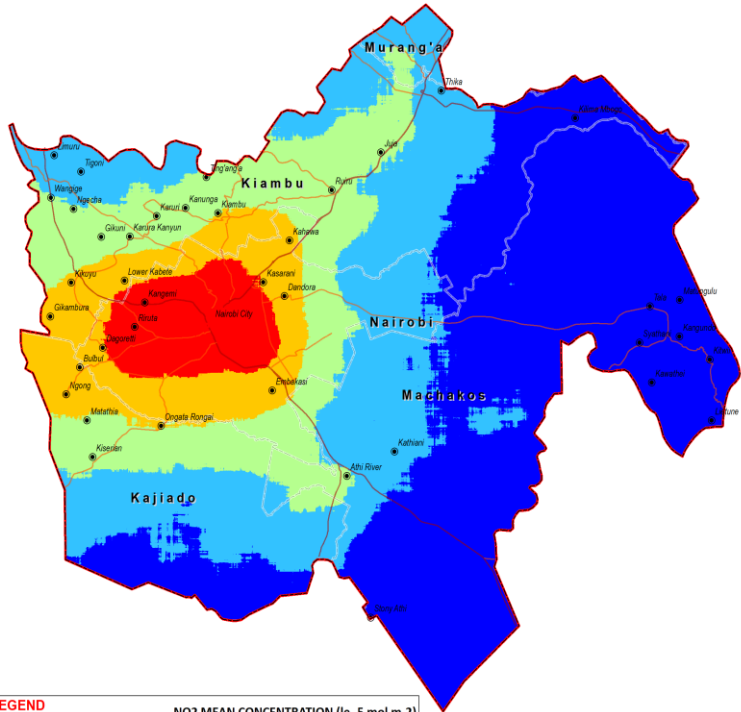


mean and 95% confidence interval in mean

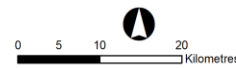
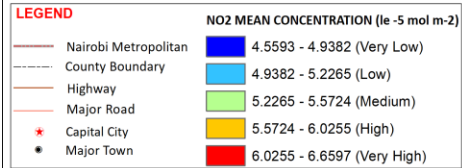
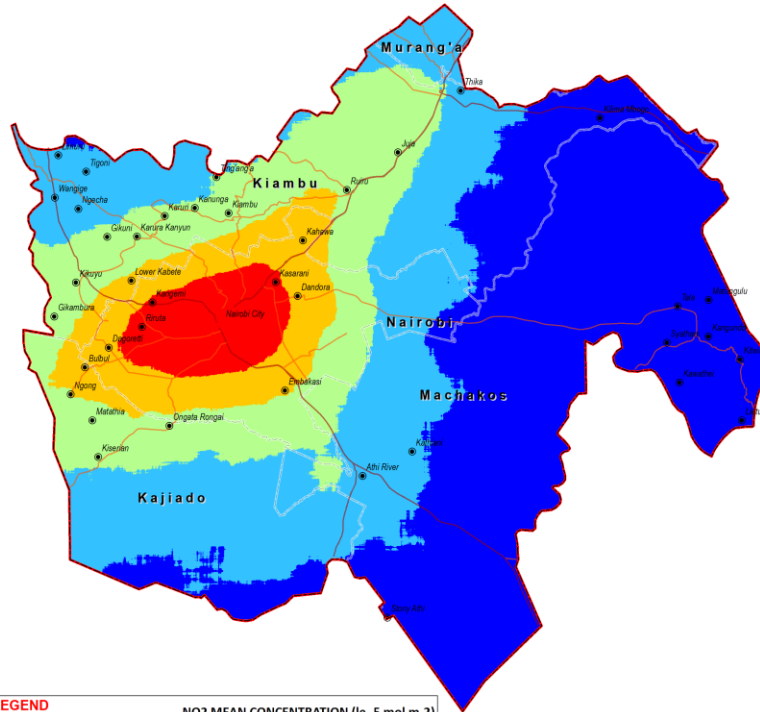
**Case Study II:  
Nairobi Air Quality Monitoring  
Programme**

# Mean Satellite Nitrogen Dioxide Concentration in Nairobi

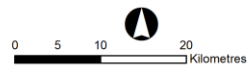
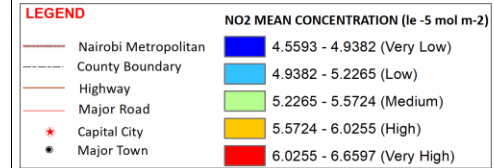
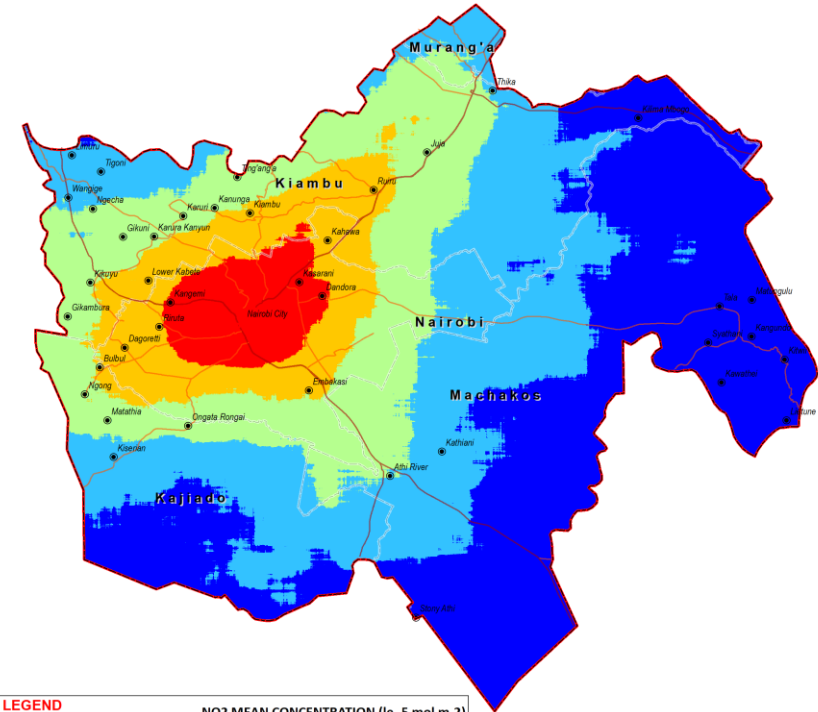
MEAN NITROGEN DIOXIDE CONCENTRATION 2018



MEAN NITROGEN DIOXIDE CONCENTRATION 2019



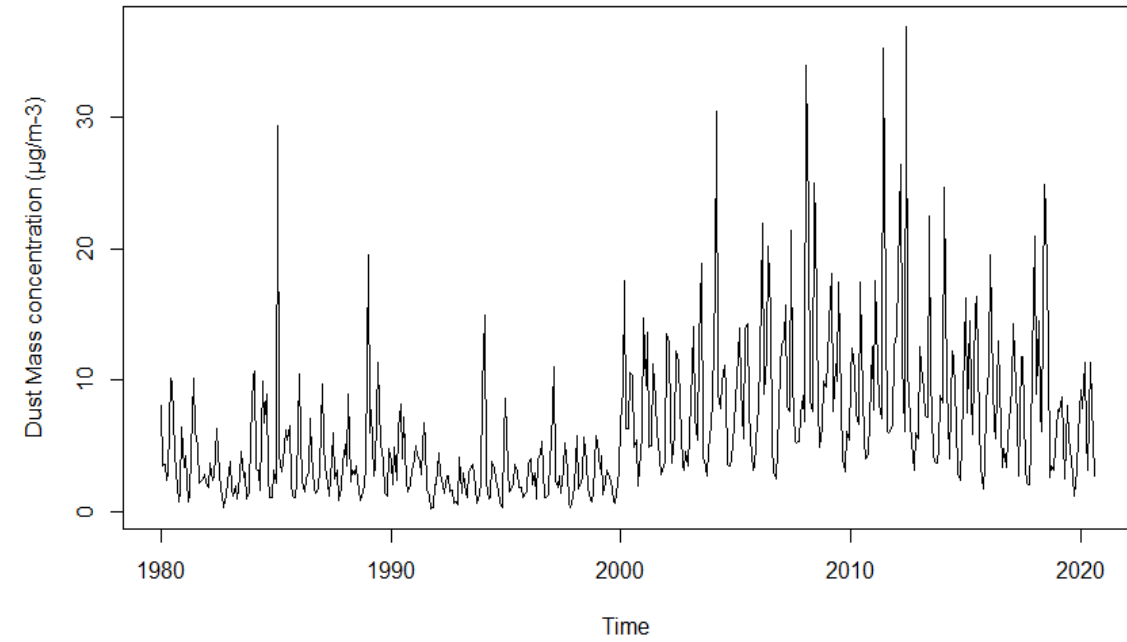
MEAN NITROGEN DIOXIDE CONCENTRATION 2020



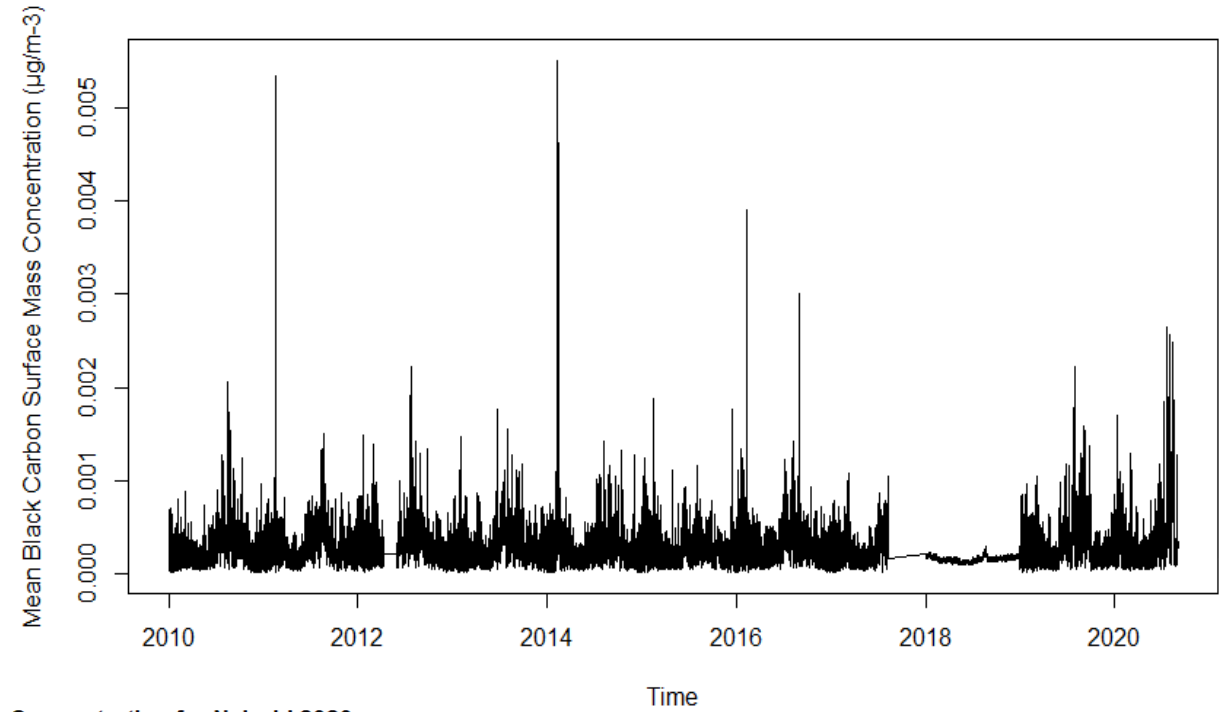


# Mean Satellite Particulate Matter Concentration in Nairobi

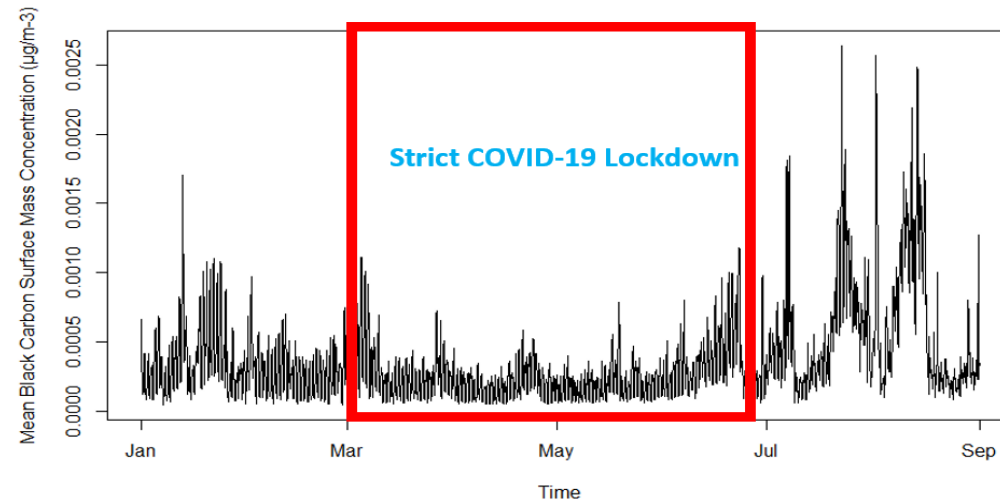
Area-Averaged of Dust Surface Mass Concentration - PM 2.5  
monthly 1980-Jan - 2020-Sep



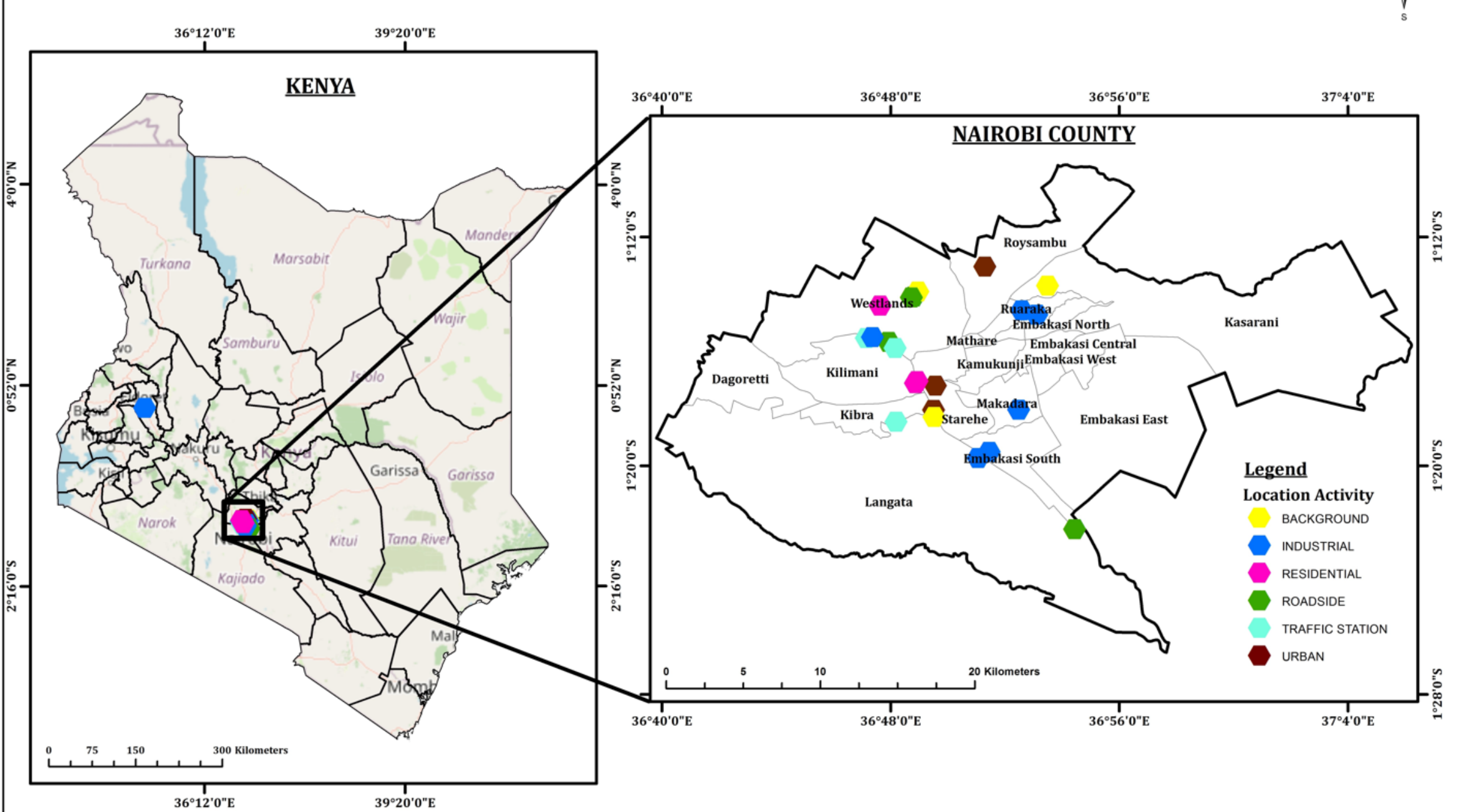
Mean Black Carbon Mass Concentration for Nairobi 2010-2020



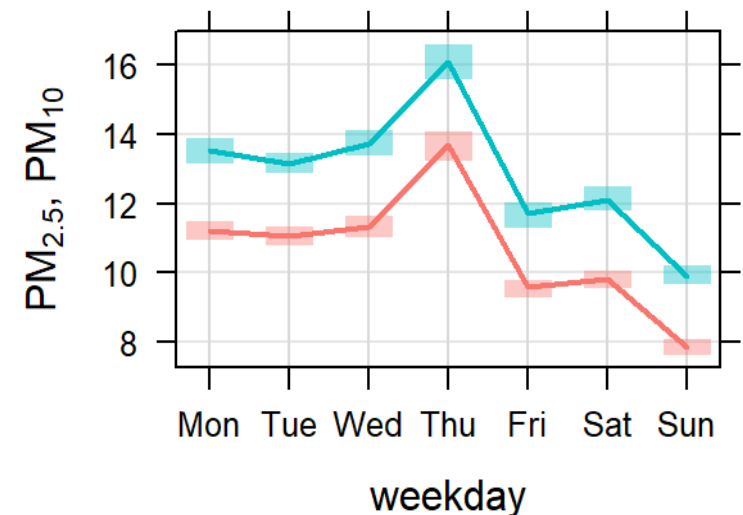
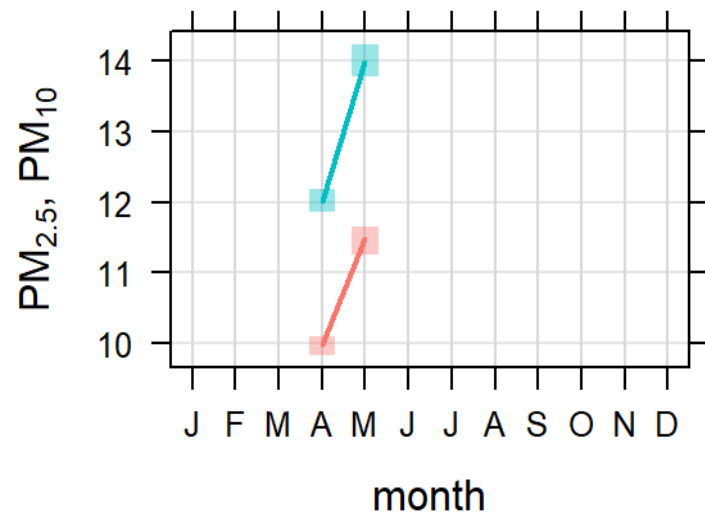
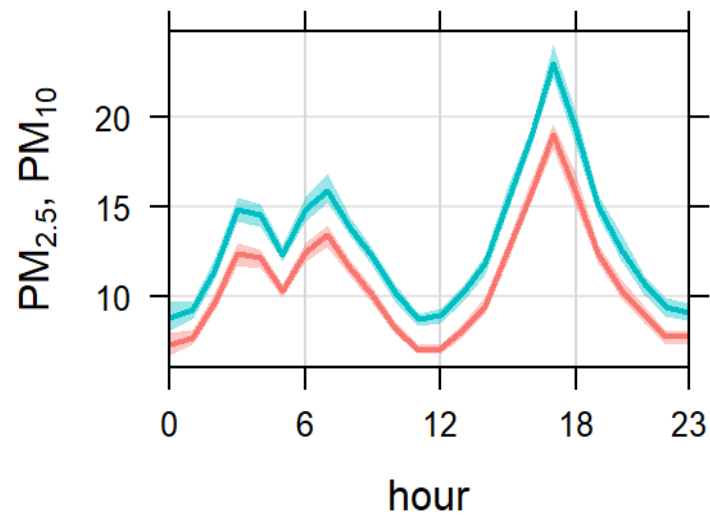
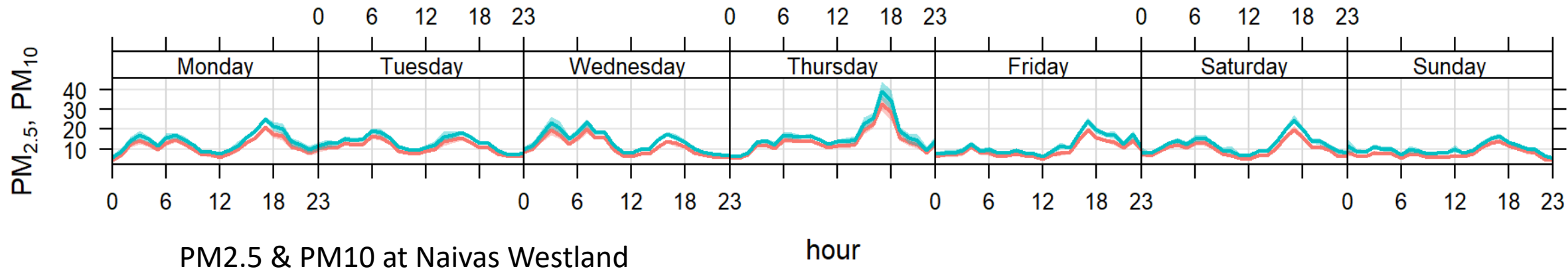
Mean Black Carbon Mass Concentration for Nairobi 2020



# Nairobi Air Quality Network Map

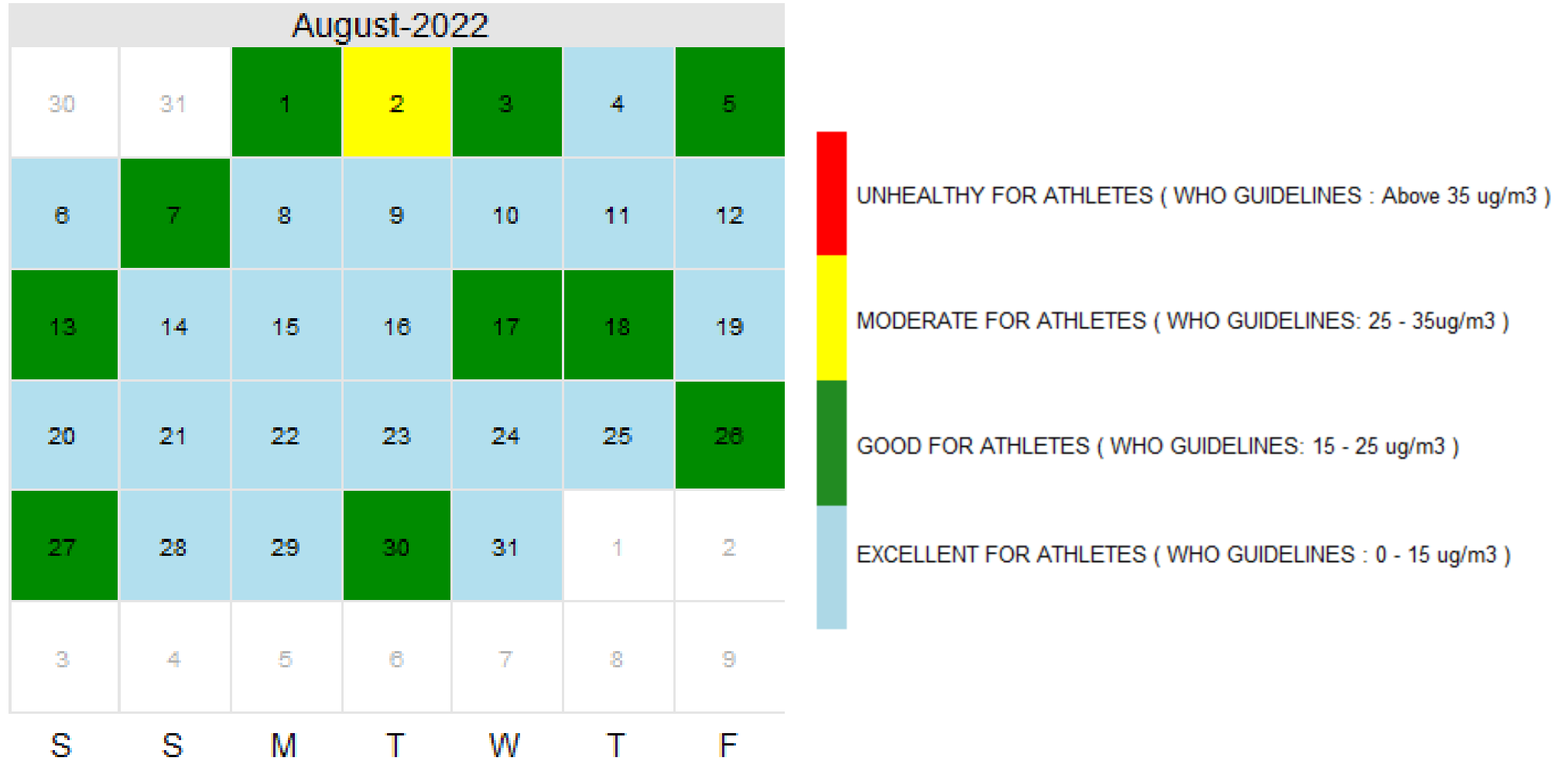


# Mean PM2.5 Ground Monitoring Concentration in Nairobi



mean and 95% confidence interval in mean

# Mean PM2.5 Ground Monitoring Concentration in Nairobi

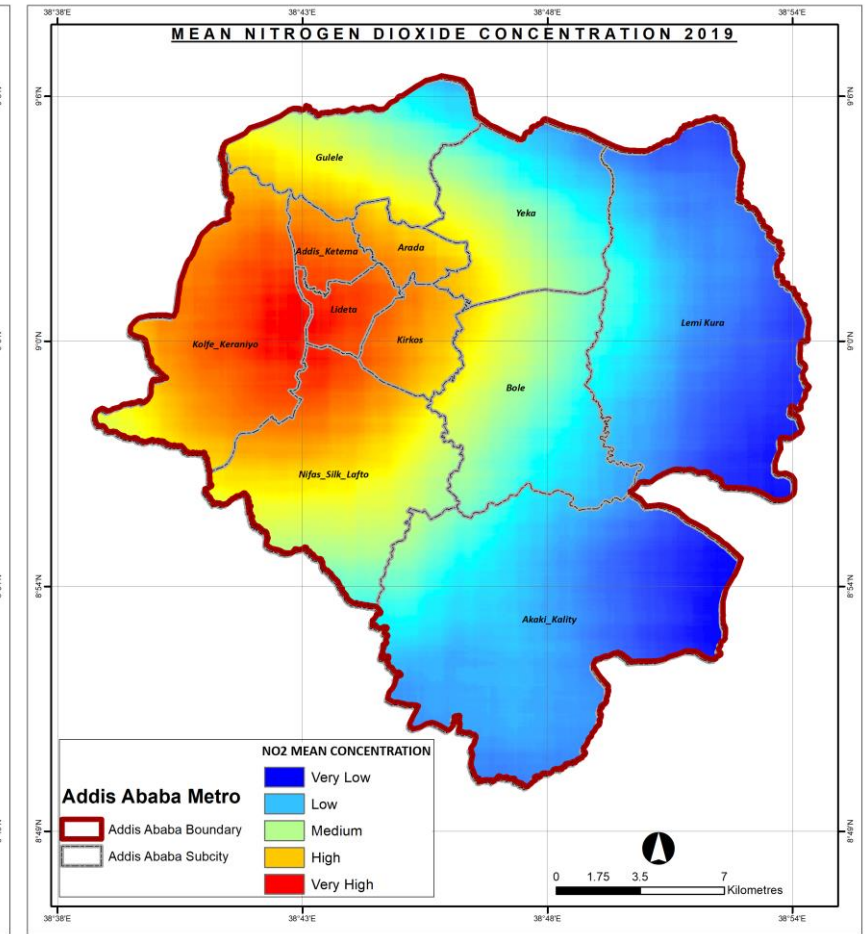
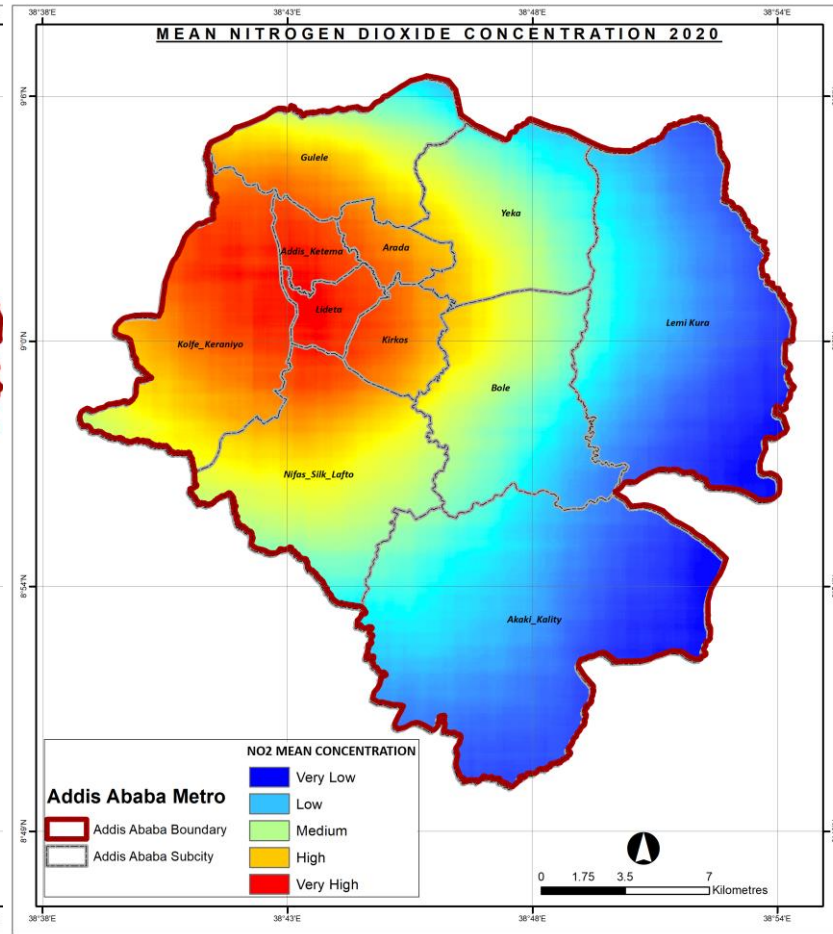
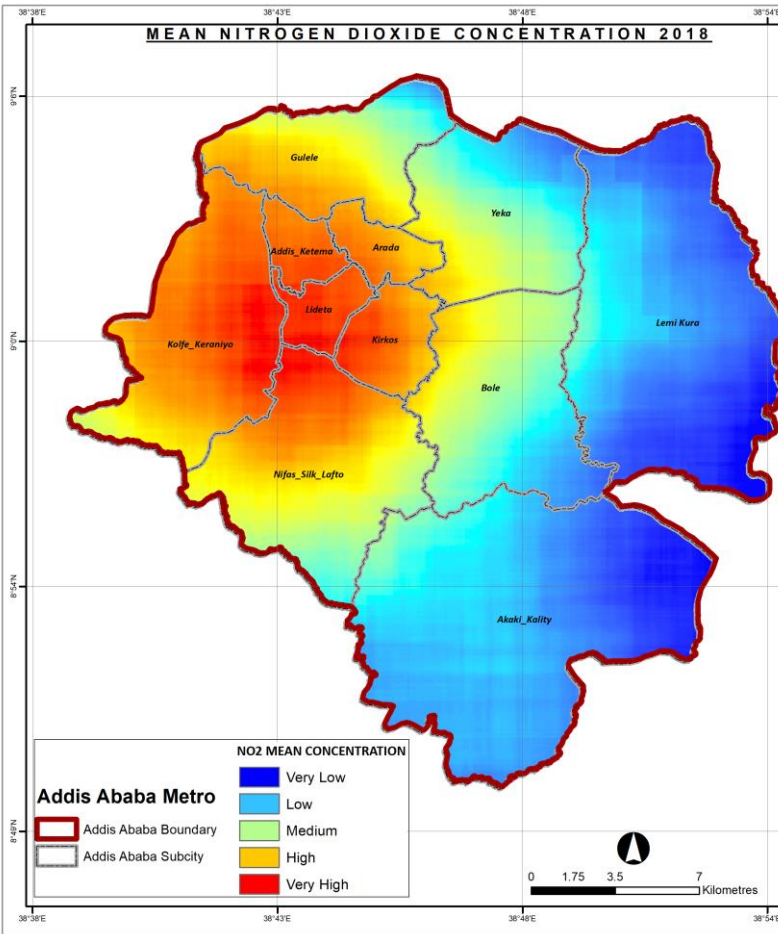


24 HOUR AVERAGE FOR FINE PARTICULATE  
MATTER(PM 2.5)



**Case Study III:  
Addis Ababa Air Quality Monitoring  
Programme**

# Mean Satellite Nitrogen Dioxide Concentration in Addis Ababa



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*Thank you for your Attention*