Long-term trends in air quality in tropical megacities using Earth observations

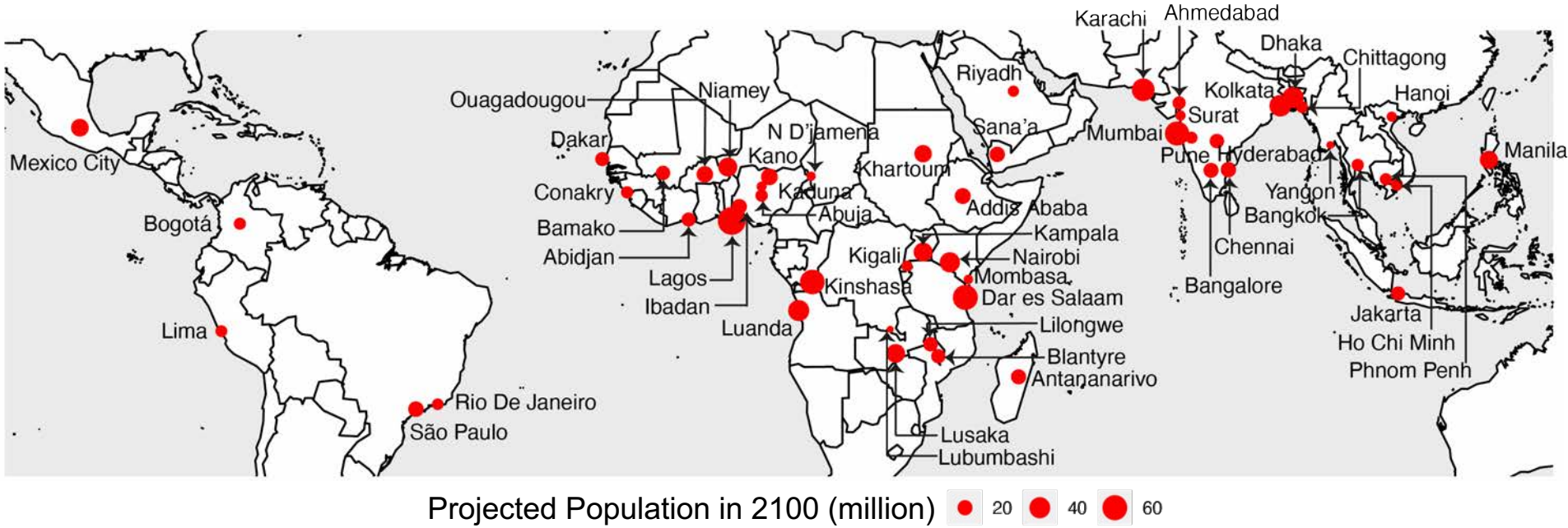
Karn Vohra (kxv745@bham.ac.uk), E. A. Marais, S. Suckra, L. Kramer, W. J. Bloss, R. Sahu, A. Gaur, S. N. Tripathi, M. Van Damme, L. Clarisse, P. F. Coheur

UNIVERSITY OF BIRMINGHAM

Long-term trends in air quality in tropical megacities using Earth observations

Karn Vohra (kxv745@bham.ac.uk), E. A. Marais, S. Suckra, L. Kramer, W. J. Bloss, R. Sahu, A. Gaur, S. N. Tripathi, M. Van Damme, L. Clarisse, P. F. Coheur

Tropics are the next frontier in air pollution

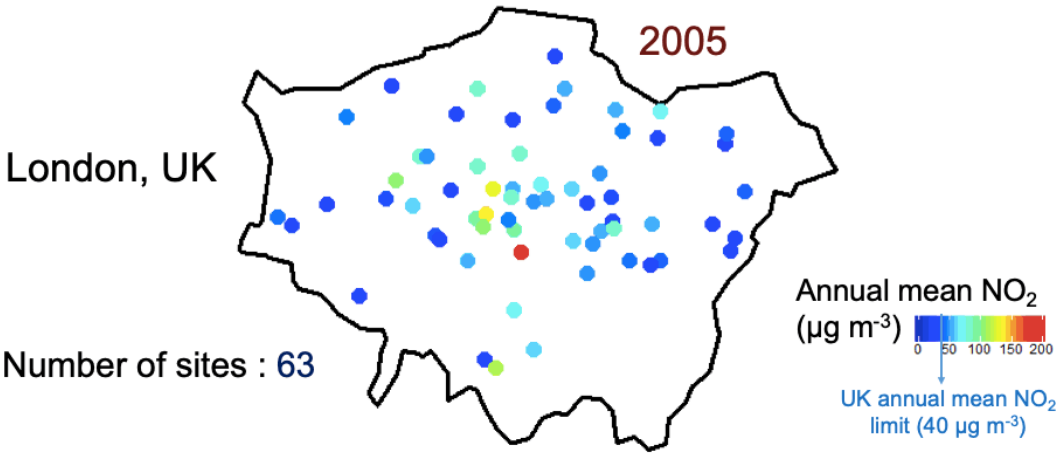


Projected Population in 2100 (million) 20 40 60

51 cities within the tropics will be megacities by 2100 **[Hoornweg & Pope, 2016]**

Assessing Earth observations & trends

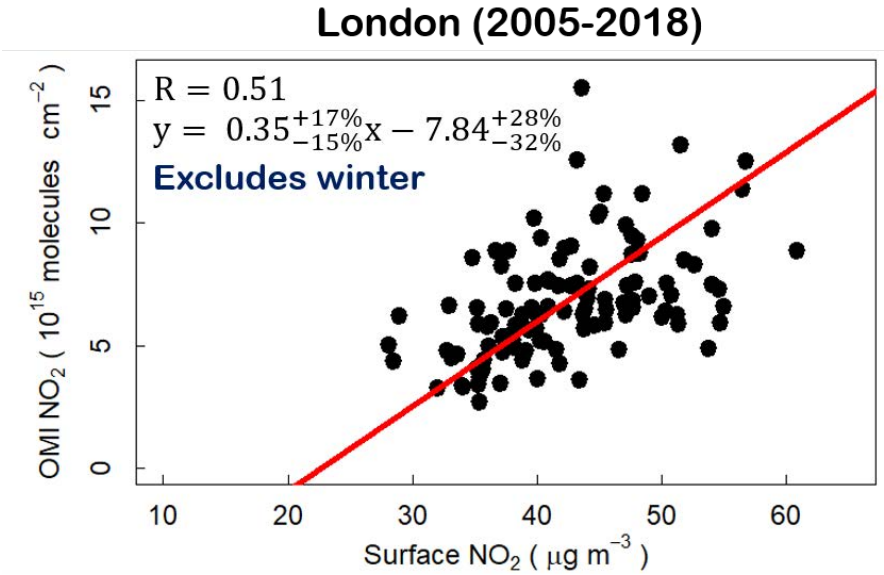
Coverage of surface NO_2 monitors



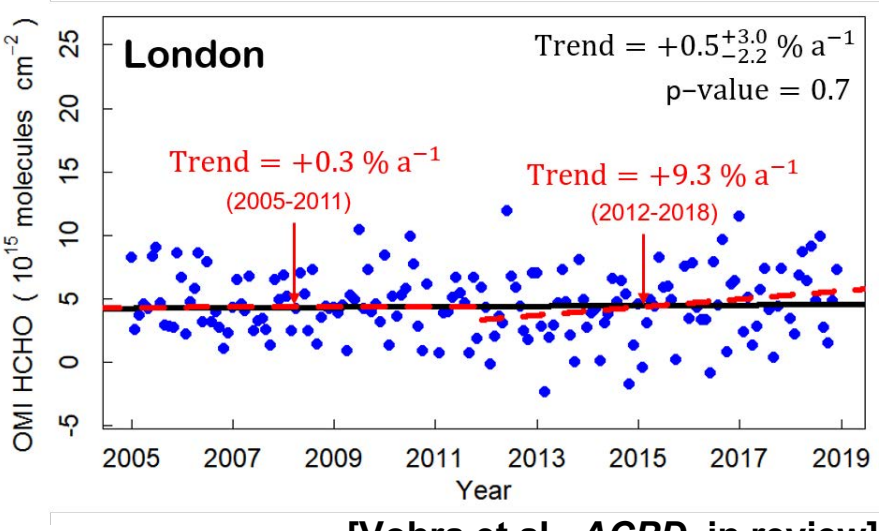
Data from *London Air Quality Network (LAQN)*

- Surface monitoring of air pollutants have limitations
- We assess Earth observations against available surface data
- We then analyse trends from the long-record of Earth observations

Satellite versus surface NO_2



Trend in London NMVOCs

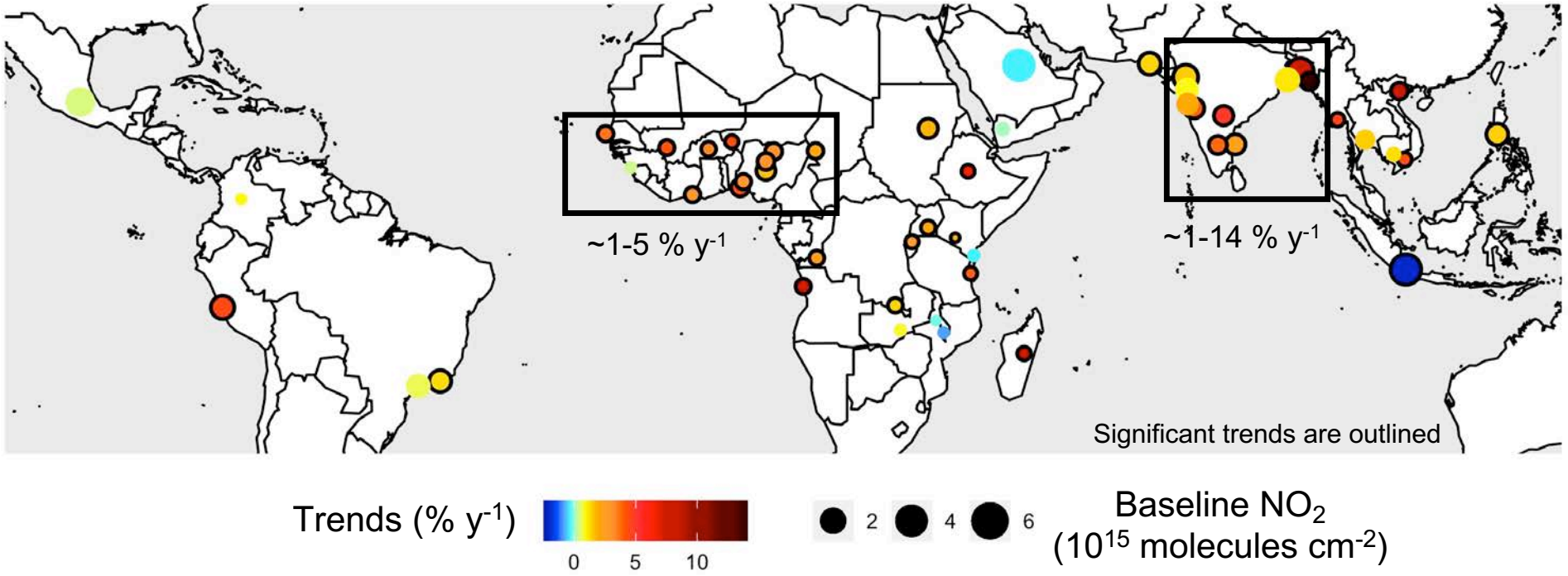


[Vohra et al., *ACPD*, in review]

Long-term trends in air quality in tropical megacities

Trends in NO_2 (2005-2018)

NASA OMI Level-2 Tropospheric column NO_2 version 3.0

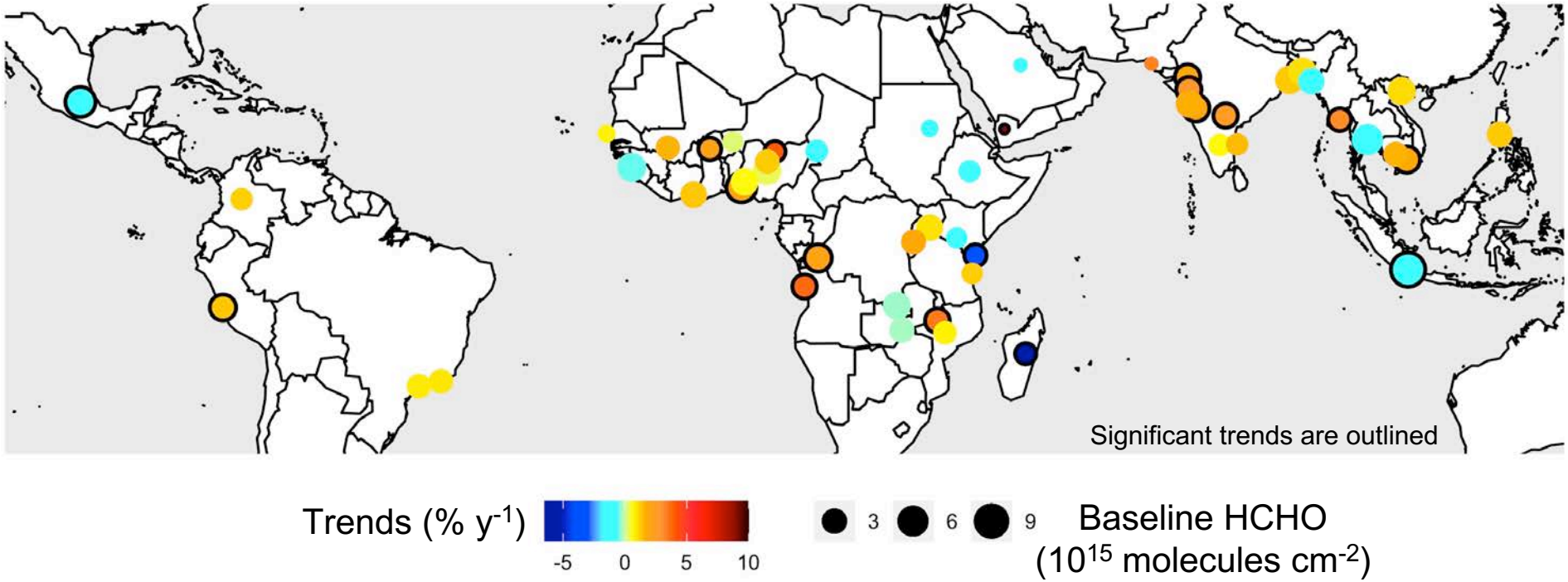


NO_2 has increased in 46 out of 51 cities

Long-term trends in air quality in tropical megacities

Trends in reactive NMVOCs (2005-2018)

QA4ECV OMI Level-2 Total column HCHO version 1.2

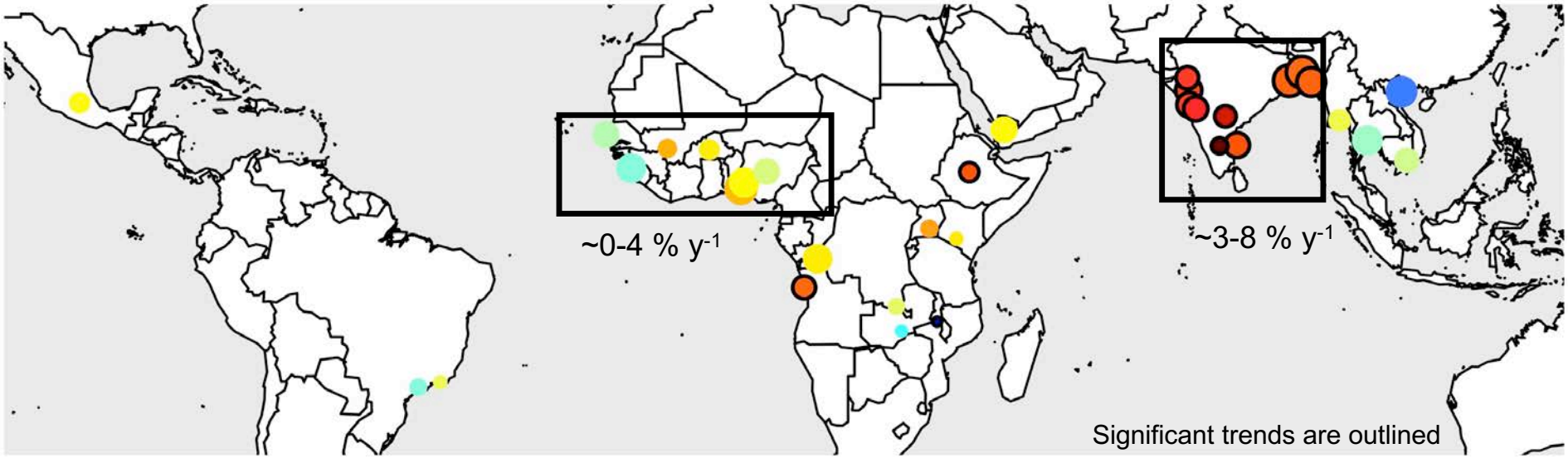


HCHO (reactive NMVOCs) has increased in 37 out of 51 cities

Long-term trends in air quality in tropical megacities

Trends in $PM_{2.5}$ (2005-2018)

NASA MODIS Level-2 Dark Target AOD Collection 6.1



AOD has increased in 25 out of 33 cities

Next steps

- Interpret the drivers of these trends
- Compare trends to widely used global emission inventories