Air quality-health aspects in world's megacities

Health Surveilance Air Quality Pilot (S2P3)

Friday the 1st of April

10:00 – 11:00 (CET)

Contents

- Air quality indices,
- The aggregate risk index (ARI),
- The ARI for megacities,
- Global component → NextGEOSS.

Air quality indices

- There are several AQ existing:
  - European Air Quality Index,
  - DAQI (Defra, UK),
  - India or US AQI ,

- Only considering the highest pollutant concentration :
  - One pollutant at a time,
  - No direct link to health,
  - Information that people are affected by one pollutant a time.

Air quality indices

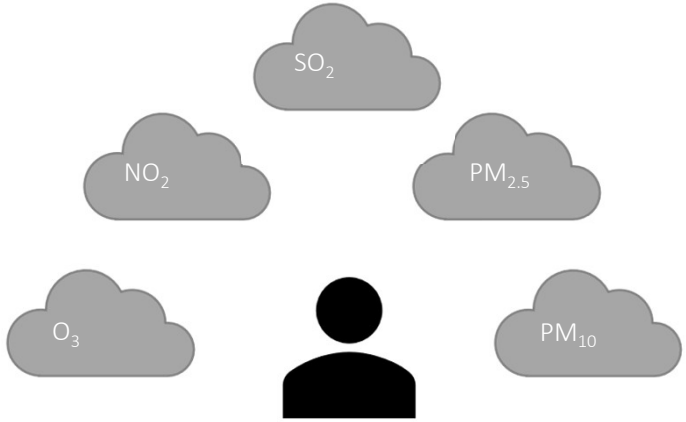
O_3 PM_{10}

NO_2 $PM_{2.5}$

→ ARI

The Aggregate Risk Index

- Tool to improve communication on air pollution levels & associated health risk,
- Five considered pollutants:



The Aggregate Risk Index

- Tool to improve communication on air pollution levels & associated health risk,
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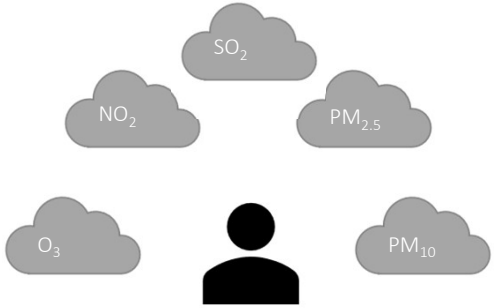
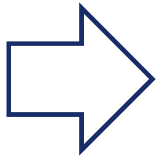


- $ARI = \sum_i a_i \times C_i$ (Sicard et al, 2012) with:
  - a_i: risk index coefficient (based on WHO Relative Risks, for a health end point),
  - C_i: pollutant concentration (daily mean, 8h max. for O_3).

ARI for megacities

33* (2018)



43* (2030)

** UNDESA, 2018*

ARI for megacities

- One of the issues that face megacities ➔ Air pollution

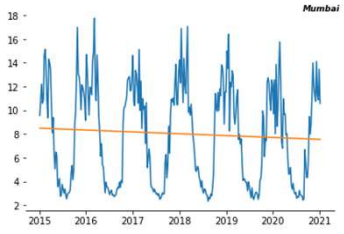
- Also: lack of monitoring in-situ stations

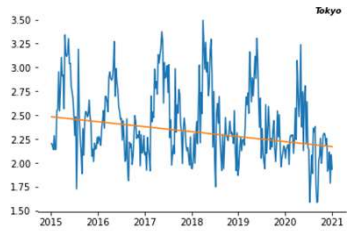
ARI for megacities

Atmosphere Monitoring Service

- Global re-analysis products,
- 2015 → 2020,
- NO_2, O_3, $PM_{2.5}$, PM_{10}, SO_2,
- Rel. Risk from WHO, 2021.

ARI for the 43 megacities *





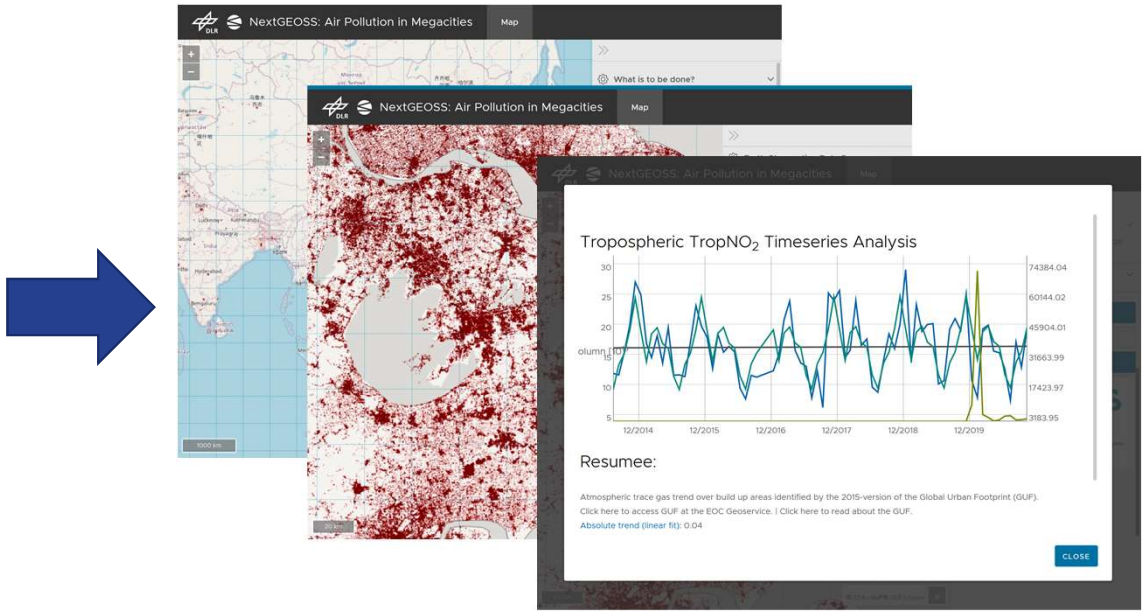
DLR

health

**** https://en.unesco.org/events/eaumega2021/megacities***

ARI for megacities - display

01/04/2022

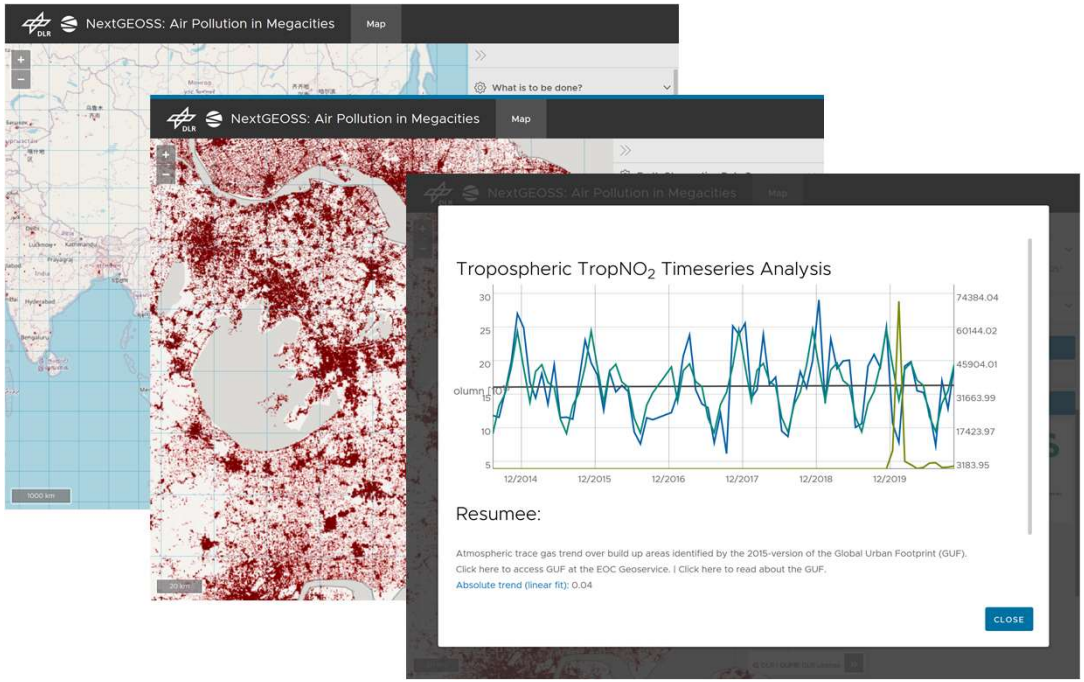


https://hsaq-eshape.eu/

https://www.nextgeoss-airquality.de/

HSAQ Global component - NextGEOSS

- Provides:
  - On-demand-service for analysis air pollution & health risk in urban areas worlwide,
  - Time series with trends of air pollution levels, with associated risk increase,
- Supports:
  - Env. Agencies, public authorities & health community,
  - Develpoment of mitigation, adaptation & prevention measures.
- Builds upon:
  - H2020 EuroGEO NextGEOSS,
  - EO data, Copernicus program & developments with EuroGEO,



https://www.nextgeoss-airquality.de/

Summary

- ARI → short term exposition to air pollutant mixture & relative risks to quantify health risk increase,
- Global on-demand service → time series & trends of air pollutants & the ARI worldwide,
- Using a co-design process, the service → existing EO data sets (eg. Copernicus data) and NextGEOSS developments,
- Sustainability → implementation in the DLR UKIS (Environmental and Crisis Information Systems) infrastructure.

Summary

- ARI considering short term exposition to air pollutant mixture & relative risks to quantify health risk increase,
- Global on-demand service to derive time series & trends of air pollutants & the ARI worldwide,
- Using a co-design process, the service builds upon existing EO data sets (eg. Copernicus data) and NextGEOSS developments,
- Sustainability → implementation in the DLR UKIS (Environmental and Crisis Information Systems) infrastructure.

References

- M. Houdayer, E. Khorsandi, J. Handschuh, F. Baier, and T. Erbertseder "Comparing the aggregated health risk from air pollution calculated from different Earth observation resources", Proc. SPIE 11864, Remote Sensing Technologies and Applications in Urban Environments VI, 118640A (23 September 2021); https://doi.org/10.1117/12.2599929
- Sicard, P., Talbot, C., Lesne, O., Mangin, A., Alexande, N., Collomp, R., “The Aggregated Risk Index: An intuitive tool providing the health risks of air pollution to health care community and public.”, Atmos. Envi., 46, 11-16, http://dx.doi.org/10.1016/j.atmosenv.2011.10.048, (2012).
- United Nations, Department of Economic and Social Affairs, Population Division. 2019. *World Urbanization Prospects 2018: Highlights* (ST/ESA/SER.A/421) https://population.un.org/wup/Publications/Files/WUP2018-Highlights.pdf (Accessed: 2022-01-04)