More than half of the world's population now lives in urban rather than rural areas. The urban impact on the world citizen has never been greater.

- **science & policy questions**
- **regional urban hot spots**

CityZen (megaCITY – Zoom for the Environment) is a 3-year EU (FP 7) funded research project investigating the environmental effects of megacities and emission hot spots on local, regional and global scales, with respect to air quality and climate change.

- **ground-based observational data**
- **satellite observations**
- **model simulations**

Hot spot and megacity focus areas:

- Po Valley Region (Italy)
- Eastern Mediterranean Region
  - Athens, Greece
  - Cairo, Egypt
  - Istanbul, Turkey
- Ruhr Region (Germany)
- BeNeLux Region
- London, United Kingdom
- Pearl River Delta Region (China)
  - Guangzhou
  - Hong Kong

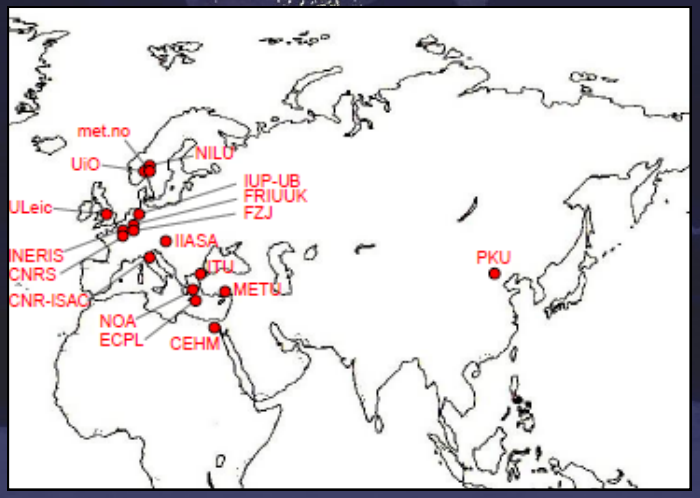
Edited by Erika von Schneidemesser, Paul S. Monks

Contact point Paul S. Monks, University of Leicester, P.S.Monks@leicester.ac.uk; Michael Gauss, Norwegian Meteorological Institute, michael.gauss@met.no

Contributors Augustin Colette, Michael Gauss, Maria Kanakidou, Nikolaos Mihalopoulos, Paul S. Monks, Andreas Richter, Erika von Schneidemesser

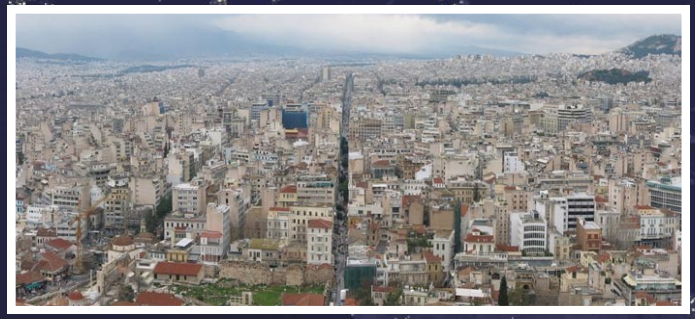
http://www.cityzen-project.eu/

16 partners | Europe, Africa, Asia | 10 countries



background image: NASA Visible Earth, http://visibleearth.nasa.gov

megaCITY Zoom for the ENvironment

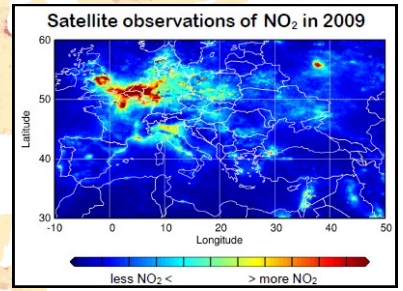


Addressing the environmental impact of megacities

SEVENTH FRAMEWORK PROGRAMME

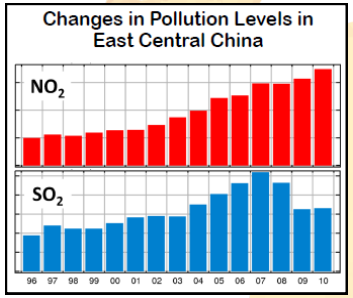
Quantify and understand current air pollution in and around the focus megacities and hot spots

- Evaluation of long-term trends in and around the hot spot regions is being done using ground-based data, satellite observations, and regional and global chemistry-transport models

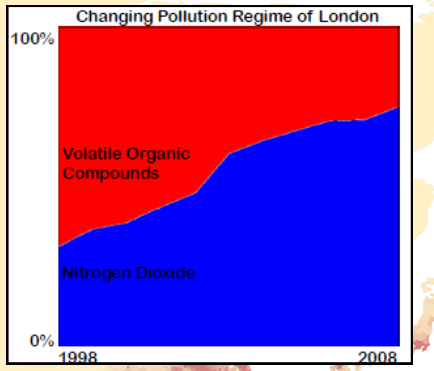


- Observational data trends and trends in emissions are being compared to regional and global models to assess model performance and validate existing emission inventories

- Trends from satellite observations spanning the last 10 years were decreasing for NO_2 in densely populated areas of Western Europe, while increasing levels were observed for Cairo, Istanbul, and regions in China



- Modelling comparing the 1998 pollutant regime in London to that of 2008 found that this has changed the when, where, and how of ozone formation, moving the majority of the ozone production outside of the megacity area

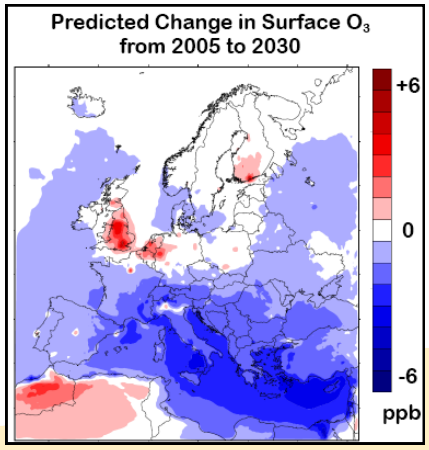


- The majority (>80%) of recent exceedances of particulate matter standards in the Eastern Mediterranean agglomerations are anthropogenic in origin, however, there are significant contributions from natural sources (~20%) and from the long-range transport of anthropogenic emissions (20-50%)

How are megacities and hot spots responding to climate forcing and future emission changes?

- Model simulations of the future atmosphere show decreases in particulate matter concentrations when both climate change an emission reduction measures are taken into account

- Under climate conditions foreseen for 2030, model simulations predict increased ozone concentrations, however, hypothetical emission reductions will more than compensate for this and therefore an overall reduction in ozone is predicted



Moving Forward

- Various options of climate-friendly air quality measures are considered in newly developed emission scenarios to be used in regional and global model simulations of the future up to the year 2030
- Climate models are being used to investigate interactions among aerosols, climate (radiation balance), cloud formation, and other meteorological parameters
- The impact of emissions from megacities regionally and globally is studied by removing megacity emissions completely or by redistributing them over larger land areas in models, in order to simulate a more even distribution of emissions
- A direct quantification of export fluxes will be performed by means of novel numerical techniques specifically designed to identify the impact of megacity on their surroundings

population density map image: NASA