

KORUS-AQ: An International Cooperative Air Quality Field Study in Korea



Background

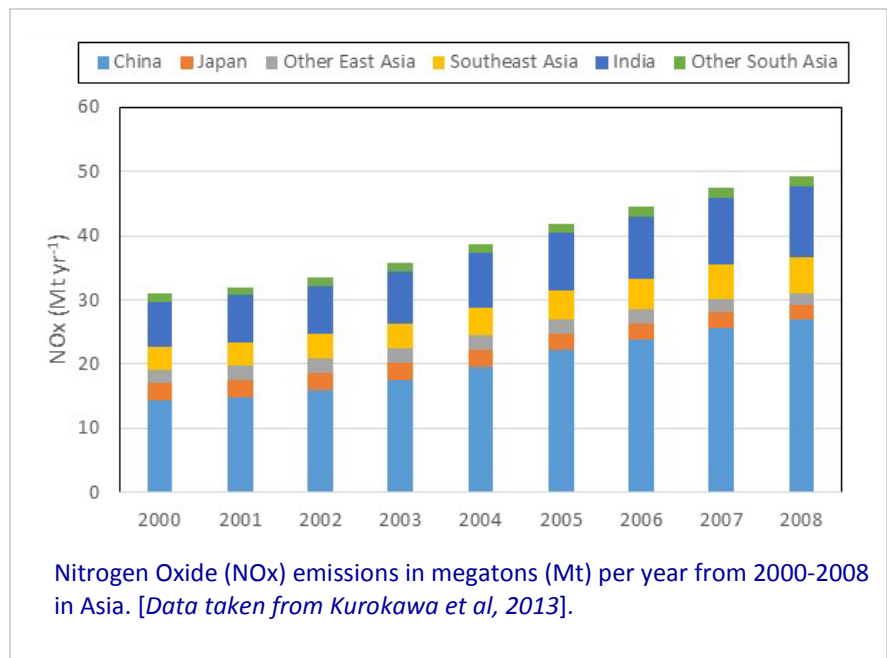
Air quality is a global concern. East Asia is a region of particular interest as it has experienced higher air pollutant emissions due to rapid economic growth and increased energy use.

Over the years, scientists have studied satellites as a possible tool to improve air quality monitoring. Satellites have a disadvantage because they only collect observations once per day, however, air quality can change from hour-to-hour in a single day.

Newer satellites are currently being built to collect hourly air quality measurements. Some are anticipated to be launched internationally in 2018-2019 and will collect air quality data over Asia, North America and Europe. Ground-based air monitoring sites provide key data to confirm data received from satellites.

What is KORUS-AQ?

The Korea-United States Air Quality Study (KORUS-AQ) is an international, multi-organization mission to observe air quality across the Korean peninsula and surrounding waters. National Aeronautics and Space Administration (NASA) and the Korean National Institute of Environmental Research (NIER) are leading the research.



Participants include EPA, National Center for Atmospheric Research (NCAR), National Oceanic and Atmospheric Administration (NOAA), academia and other research institutions. The study will take place in South Korea which provides an ideal research setting for many reasons:

- The country is impacted by a unique mix of emissions including pollution from mainland China as well as seasonal pollution such as long-range transport of wind-blown dust and smoke from fires;
- There is a distinct separation of urban and rural areas

allowing for better understanding of how air pollutant emissions from the different areas mix;

- There are over 300 ground-based air quality monitoring sites that measure criteria pollutants (gases and particulate matter) and volatile organic compounds and meteorological data such as temperature, relative humidity and wind speed/direction. These data can be used to support satellite data;
- Korea is currently operating a satellite instrument that measures atmospheric aerosols and ocean color.

This information along with ground site data can be used to improve methods that will be informative for the satellite launches in 2018-2019.

KORUS-AQ will integrate observations from satellites, aircraft, and ground sites with air quality models to understand the factors controlling air quality across urban, rural and coastal boundaries in East Asia.

What is EPA's Role in KORUS-AQ?

EPA will provide expertise in ground-based measurements similar to the efforts under the DISCOVER-AQ Earth Venture Mission (2011-2014) led by NASA. EPA will set-up a suite of ground-based instrumentation in Seoul, South Korea at an existing air quality monitoring site. Measurements will focus on nitrogen oxides, ozone, and particulate matter using analyzers based on EPA's Federal Reference and Equivalent Methods (FRM/FEM). In addition to traditional FRM/FEM air monitoring methods, EPA will also advance knowledge of next generation air monitoring tools such as remote sensing and small sensor technologies. EPA's specific goals are to:

- Collect trace gas measurements and column/profile observations with a focus on ozone, nitrogen oxides, formaldehyde, and particulate matter;
- Understand how the measurement equipment performs in an area with

different pollution levels and mixtures;

- Contribute to the larger KORUS-AQ dataset for evaluating air quality and modeling activities;
- Continue evaluation of sensor technologies and remote sensing tools
- Evaluate potential applications of sensors including citizen science and validation of satellite and aircraft observations;
- Conduct educational outreach in the local community.

EPA will collect measurements from May to June 2016. These measurements will be combined with observations from aircraft and satellite data to allow for improved understanding of air quality in East Asia.

Anticipated Outcomes

Participation in KORUS-AQ will allow EPA to:

- Continue evaluation of the gold standard FRM/FEM methods for monitoring air quality;
- Evaluate next generation air monitoring tools;
- Provide data to the air quality modeling community to further advance global-scale modeling;
- Apply the knowledge gained to support ground-based measurements during the TEMPO satellite launch in 2018/2019;

- Further existing partnerships and build new international partnerships.

Data from KORUS-AQ will be available to the public within six months after the end of the study.

References:

Kurokawa, J.; Ohara T.; Morikawa, T.; Hanayama, S.; Janssens-Maenhout, G.; Fukui, T.; Kawashima, K.; Akimoto, H. Emissions of air pollutants and greenhouse gases over Asian regions during 2000-2008: Regional Emission inventory in Asia (REAS) version 2. *Atmospheric Chemistry and Physics* 13, 11019-11058, 2013.

More Information:

KORUS-AQ NASA Homepage:
<https://espo.nasa.gov/home/korus-aq>

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