KORUS-AQ Timeline of Significant Events and Future Milestones

May 2010	NCAR scientists visit several sites and institutions and begin thinking about the possibility of an aircraft experiment
2011	NCAR-NIER collaborative observation at Taehwa Research Forest initiated
September 2012	NASA & NCAR visit to Korea and discussion of common interests and respective capabilities with scientists at NIER
September 2013	Korean visitors including an official from the Ministry of Environment visit Houston for DISCOVER-AQ to see a field study in action and discuss common interests for a study in Korea
December 2013	Town Hall at Fall AGU meeting to gauge community interest in an air quality study working with Korea
January 2014	A preliminary rationale document is completed to articulate the merits of an air quality study in Korea with details on how the US and Korea might cooperate
May 2014	Second visit to Korea, Steering Group is formed; KORUS-AQ name is adopted; visit to Osan airbase

KORUS-AQ Timeline of Significant Events and Future Milestones

November 2014	Initial draft of International Agreement finalized by NASA and transmitted to State Department
December 2014	US and Korean White Papers completed by the KORUS-AQ Steering Group and made available online
January 2015	Biweekly webex discussions between US and Korean Steering Group members begin
February 2015	KORUS-AQ Solicitation for proposals issued in ROSES 2015
April 2015	NASA sends scientists to Korea for early installation of Pandora spectrometers and Aeronet sunphotometers at 6 field sites to collect observations in advance of the 2016 field study
May 2015	International Agreement returned from State Department with minimal comment and forwarded to Korea
May 2015	KORUS-AQ due date for proposals on 15th (66 proposals submitted)
May/June 2015	Korean colleagues conduct a pre-campaign of ground observations and King Air research flights

KORUS-AQ Timeline of Significant Events and Future Milestones

June 2015	Third visit to Korea; Steering Group finalizes deployment dates (1 May – 15 June 2016); meetings at Osan airbase demonstrate basic feasibility and the decision to base the research aircraft there is finalized
July 2015	KORUS-AQ Panel Review convenes; Korean scientists participate as both reviewers and observers
August 2015	KORUS-AQ Science Team selections announced (23 proposals selected)
September 2015	Korea accepts final language of the International Agreement (MOU)
October 2015	KORUS-AQ Science Team meeting at NASA LaRC, signed MOU delivered

KORUS-AQ Timeline of Significant Events and Future Milestones

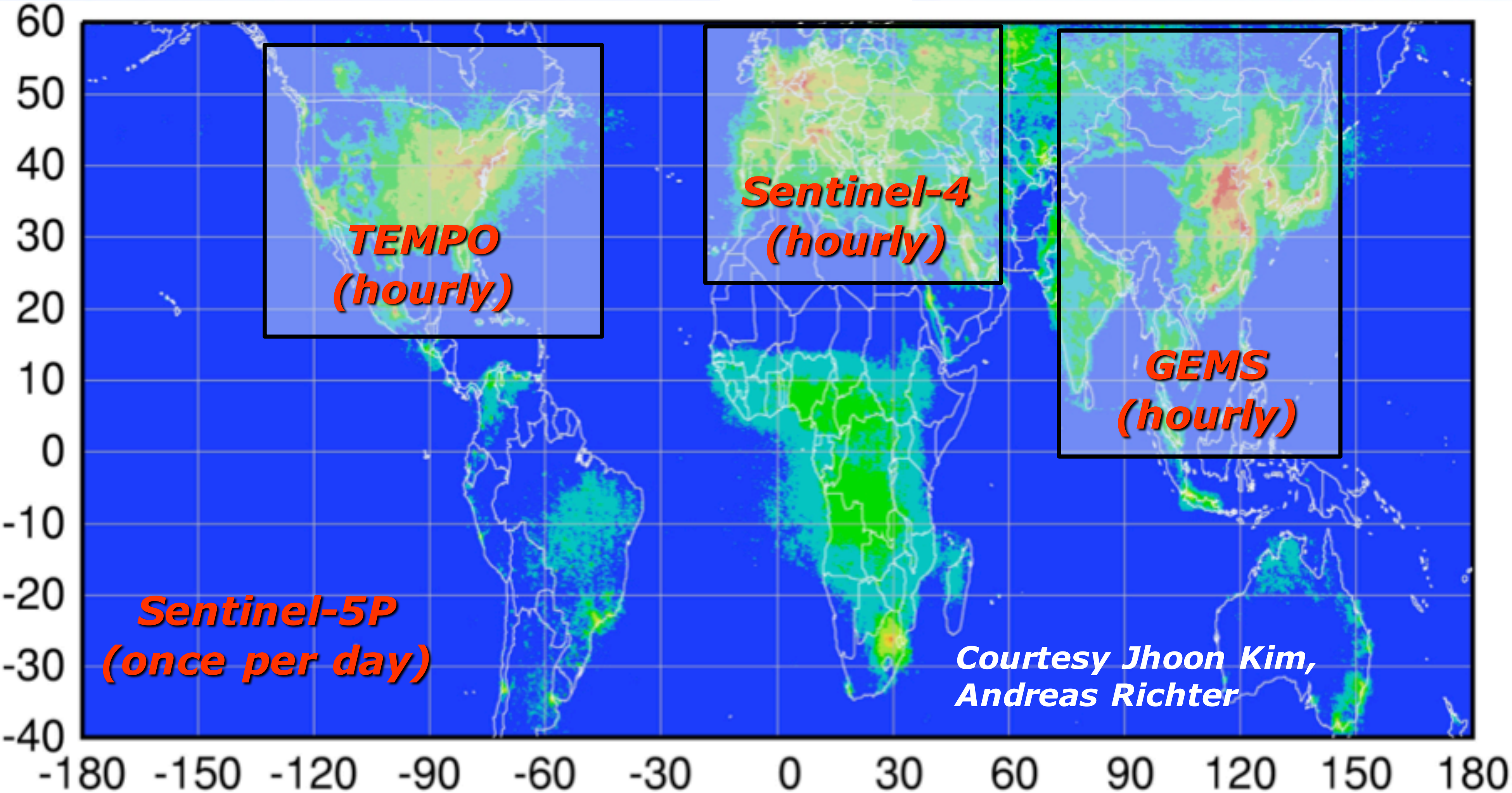
December 2015	Convene AGU sessions and meet to discuss progress in field study plans
January 2016	Visit Air Traffic Control authorities in Korea to discuss flight plans
March-April 2016	Aircraft integration (DC-8 and LaRC King Air)
May-June 2016	KORUS-AQ Field Deployment (120 research flight hours for each aircraft)

Scientific rationale and the unique value of a Korean study

Satellite observability of air quality

- Including integration with models and ground monitoring networks
- Validation strategy testbed with benefits to GEO (TEMPO, GEMS, Sentinel-4) and LEO (Sentinel-5 precursor) missions

Global Pollution Monitoring Constellation (2018-2020)



Policy-relevant science and environmental services enabled by common observations

- Improved emissions, at common confidence levels, over industrialized Northern Hemisphere
- Improved air quality forecasts and assimilation systems
- Improved assessment, e.g., observations to support United Nations Convention on Long Range Transboundary Air Pollution

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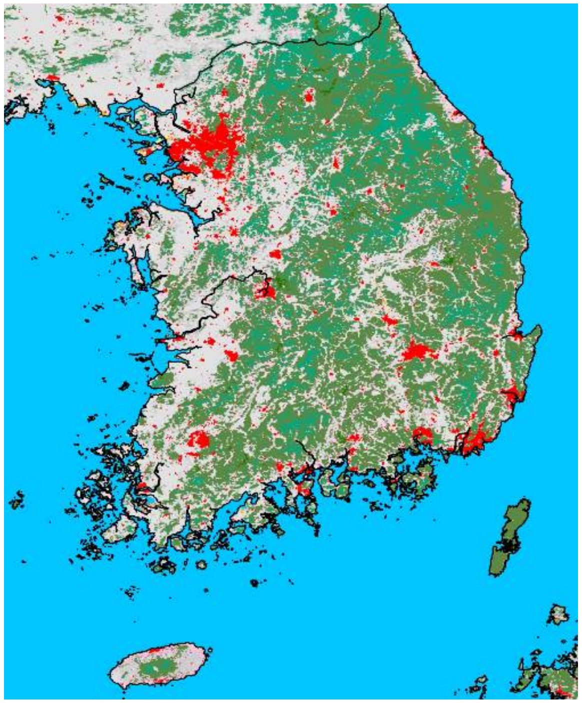
Megacity environment – Model evaluation of Emissions, Chemistry, Transport

- Seoul Metropolitan Area (SMA) ranked as 2nd largest metropolitan area worldwide
- SMA includes approx. 50% of Korean population



MODIS land cover map of South Korea.
Red colors denote urban and built-up areas, greens are forests, and gray indicates croplands (courtesy Christine Wiedinmyer).

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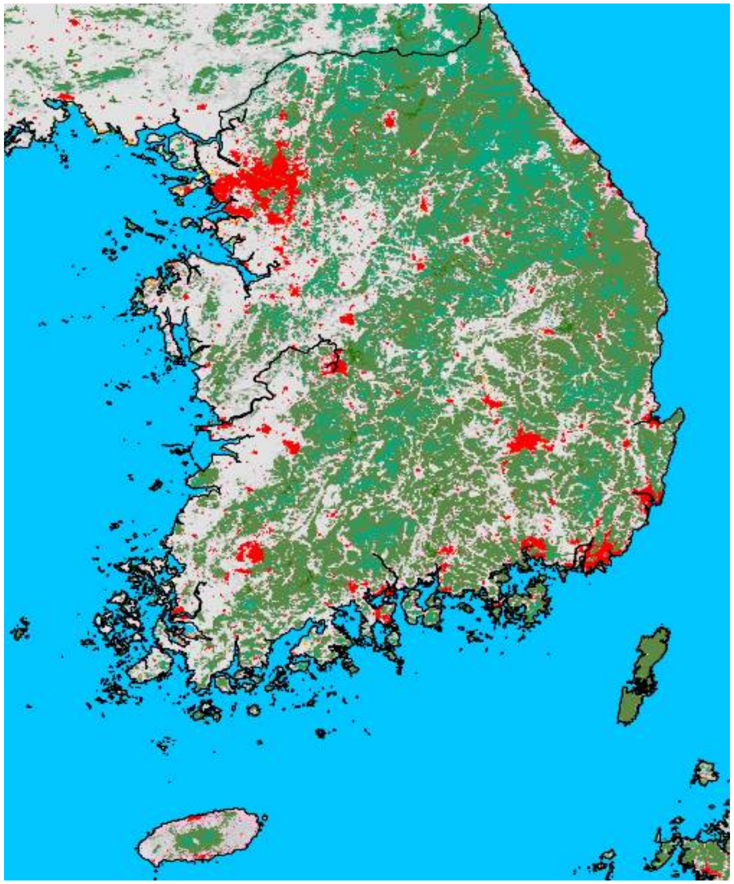
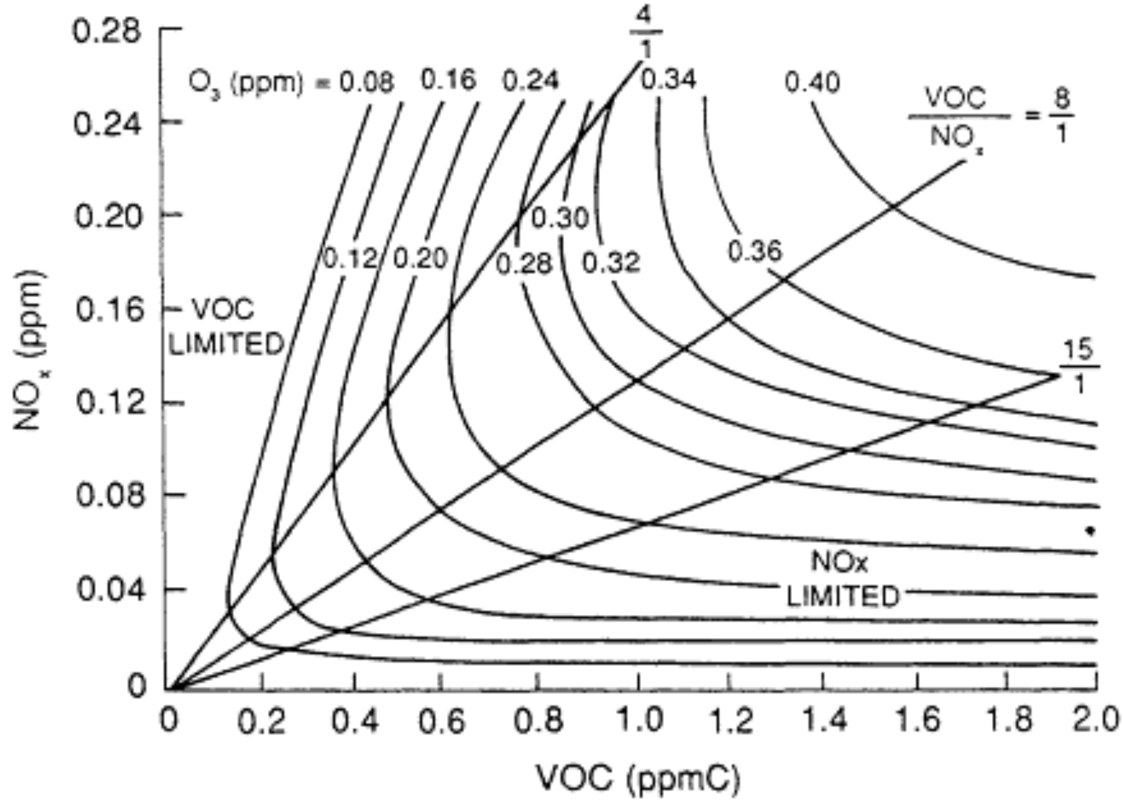
Anthropogenic/Biogenic Mixtures

- Sharp transition between SMA and surrounding rural areas provides opportunities to target specific urban/rural mixtures and discern impacts on secondary pollution formation (ozone and aerosols)





This typical ozone isopleth diagram shows the nonlinear response of ozone production to mixtures of NO_x and hydrocarbons. The diversity of mixtures occurring across the Seoul Metropolitan Area (NOx and VOC sources) and downwind (BVOC sources) provide an ideal natural laboratory to examine a broad range of mixtures.

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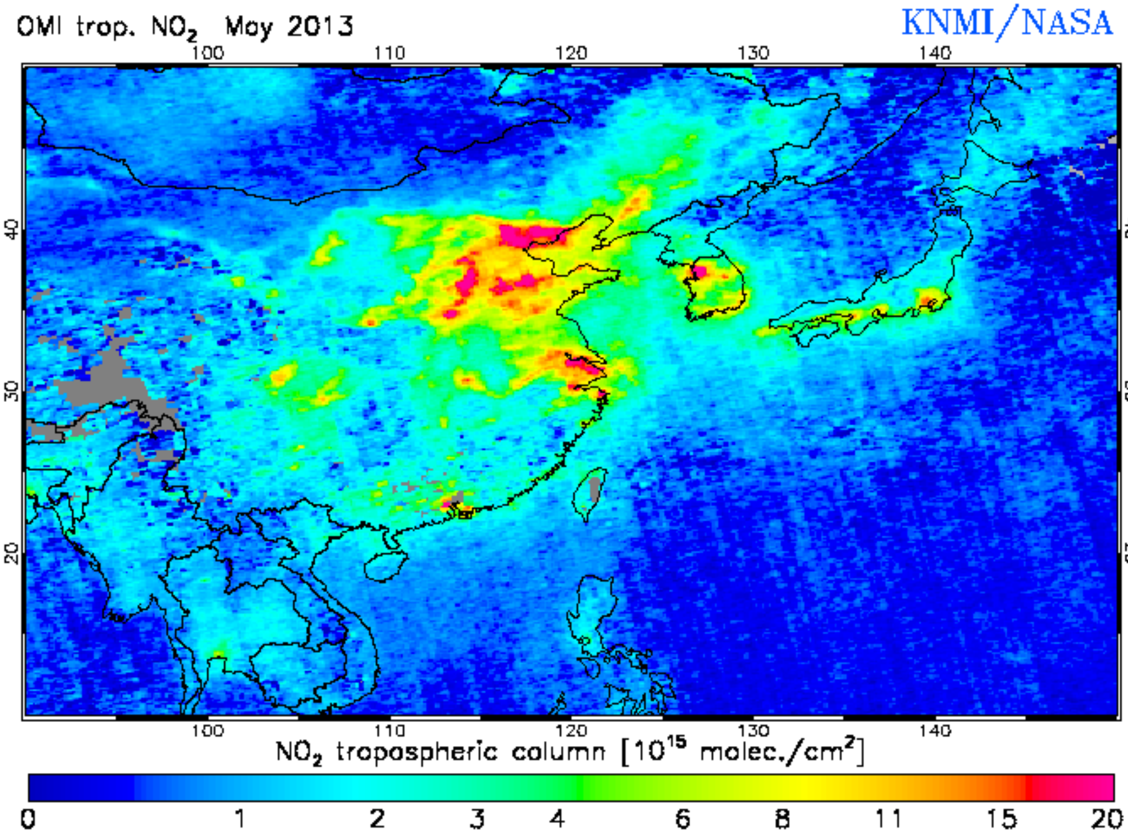
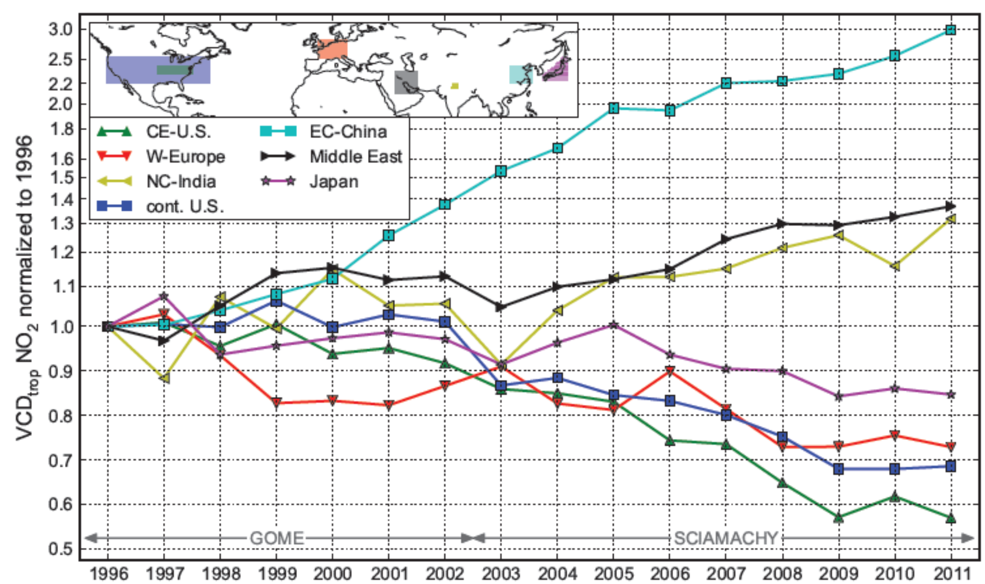
Transboundary pollution – Local sources versus upwind along the Pacific Rim
- Evaluate transport efficiency, removal rates, deposition impacts
- Surrounding waters serve as a buffer to isolate upwind from local sources
- Numerous upwind megacities, e.g., Beijing and Shanghai
- Opportunity to confirm Asian emission trends via comparison with previous airborne campaigns



Example of the distribution of tropospheric NO_2 over Asia.
(http://www.temis.nl/airpollution/no2.html)

Mean annual tropospheric NO_2 column densities detected by the GOME and SCIAMACHY satellites show large relative changes in NO2 over China from 1996-2011.
(taken from Hillbol et al., 2013)



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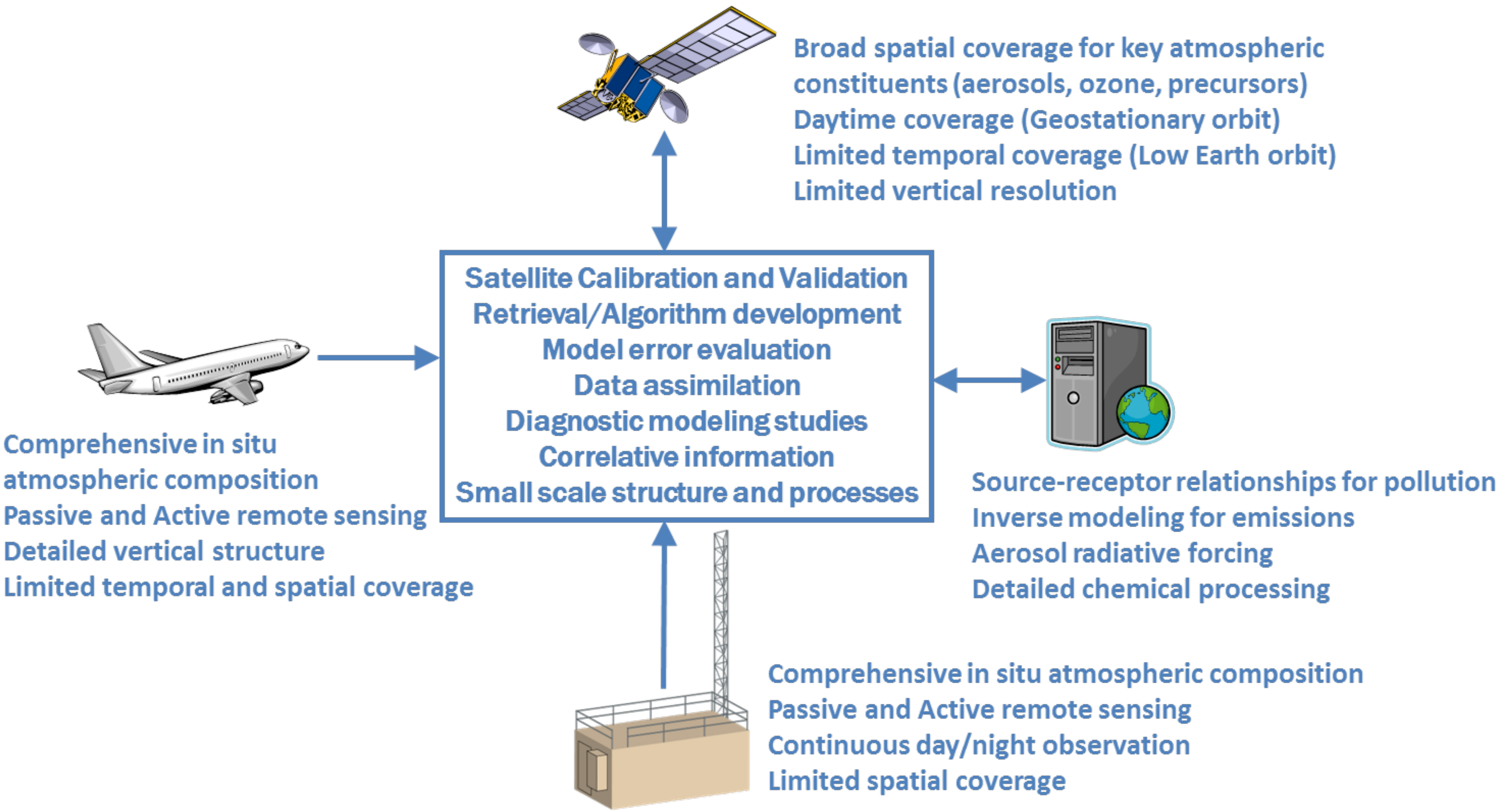
NASA's Atmospheric Composition Goals emphasize "Progress in understanding and improving predictive capability for changes in the ozone layer, climate forcing, and air quality associated with changes in atmospheric composition."



KORUS-AQ will combine assets from the Korean and U.S. atmospheric scientists communities and their supporting organizations (NIER, NASA, Universities, etc.) to implement an integrated observing system for improving our understanding of Air Quality