

Science Team Telecon

Fall AGU Abstracts

KORUS-AQ publications (Elementa Special Feature)

Final Science Report Chapter Updates

Abstract	Title	Presenter
A11F-0018	Carbon monoxide budget during KORUS-AQ, first joint assimilation of NUCAPS CrIS and MOPITT CO retrievals	Ben Gaubert
A13F-1337	Characteristics of In Situ Fine Fraction Aerosol Spectra from 300-700 nm Observed Around the Korean Peninsula During KORUS-OC	Carolyn Jordan
A14D-05	Secondary Organic Aerosol Production from Local Emissions Dominates OA Budget over Seoul, South Korea, during KORUS-AQ	Jason Schroder
A23M-1790	Sensitivity of Particulate Matter Concentrations in South Korea to East Asian Ammonia Emissions	Eunhye Kim
A23M-1819	New Particle Formation and Diurnal Variations in Number Concentration Downwind of Seoul, Korea	Jisoo Park
A31B-06	Characteristics and Sources of VOCs in the Seoul Region during KORUS-AQ	Isobel Simpson
A31B-07	Improving Bottom-up Emissions Information Based on Air Quality Measurement and Modeling Feedbacks – The KORUS Emissions Inventory	Jung-Hun Woo
A31F-01	Meteorology Influencing Springtime Air Quality and Pollution Transport in Korea	Dave Peterson
A31F-02	Issues with Understanding Atmospheric Oxidation and Ozone Production during KORUS-AQ	Bill Brune
A31F-03	Observational constraints on water vapor sensitivity of glyoxal to formaldehyde ratio (R_{GF})	Dongwook Kim
A31I-0072	Observational Data-Driven Surface Concentrations Derived from Aircraft Profiles and Satellite Total Columns	Kang Sun

Abstract	Title	Presenter
A33F-04	Issues in air quality modeling for the KORUS-AQ campaign	Rokjin Park
A33I-2096	Improving the Quantification of Fossil Fuel Carbon Dioxide using Radiocarbon Measurements from the KORUS-AQ Field Campaign	Yonghoon Choi
A33I-2107	Short-term CO/CO ₂ Ratios and Modeled CO Tracers for Assessing Regional Transport Over the Seoul Megacity During the 2016 KORUS-AQ Field Campaign	Hannah Halliday
A33K-2140	Significant contribution of anthropogenic dust to fine aerosol mass during a Chinese haze event as measured by KORUS-AQ observations	Pablo Saide
A33K-2145	Evolution of Acrolein Peroxyacetyl Nitrate (APAN) in Petrochemical and Agricultural Fire Plumes	Yung Ro Lee
A33K-2156	Airborne Formaldehyde Measurements over the Petrochemical & Industrial Complexes on Korea's Northwest Coast During the KORUS-AQ Study: Estimation of Formaldehyde & Precursor Emission Fluxes and Potential Effects on Seoul's Air Quality	Alan Fried
A33K-2177	Assessing atmospheric CH ₂ O abundance and its emission sources using the GEOS-5 model, satellite and aircraft observations	Qing Liang
A41E-08	The Impact of Geostationary Aerosol Observations on the GEOS Aerosol Forecasting System	Arlindo da Silva
A42A-07	Gas-Particle Partitioning of Total Alkyl Nitrates During KORUS-AQ	Hannah Kenagy
A44A-01	Aerosol Property Retrieval and Applications in Air Quality Monitoring from geostationary orbit using GOCI and AHI	Jhoon Kim

Abstract	Title	Presenter
A51A-05	Pandora Ground Based measurements of Total Column NO ₂ and HCHO Compared with Satellite and Aircraft Data	Jay Herman
A51A-07	Vertical Divergence of Reactive Trace Gases – Comparisons for three different photochemical environments	Saewung Kim
A51G-0011	The Dark Target aerosol algorithm applied to Himawari-8 Advanced Himawari Imager (AHI)	Shana Matoo
A51G-0013	Understanding different characteristics of multiple LEO and GEO satellite aerosol data over East Asia during 2016 KORUS-AQ campaign	Myungje Choi
A51L-0097	Analysis of AERONET Remote Sensing and LARGE In-Situ Measurements of Aerosol Properties During the KORUS-AQ Campaign with Focus on Pollution Transport Events and the Influence of Cloud/Fog and High RH	Tom Eck
A51L-0115	Towards a satellite - in situ hybrid estimate for organic aerosol abundance	Jin Liao
A52A-06	Tracking Fossil Fuel Emissions in East Asia by Combining Model Simulations, Satellite Observations, and Field Measurements of the CO-to-CO ₂ Ratio	Wenfu Tang
A53A-06	A Global Survey of Submicron Aerosol Acidity (pH)	Ben Nault

Abstract	Title	Presenter
A53G-2064	Constraining NO _x and NMVOC Emissions using OMPS during KORUS-AQ Campaign and Implications for Ozone Formation	Amir Souri
A53G-2065	Assessment of in-situ and remote sensing NO ₂ observations during DISCOVER-AQ and KORUS-AQ field campaigns	Sungyeon Choi
A53G-2066	The pattern of HCHO and NO ₂ columns in the downwind area of Seoul during KORUS-AQ campaign	Yeseul Cho
A54D-01	Atmospheric trace gas (NO ₂ and ozone) dynamics over coastal waters near polluted urban regions	Maria Tzortziou
A54D-07	Using KORUS-OC Observations for a Feasibility Study on Using Satellite- & Ground-based Data for Offshore Air Quality Monitoring	Deb Kollonige

Going forward, here are a few requirements that will help us to keep track of science team progress and ensure consistency among the published findings:

- 1) **Anyone in the draft stage of manuscript writing should email their title and full author list to Jim Crawford. We will keep the list updated and shared at each monthly webex.**
- 2) **Authors are highly encouraged to present a summary of their analysis and findings during a monthly webex before submitting the paper.**
- 3) **Authors should also identify the target journal for their paper. We have not yet decided on whether a special issue will be commissioned, but this information may help us to decide whether to have a special issue or allow our papers to span many journals.**
- 4) **Double check to be sure that the most recent data is being used in your analysis (e.g., LARGE-APS size distribution data for DC-8 was updated today).**
- 5) **KORUS-AQ data doi's will become available in the near future. Please use these doi's to reference the data used in your paper.**
- 6) **Intercomparison analyses of measurements are underway and will be presented in a future webex. If you are using variables measured by multiple groups, please be aware of and prepare to cite intercomparison results.**

The KORUS-AQ Leadership has agreed to support a subset of papers to be submitted as a Special Feature to Elementa (<https://www.elementascience.org/about/>)

These papers would represent high-level overviews of the campaign and the major questions posed in the Final Science Synthesis Report

This is a preliminary list of paper topics and the team members taking primary responsibility:

- 1) Campaign Overview (Crawford and KORUS-AQ leads)
- 2) Meteorological Overview (Peterson)
- 3) Detailed Analysis of Olympic Park Observations and the Factors Controlling Air Quality (Gangwoong and Meehye Lee, possibly multiple papers) – Taehwa should be contrasted when possible
- 4) Ozone Photochemical Production and Sensitivity (Schroeder)
- 5) Aerosol Synthesis and Overview (LARGE Team)
- 6) VOC Source Apportionment (Simpson) – also a contribution from Jung-Hun for the emissions inventory?
- 7) Multi-model assessment of Air Quality during the campaign (Park and Emmons)
- 8) Remote Sensing: Insights and Future Expectations in the context of KORUS-AQ (Jhoon Kim and Jay Al-Saadi) – possibly multiple papers

Deadline for paper submissions: 31 May 2019

Authors	Title	Journal	Status
Hwajin Kim, Qi Zhang, Jongbae Heo	Influence of Intense secondary aerosol formation and long range transport on aerosol chemistry and properties in the Seoul Metropolitan Area during spring time: Results from KORUS-AQ	Atmospheric Chemistry and Physics	Published
Najin Kim, Minsu Park, Seong Soo Yum, Jong Sung Park, Hye Jung Shin, Joon Young Ahn	Impact of urban aerosol properties on cloud condensation nuclei (CCN) activity during the KORUS-AQ field campaign	Atmospheric Environment	Under Review
W. Hu, D.A. Day, P. Campuzano-Jost, B.A. Nault, T. Park, T. Lee, P. Croteau, M.R. Canagaratna, J.T. Jayne, D.R. Worsnop, J.L. Jimenez	Evaluation of the new capture vaporizer for Aerosol Mass Spectrometers (AMS): Elemental composition and source apportionment of organic aerosols (OA).	ACS Earth Space Chemistry	Published
W. Hu, D.A. Day, P. Campuzano-Jost, B.A. Nault, T. Park, T. Lee, P. Croteau, M.R. Canagaratna, J.T. Jayne, D.R. Worsnop, J.L. Jimenez	Evaluation of the new capture vaporizer for Aerosol Mass Spectrometers: characterization of organic aerosol mass spectra	Aerosol Science and Technology	Published
Wenfu Tang, A. F. Arellano, J. P. DiGangi, Yonghoon Choi, G. S. Diskin, A. Agustí-Panareda, M. Parrington, S. Massart, B. Gaubert, Youngjae Lee, Dan-bee Kim, Jinsang Jung, Hong Jinkyu, Yugo Kanaya, Mindo Lee, A. M. Thompson, J. H. Flynn, and Jung-Hun Woo	Evaluating High-Resolution Forecasts of Atmospheric CO and CO ₂ from a Global Prediction System during KORUS-AQ Field Campaign	Atmospheric Chemistry and Physics	Published
Wenfu Tang, L. K. Emmons, A. F. Arellano Jr., B. Gaubert, C. Knote, S. Tilmes, R. R. Buchholz, G. G. Pfister, D. R. Blake, N. J. Blake, J. P. DiGangi, Yonghoon Choi, G. S. Diskin, Jung-Hun Woo	Source Contribution to Carbon Monoxide during KORUS-AQ Using CAM-chem Tagged Tracers	JGR-Atmospheres	Under Review

Authors	Title	Journal	Status
Eric Heim, et al.	Asian Dust Observed during KORUS-AQ Facilitates the Uptake and Incorporation of Soluble Pollutants during Transport to S. Korea; The Hwangsa Anthropogenic Model	TBD	In prep
Dan Goldberg, et al.	A top-down assessment using OMI NO ₂ suggests and underestimate in the NO _x emissions inventory in Seoul, South Korea during KORUS-AQ	ACPD	In review
Myunge Choi et al.	Validation, comparison, and integration of GOCI, AHI, MODIS, MISR, and VIIRS aerosol optical depth over East Asia during 2016 KORUS-AQ campaign	TBD	In prep
Myungje Choi, Seoyoung Lee, et al.	Assessment of 3-D aerosol distribution for long-range transport and local emission using GOCI and ground, airborne, and satellite lidar measurement during 2016 KORUS-AQ	TBD	In prep
Heesung Chong, Seoyoung Lee, et al.	High resolution remote sensing of SO ₂ and HCHO from the GeoTASO instrument during KORUS-AQ: PCA-based vertical column retrievals	TBD	In prep
Heesung Chong, et al.	Surface NO ₂ volume mixing ratio estimated from total column observations of Pandora spectrometer during KORUS-AQ	TBD	In prep
Seoyoung Lee, Jhoon Kim, Myungje Choi, Jaemin Hong, Hyungkwang Lim, Tom Eck, Brent Holben, Joon-Young Ahn, Jeongsoo Kim, Ja-Ho Koo	Analysis of long-range transboundary transport (LRTT) effect on Korean aerosol pollution during the KORUS-AQ campaign	Atmospheric Environment	Submitted
Sujung Go, et al.	Imaginary part of refractive index derived from UV-MFRSR in Seoul, and implications for retrieving UV Aerosol Optical Properties for GEMS measurements	Remote Sensing of Environment	In prep
Hyungkwan Lim, et al.	Aerosol loading height retrieval from AHI using spatiotemporal variability during KORUS AQ	TBD	In prep

Authors	Title	Journal	Status
Hyungkwan Lim, Myungje Choi, Mijin Kim, Jhoon Kim, Sujung Go, and Seoyoung Lee	Intercomparing the Aerosol Optical Depth using the Geostationary Satellite Sensors (AHI, GOCl and MI) from Yonsei AErosol Retrieval (YAER) Algorithm	J. Korean Earth Sci. Soc.	Published
Yeseul Cho, Ja-Ho Koo, et al.	Spatiotemporal properties of O3 and NO2 in the Seoul Metropolitan Area: comparison among total column, vertical profile, and surface patterns	TBD	In prep
Sang Seo Park, et al.	Temporal variation of total ozone without its variations at surface and stratosphere	TBD	In prep
Paul Romer, Ron Cohen, et al.	Constraints on aerosol nitrate photolysis as a potential source of HONO and NOx	TBD	In prep
W. Hu, P. Campuzano-Jost, D. A. Day, B. A. Nault, T. Park, T. Lee, A. Pajunoja, A. Virtanen, P. Croteau, M. R. Canagaratna, J. T. Jayne, D. R. Worsnop, J. L. Jimenez	Size distributions and ambient quantifications for organic aerosol (OA) in aerosol mass spectrometer (AMS) instruments with the new capture vaporizer (CV)	Journal of Aerosol Science	In prep
B. A. Nault, P. Campuzano-Jost, D. A. Day, J. C. Schroder, B. Anderson, A. Beyersdorf, D. R. Blake, W. H. Brune, J. D. Crouse, R. C. Cohen, Y. Choi, C. Corr, J. A. de Gouw, J. Dibb, J. P. DiGangi, G. Diskin, A. Fried, L. G. Huey, M. J. Kim, C. J. Knote, K. D. Lamb, T. Lee, D. D. Montzka, T. Park, A. E. Perring, S. E. Pusede, P. S. Romer, E. Scheuer, J. P. Schwarz, K. L. Thornhill, P. O. Wennberg, A. J. Weinheimer, A. Wisthaler, J. H. Woo, P. J. Wooldridge, and J. L. Jimenez	Secondary Organic Aerosol Production from Local Emissions Dominates the Organic Aerosol Budget over Seoul, South Korea, during KORUS-AQ	Atmospheric Chemistry and Physics	In Review

Authors	Title	Journal	Status
B. A. Nault, P. Campuzano-Jost, D. A. Day, J. C. Schroder, D. R. Blake, M. R. Canagaratna, J. A. de Gouw, F. Flocke, A. Fried, J. B. Gilman, T. F. Hanisco, L. G. Huey, B. T. Jobson, W. C. Kuster, B. Lefer, J. Liao, D. D. Montzka, I. B. Pollack, J. Peischl, B. Rappenglueck, J. M. Roberts, T. B. Ryerson, J. Stutz, P. Weibring, A. J. Weinheimer, E. C. Wood, and J. L. Jimenez	Quantification of the Rapid Photochemical Secondary Organic Aerosol Production Observed across Megacities around the World	Nature Geosciences or PNAS	In prep
B. A. Nault, P. Campuzano-Jost, D.A. Day, W. W. Hu, B. B. Palm, J. C. Schroder, R. Bahreini, H. Bian, M. Chin, S. L. Clegg, P. Colarco, J. Crouse, J. A. de Gouw, J. Dibb, M. J. Kim, J. Kodros, F. D. Lopez-Hilfiker, E. A. Marais, A. Middlebrook, J. A. Neuman, J. B. Nowak, J. Pierce, J. M. Roberts, E. Scheuer, J. A. Thornton, P. R. Veres, P. O. Wennberg, and J. L. Jimenez	Global Survey of Submicron Aerosol Acidity (pH)	Nature Geosciences or PNAS	In prep
D. Jeong, R. Seco, D. Gu, Y. Lee, B. Nault, C. Knote, T. Mcgee, J. Sullivan, J. L. Jimenez, P. Campuzano-Jost, D. Blake, D. Sanchez, A. Guenther, D. Tanner, G. Huey, R. Long, B. E. Anderson, S. R. Hall, Y.-J. Lee, D. Kim, J.-Y. Ahn, A. Wisthaler, and S. Kim	Integration of Airborne and Ground Observations of Nitryl Chloride in the Seoul Metropolitan Area and Its Impact on the Regional Oxidation Capacity During the KORUS-AQ 2016 Field Campaign	TBD	In prep
D. Sanchez, R. Seco, D. Gu, A. Guenther, D. Jeong, J. Mak, Y.-J. Lee, D. Kim, D. Blake, S. Herndon, D. Jeong, T. Mcgee, and S. Kim	OH Reactivity Budget Analysis at the Taehwa Research Forest During KORUS-AQ 2016	TBD	In prep

Authors	Title	Journal	Status
Isobel Simpson, et al.	Characterization and source apportionment of VOCs in the Seoul Metropolitan Area	TBD	In prep
Kara Lamb, et al.	Estimating Source Region Influences on BC abundance, microphysics, and radiative effect over S. Korea	JGR-Atmospheres	In review
Jinkyul Choi, Rokjin J. Park, Hyung-Min Lee, Seungun Lee, Duseong S. Jo, Jaemin I. Jeong, Daven Henze, Jung-Hun Woo, Soo-Jin Ban, Min-Do Lee, Cheol-Soo Lim, Mi-Kyung Park, Hye J. Shin, Seogju Cho, and David Peterson	Source attribution of PM _{2.5} for Korea during the KORUS-AQ campaign using GOES-Chem adjoint model	TBD	In prep
Yujin Ok, Rokjin J. Park, D. Blake, W. Brune, A. Weinheimer, A. Fried, J. Crawford, and J. Schroeder	Evaluation of simulated VOCs during the KORUS-AQ campaign and their effect on ozone production in Korea	TBD	In prep
Hyeonmin M. Kim, Rokjin J. Park, Jaemin I. Jeong, Daun Jeong, Saewung Kim, and Seogju Cho	Effect of nitryl chloride chemistry on oxidation capacity in East Asia	TBD	In prep
Hyung-Min Lee, Rokjin Park, Hyeong-Ahn Kwon	Top-down estimate of isoprene emissions in East Asia using inverse modeling: implication of satellite retrievals from GOME-2 and OMI formaldehyde with KORUS-AQ aircraft observations	TBD	In prep
David Peterson, et al.	Meteorology Influencing Pollution Regimes and Transport during KORUS-AQ	Elementa	In prep

Authors	Title	Journal	Status
K. Miyazaki, T. Sekiya, D. Fu, K. Bowman, S. Kulawik, K. Sudo, T. Walker, Y. Kanaya, M. Takigawa, K. Ogochi, H. Eskes, F. Boersam, B. Gaubert, J. Barre, and L. Emmons, and the KORUS-AQ team	Evaluation of a multi-constituent chemical reanalysis during KORUS-AQ: Role of dynamics and emissions	JGR-Atmospheres	In prep
Changmin Cho, J. St. Clair, G. Wolfe, Jin Liao, Sukhan Jung, Dae il Kang, Jinsoo Choi, Myung-Hwan Shin, Jinsoo Park, T. Hanisco, Kyung-Eun Min	Top-down estimation of volatile organic compounds (VOCs) emission rates in petrochemical complex using airborne in-situ formaldehyde (HCHO) observation	Atmospheric Environment or ACP	In prep
Minsu Park, Najin Kim, Seong Soo Yum, Lee Thornhill, Bruce Anderson, Dong-Su Kim, Hyun-Jae Kim, Ha-Eun Jeon, Yun-Seo Park, Sang-Bo Lee	On the submicron aerosol distributions and CCN activity in and around the Korean Peninsula measured onboard the NASA DC-8 research aircraft during the KORUS-AQ field campaign	TBD	In prep
Jin Liao, T. Hanisco, G. Wolfe, J. St. Clair, J. Jimenez, P. Campuzano-Jost, B. Nault, A. Fried, E. Marais, G. Gonzalez Abad, K. Chance, H. Jethva, T. Ryerson, C. Warneke, A. Wisthaler	Towards a satellite-in situ hybrid proxy for organic aerosol abundance	ACP	In prep
Mark F. Lunt, Sunyoung Park, Shanlan Li, Stephan Henne, Alistair J. Manning, Anita L. Ganesan, Isobel J. Simpson, Donald R. Blake, Qing Liang, Simon O'Doherty, Christina M. Harth, Jens Muhle, Peter K. Salameh, Ray F. Weiss, Paul B. Krummel, Paul J. Fraser, Ronald G. Prinn, Stefan Reimann, and Matthew Rigby	Continued emissions of the banned ozone-depleting substance - carbon tetrachloride - from East Asia	GRL	Submitted

Authors	Title	Journal	Status
Herman, Jay, Elena Spinei, Jhoon Kim, Jae Kim, Woogyung Kim, Nader Abuhassan, Michal Segal-Rozenhaimer, Alexander Cede	NO ₂ and HCHO Measurements in Korea from 2012 to 2016 using a network of Pandora Spectrometer Instruments	AMT	Submitted
Spinei, E., N. Abuhassan, A Cede, M. Tiefengraber, M. Mueller, J. Herman, N. Nowak, B. Poche, S. Choi, A. Whitehill, J. Szykman, V. Lukas, D. Williams, R. Long, Jin Liao, Jason St. Clair, Glenn Wolfe, Thomas Hanisco, Changmin Cho, Alan Fried, Petter Weibring, Dirk Richter, Robert Swap, James Walega	Pandora formaldehyde measurements during KORUS-AQ over Olympic Park and Taehwa (South Korea, April-June 2016)	AMT	Submitted
KORUS-AQ Leadership	KORUS-AQ Overview Paper	Elementa	In prep

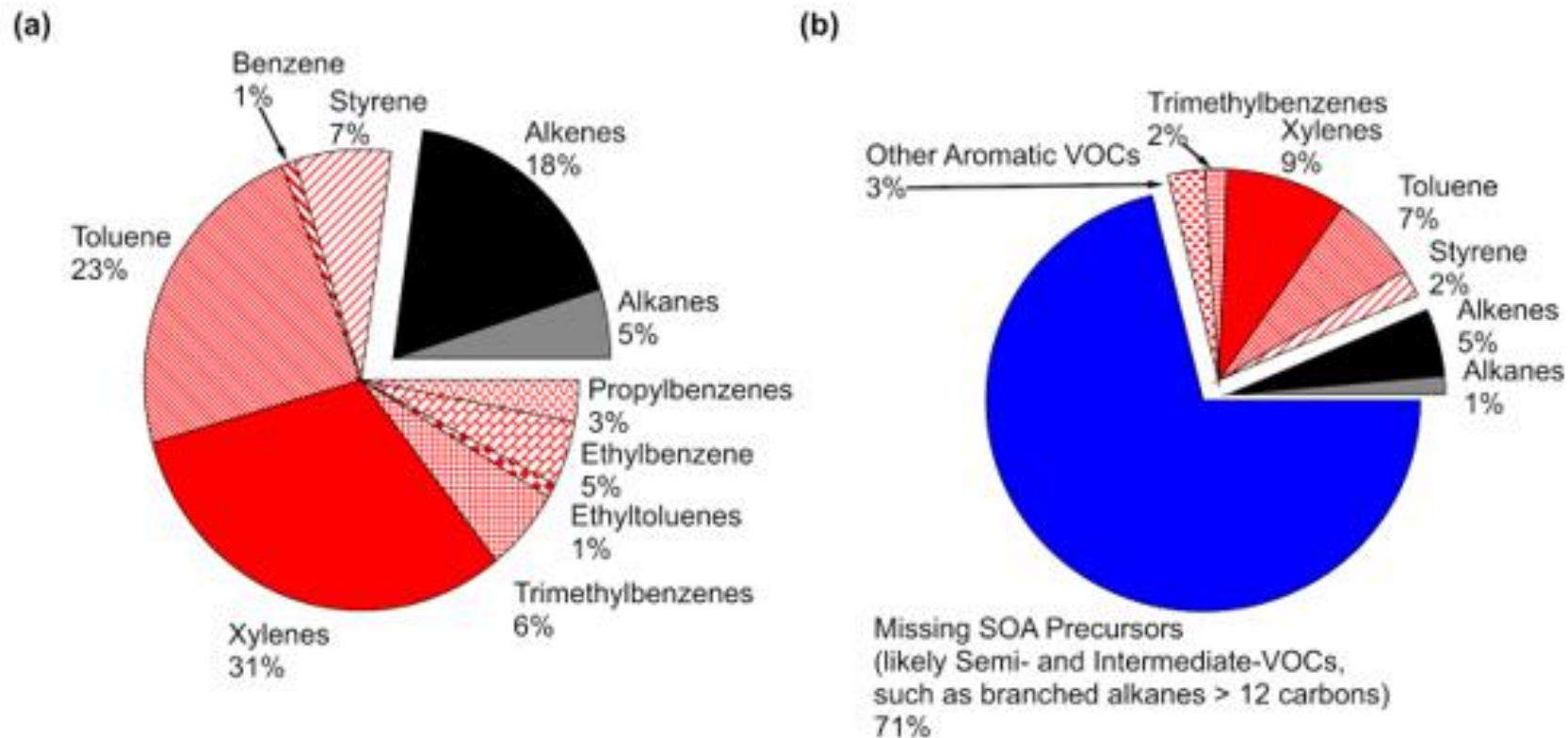
Work Session 3: Emissions

PRESENTATIONS:

NAME	TITLE
Jung-Hun Woo	Overview of KORUS-AQ emissions inventory
Dan Goldberg	A top-down assessment using OMI NO ₂ suggests an underestimate in the NO _x emissions inventory in Seoul
Rokjin Park	Evaluation of NO _x emissions in South Korea during the KORUS-AQ using multi-model comparisons
Kazuyuki Miyazaki	Satellite top-down emission estimates for NO _x , CO, and SO ₂
Isobel Simpson	Source apportionment results for VOCs in the Seoul region

MODERATORS: Jung-Hun Woo, Isobel Simpson
RAPPORTEURS: Hannah Halliday





(Left) The estimated contribution of measured volatile organic compounds to the local secondary organic aerosol production over the Seoul Metropolitan Area for the typical extent of oxidation observed over Seoul. (Right) The potential contribution of the measured and inferred (non-measured) volatile organic compounds to the local secondary organic aerosol production over the Seoul Metropolitan Area for typical amount of oxidation observed over Seoul. "Other aromatic VOCs" include benzene, ethyltoluenes, ethylbenzene, and propylbenzenes.

Text for report:

Secondary organic aerosol (SOA) is one of the more important, but complex, portions of the PM₁ budget during KORUS-AQ. Recent work, including results from KORUS-AQ, has established that greater than 50% of the secondary organic aerosol is produced from locally emitted volatile organic compounds (VOCs), and these VOCs undergo rapid chemistry to produce SOA. Figure XX shows that, for the measured VOCs, toluene, xylenes, and trimethylbenzenes account for ~60% of the SOA produced over SMA. However, as discussed in numerous studies for cities around the world, including a recent one for the Seoul Metropolitan Area, these VOCs cannot account for all the observed SOA over SMA. Figure XX indicates that the measured VOCs account for 29% of the observed SOA, and the rest of the SOA originates from missing SOA precursors. It is suggested that these missing SOA precursors maybe VOCs with more than 12 carbons, and these are VOCs are emitted from transportation (especially diesel vehicles), cooking, paint, and industry. We recommend further work to identify these missing SOA precursors in order to determine the sources of these VOCs.

Point Sources

Moderator: Alan Fried

Rapporteur: Dianne Sanchez

- 1. There is an increased formaldehyde burden over Daesan industrial complex that needs to be further investigated at other industrial complexes, not just Daesan**

- 2. Elevated levels of many VOCs have been measured, especially ethene and light alkanes**
 - a. The emitted VOCs include benzene, formaldehyde, and 1,3-butadiene, known carcinogens, have been measured over the Daesan plant

 - b. Aircraft measurements of benzene are broadly consistent with the ground measurements near the facility

3. The VOC emissions from aircraft top down estimates from multiple approaches are giving broadly the same result that the emission inventories are being underestimated by a factor of roughly 2-4

a. More work needs to be done to constrain the uncertainties of the top down emission estimates

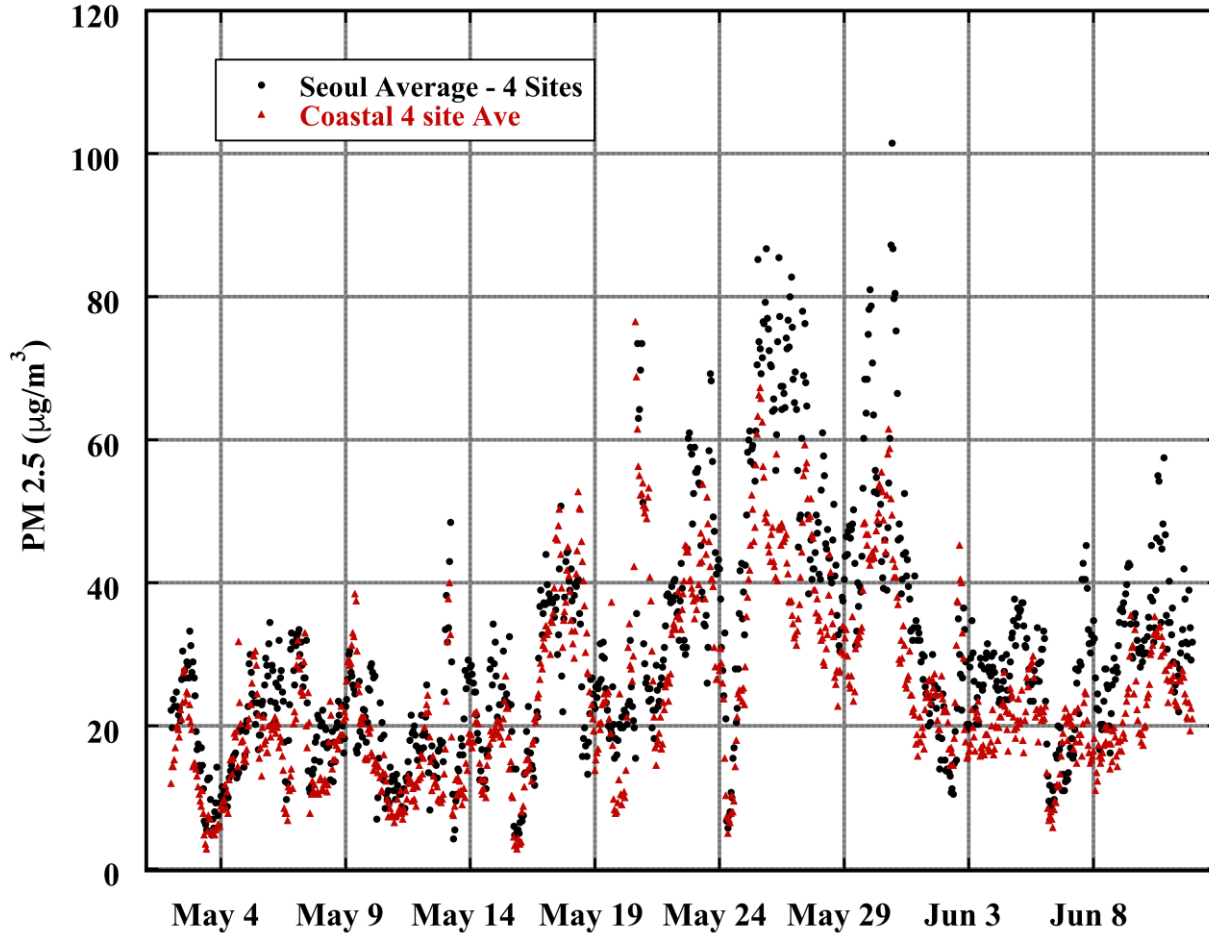
b. We are extrapolating snapshot measurements which creates uncertainty in yearly estimates

c. It is important to use uniform and geographically specific emissions inventories for the Daesan plant, and other facilities (if applicable)

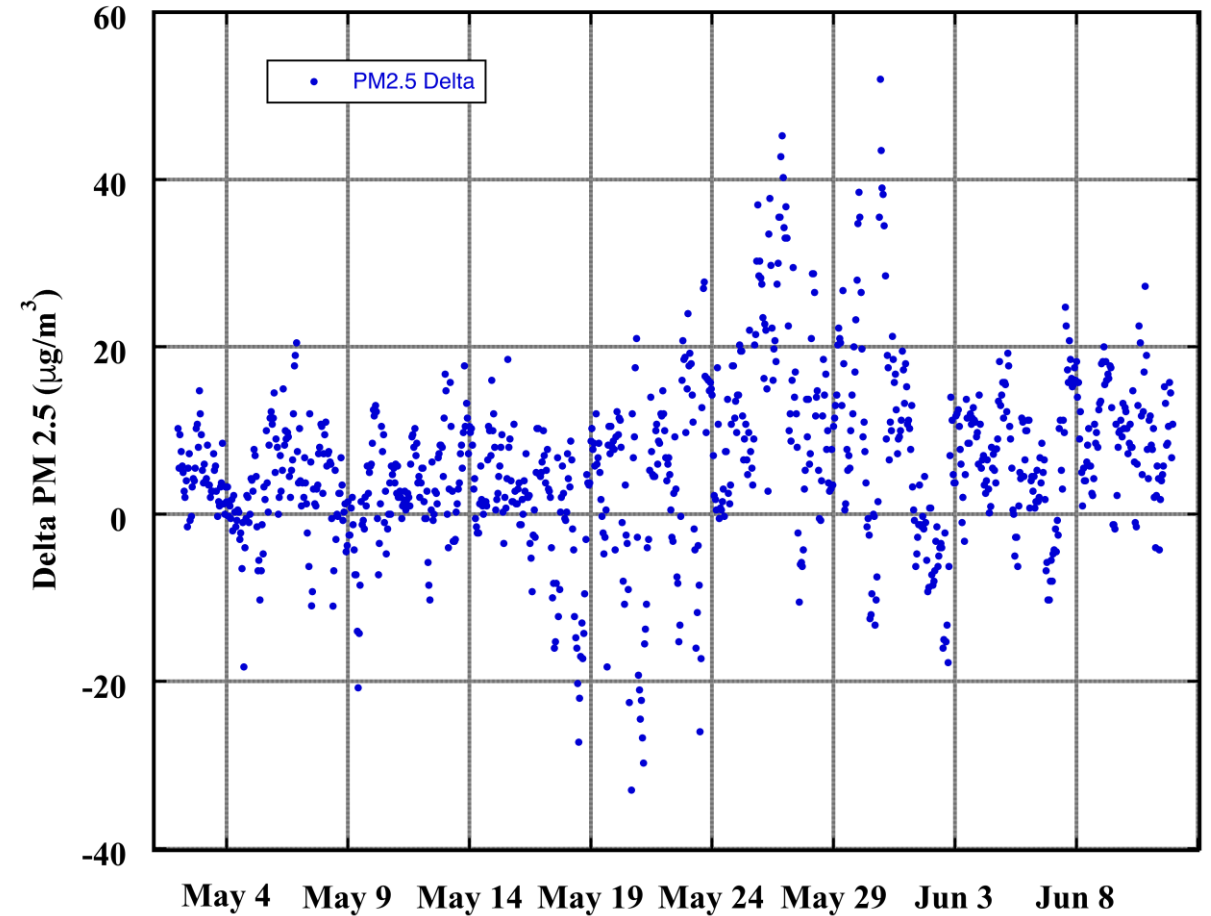
d. Formaldehyde and its precursors are underestimated by a factor of ~5 (30% of total VOCs)

4. NO_x and SO₂ aircraft top down estimates are generally well-matched to emissions inventory estimates for large point sources

PM 2.5 Hourly Measurements May 2 - June 11, 2016



PM 2.5 Hourly Measurements May 2 - June 11, 2016
Seoul - Coastal : 4 Site Averages



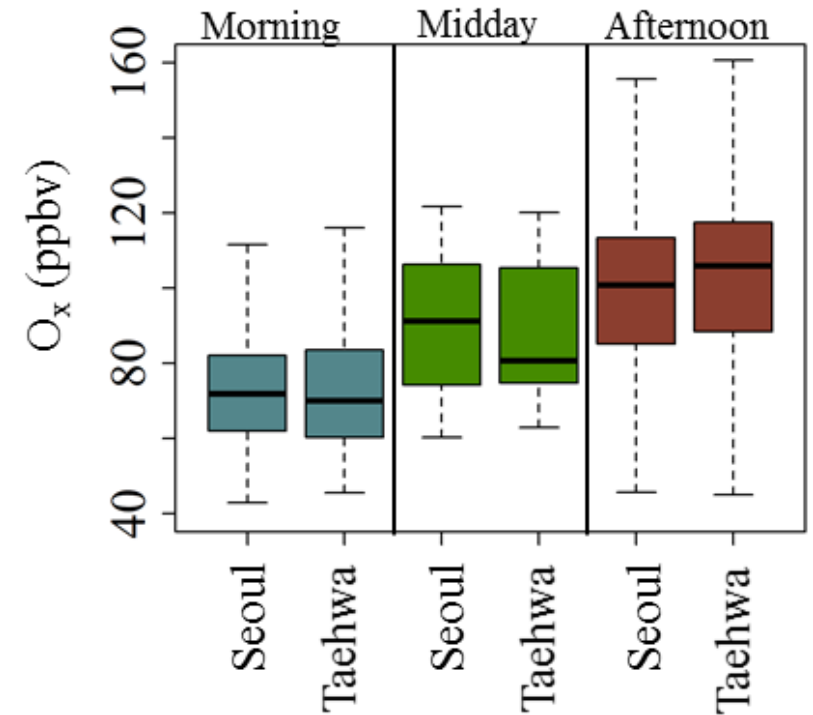
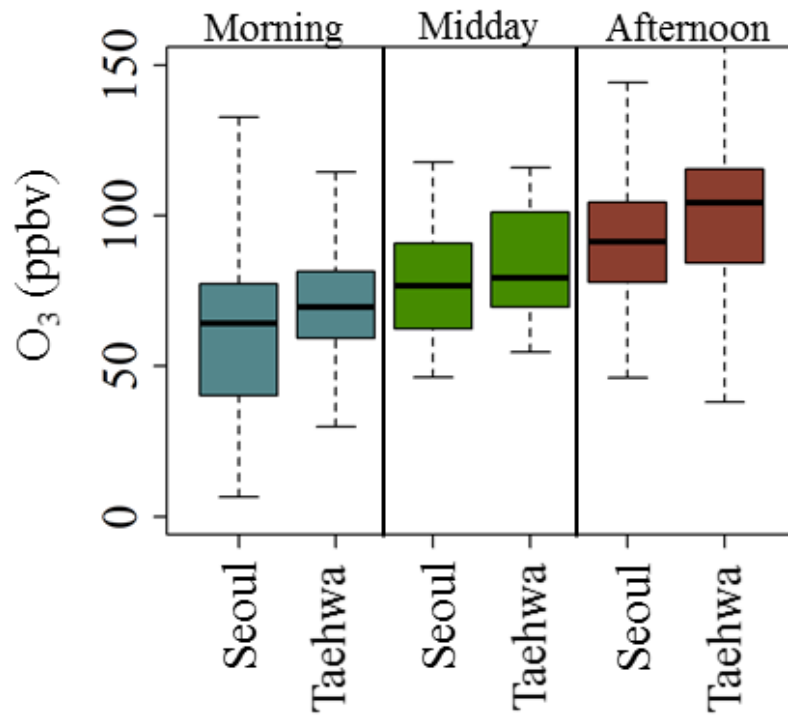
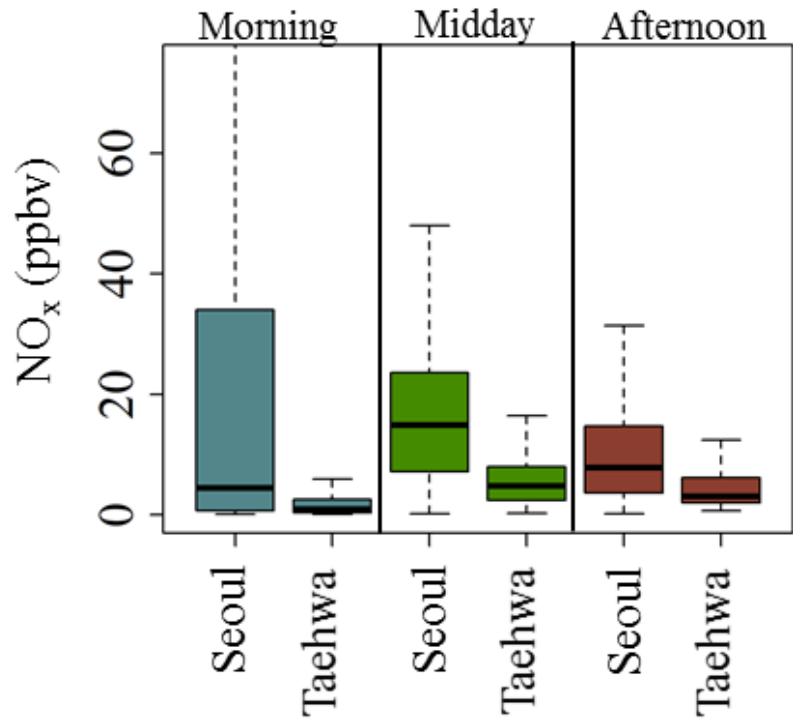
The PM_{2.5} difference between means of the Seoul sites minus the Coastal sites averaged 21.2 $\mu\text{g}/\text{m}^3$ for the largest transboundary event of May 25-26 (2 day mean= 67.9 $\mu\text{g}/\text{m}^3$ in Seoul), while for the Stagnation period of May 17-22 (5 day mean) the average difference was only -0.2 $\mu\text{g}/\text{m}^3$ for the Seoul-Coastal difference in PM_{2.5}. This suggests the possibility that over Seoul during the transboundary transport event an additional ~31% aerosol mass from new particle formation may have occurred in the aerosol water and/or in the fog or cloud droplets (May 25-26 had high RH plus fog over the West Sea and clouds over sea and land).



4 Seoul sites are PM2.5 sites within 0.05 lat/long (~5 km) of Yonsei Univ.

4 Coastal sites are West of 126.7 E Longitude and North of 37.2 N latitude – much fewer sites are located in the coastal region

Data quality control: Sites with Hourly PM2.5 that exhibited values >150 were excluded; sites with constant single digit values for several hours that then abruptly jumped to >20 were also excluded; one site in coastal region excluded due to location adjacent to a very densely built area.



Revised figure based on discussion at the Science Team meeting shows statistics for DC-8 observations below 1 km over Seoul and Taehwa:

- NO_x gradient between Seoul and Taehwa is greatest in morning, but present at all times of day, consistent with the source distribution.
- Low median value for NO_x in the morning reflects values in the lower free troposphere before the growth of the BL. Total NO_x increases from morning to midday (show Pandora column data to corroborate?)
- Ozone increases across SMA throughout the day with greater exposure downwind due to partitioning effects of high NO_x in Seoul. This is demonstrated by the equivalence in O_x over Seoul and Taehwa.
- Increases in O_x demonstrate photochemical production increasing oxidant levels throughout the day.

Status of updates to RSSR Question 5:
How is Seoul affected by transport of air pollution
from sources from regional to continental to
hemispheric scales?

Louisa Emmons

Rokjin Park

Jung-Hun Woo

RSSR Question 5: Transport impact on Seoul

Louisa Emmons, Rokjin Park, Jung-Hun Woo

New results at August STM are consistent with RSSR

- Additional results available from CO/CO₂ analysis, tagged CO, tagged NO_x, CMAQ as well as global PM source contributions

Additional model simulations planned:

- 1) Simulations with updated 2015 emissions (to be provided by Jung-Hun Woo in a couple weeks)
- 2) Run with inventory for 2022 (to be provided by Jung-Hun Woo)

Model participants: NCAR (CAM-chem, WRF-Chem), Iowa/UCLA (WRF-Chem), SNU (GC), PNU (CMAQ), Ajou?, Konkuk (emissions)

Model improvements and recommended measurements for future work

Model improvements needed:

- Representation of Secondary Organic Aerosols (SOA)
- Representation of Secondary Inorganic Aerosols (SIA)
- Representation of PBL – height, mixing within, entrainment

Observations needed:

- NH₃
- Heterogeneous chemistry, high RH effects
- Nighttime
- Winter conditions (low O₃, SOA, high PM)
- Fluxes from China