

Progress of the Joint Research Activities on Model Inter-Comparison Study for Asia (MICS-Asia)

SAC21

26-28 October 2021

Virtual Meeting

J. Kurokawa, Y. Kiriya, and K. Sato (NC)

T. Nagashima, S. Itahashi, B. Ge, M. Gao, T. Han,

M. Li, Q. Zhang, J.-H. Woo, J. Fu, G. Carmichael, and Z. Wang

MICS-Asia Phase III

Topic 1: AQ model inter-comparison

- Dr. Zifa Wang (CAS/IAP, China)
- Dr. Joshua Fu (Univ. of Tennessee, USA)
- Dr. Kazuyo Yamaji (Kobe Univ., Japan)

Topic 2: Emission Inventory

- Dr. Jung-Hung Woo (Konkuk Univ., Korea)
- Dr. Toshimasa Ohara (NIES, Japan)
- Dr. Qiang Zhang (Tsinghua Univ., China)

Topic 3: AQ and Climate Change

- Dr. Greg Carmichael (Univ. of Iowa, USA)
- Dr. Zhiwei Han (CAS/IAP, China)
- Dr. Yafang Cheng (Max Planck, Germany)

Topic 4: Southeast Asia

- Dr. Narisara Thongboonchoo (KMITL, Thailand)
- Dr. Yun Fat Lam (Univ. of Hong Kong, China)
- Dr. Mint-Tung Chuang (Research Center for Environmental Changes, Taiwan)

Ozone

- Dr. Jie Li (CAS/IAP, China)
- Dr. Tatsuya Nagashima (NIES, Japan)

Deposition

- Dr. Syuichi Itahashi (CRIEPI, Japan)
- Dr. Baozhu Ge (CAS/IAP, China)

PM_{2.5}

- Dr. Meigen Zhang (CAS/IAP, China)
- Dr. Joshua Fu (Univ. of Tennessee, USA)

SR Analysis

- Dr. Joshua Fu (Univ. of Tennessee, USA)

Topic 3

- Dr. Greg Carmichael (Univ. of Iowa, USA)
- Dr. Zhiwei Han (CAS/IAP, China)
- Dr. Meng Gao (Hong Kong Baptist Univ., China)

Special Issue of MICS-Asia III

https://acp.copernicus.org/articles/special_issue987.html

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Regional assessment of air pollution and climate change over East and Southeast Asia: results from MICS-Asia Phase III

Editor(s): ACP co-editors | Coordinators: Joshua Fu, Yafang Cheng, and Qiang Zhang | Co-organizers: Zifa Wang, Gregory R. Carmichael, and Jun-ichi Kurokaw

Finally, 26 papers were published in the Special Issue of MICS-Asia Phase III

The 11th International Workshop on Atmospheric Modeling Research in East Asia 8-9 March 2021 (Virtual)

AGENDA

<i>Day 1: Monday, March 8, 2021 UTC 0:00-3:00</i>		
00:00-00:05	Opening remarks	Zifa Wang
	Discussion on work plan of MICS-Asia Phase IV and activities in 2021	
00:05-00:20	Review of previous web meetings	Junichi Kurokawa
00:20-01:10	Air quality model working group	Tatsuya Nagashima, Jie Li, Syuichi Itahashi, Baozhu Ge
01:10-01:50	Air quality and climate model working group	Meng Gao, Zhiwei Han
01:50-02:10	Observation working group	Keiichi Sato
02:10-02:30	Emission inventory working group	Meng Li, Qiang Zhang, Jung-Hun Woo
02:30-02:50	Other issues	
02:50-03:00	Announcements including from participants	

Day 2: Tuesday, March 9, 2021 UTC 0:00-3:00

00:00-00:30 Summary for the first day and next steps after the workshop Jun-ichi Kurokawa

Research Presentations

00:30-00:50 Seasonal variation of wet deposition over Southeast Asia from the findings of MICS-Asia III Syuichi Itahashi

00:50-01:10 Multi-model simulation and comparison of Nitrogen deposition over China and South East Asia. Baozhu Ge

01:10-01:30 Probing the integrated process rate during long-range transport in East Asia. Ming-Tung Chuang (Roger)

01:30-01:50 Towards near real-time tracking of anthropogenic emissions in China: case studies during COVID-19 and future perspectives Bo Zheng

01:50-02:10 New progress for developing high-resolution Chinese air quality reanalysis datasets (CAQRA) Xiao Tang

02:10-02:35 "Model Discrepancies in MICS-Asia III: What to do in MICS-Asia IV" - Uncertainties of Heterogeneous Processes for Surface O₃ in the Urban and Marine atmosphere - Hajime Akimoto

Others

02:35-02:55 General discussions, other issues, and announcement including from participants

02:55-03:00 Closing remarks Gregory Carmichael

What should be learned from Phase III?

Major scientific issues

- The spatial resolution of models in Phase III (45km) is not enough for detailed analysis.
- Contributions of different physical and chemical processes (or relationships between different model configuration and different model results) need to be analyzed more.
- It is necessary to collect more observation data
- Analysis of specific events is important.

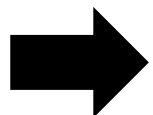
Points other than specific scientific issues

- Progress speed
- Flexibilities on research topics
- Communication among participants
- Linkage with related communities
- Outreach activities

Outline of MICS-Asia Phase IV

Major topics of Phase IV

- **Inter-comparison studies for AQ models**
- **Inter-comparison studies for AQ and CC models**
- **Development of emission inventories in Asia**
- **Collecting and analyzing observations in Asia**
- **Improvement and development of AQ and CC models**
- **Capacity building activities**
- **Outreach activities (ex. websites, publications, etc.)**



Working groups were established for topics in read

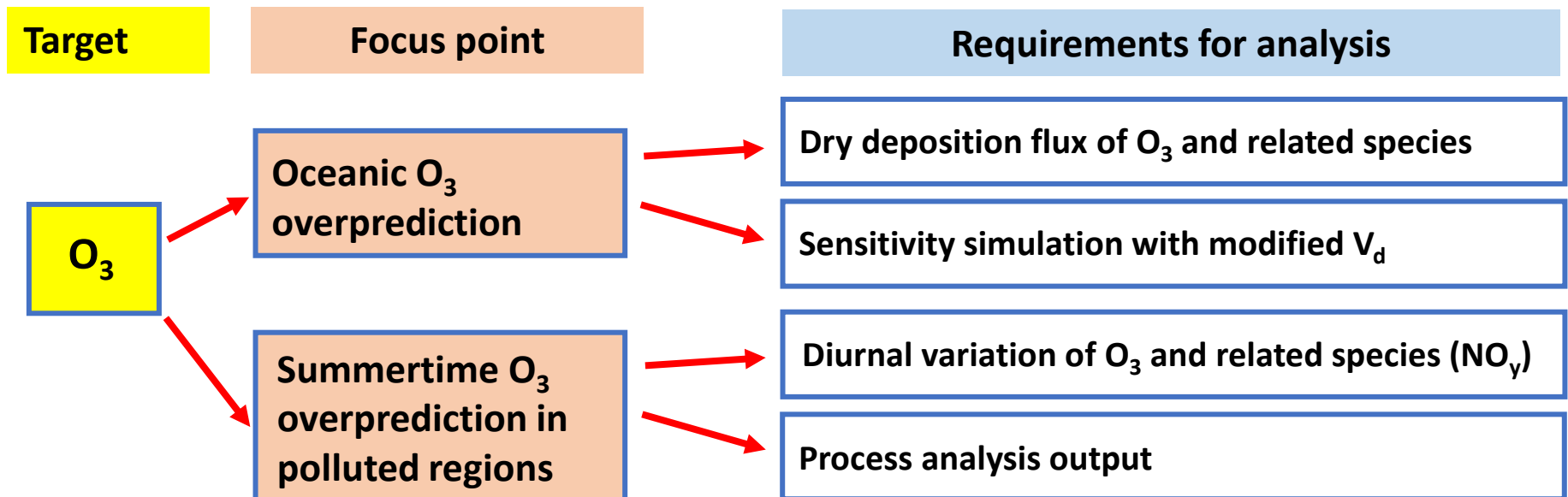
Air Quality Model Working Group

Leading Researchers:

Tatsuya Nagashima (NIES, JAPAN), Syuichi Itahashi (CRIEPI, Japan)
Jie Li, Baozhu Ge (IAP/CAS, China)

Work Plan in 2021

- Preparation of lists of targets, focus points, and requirement for analysis
- Design of simulations (Domain, period, list of history output, etc.)
- Preparation of model input data (meteorological fields, lateral boundary, emission data, etc.)
- Preparation of observation data for model validation



Air Quality (AQ) and Climate Change (CC) Model Working Group

Leading Researchers:

Meng Gao (Hong Kong Baptist University, China),
Zhiwei Han (IAP/CAS, China)

Work Plan in 2021

- Establishment of research topics
 - Examination of factors of uncertainties in AQ/CC model
 - Evaluation of interaction between PM_{2.5} and O₃
 - Evaluation of indirect effects
 - Analysis focusing on India
 - Future projected simulations
 - Others (such as carbon neutral)
- Establishment of small groups for specific AQ/CC topics
- Relationship with other research communities
 - ⇒ AEROCOM, AQMEII, CCMI, etc.

Emission Inventory Working Group

Leading Researchers:

Meng Li (NOAA, US), Qiang Zhang (Tsinghua University, China),
Jung-Hun Woo (Konkuk University, Republic of Korea)

Work Plan in 2021

- Development of MIXv2 (Mosaic based emission inventory in Asia)
- Development of natural emission data
- Preparation of other emission data (Biomass burning, International navigation, aviation, etc.)

General Information of MIXv2

- Target Year: 2010-2017(2018?)
- Target Region: East and South Asia
- Target Sources: Major anthropogenic sources (Fuel combustion, Industrial process, Agricultural activities, etc.)
- Target Species: SO₂, NO_x, CO, NMVOC, NH₃, PM_{2.5}, PM₁₀, BC, OC, and CO₂
- VOC: SAPRC99, SAPRC07, CB05
- Spatial Resolution: 0.1° × 0.1°
- Temporal Resolution: Monthly

Components of MIXv2

- China: MEIC (Multi-resolution Emission Inventory for China)
- Japan: PM2.5EI for Road Transport, J-STREAM for Stationary Sources
- Republic of Korea: Emissions based on the Clean Air Policy Support System (CAPSS)
- Others: REAS (Regional Emission Inventory in Asia)

Observation Working Group

Leading Researchers

Keiichi Sato (Asia Center for Air Pollution Research, Japan)

*Other researchers need to be invited.

Work Plan in 2021

- Call for researchers interested in the observation working group
- Preparation of catalog list of available observation data (such as ground, vertical and satellite observation) for model validation in MICS-Asia Phase IV
 - ⇒ EANET data
 - ⇒ National monitoring data
 - ⇒ Research base data including campaign data
 - ⇒ Collaboration with TOAR (Tropospheric Ozone Assessment Report)-II East Asia Focus Working Group
 - ⇒ Others
- Collaboration with modeling researchers for such as MMF (Measurement-Model Fusion) and Reanalysis data
 - ⇒ Joshua Fu (Tennessee University, US), Xiao Tang (CAS/IAP, China)

The 12th MICS-Asia Workshop

(Under consideration)

Date: Later half of February in 2022

Venue: Web conference (or hybrid style considering situation of COVID-19)

Agenda:

- **Progress reports of each working group and discussion on next steps**
- **Research presentations from participants of MICS-Asia**
- **Presentations from invited researchers outside MICS-Asia and discussion on future collaboration**
⇒ **In addition to other modelling community, researchers of related fields will be invited.**

**Thank you for your
attention!**