



SURAT KETERANGAN
MELAKUKAN KEGIATAN PENGABDIAN KEPADA MASYARAKAT
INSTITUT TEKNOLOGI NASIONAL
No. 590/C.02.01/LP2M/VIII/2018

Yang bertanda tangan di bawah ini,

Nama : Dr. Tarsisius Kristyadi, S.T., M.T.
Jabatan : Kepala
Unit Kerja : LP2M-Itenas
JL. P.K.H. Mustafa No.23 Bandung

Menerangkan bahwa,

Nama	NPP	Jabatan
Dr. Didin Agustian Pemadi, M.Eng.	20180701	Pembicara

Telah melakukan kegiatan Pengabdian kepada Masyarakat sebagai berikut:

Nama Kegiatan : Workshop of The Global Atmospheric Watch (GAW) Activity
Tempat : Jakarta
Waktu : 07-08 Agustus 2018
Sumber Dana : Badan Meteorologi Klimatologi dan Geofisika (BMKG) RI

Demikian surat keterangan ini dibuat untuk dapat dipergunakan sebagaimana mestinya.

Bandung, 28 Agustus 2018

Lembaga Penelitian dan Pengabdian
kepada Masyarakat (LP2M) Itenas
Kepala,


Itenas
LP2M

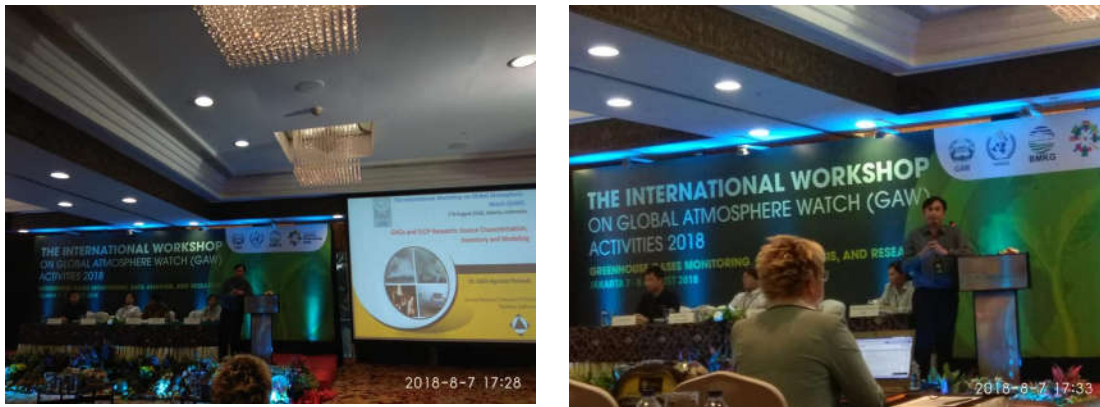
Dr. Tarsisius Kristyadi, S.T., M.T.
NPP 960604

Laporan Pengabdian kepada Masyarakat

Pembicara pada workshop internasional “Global Atmospheric Watch Activities 2018” di Jakarta, 7 Agustus 2018

Disusun oleh: Dr Didin Agustian Permadi (Teknik Lingkungan)

Badan Meteorologi, Klimatologi dan Geofisika (BMKG) pusat bekerjasama dengan lembaga meteorologi dunia (WMO) dalam pelaksanaan workshop internasional mengenai kegiatan monitoring gas rumah kaca (di berbagai belahan dunia dalam program “Global Atmospheric Watch Activities 2018”. BMKG) mengundang Dr Didin Agustian Permadi, Staf Pengajar Jurusan Teknik Lingkungan, sebagai salah satu pembicara untuk menyampaikan topik mengenai penelitian tentang GRK: karakterisasi sumber, monitoring dan modeling (lihat surat undangan dan agenda di lampiran). Foto-foto mengenai presentasi yang bersangkutan diperlihatkan pada gambar-gambar berikut. Selain itu file presentasi (dalam pdf) juga dilampirkan dalam laporan ini.



Gambar 1. Foto-foto kegiatan

Disusun oleh:

11 Agustus 2018



Dr. Eng. Didin Agustian Permadi

Staf Pengajar Jurusan Teknik Lingkungan ITENAS Bandung



METEOROLOGICAL CLIMATOLOGICAL AND GEOPHYSICAL AGENCY

Jl. Angkasa I No. 2, Kemayoran, Jakarta 10720, Phone : (62 21) 424 6321 Facs. : (62 21) 424 6703
P.O. Box 3540 Jkt, Website : <http://www.bmkg.go.id>

Ref: UM. 202/359/02/VI/2018

Jakarta, 7 June 2018

Head of LPPM, ITENAS
PHH Mustopha Street No. 23
Bandung Indonesia

Subject : Invitation to Dr. Didin Agustian Permadi, Lecturer in Environmental Engineering Department to attend International Workshop of the Global Atmospheric Watch (GAW) Activity as a Speaker, Jakarta, 07 – 08 August 2018

Dear Sir,

I have the honor to inform you that the Agency for Meteorology, Climatology, and Geophysics of Indonesia (BMKG) in collaboration with the World Meteorological Organization (WMO) will convene **2-day International Workshop of the GAW Activity in Jakarta on 07- 08 August 2018.**

The objectives of the workshop are to develop recommendations for policy makers in the region on strengthening the capacity and the data quality of GAW network as well as to improve international cooperation, knowledge transfer, and information exchange on the **measurement method, data collecting and analysis, and calibration system capacity** among GAW members and to other national and international institutes.

In accordance with the objectives of the workshop, I would like to invite **Dr. Didin Agustian Permadi**, Lecturer in Environmental Engineering Department as a speaker in the workshop. Hotel accommodation during the meeting will be covered by BMKG.

A workshop circular letter and tentative agenda are attached for your consideration. We appreciate for your kind attention and looking forward to hearing your confirmation at your earliest convenience.

Yours faithfully,

Drs. Herizal, M.Si

Deputy of Climatology

Agency for Meteorology, Climatology, and Geophysics (BMKG)



TENTATIVE AGENDA
INTERNATIONAL WORKSHOP ON GAW ACTIVITIES 2018
JAKARTA INDONESIA, AUGUST 7-8 2018

Day-1		
Opening Ceremony		
08.00 – 09.00	Participant Registration	
09.00 – 09.15	Opening Ceremony	MC
09.15 – 09.35	Keynote Speech	<i>Director General of Meteorological Climatological and Geophysical Agency of Indonesia</i>
09.35 – 09.55	Keynote Speech	<i>Chief of Atmospheric Environment Research Division WMO</i>
09.55 – 10.10	Photo Session	Committee
10.10 – 10.30	Coffee Break / Press Conference	Committee
Session 1: GAW's Role		
Chairman:		
10.30 – 10.45	Presentation	Drs. Herizal, M.Si (Deputy Director for Climatology BMKG)
10.45 – 11.00	Presentation	GAW Mauna Loa *)
11.00 – 11.15	Presentation	Dr. Andi Eka Sakya (BPPT) *)
11.15 – 11.30	Presentation	Dr. Lingxi Zhou (GAW Mt. Waliguan China)
11.30 – 11.45	Presentation	Drs. Hartanto (GAW Bukit Kototabang)
11.45 – 12.00	Discussion	Chairman
12.00 – 13.00	Lunch Break	Committee
Session 2: GAW's Role		
Chairman:		
13.00 – 13.15	Presentation	Dr. Sergey Assonov (IAEA) *)
13.15 – 13.30	Presentation	Dr. Dodo Gunawan (Director for Climate Change Information-BMKG)
13.30 – 13.45	Presentation	Dr. Mohan Kumar (GAW Daanum Valley Malaysia)
13.45 – 14.00	Presentation	Prof. Dr. Edwin Aldrian (BPPT)
14.00 – 14.15	Presentation	Dr. Ed Dlugokencky (NOAA) *)

14.15 – 14.30	Discussion	Chairman
Session 3: GHG Data Analysis		
Chairman:		
14.30 – 14.45	Presentation	Dr. Martin Steinbacher (EMPA) *)
14.45 – 15.00	Presentation	Dr. Mikio Ueno (WDCGG) *)
15.00 – 15.15	Presentation	Yukio Terao, Phd (NIES)
15.15 – 15.30	Presentation	Dr. Puji Lestari (ITB) *)
15.30 – 15.45	Presentation	Dr. Muhammad Kholid Ridwan (UGM)*)
15.45 – 16.00	Discussion	Chairman
15.45 – 19.00	BREAK	
19.00 – 20.30	WELCOME DINNER	
End of Day 1		
Day-2		
Session 4: GHG Research and Experts		
Chairman:		
08.00 – 09.00	Participant Registration	
09.00 – 09.15	Presentation	Ferdika, M.Si (Research and Development BMKG) *)
09.15 – 09.30	Presentation	Dr. Rusmawan Suwarman (ITB)
09.30 – 09.45	Presentation	Dr. Thi Quynh Hoa Vu (MONRE-Vietnam) *)
09.45 – 10.00	Presentation	Dr. Zoe Miranda Loh (CSIRO)
10.00 – 10.15	Presentation	Prof. Mastura Mahmud (University of Kebangsaan Malaysia)
10.15 – 10.30	Discussion	Chairman
10.30 – 10.45	Coffee Break	Committee
Day-2		
Session 5: GHG Research and Experts		
Chairman:		
10.45 – 11.00	Presentation	Dr. Haeyoung LEE (KMA) *)
11.00 – 11.15	Presentation	Dr. Didin Agustian (ITENAS)
11.15 – 11.30	Presentation	Dr. Jocelyn Turnbull (New Zealand) *)

11.30 – 11.45	Presentation	Teruo Kawasaki (JMA) *)
11.45 – 12.00	Presentation	Picarro
12.15 – 12.30	Discussion	Chairman
12.30 – 13.30	Lunch Break	Committee
Day-2		
Recomendation		
13.30 – 14.00	Recommendation	Drs. Guswanto, M.Si (Director for Applied Climate Information Services BMKG)
14.00 – 14.15	Closing remarks	Drs. Herizal, M.Si (Deputy Director for Climatology BMKG)

***) TO BE CONFIRMED**

THE INTERNATIONAL WORKSHOP ON GLOBAL ATMOSPHER WATCH (GAW) ACTIVITIES 2018



Pic: billygraham.org

BACKGROUND

The World Meteorological Organization (WMO) established the Global Atmosphere Watch (GAW) Programme in 1989 to promote systematic and reliable observations of the global environment, including greenhouse gases (e.g. CO₂, CH₄, CFCs, and N₂O) and some reactive gases (e.g., O₃, CO, VOCs, NO_x, and SO₂) in the atmosphere. In the tropical regions, the GAW Station in Bukit Kototabang in West Sumatra has been operated since 1996 by by Agency for Meteorology Climatology and Geophysics of the Republic Indonesia (BMKG) as a GAW Global Station. This station becomes the only station in Indonesia that is classified as a pristine air reference station, which has continuous and most complete data of atmospheric physical and chemical measurements. BMKG shows high commitment on GAW observation over equator region. In 2013, new observation network was installed in Palu (Sulawesi) and Sorong (Papua). It is expected the new observation sites together with GAW Bukit Kototabang will represent the condition over Indonesia region.

EXPECTED KEYNOTE SPEAKERS



Dwikorita Karnawati, Phd
*Director General of the Agency for
Meteorology Climatology and Geophysics
of the Republic Indonesia (BMKG)*

Dr. Oksana Tarasova
*Chief of Atmospheric Environment
Research Division
Research Department
World Meteorological Organization*



WHY ATTEND

This is one of the best events that BMKG will held in this year. We will discuss and highlight the national and international collaboration on GAW activities and capacity building which focus on green house gases monitoring.

FOCUS

- Strengthen the GHG monitoring and analysis in global scale.
- Potential regional activities in monitoring the GHG
- Research and new improvement in GHG monitoring

Venue:

Jakarta, Indonesia on 7-8 August 2018

Mailing Address

All correspondence concerning the workshop should be addressed to the Organizing Committee (OC):
Workshop International on GAW Activity – Committee BMKG
Jl. Angkasa I No.2 Kemayoran - Jakarta Pusat 10720, Indonesia
Phone: +62 21 4246321 Ext. 2418;
E-mail : wsgaw@bmkg.go.id



The International Workshop on Global Atmospheric Watch (GAW)

7-8 August 2018, Jakarta, Indonesia

GHGs and SLCP Research: Source Characterization, Inventory and Modeling

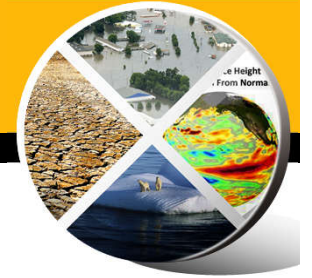


Dr. Didin Agustian Permadi

Institut Teknologi Nasional (ITENAS)
Bandung, Indonesia



Outline



- 1 Why GHGs and SLCPs?
- 2 Source characterization
- 3 Emission inventory (highlight)
- 4 Modeling effort
- 5 Summary

Why GHGs and SLCPs?



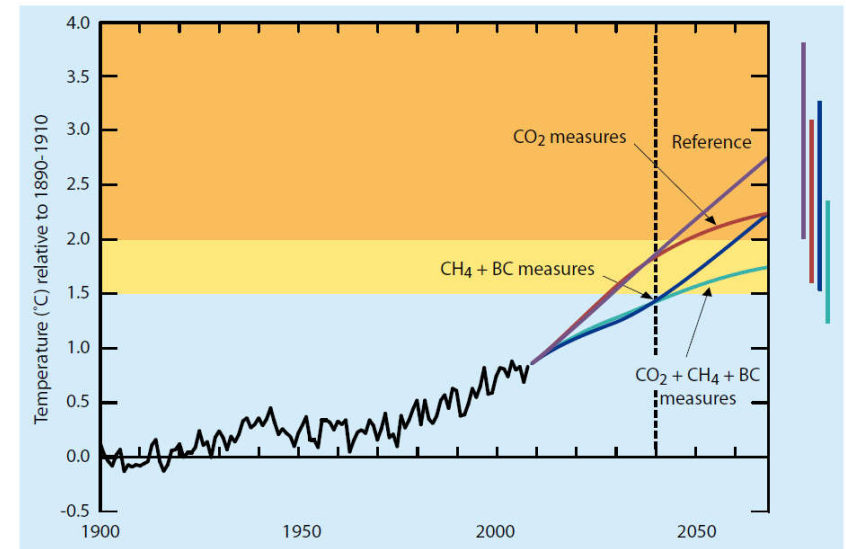
“Two faces at the same coin” →
GHGs come from the same sources of air pollutants: fuel combustion

Short-lived Climate Forcing pollutants (SLCPs) are: relatively short-lived in the atmosphere, act as air pollutants (except HFCs) and contribute to global warming

Multiple benefits of reducing SLCPs (WMO-UNEP, 2011):

- **Reduce air pollution – Protect health and crops**
- **Slow down near-term global warming, reduce regional impacts of climate change**

Air quality – climate co-benefit??



Source: WMO-UNEP, 2011

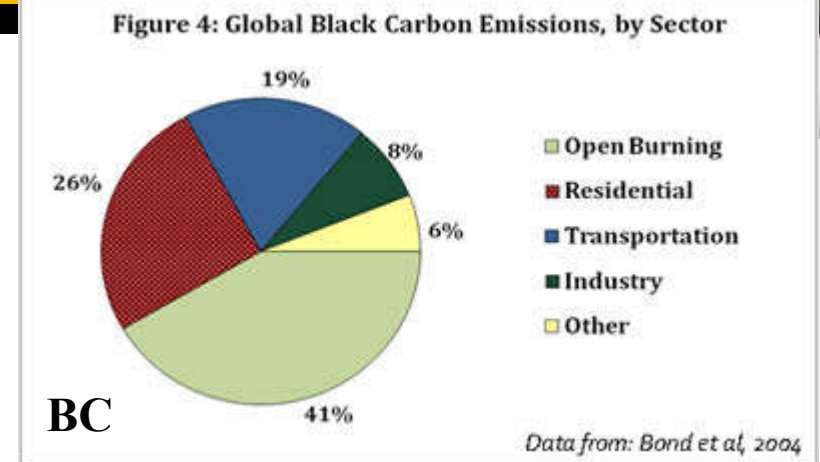
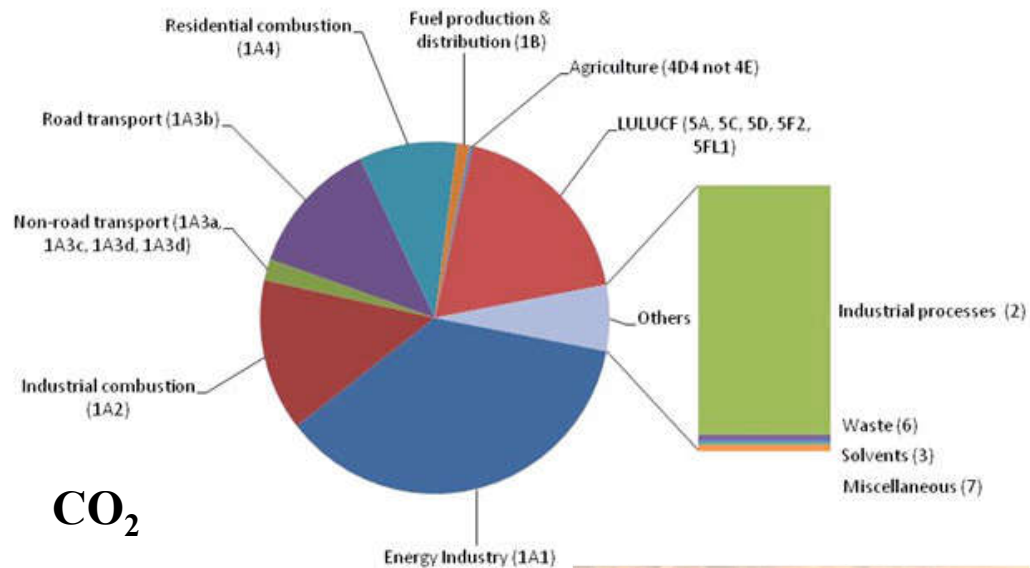
CO₂: 100-1000 years

Black carbon: 3-8 days

Tropospheric ozone: 4-18 days

CH₄: 12 years

Important sources of global CO₂ and BC



SLCP emission reductions: Low hanging fruits to tackle both air pollution and climate change problems hence co-benefits?



Source characterization (CROB) at AIT



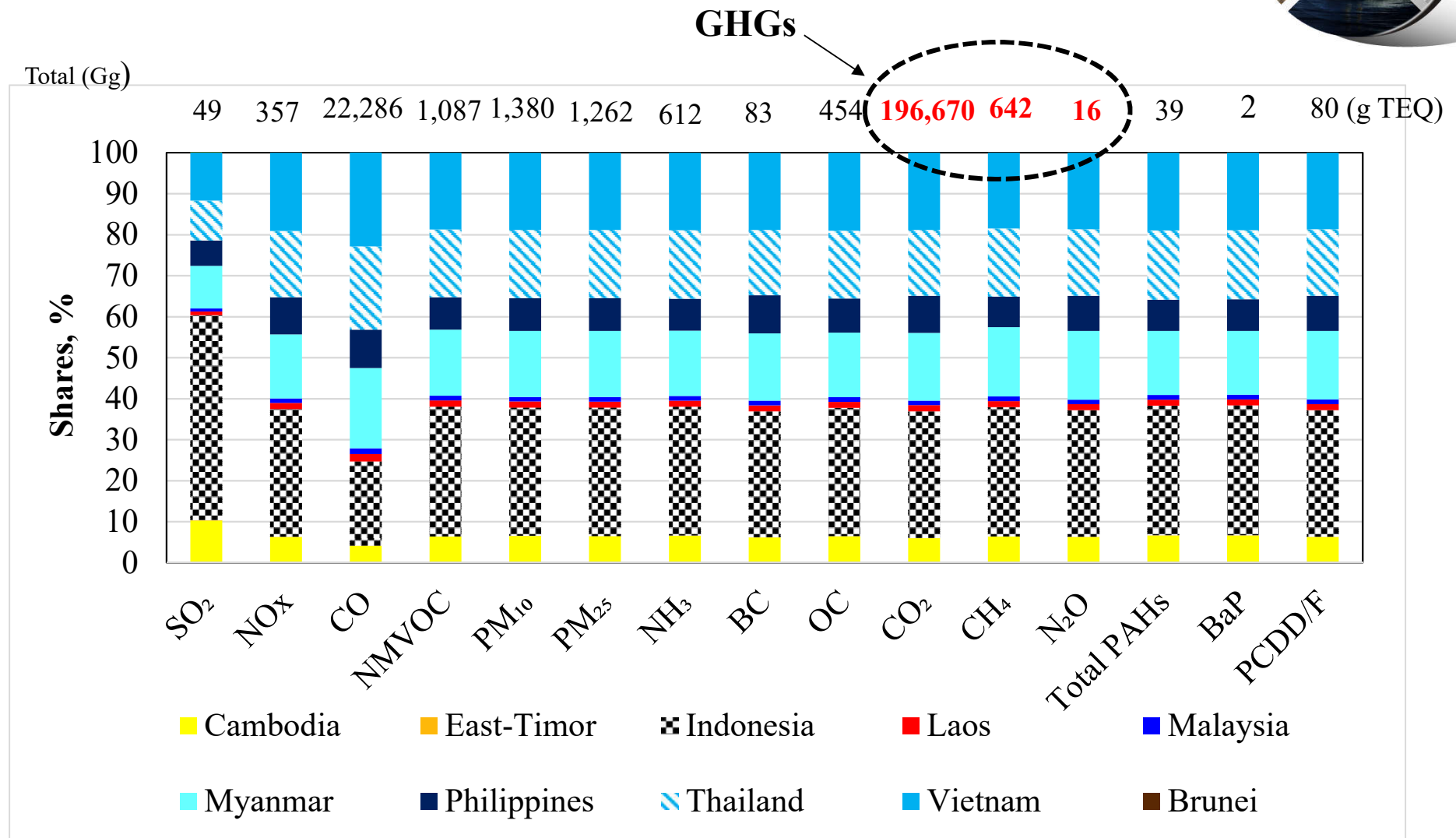
Emission factors of rice-straw open burning

Species	EF, g/kg RS	Emission, t/km ²
PM _{2.5}	8.3	4.8
PM ₁₀	9.4	5.5
CO	97	56
BC	0.51	0.3
OC	2.99	1.7
CO ₂	1147	665

Source: Kim Oanh et al., 2011

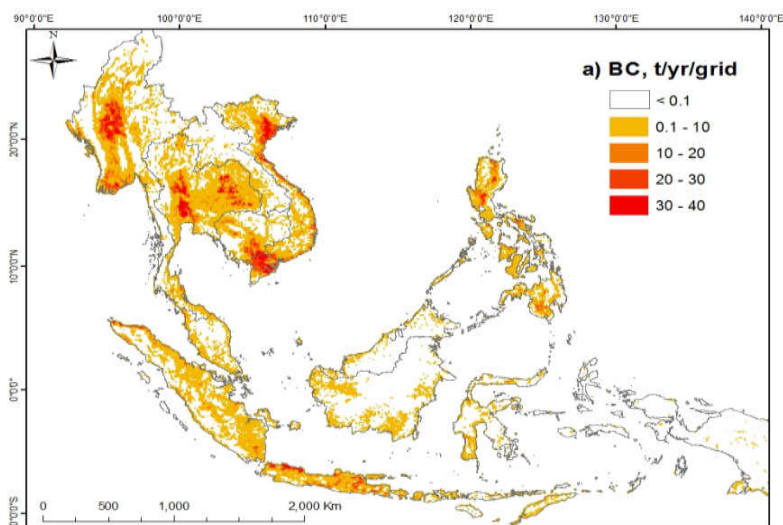
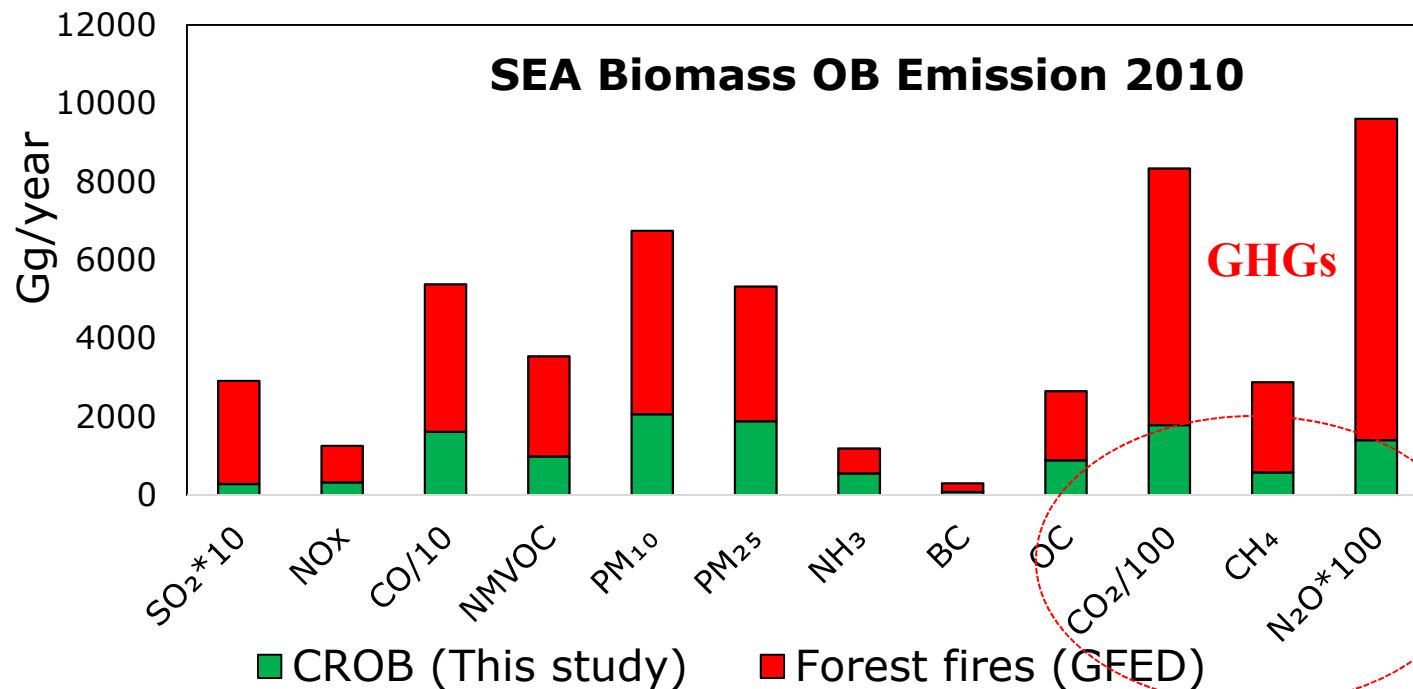
- Emission factors (EFs) represent amount of pollutant emitted per unit of activity (mass of biomass or area)
- Data are still required especially for the regional specific emission sources: crop residue open burning (CROB)
- Better estimation of emission (Emission Inventory)

Emission of crop residue OB in SEA, 2010



In this low combustion efficiency emission source: GHGs are still massively emitted

Regional specific emission sources



For more details:



Contents lists available at ScienceDirect

Atmospheric Environment

journal homepage: www.elsevier.com/locate/atmosenv



Annual emissions of air toxics emitted from crop residue open burning in Southeast Asia over the period of 2010–2015

Nguyen Thi Kim Oanh^{a,*}, Didin Agustian Permadi^a, Philip K. Hopke^{b,c}, Kirk R. Smith^d,
 Nguyen Phan Dong^a, Anh Nguyet Dang^a

^a Environmental Engineering and Management, School of Environment, Resources and Development, Asian Institute of Technology, Pathumthani 12120, Thailand

^b Center for Air Resources Engineering and Science, University of Clarkson, Potsdam, NY 13699, USA

^c Department of Public Health Sciences, University of Rochester School of Medicine and Dentistry, Rochester, NY 14642, USA

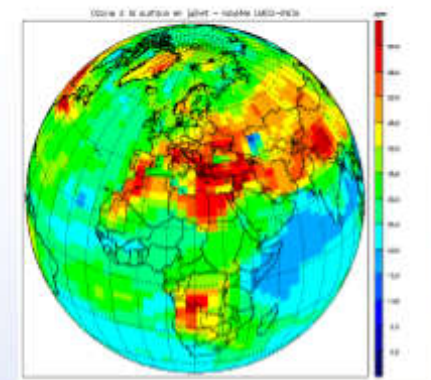
^d University of California, Environmental Health Sciences, School of Public Health, Berkeley, CA, USA



Regional modeling effort: WRF-CHIMERE



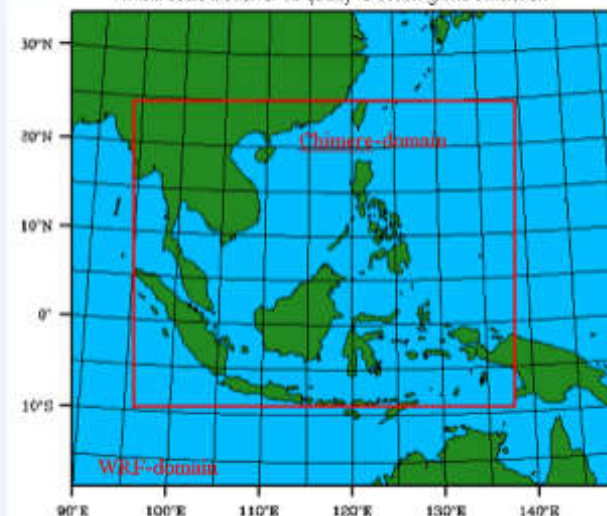
Providing **meteorological fields** for base year with initial and lateral boundary conditions from NCEP FNL dataset



Lateral boundary conditions:
 LMDZ-INCA: monthly average of trace gases
 GOCART: monthly average of aerosols

Biogenic emissions are calculated on-line in the CHIMERE (Simpson et al., 1999) as a function of the season and the type of the vegetation cover as provided by the Global Land Cover Facility (GLCF) (<http://glcf.umd.edu>) with resolution 1km x 1km.

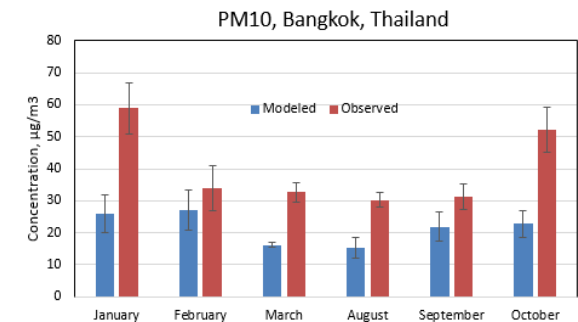
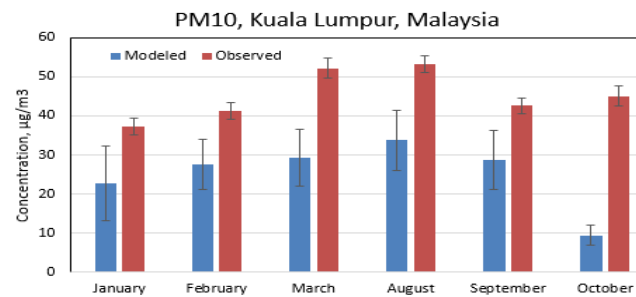
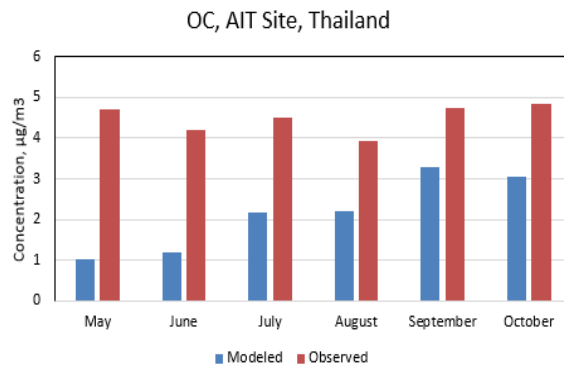
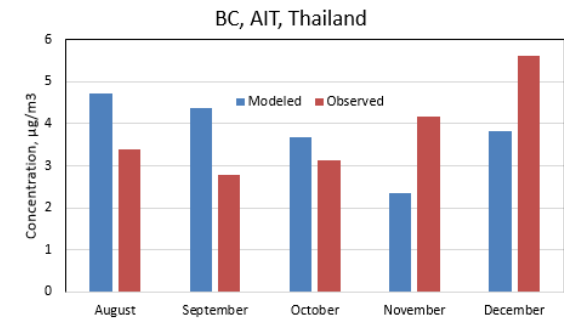
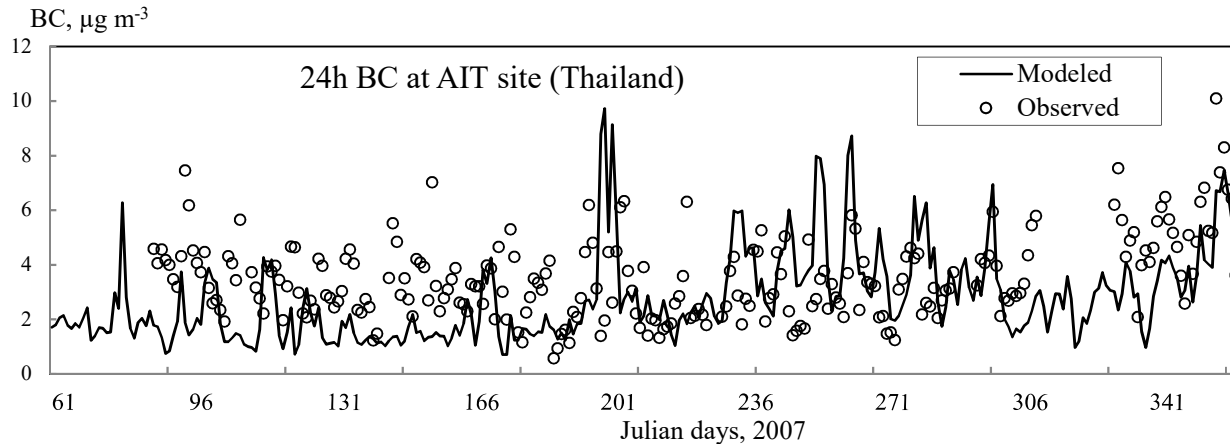
The Chimere chemistry-transport model
 A multi-scale model for air quality forecasting and simulation



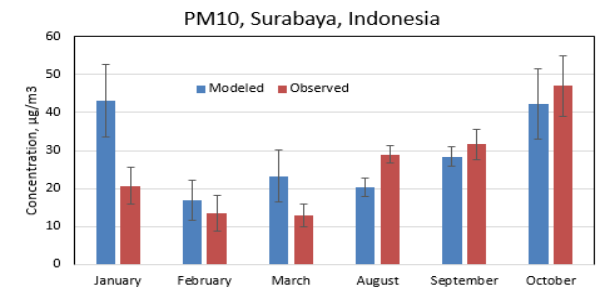
Emissions from the regional EI activity were then further treated to follow EMEP emission structure of around 33 species (primary aerosols: PM_{10} , $PM_{2.5}$, TSP, BC and OC)



WRF/CHIMERE model output evaluation

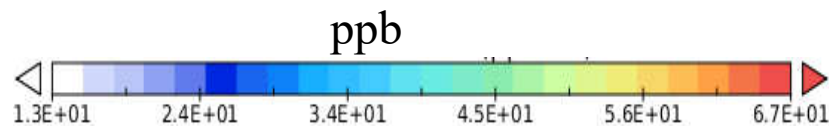
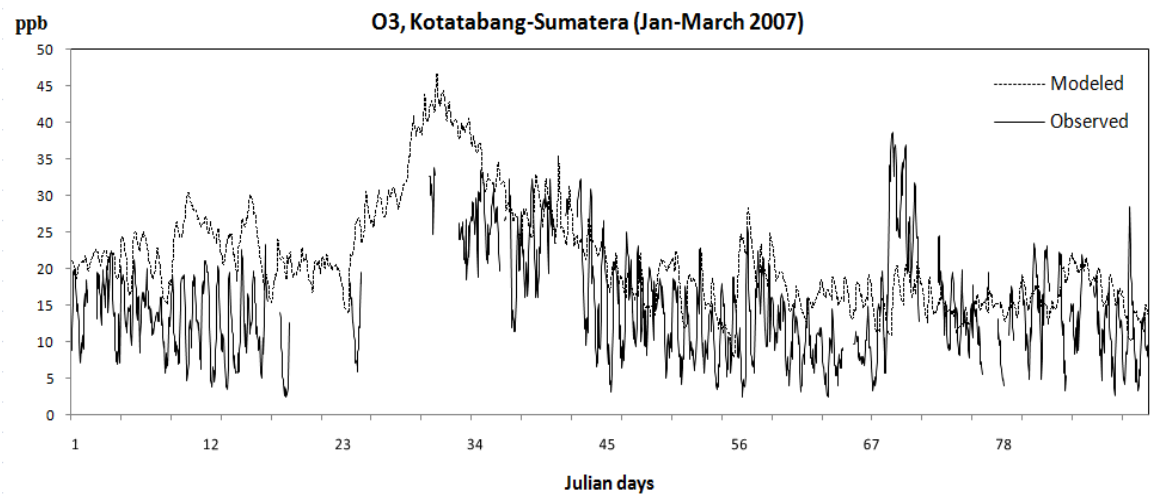
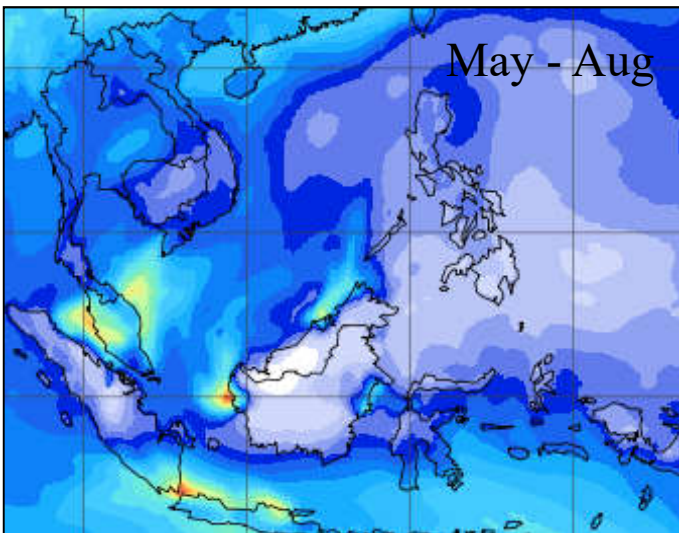
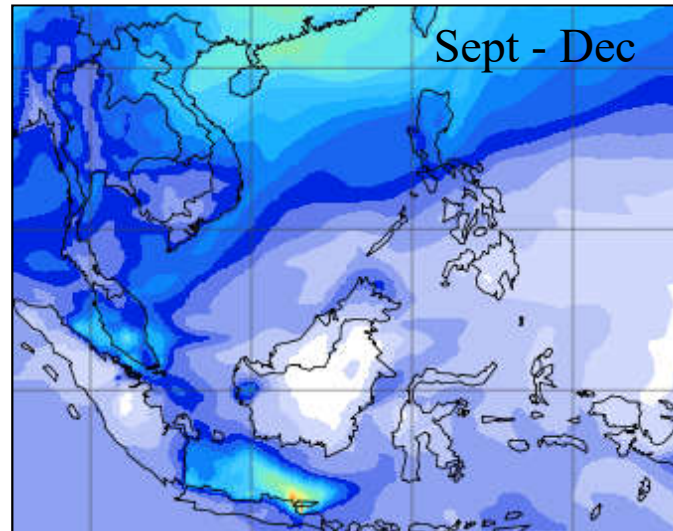
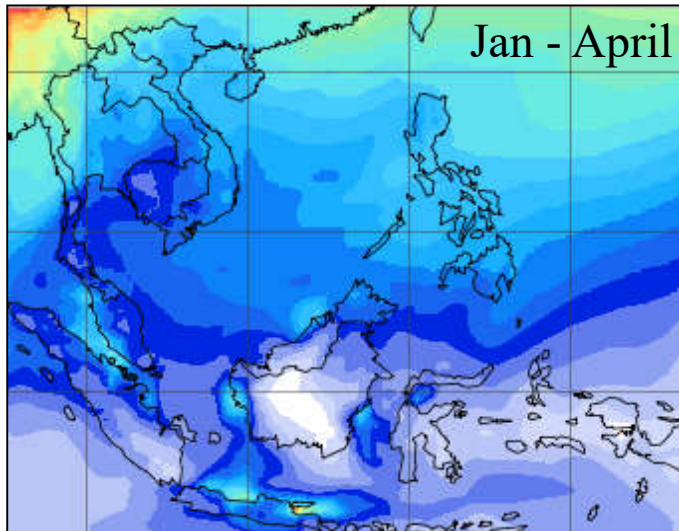


Pollutant	Site	MFB	MFE	MB
PM10	Kuala Lumpur, Malaysia	-41.1	56.1	-10.3
	Surabaya, Indonesia	-8.9	18	-2.6
	Bangkok, Thailand	-53.3	55.7	-17.5
BC	AIT, Thailand	-3.3	20.8	-0.12
OC	AIT, Thailand	-72.4	75.0	-2.1



Criteria for Mean Fractional Bias (MFB) $\leq \pm 60\%$
Mean Fractional Error $\leq +75\%$ (Boylan and Russell, 2006)

Ozone simulation & comparison with GAW

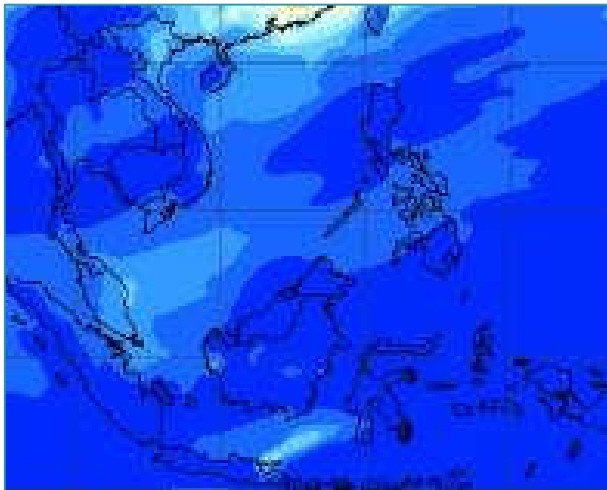


Source: Permadi (2013)

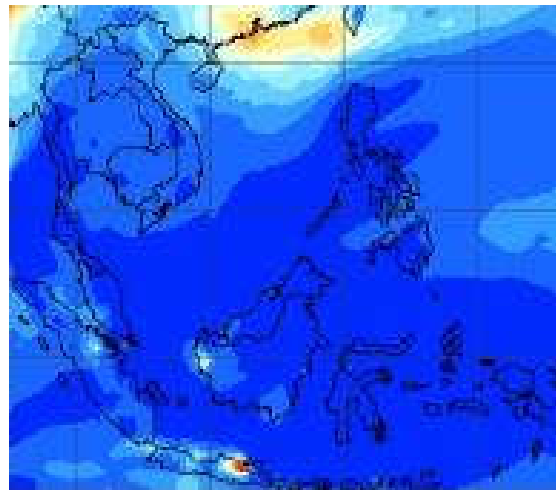
Aerosol Optical Depth (AOD)



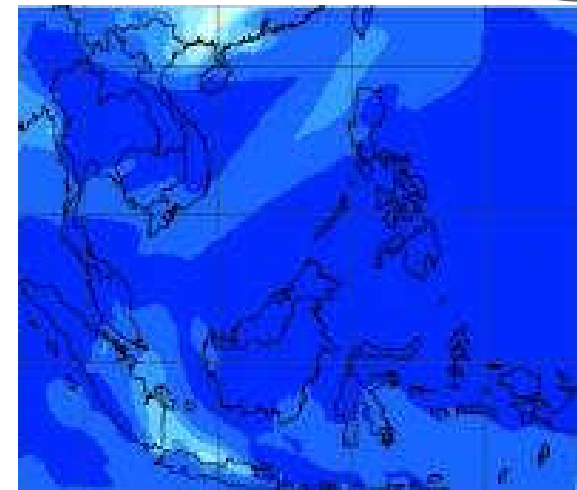
Modeled AOD - Jan



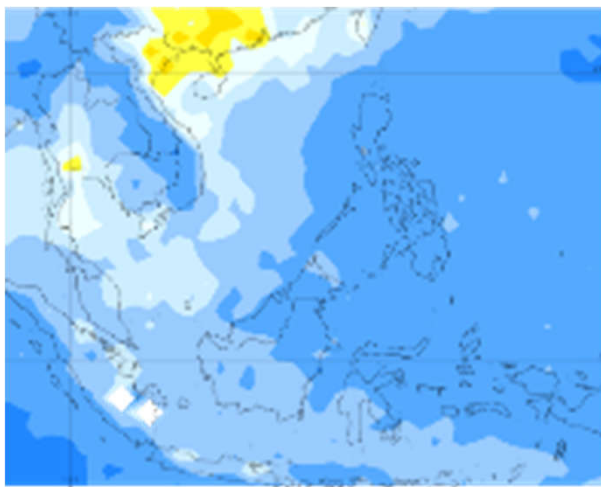
Modeled AOD - April



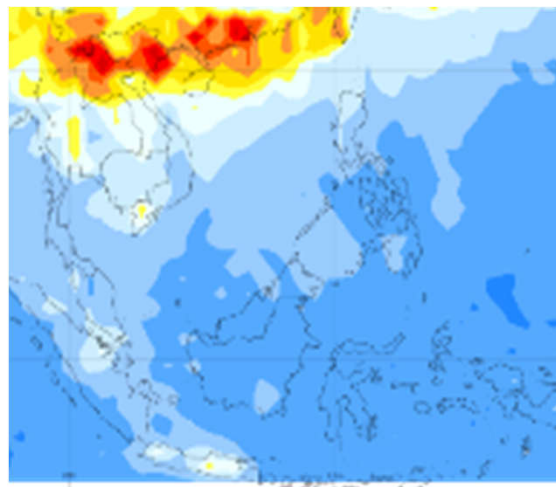
Modeled AOD - Nov



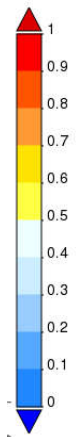
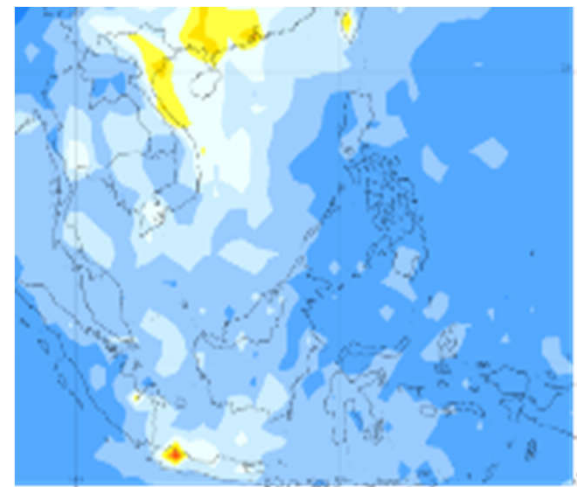
MODIS AOD - Jan



MODIS AOD - April

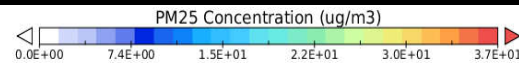


MODIS AOD - Nov

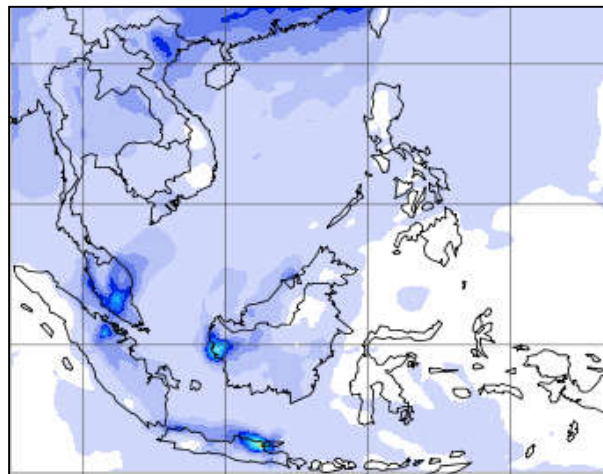


Permadi, et al.2018a. Atmospheric Chemistry and Physics. 18, 2725-2747.

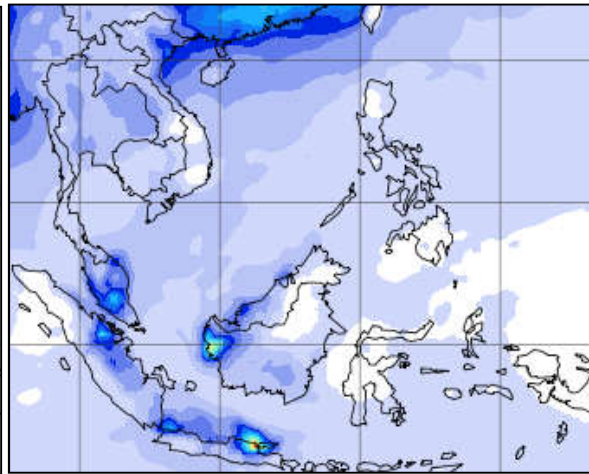
Future air quality (BAU2030 & RED2030)



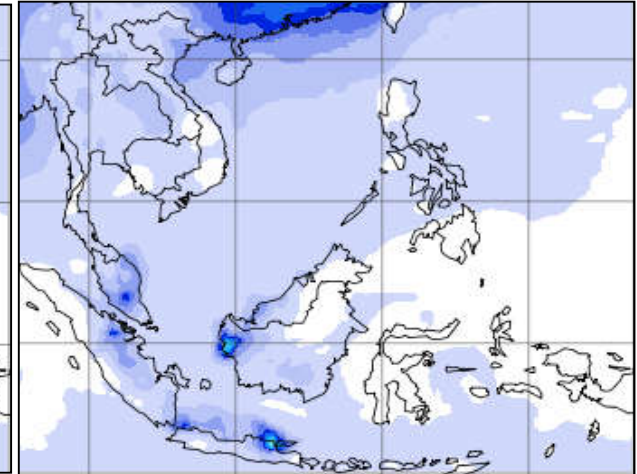
Annual PM_{2.5} BY2007



Annual PM_{2.5} BAU2030



Annual PM_{2.5} RED2030



BAU2030

Project all BC emission sources for all countries (detail for INA & THAI)

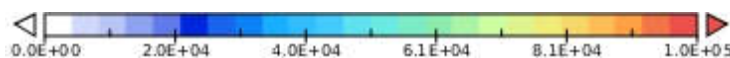
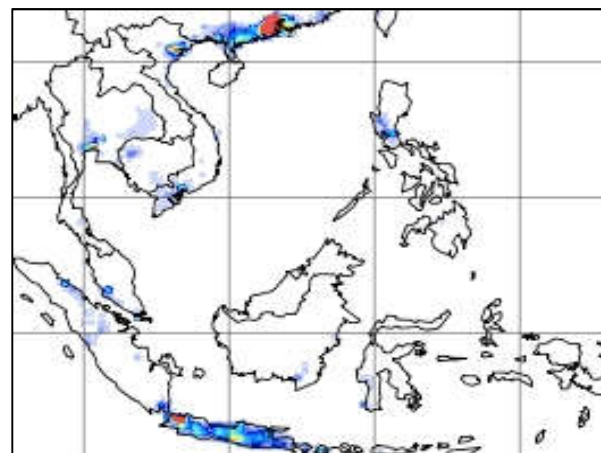
10 years of past activity data

Simple regression statistical analysis

RED2030 (for INA & THAI)

Source sector	Measures
Residential	Fuel shifting, improved <u>cookstove</u>
Transport	Emission standard, cleaner fuel
Industry	Control for key sector, technology and fuel
Open burning	Law enforcement

BAU2030 - RED2030



Cases of avoided premature mortality/100,000

(BAU2030-RED2030)	INA	Thailand
Mortality/100,000 population (this study)	58	41
Shindell et al. (2011)	74	68

Source:
Permadi et al. 2018b. Atmospheric Chemistry and Physics. 18, 3321-3334.

BC direct radiative forcing

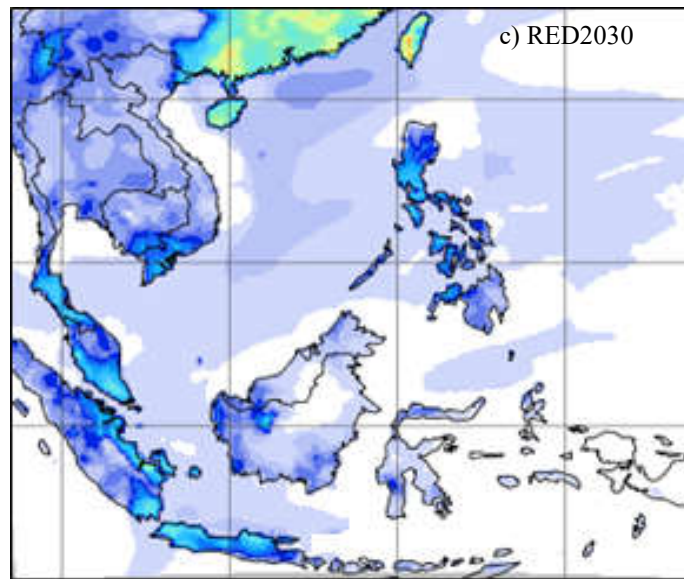
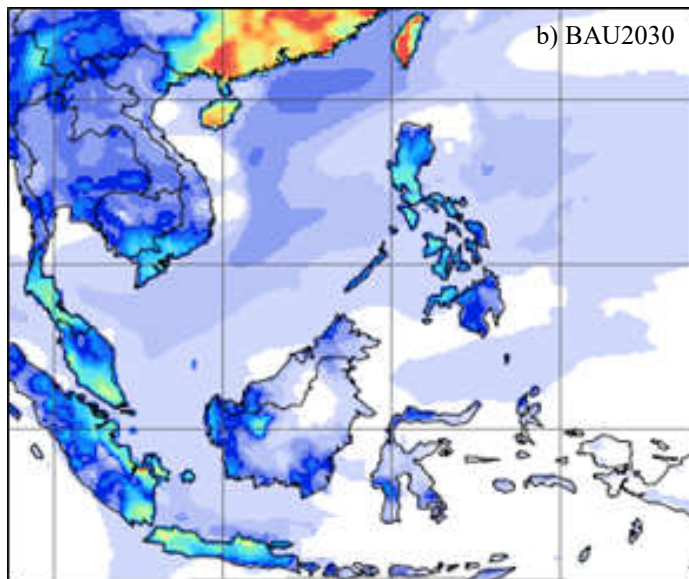
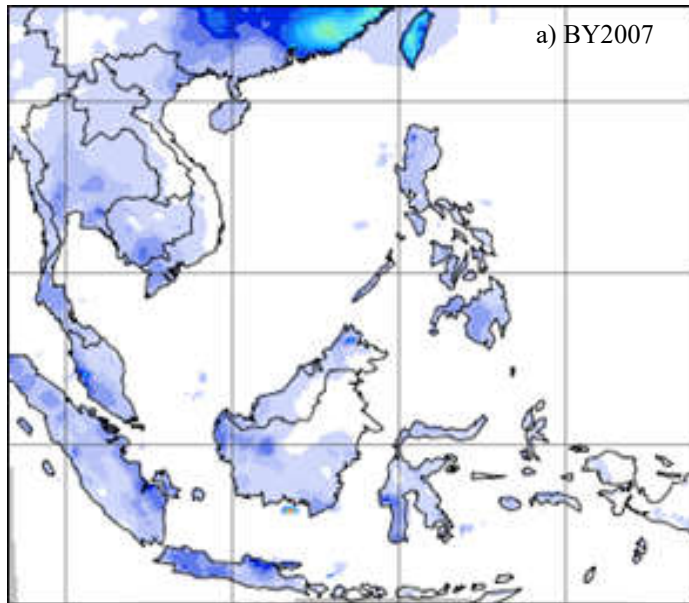


COBENEFITS OF RED2030:

REDUCED BC DRF
→ LESS WARMING

IMPROVED AIR
QUALITY → LESS
HEALTH IMPACTS

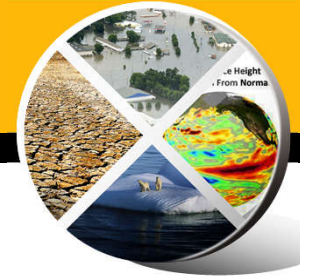
REDUCED GLOBAL WARMING POTENTIAL
(CO₂ Eq.)



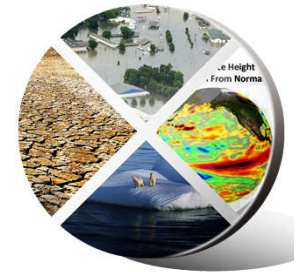
0.0E+00 4.8E-01 9.6E-01 1.4E+00 1.9E+00 2.4E+00 W/m²

Source:
Permadi et al. 2018b.
Atmospheric Chemistry and Physics. 18,
3321-3334.

Summary



- ◆ Integrated approach for GHGs and SLCPs is required
- ◆ Several tools for the integration: emission source characterization, emission inventory, modeling and **ambient monitoring (through GAW network)**
- ◆ Modeling the impacts of emission reductions on air quality and climate change: common air quality models did not incorporate CO₂, N₂O, etc but GCMs and RCMs did
- ◆ Co-benefit framework: exploring various emission reduction measures that can lead to both air quality improvement and climate forcing mitigation



Acknowledgment:

ABC emission Inventory Team

SDCC/AIT-France Network

PEER-NSF-USAID (www.peer.ait.ac.th)

Contact:

didin.agustian@gmail.com

https://www.researchgate.net/profile/Didin_Agustian