CO from Indonesian fires in 2015

Narcisa Nechita-Banda[1], Maarten Krol[1,2,3], Guido R. van der Werf[4], Johannes W. Kaiser[5], Sudhanshu Pandey[3], Vincent Huijnen[6], Cathy Clerbaux[7,8], Pierre Coheur[8], Merritt N. Deeter[9], Thomas Röckmann

Accepted in Phil. Transactions. B. (special issue ENSO): Monitoring emissions from the 2015 Indonesian fires using CO satellite data

WAGENINGEN UNIVERSITY
WAGENINGEN UR

SRON
Netherlands Institute for Space Research

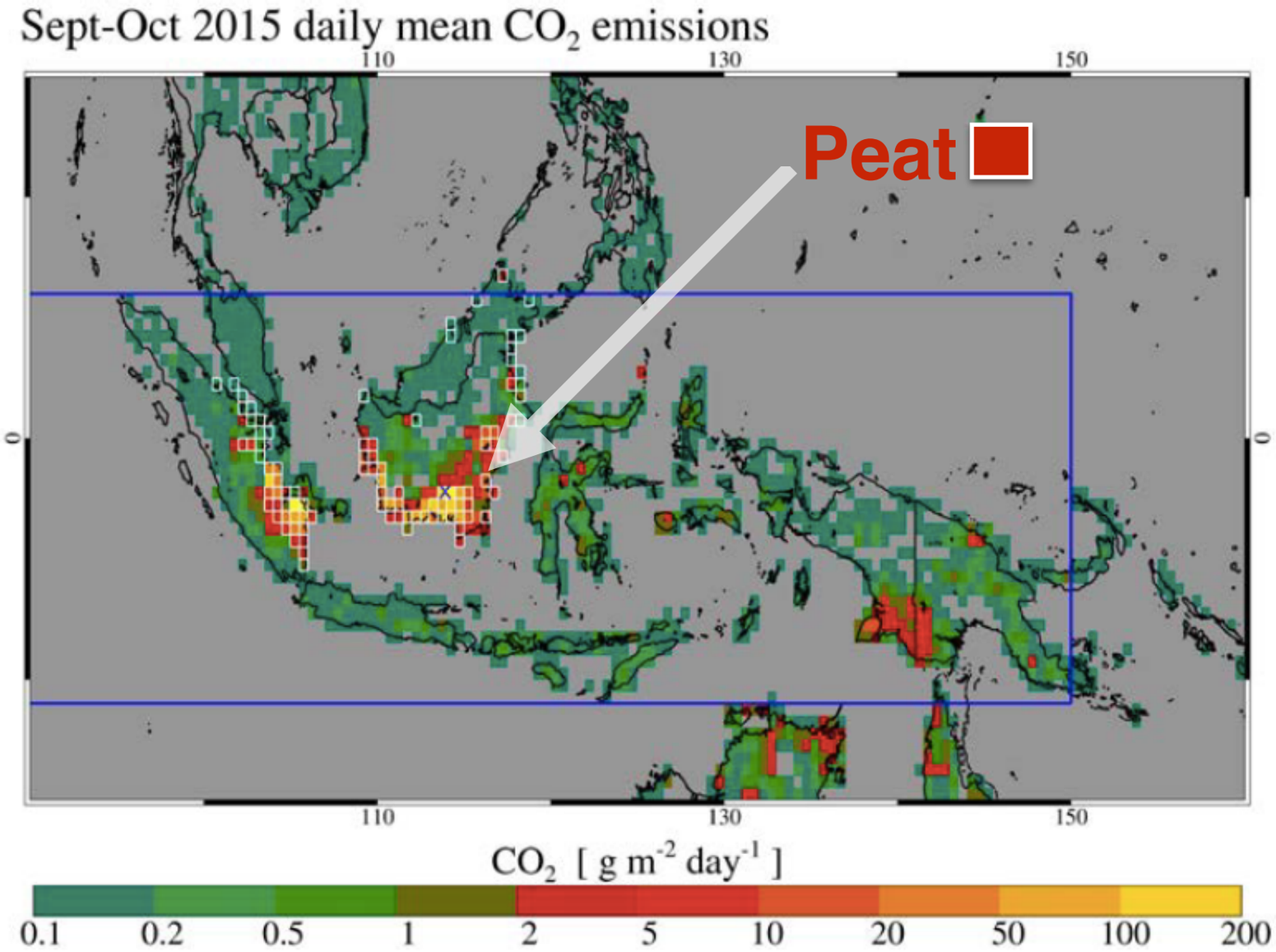
Institute for Marine and Atmospheric research Utrecht

INDONESIA FIRES CONCENTRATED IN SUMATRA, KALIMANTAN AND PAPUA

fires.globalforestwatch.org

WORLD RESOURCES INSTITUTE

GFAS (CAMS) estimates of emissions



Huijnen et al., 2016,
Nature Scientific Reports

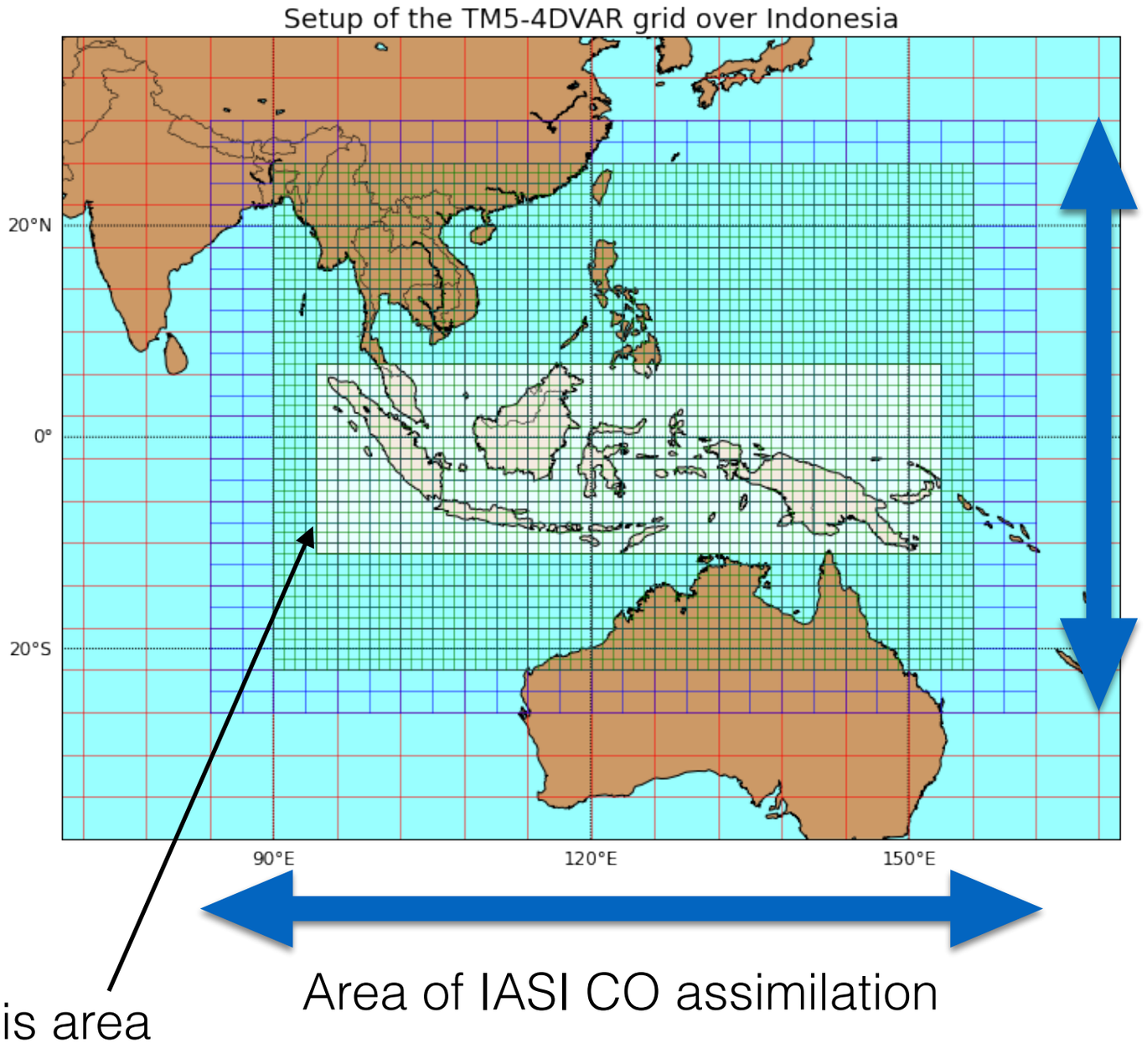
Setup TM5-4DVAR CO emission optimisation

- GFAS CO-BB emissions
- Prescribed source VOCs

- sink OH prescribed

- NOAA-surface observations
- IASI CO satellite data (applying AK)/ MOPITT

- Iterative 4DVAR optimisation
- BB emissions optimised in 3-daily periods
- 1 Aug 2015 - 15 Dec 2015

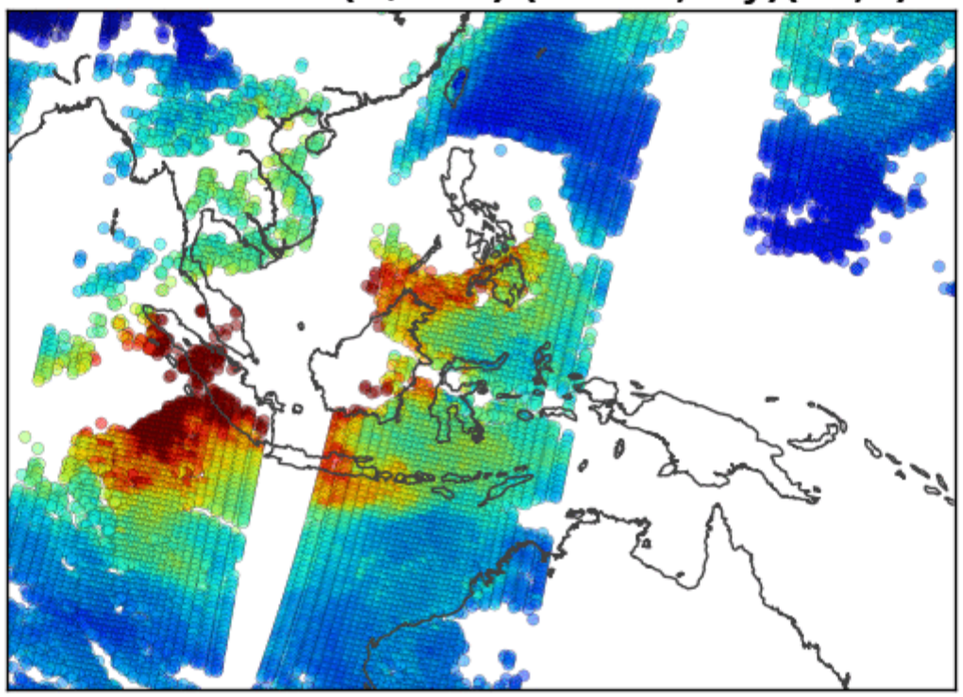


WAGENINGEN UNIVERSITY
WAGENINGEN UR

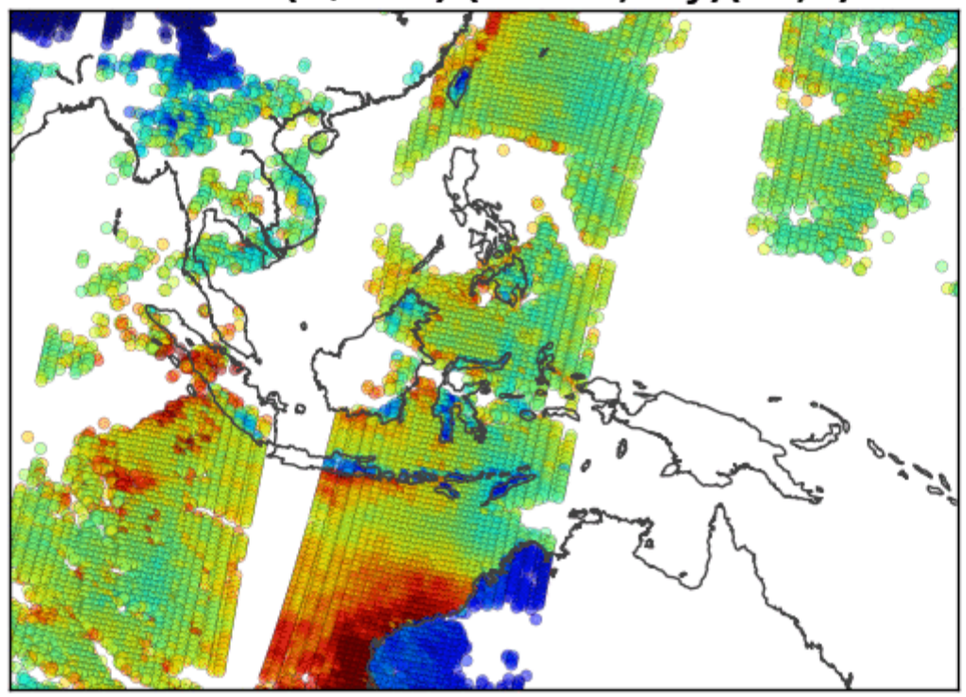
SRON
Netherlands Institute for Space Research

Institute for Marine and Atmospheric research Utrecht

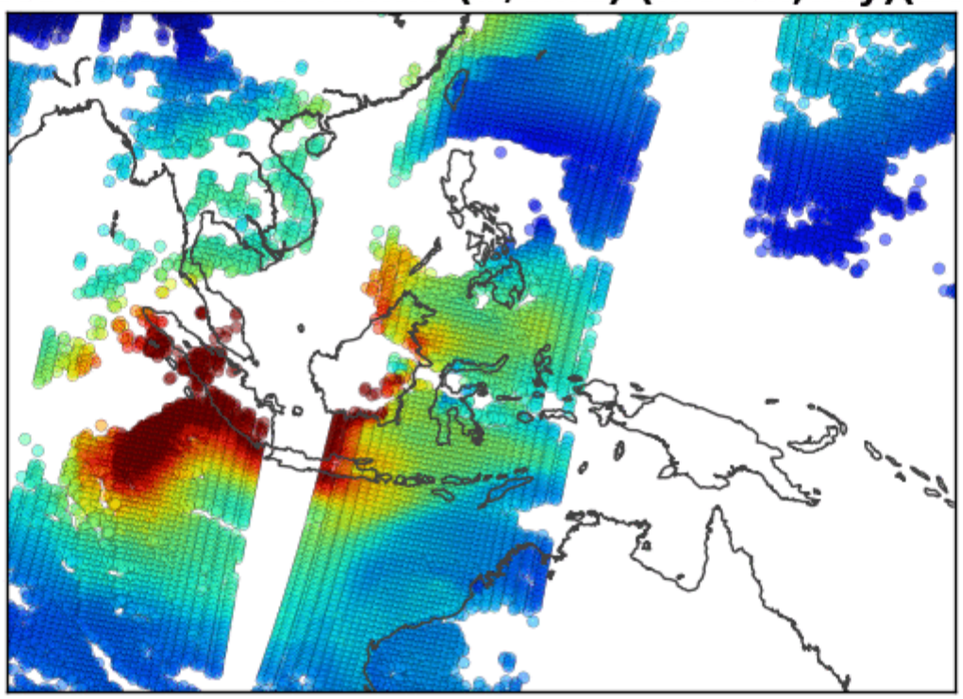
IASI columns (#/cm2) (month,day)(10,1)



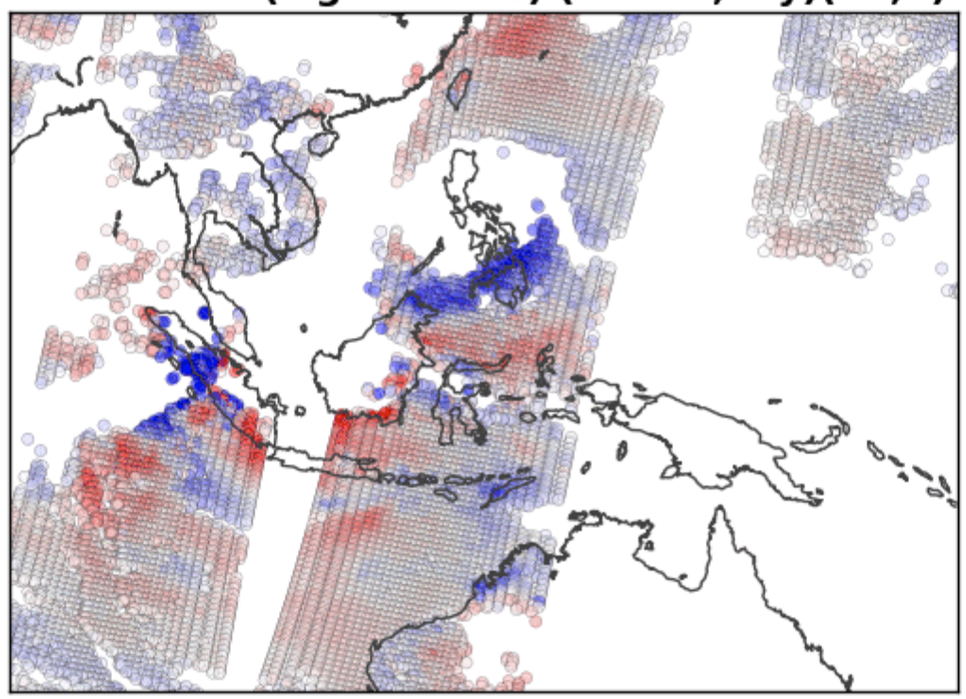
Error*5 (#/cm2) (month,day)(10,1)

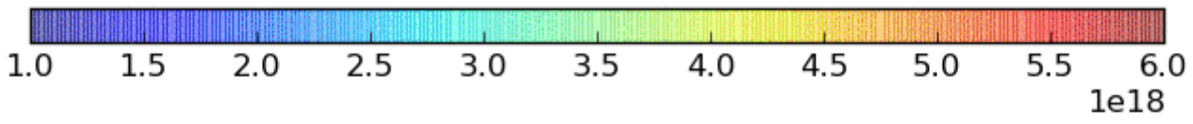


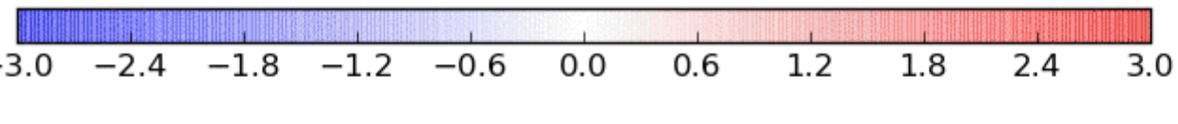
poste Modeled columns (#/cm2) (month,day)(10,1)



Model-Obs (sigma units) (month,day)(10,1)



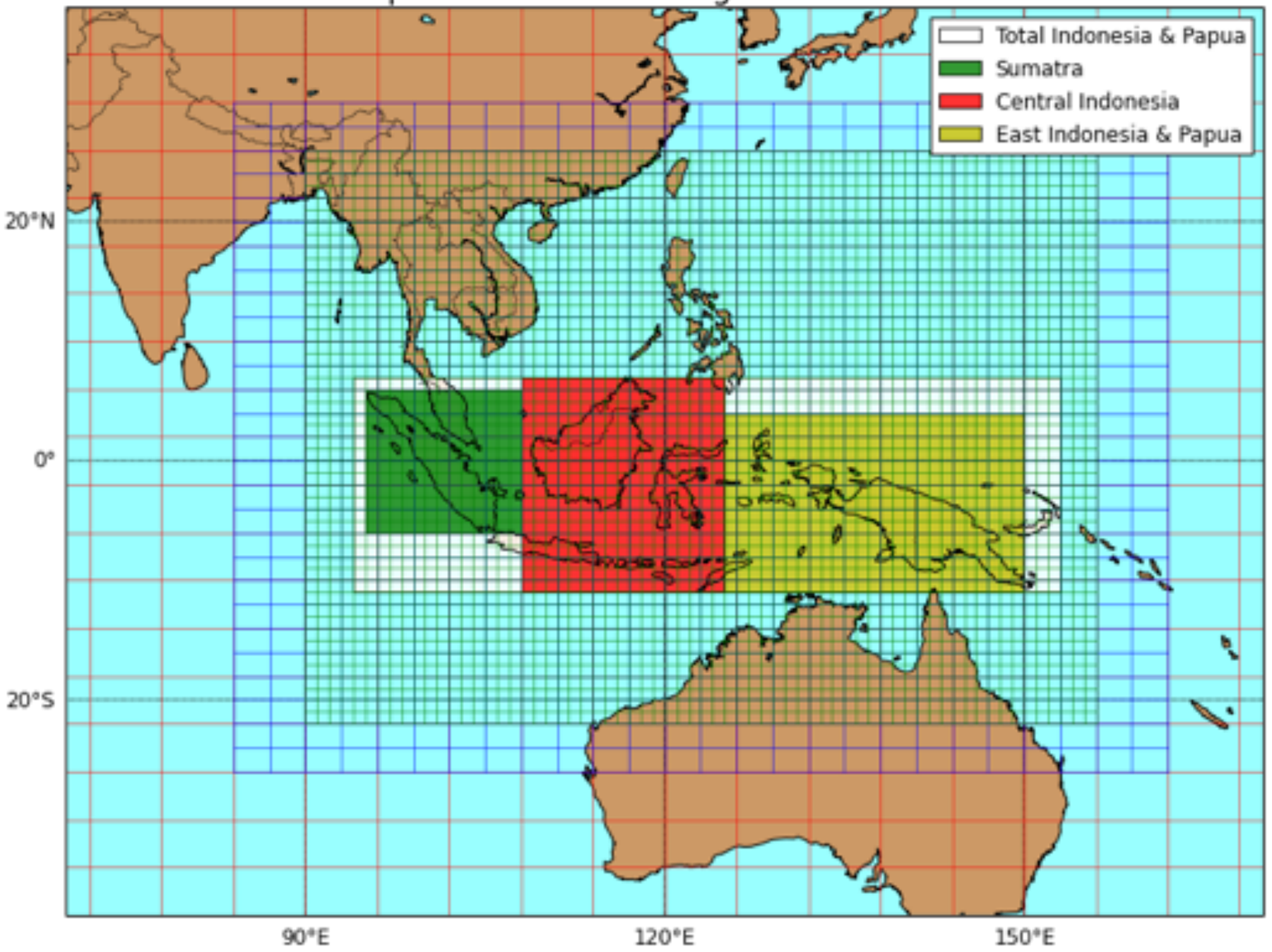




WAGENINGEN
WA

6x10^{18} molecules CO cm^{-2} = 280 ppb

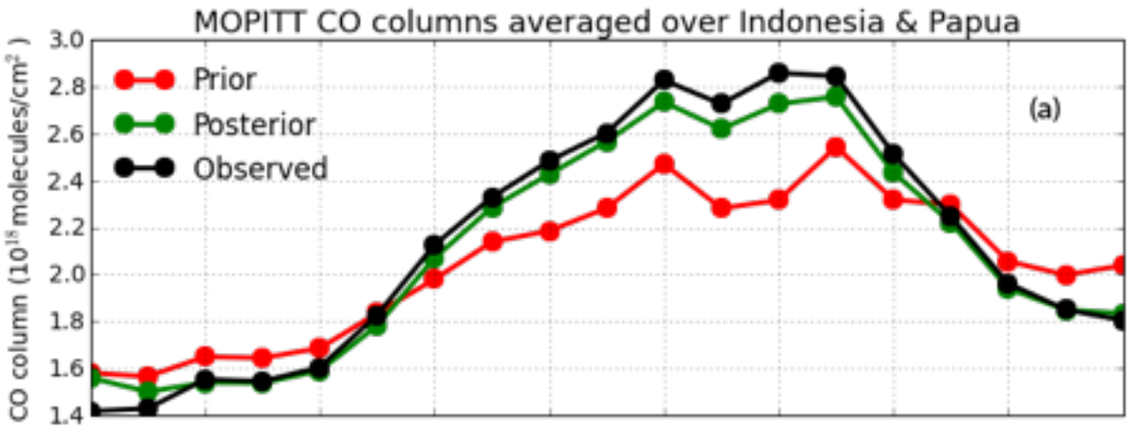
Setup of the TM5-4DVAR grid over Indonesia

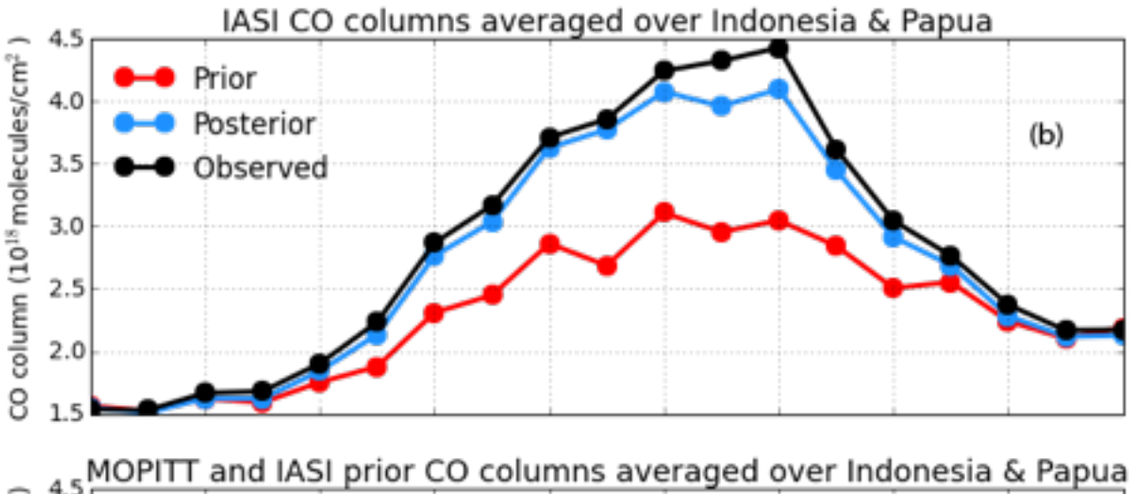


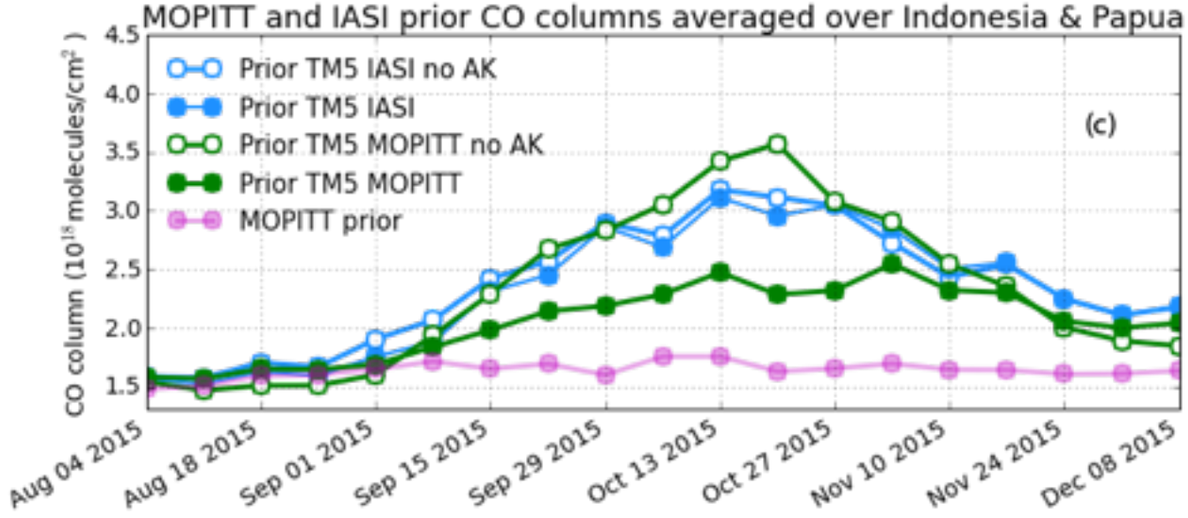
WAGENINGEN UNIVERSITY
WAGENINGEN UR

SRON
Netherlands Institute for Space Research

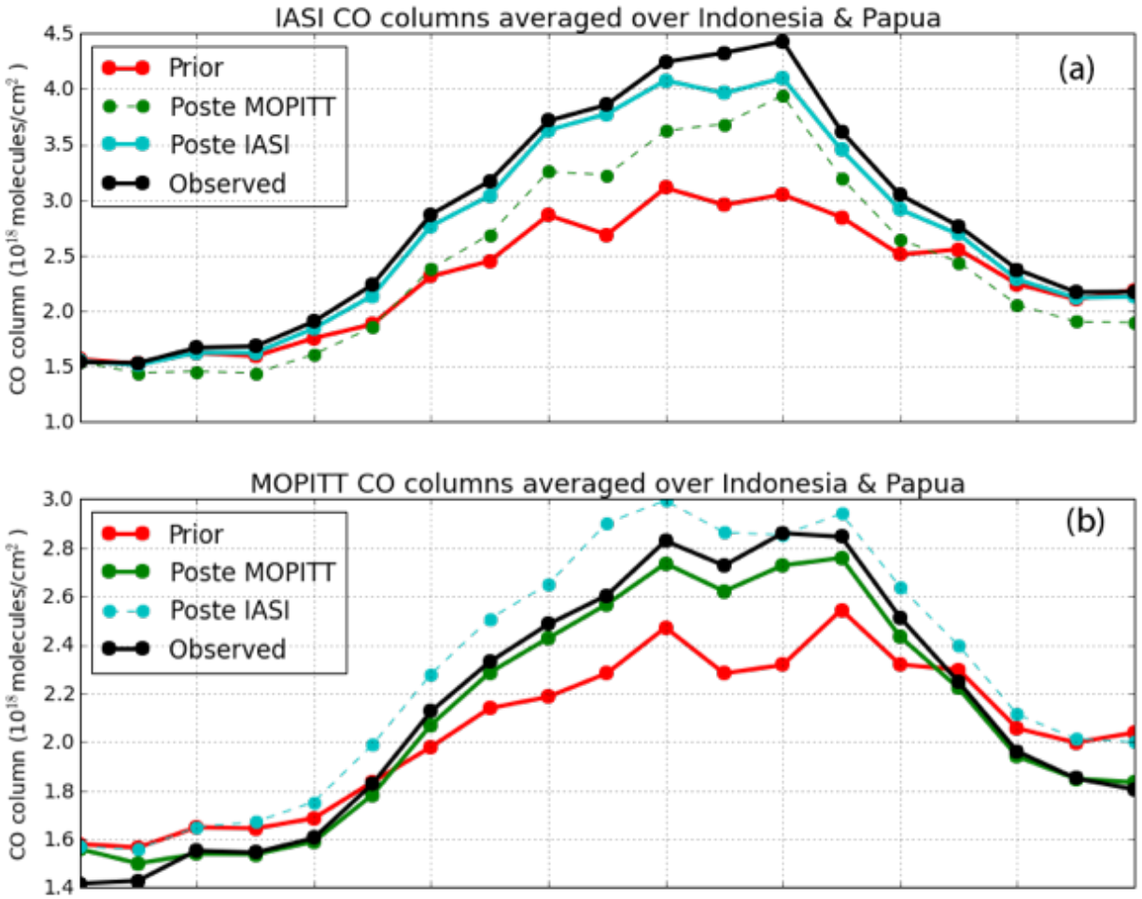
Institute for Marine and Atmospheric research Utrecht





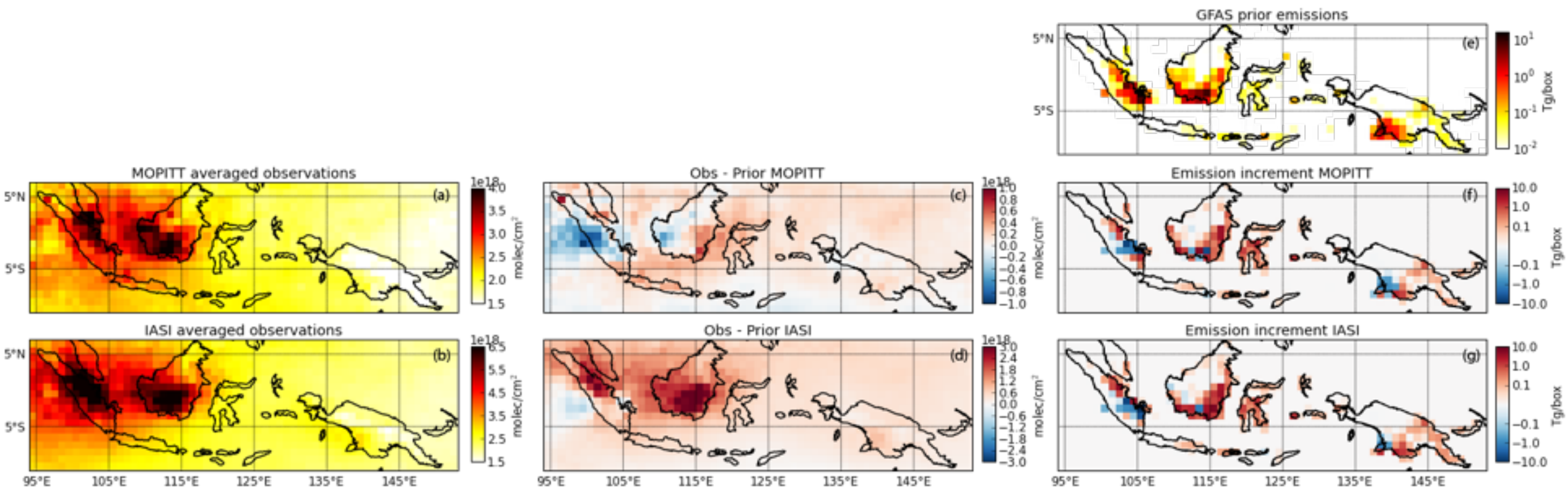


Conclusion: IASI > MOPITT; AK more important for MOPITT



WAGENINGEN UNIVERSITY
WAGENINGEN UR

SRON
Netherlands Institute for Space Research

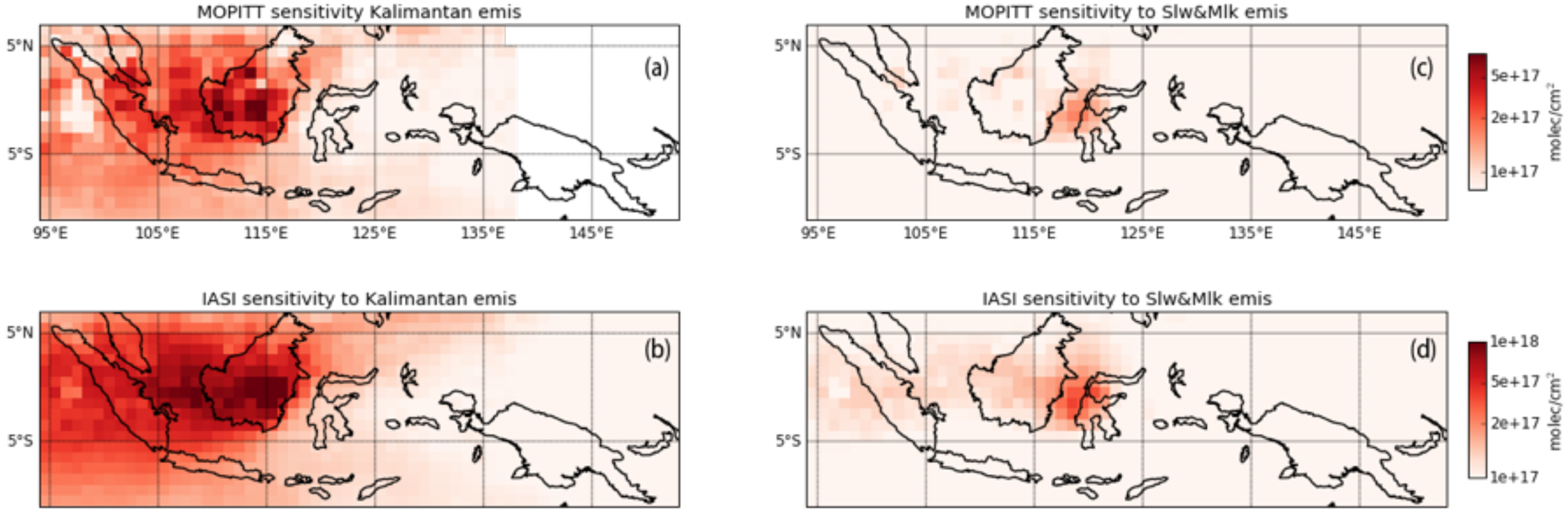


Note: spatial-temporal sampling IASI /= MOPITT

WAGENINGEN UNIVERSITY
WAGENINGEN UR

SRON
Netherlands Institute for Space Research

Institute for Marine and Atmospheric research Utrecht



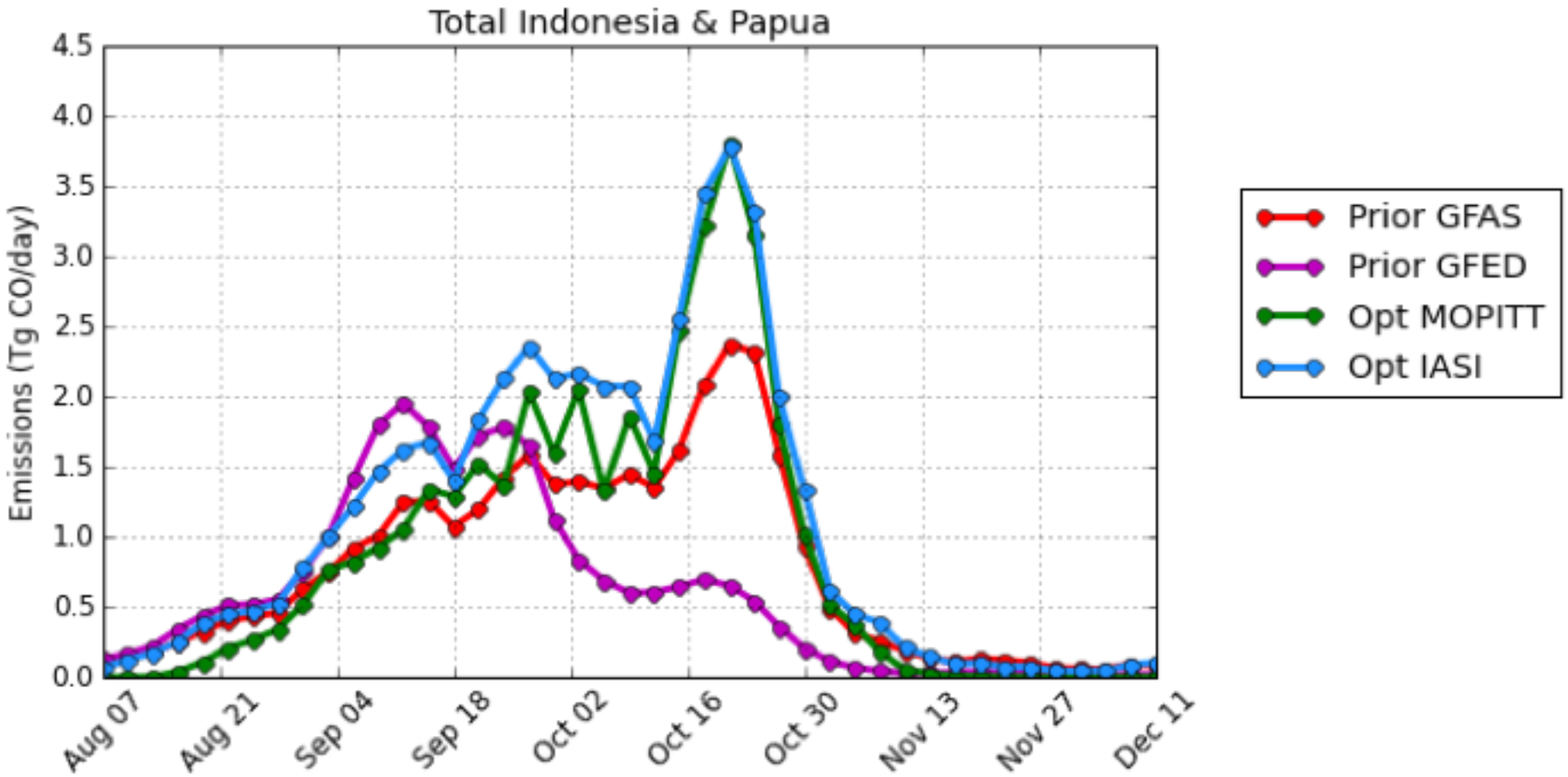
Can we separate emissions in different regions?

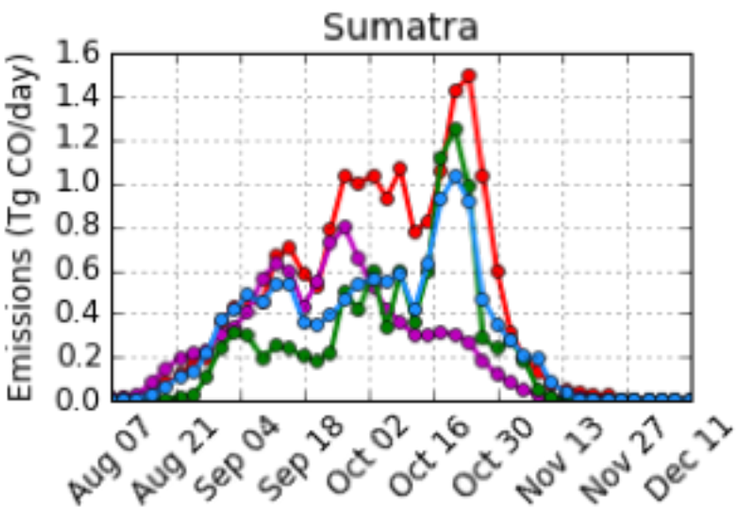
Figure S10 Differences in MOPITT and IASI CO total columns over Indonesia and Papua, averaged over 1 August to 15 December 2015, due to emission perturbations over Kalimantan (a and b) and over Sulawesi and Maluku islands (c and d). The emission perturbations applied are equal to the emission differences between posterior 'IASI' and prior emissions. Over Kalimantan, the IASI simulation gives roughly twice more emissions than the prior, and about 10 times higher over Sulawesi and Maluku islands.

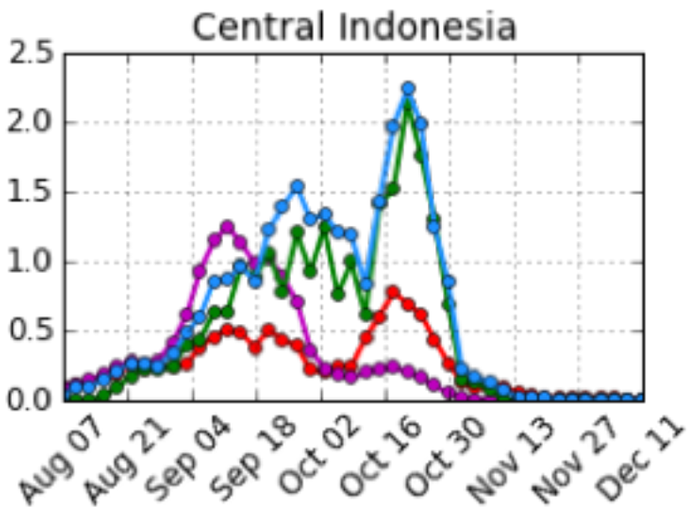
WAGENINGEN UNIVERSITY
WAGENINGEN UR

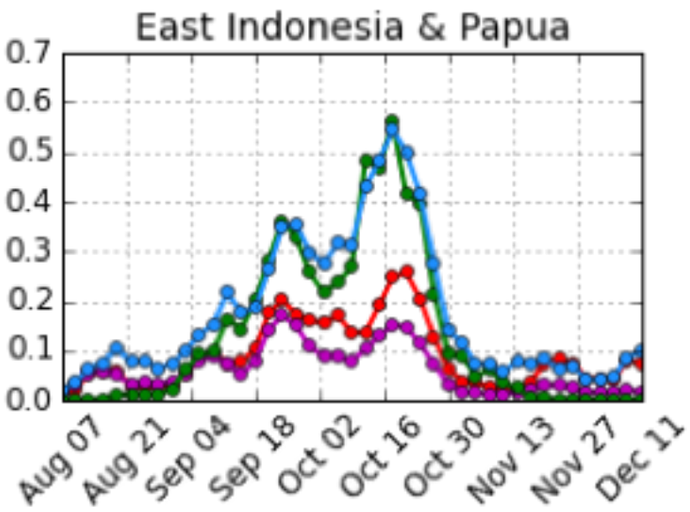
SRON
Netherlands Institute for Space Research

Institute for Marine and Atmospheric research Utrecht



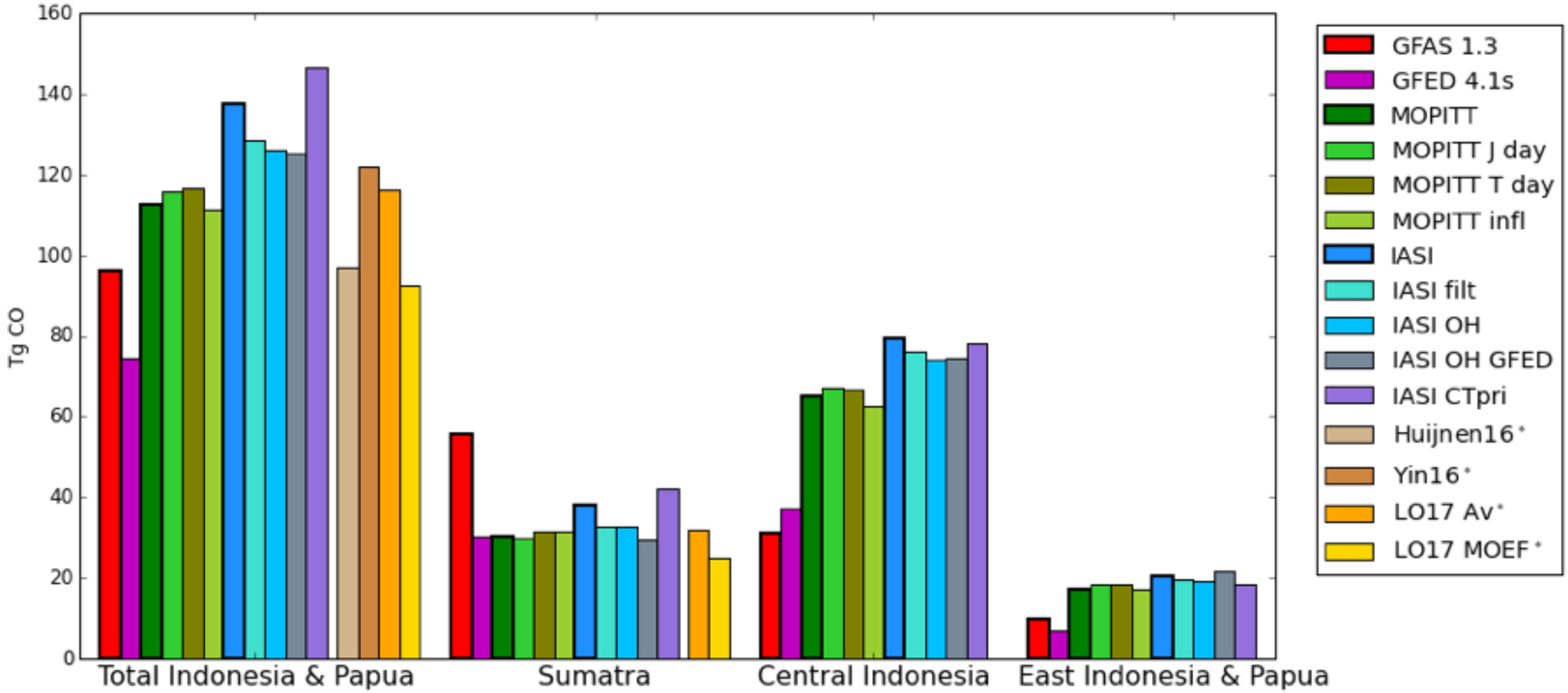






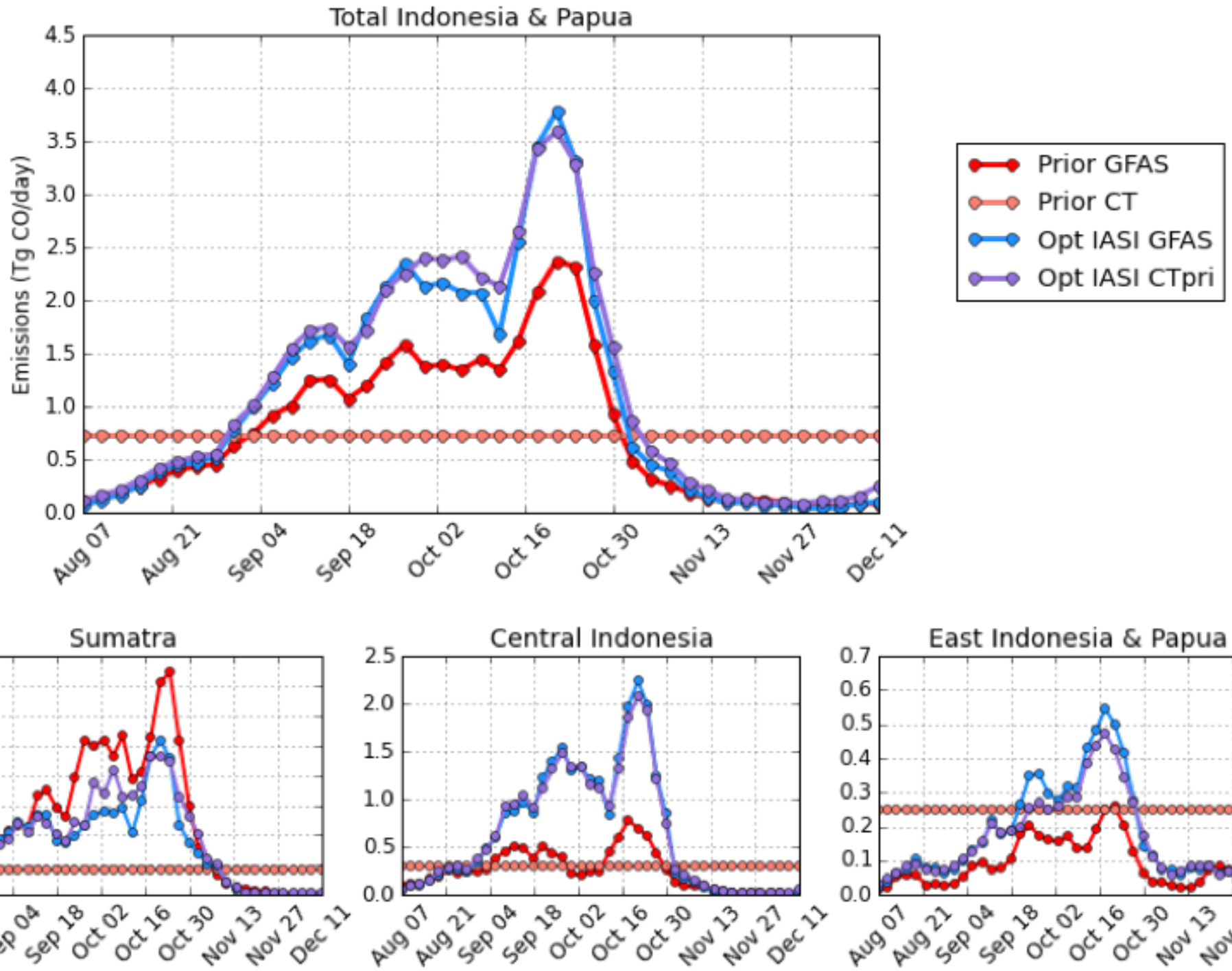
WAGENINGEN UNIVERSITY
WAGENINGEN UR

SRON
Netherlands Institute for Space Research



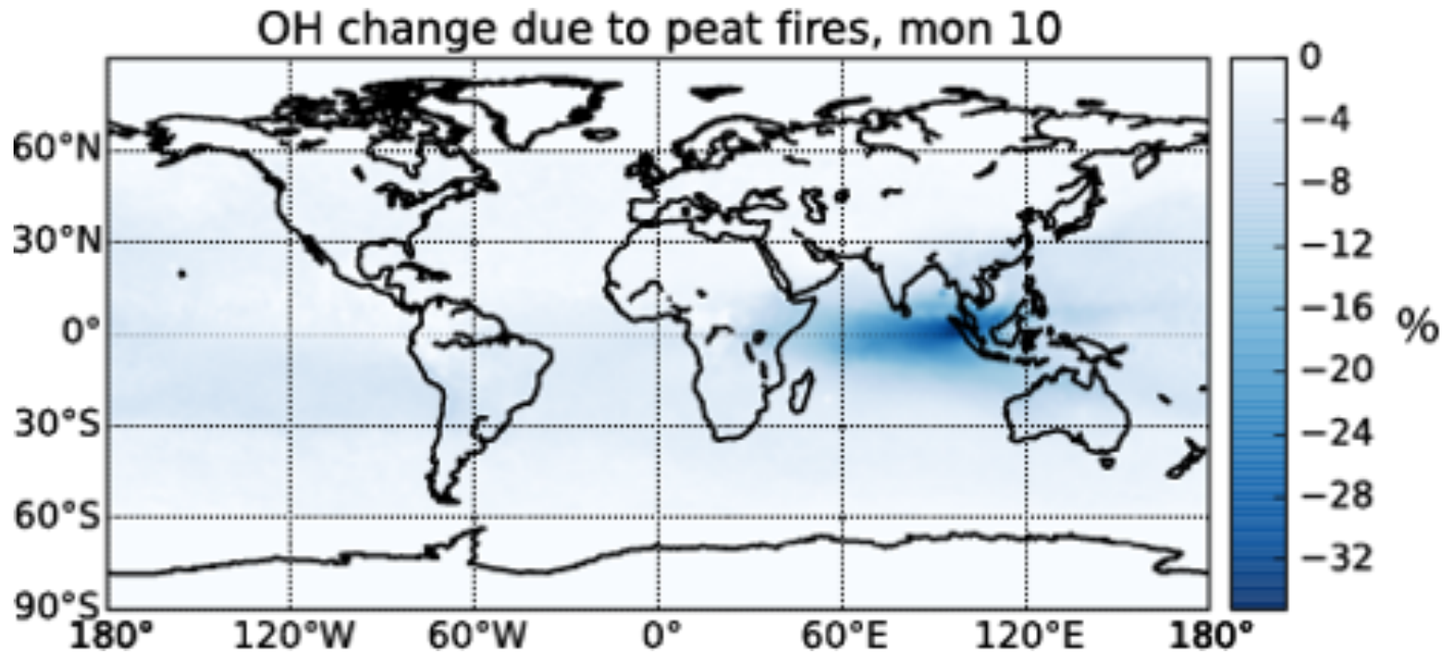
WAGENINGEN UNIVERSITY
WAGENINGEN UR

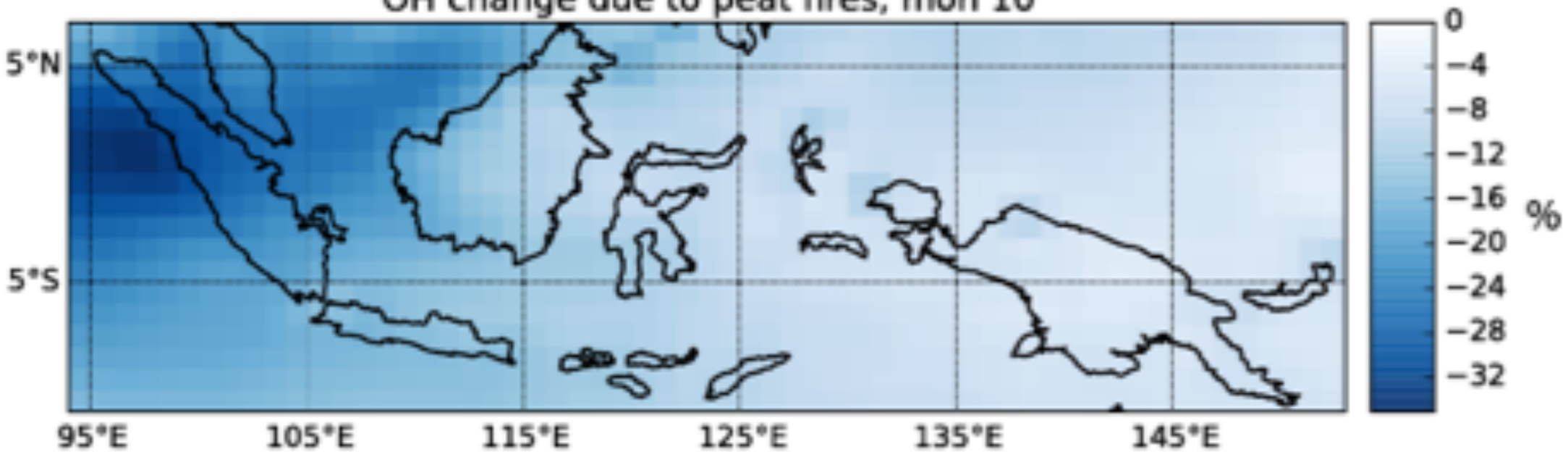
SRON
Netherlands Institute for Space Research



WAGENINGEN UNIVERSITY
WAGENINGEN UR

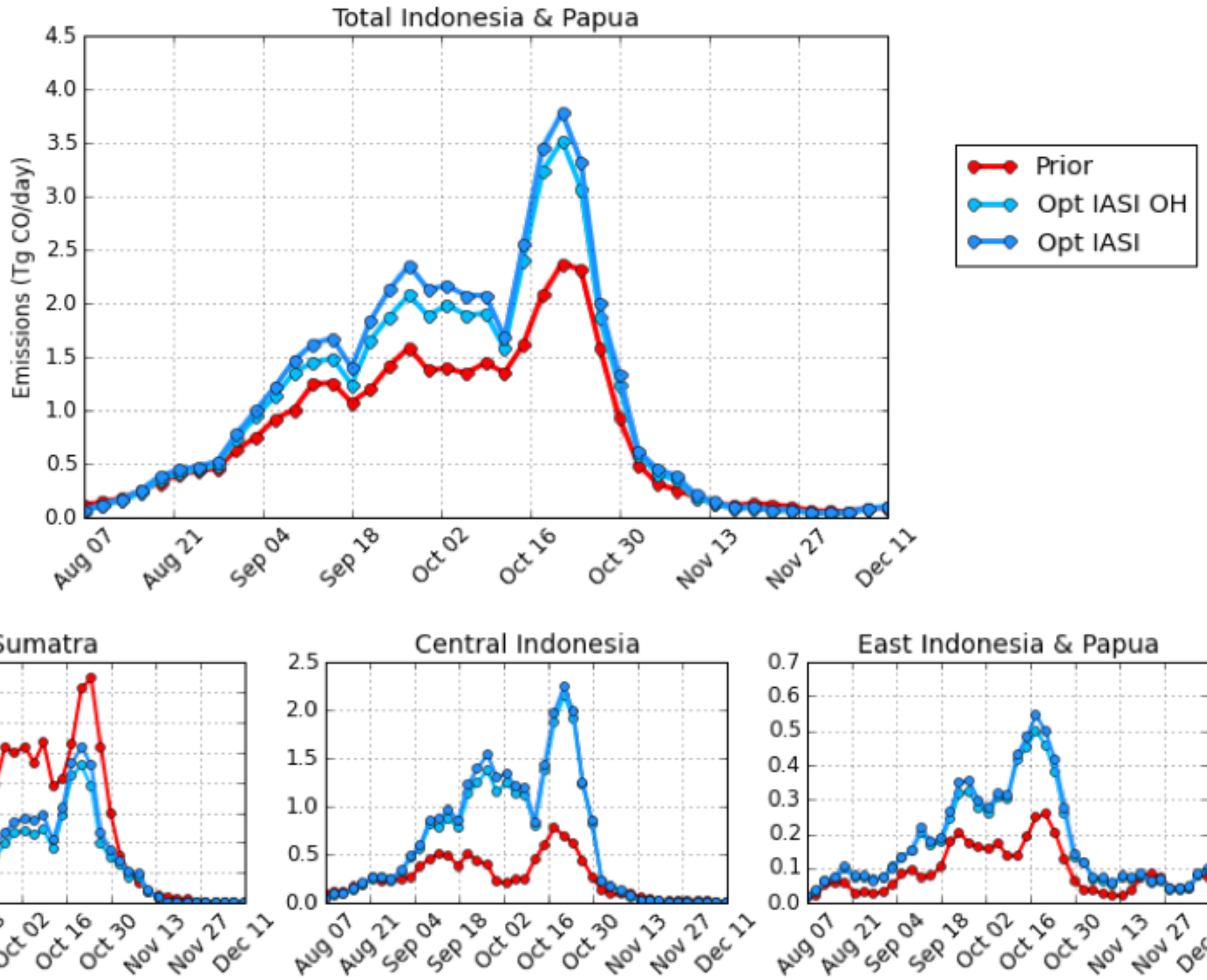
SRON
Netherlands Institute for Space Research





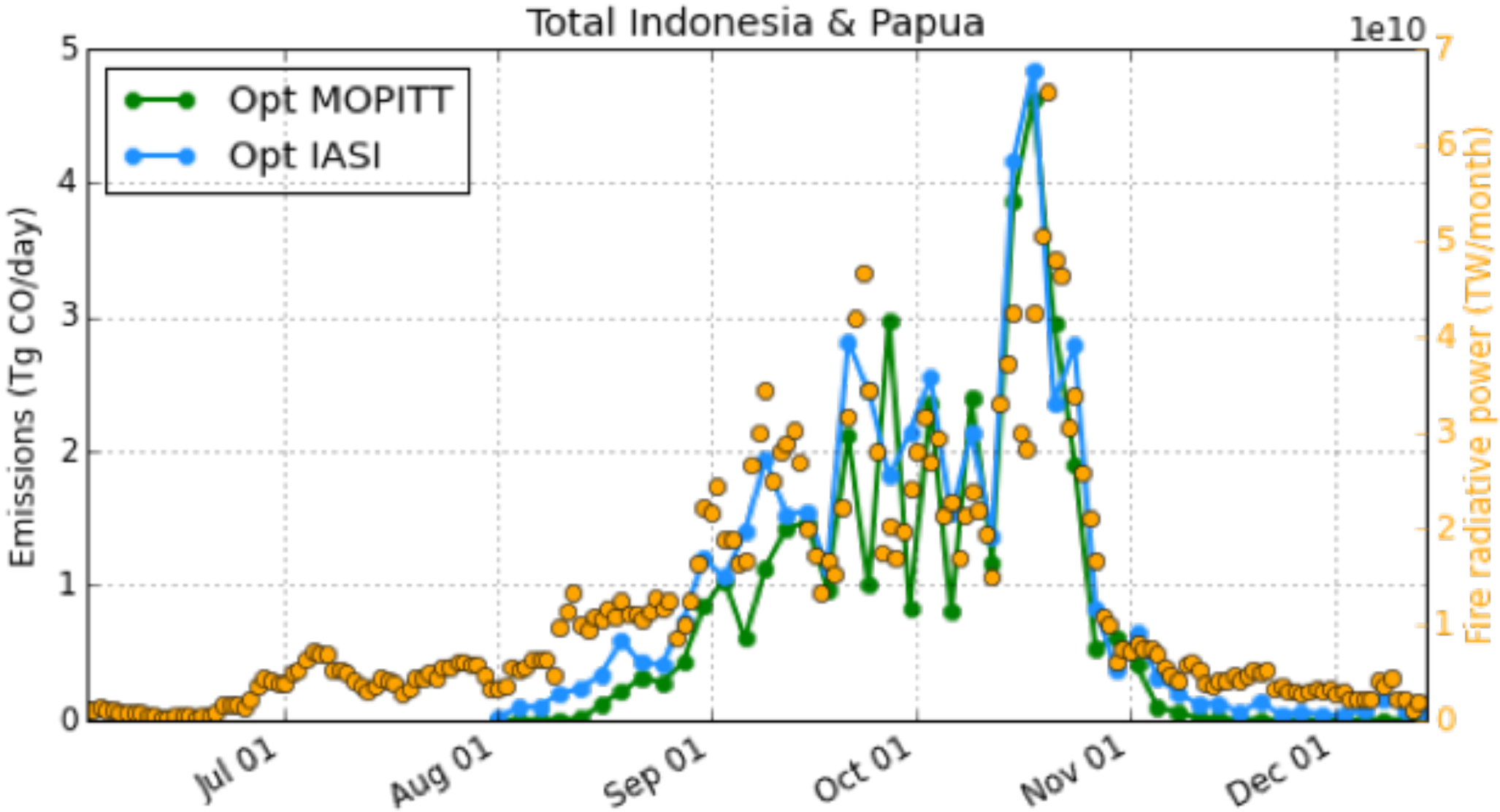
WAGENINGEN UNIVERSITY
WAGENINGEN UR

SRON
Netherlands Institute for Space Research



WAGENINGEN UNIVERSITY
WAGENINGEN UR

SRON
Netherlands Institute for Space Research



WAGENINGEN UNIVERSITY
WAGENINGEN UR

SRON
Netherlands Institute for Space Research

Publicly sharing Model data

A first experience

Narcisa Nechita-Banda

Why share?

- It is often requested by journals when publishing
- It might be useful to other people
- They might discover new results by using it, and therefore participate in the analysis effort

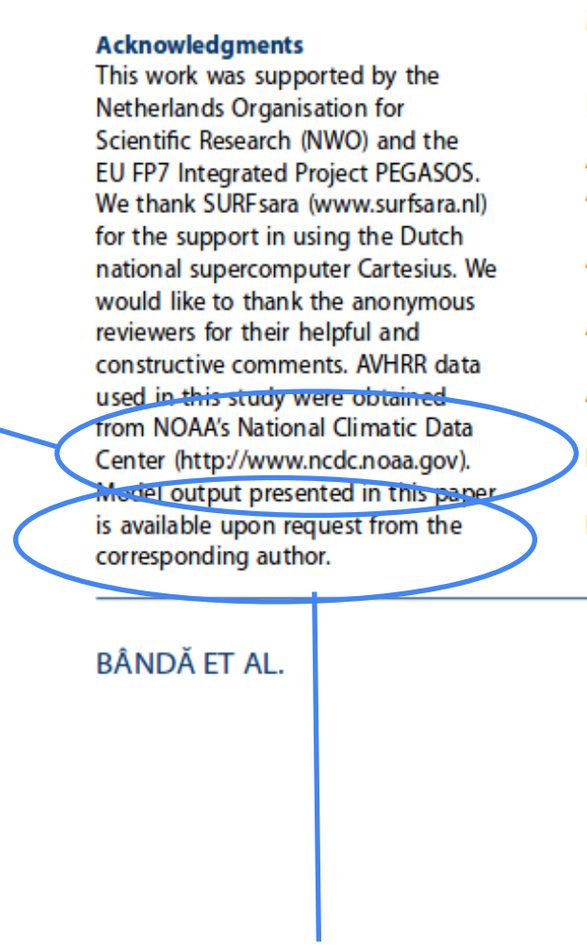
Why not share?

- There are some challenges - see next
- It takes time and effort - maybe a lot!
- You can get away with it - journals usually do not specifically request model data sharing

What modellers typically do

Code and data availability. The CTDAS code (current revision r1479) is included as Supplement and is open access under GNU General Public License version 3. The actual CTDAS code is continuously updated and under version control (SVN) on a local server at Wageningen University and Research. Access can be granted after contacting the main developers. The documentation of the code (user manual) prepared with SPHINX (see Sect. 2.5) is available at http://www.carbontracker.eu/ctdas. The input data used for CTDAS depends per application, and can be made available upon request.

Point to measurement data used in the study


Acknowledgments
This work was supported by the Netherlands Organisation for Scientific Research (NWO) and the EU FP7 Integrated Project PEGASOS. We thank SURFsara (www.surfsara.nl) for the support in using the Dutch national supercomputer Cartesius. We would like to thank the anonymous reviewers for their helpful and constructive comments. AVHRR data used in this study were obtained from NOAA's National Climatic Data Center (http://www.ncdc.noaa.gov). Model output presented in this paper is available upon request from the corresponding author.

Mauna Loa in J

References

Aan de Brugh, J. M
Aan de Brugh, J. M
budget in 2006,
Andronova, N. G., E
to 1994, *J. Geop*
Ansmann, A., F. Wa
reduction: Obse
Aquila, V., L. D. Om
Pinatubo-like er
Bândă, N., M. Krol,
volcanic eruptio
Barnes, J. E., and D.
24(15), 1923–19

BÂNDĂ ET AL.

©2

Point to code availability (not the best example here, since it is a model development paper van der Laan et al. 2017)

'Data available on request' - motivate this by saying dataset is too big

→ since TM5-4DVAR has much less output than TM5 chemistry, and there are more and bigger platforms, I didn't feel like I have a solid case here

I chose to share this time

Data used in: Nechita-Banda et al: Monitoring emissions from the 2015 Indonesian fires using CO satellite data, accepted to Philosophical Transactions B

Here are the challenges I found

… and my solutions

(I’m sure you can find better ones)

1. The right platform

Model data is usually a lot - where to put data that is not part of a bigger project with a designated data platform?

Solution: Ask Maarten

B2SHARE https://www.eudat.eu/services/b2share

- Works as a sort of dropbox, up to 20 GB
- You can ‘drop’ only one file at a time, no folders
- PID, DOI (not sure this works)
- You can opt for different data sharing policies (and this process is made easy)
- The amount of documentation you write is basically up to you
- Once dataset published you cannot change it anymore, but you can change the description

2. Writing documentation

How far to go with this?

- Describe file structure (YES)
- Describe model (NO)
- Describe model input (Partly YES)
- Describe the different model runs (Partly YES)
- Point to publication (YES…

...after a short ‘chicken and egg’ moment asking to myself which one should be published first - data or paper - I realised I can still edit the description of the data after publication)

3. Model output contains input data

… e.g. prior emissions from inventories and measurement data (surface, tower, aircraft, satellite)

Do I have the freedom to share this?

Solution: realising this while writing documentation 2 days before re-submission (!) deadline, I decided to avoid dealing with this. So I removed all input from the files.

Alternatives: Ask data providers, check their sharing policies

4. What output to share?

For each model run presented in the main paper, I shared:

- Posterior emissions (emission_poste.nc4)
- Model co-sampled observations prior and posterior (some of aggregated_apri.nc4, aggregated_apos.nc4)

5. Time?

About 1-2 days of work in my case

The result

https://trng-b2share.eudat.eu/records/01649b2e67b242d3a69d356f9b976789

Please download, use, analyse!

This was my experience.

I hope it helps you figure out whether and how

to share or not to share?