Basic Training on the Global InMAP Model: A Workshop

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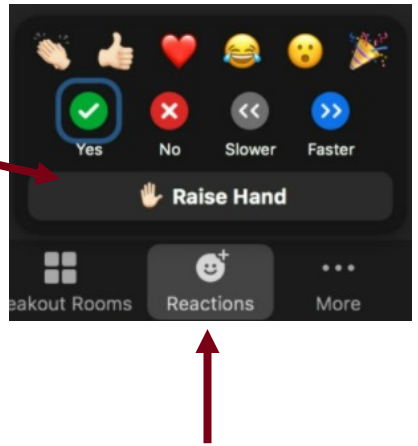
Zoom Housekeeping

Welcome to our workshop! Here are a few notes about using Zoom:

- You will be **automatically muted** upon joining the webinar.
- To **mute** or **unmute** yourself, use the microphone icon.
- Please **raise your hand** to speak using the “Reactions” icon and **lower your hand** when you are done.
- Use the **chat feature** to add comments and share input.
- If you have **technical issues**, please use the chat feature to message Emily Klos.
- You can adjust your audio through the **audio settings.** If you are having issues, you can also dial-in and listen by phone, which can be found in your registration confirmation email.



- A survey will launch at the end of this session. We appreciate any feedback you offer!
- If you would like live help in the session, you have the option for Sumil and Vikram to take control of your screen on Zoom.

Welcome & Module 2 Overview

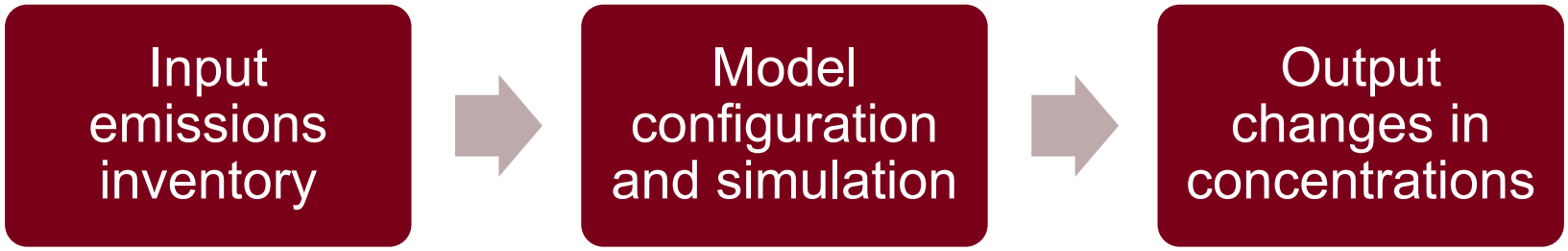
Garvin Heath, Strategic Energy Analysis Center, NREL

Recap of Module 1

In Module 1, we:

- **Discussed** what Global InMAP does operationally
- **Downloaded** and set up Global InMAP and test files for the workshop
- **Described** the ESRI Shapefile format and the TOML format
- **Described** the configuration file and its 5 main parameters
- **Demonstrated** how Global InMAP is run

Module 2 Overview



In Module 2, we will:

- **Learn** how to prepare and edit emission inputs,
- **Modify** our own configuration files for your simulation,
- **Practice** running Global InMAP on your machine,
- **Generate** results and interpret outputs

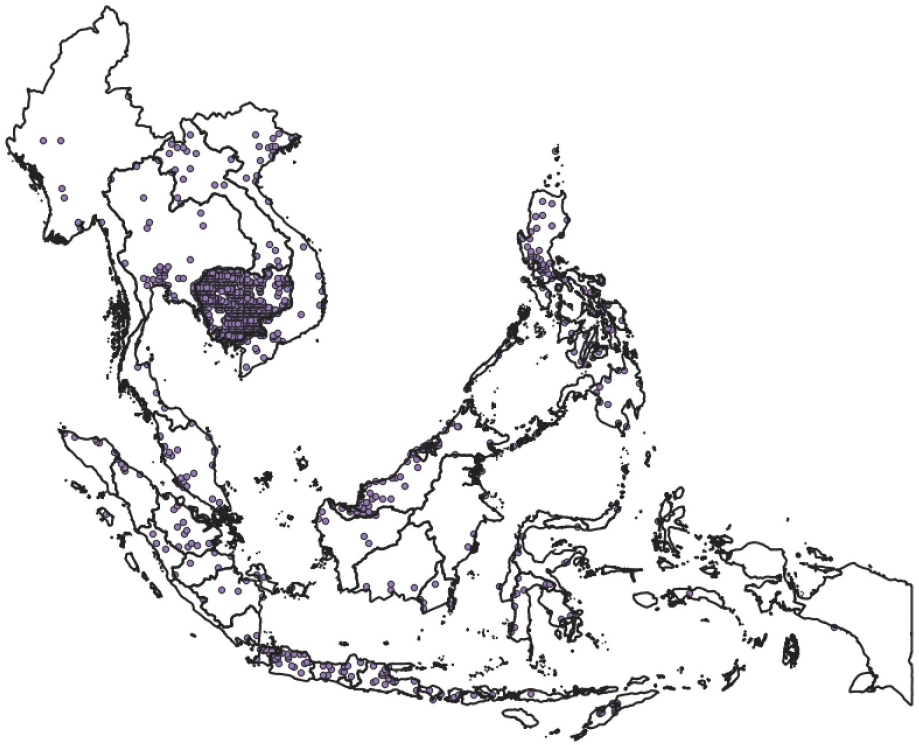
Using QGIS

Input emissions

- Open and view shapefile emissions,
- Edit emissions data,
- Find the emissions totals

Output results

- Open and view shapefile results,
- Find the average concentrations,
- Save the results to an image



Important Note about emissions attributes

Pay attention to **spelling** and **units** before running the emissions in Global InMAP

VOC	NOx	NH3	SOx	PM25	Height	Diam	Temp	Velocity
0.02902050...	0.85819300...	0.00216838...	0.67853100...	0.00532864...	127.0000000...	5.00000000...	400.000000...	23.0000000...
0.027551200...	0.81474400...	0.00205860...	0.64417700...	0.00505886...	127.0000000...	5.00000000...	400.000000...	23.0000000...

Units: **ton/year** **metres** **metres** **Kelvin** **m/s**

(or kg/year, μg/s, as specified in *sampleConfig.toml*)

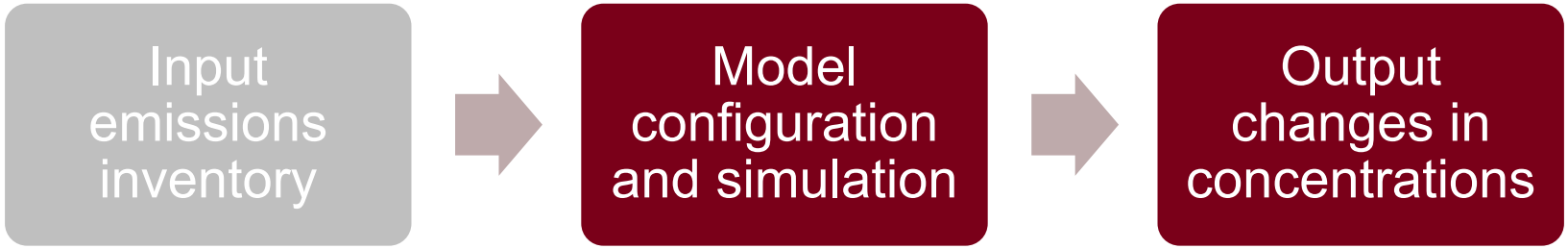
Breakout Groups

Open *test_emis.shp* in QGIS

If you haven't already done so, please download QGIS from download.qgis.org/

test_emis.shp should be in the *asean_workshop-main* folder

Module 2 Overview



In Module 2, we will:

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The Configuration File

- The configuration file is in the TOML format, and tells Global InMAP everything it needs to know to run your simulation
- We will be looking at *sampleConfig.toml* and talking about 5 main parameters in turn:
  - *VariableGridData:* The path to the computational grid.
  - *EmissionsShapefiles:* The path to the emission inputs.
  - *EmissionUnits:* The units of the emissions.
  - *OutputFile:* The path to where InMAP results go.
  - *OutputVariables:* The desired attributes for the InMAP results.

Open the configuration file *sampleConfig.toml* in your text editor

Please use a text editor that does not use Rich Text Formatting
Windows: Notepad, WordPad, Notepad++
Mac OS: TextEdit, Emacs, Vim

Breakout Groups

Run Global InMAP!

```
inmap-v1.9.5-windows-amd64.exe run steady -s --config=sampleConfig.toml
```

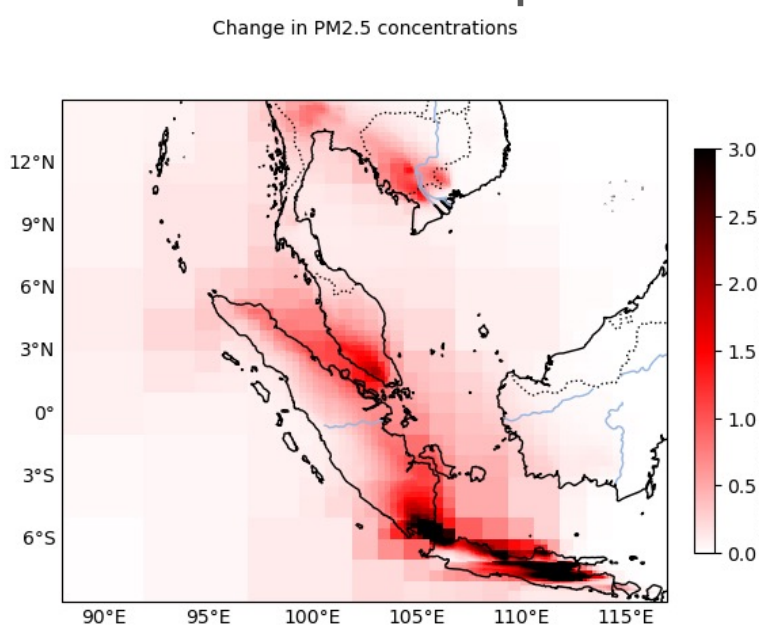
"inmap" calls the executable. In this workshop, we will download a release of InMAP, so it will be called something like "inmap-v1.9.5-darwin-amd64"

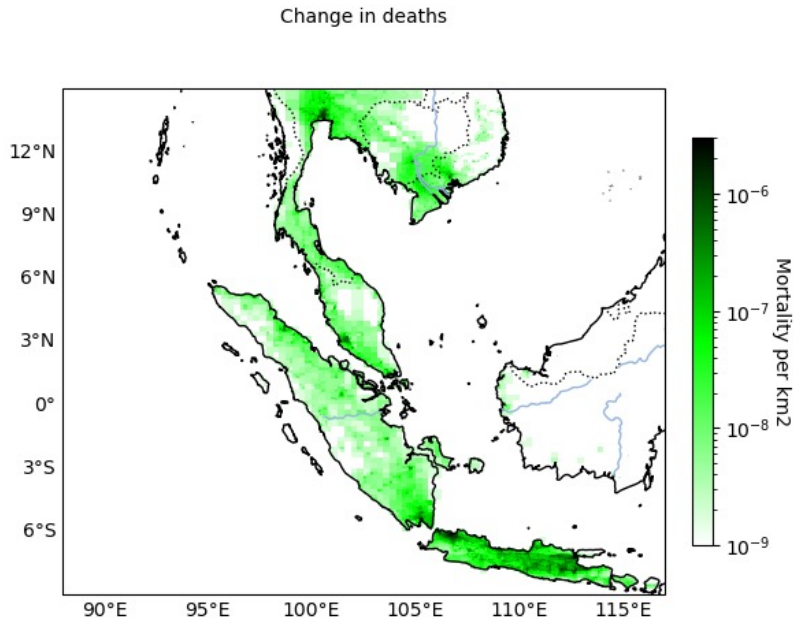
"run steady -s" tells InMAP to run in a mode where the grid is already saved out in a *.gob* file specified in the configuration. This is faster for our purposes.

"sampleConfig.toml" is the path to the configuration file that describes the Global InMAP set-up, including the emissions input files, and the grid.

Results

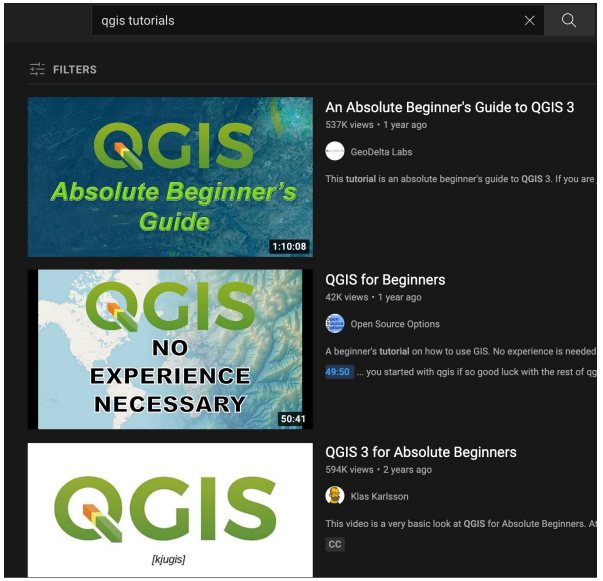
- It takes **~7 minutes** and **~1GB** memory to get results
- The test emissions increase population-weighted total $PM_{2.5}$ concentrations by **1.2 μg m^{-3} (90% pSO_4)**
- There are **10,200 additional deaths** each year in the test region from the test emissions
- We can see the spatial distribution of the results:





Additional Resources

- Help with the Command Line
  - http://www.cs.columbia.edu/~sedwards/classes/2017/1102-spring/Command%20Prompt%20Cheatsheet.pdf
- QGIS tutorials
  - https://www.youtube.com/watch?v=NHolzMgaqwE
- Other InMAP tutorials
  - https://inmap.run/blog/2019/03/04/tutorial/
- Papers
  - InMAP model (Tessum et al., 2017)
    https://doi.org/10.1371/journal.pone.0176131
  - Global extension (Thakrar et al., 2022)
    - https://doi.org/10.26434/chemrxiv-2021-wn21q-v3
- These slides are available in the workshop data



Time for Questions

Closing Remarks

Beni Suryadi, ASEAN Centre for Energy