

TM5-MP meets HERMESv3_GR

Elect and scale emissions for TM5-MP using HERMES

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Motivation

- Modify emissions in TM5-MP is not easy to access due to the inclusion of emission in the source code
- Combining TM5-MP with HERMESv3_GR, an emission election framework, this process should be made easier, faster and more user friendly

Contents

- What is HERMESv3_GR
- The Project
- Future workflow
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- Future Plans

What is HERMESv3_GR?

- High-Resolution Modelling Emission System version 3 (HERMESv3)^[1]
 - Consist of:
 - 1) global_regional module (_GR) – used in this project
 - 2) bottom-up module (BU)
 - Can be used together or independently

- HERMES = HERMESv3_GR during this talk

[1] Guevara et al., 2019, <https://doi.org/10.5194/gmd-12-1885-2019>

What is HERMESv3_GR?

- Open source Framework to prepare emissions for different models (so far WRF-CHEM, CMAQ and MONARCH)
- Combine data from different inventories with individual profiles (vertical, temporal, speciation)
- Get data suitable for target model (e.g. spatial resolution)
- Apply country-specific masks and scaling factors

The Project

Add TM5-MP as possible option in HERMES

The Project

Add TM5-MP as possible option in HERMES

Develop TM5-MP to read external emission data

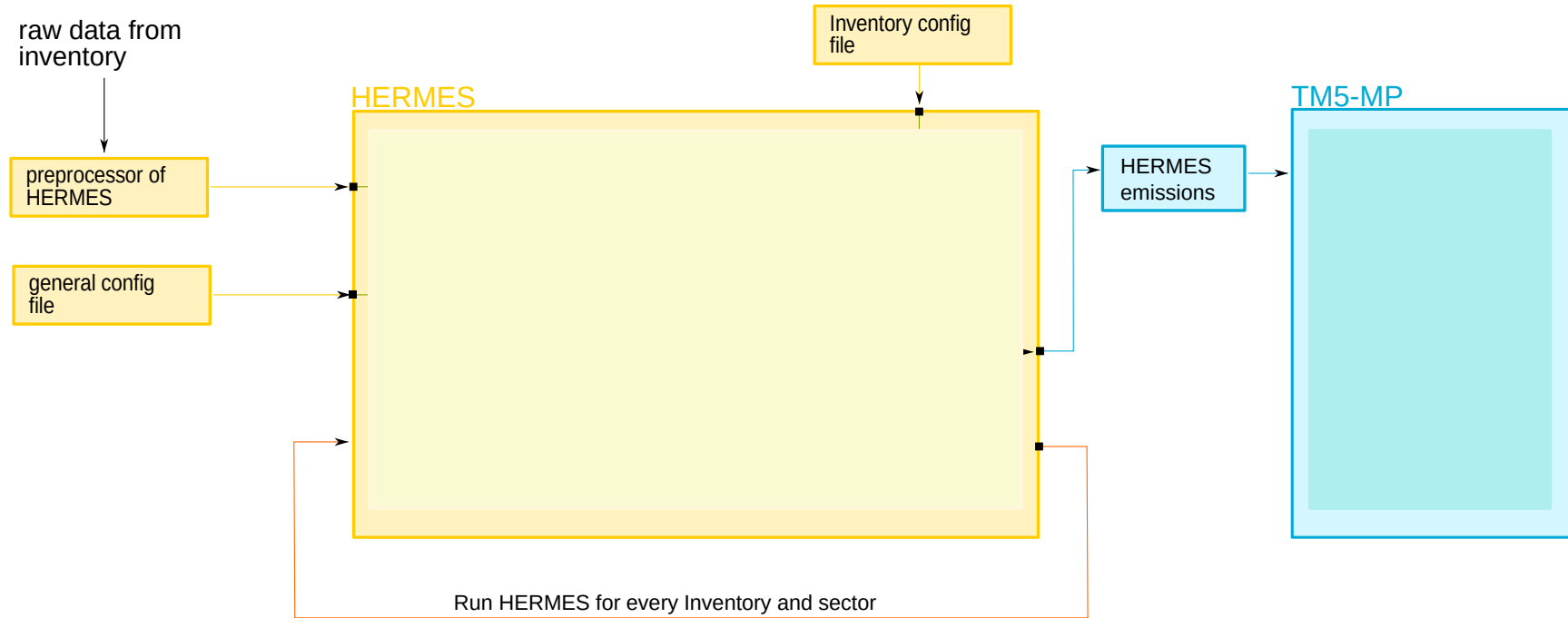
The Project

Add TM5-MP as possible option in HERMES

Develop TM5-MP to read external emission data

Use TM5-MP + HERMES in case studies

Future workflow



Current status

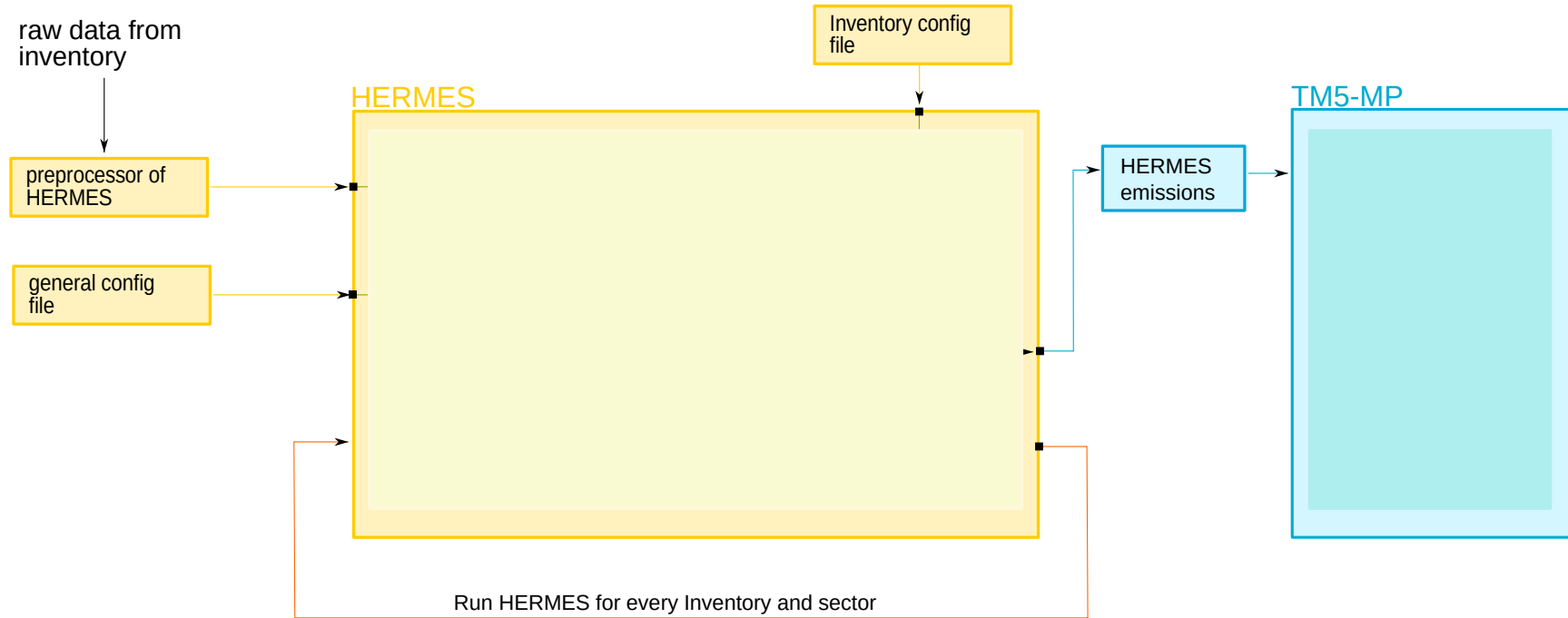
raw data from
inventory



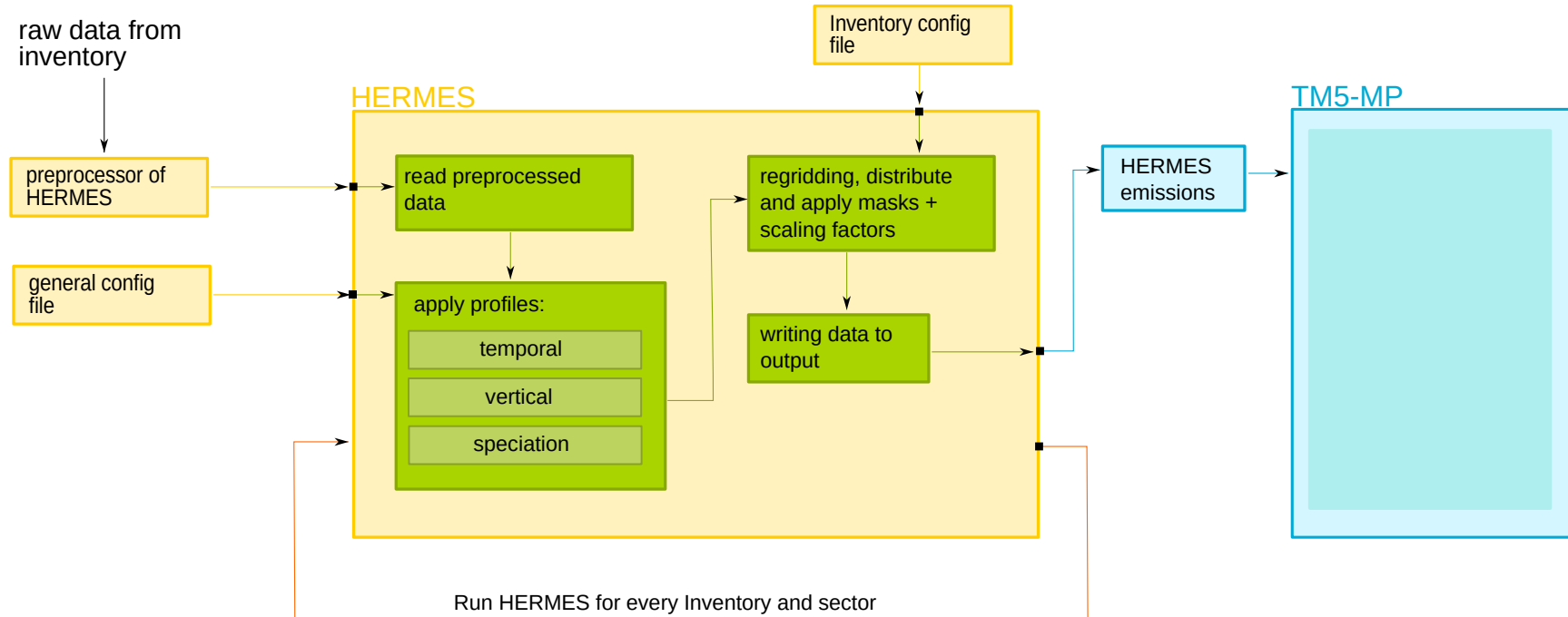
preprocessor of
HERMES

- Most used inventories already included
- Default: CEDS, EDGAR, GFED4
- Already written: CMIP6 future, MEGAN
- To do: LPJ, HYMN

Future workflow



Future workflow



Current status

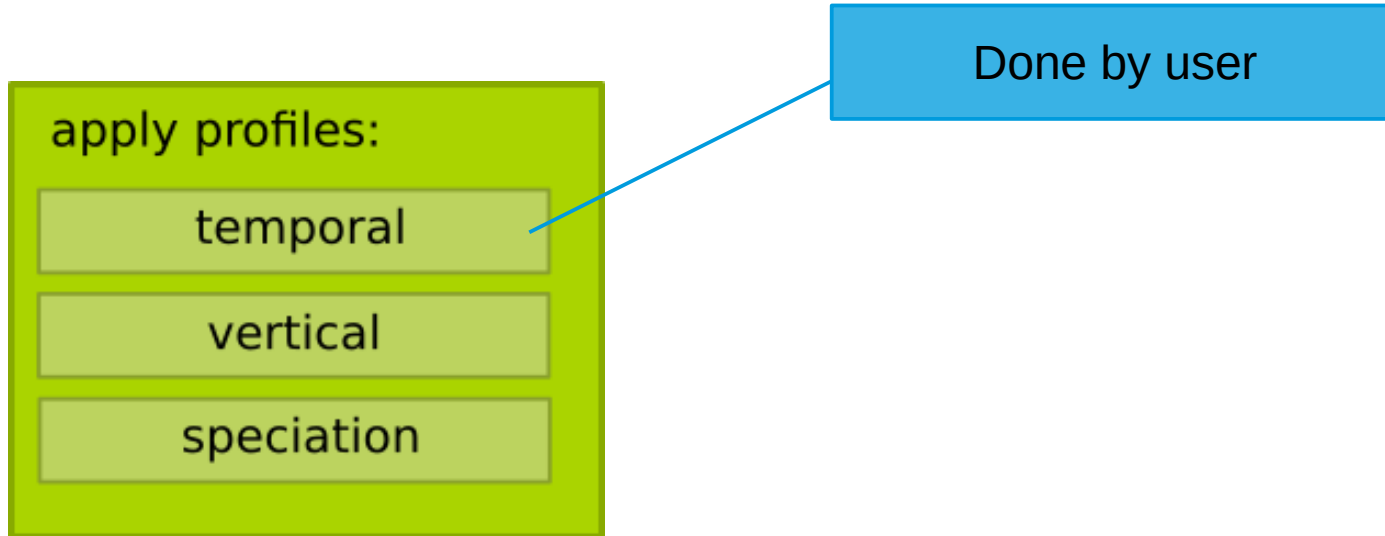
apply profiles:

temporal

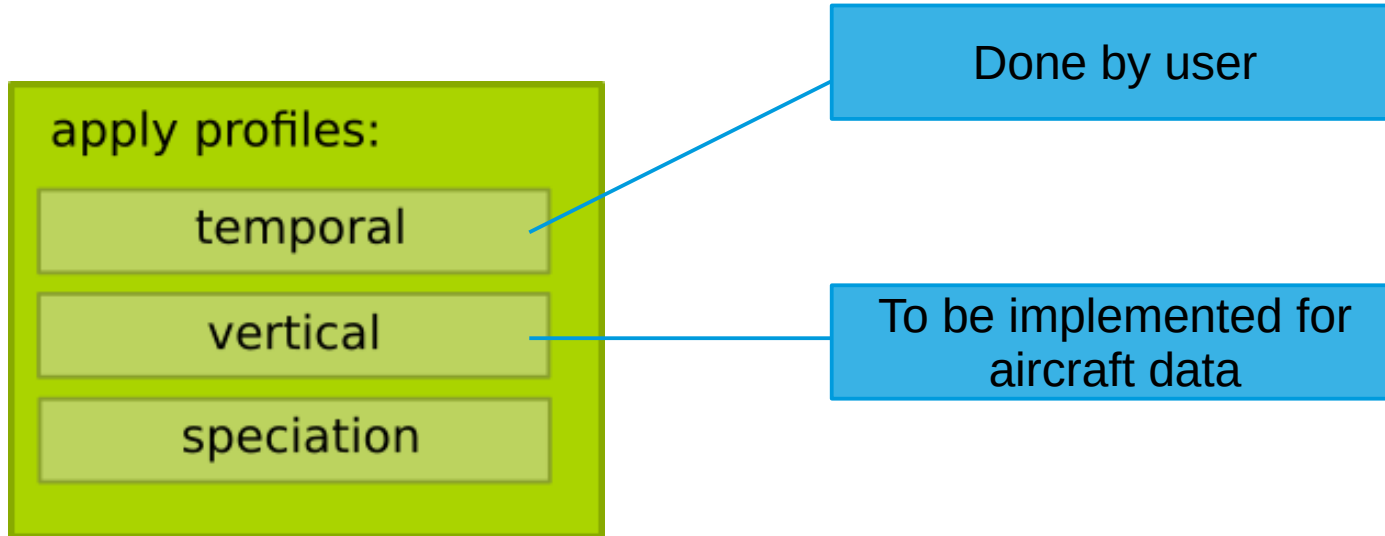
vertical

speciation

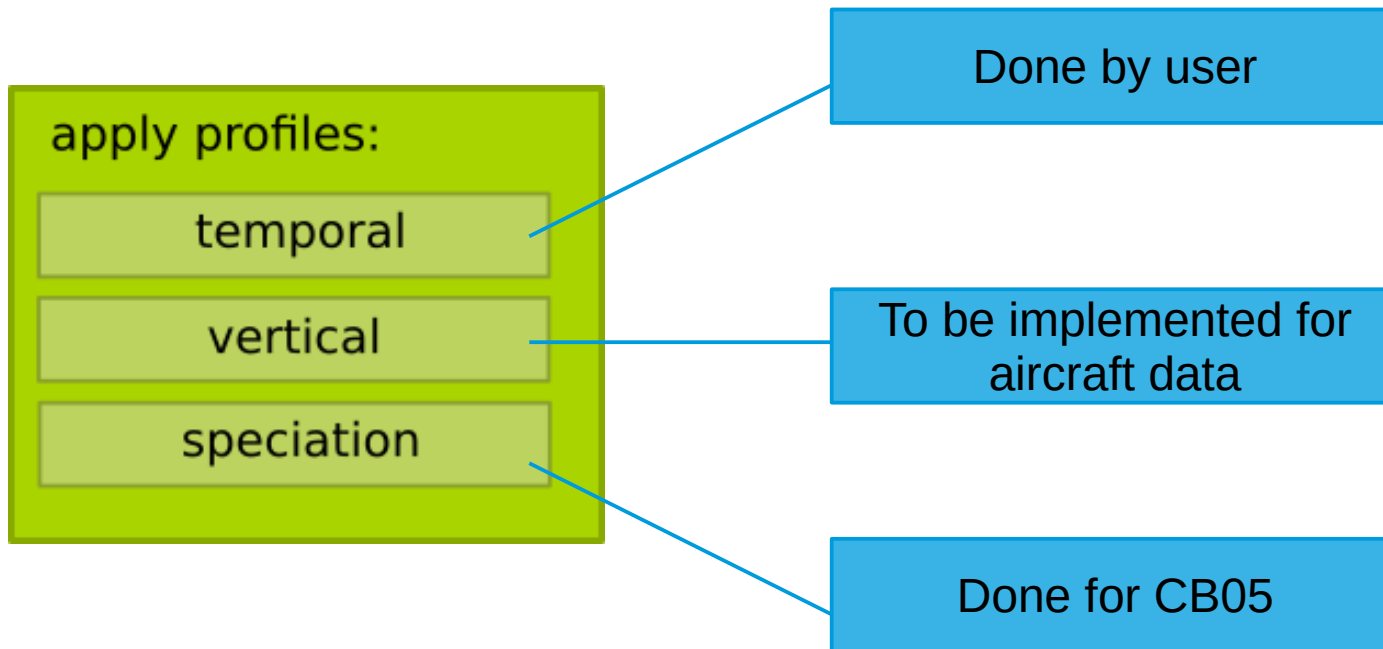
Current status



Current status



Current status



Current status

writing data to
output

- Writers format the output for the destination model
- Structure is based on existing writers
- additional transformation to $\text{kg/s(m}^2\text{)}$ applied
- Also useful meta data has to be included
 - Suggestions are very welcome

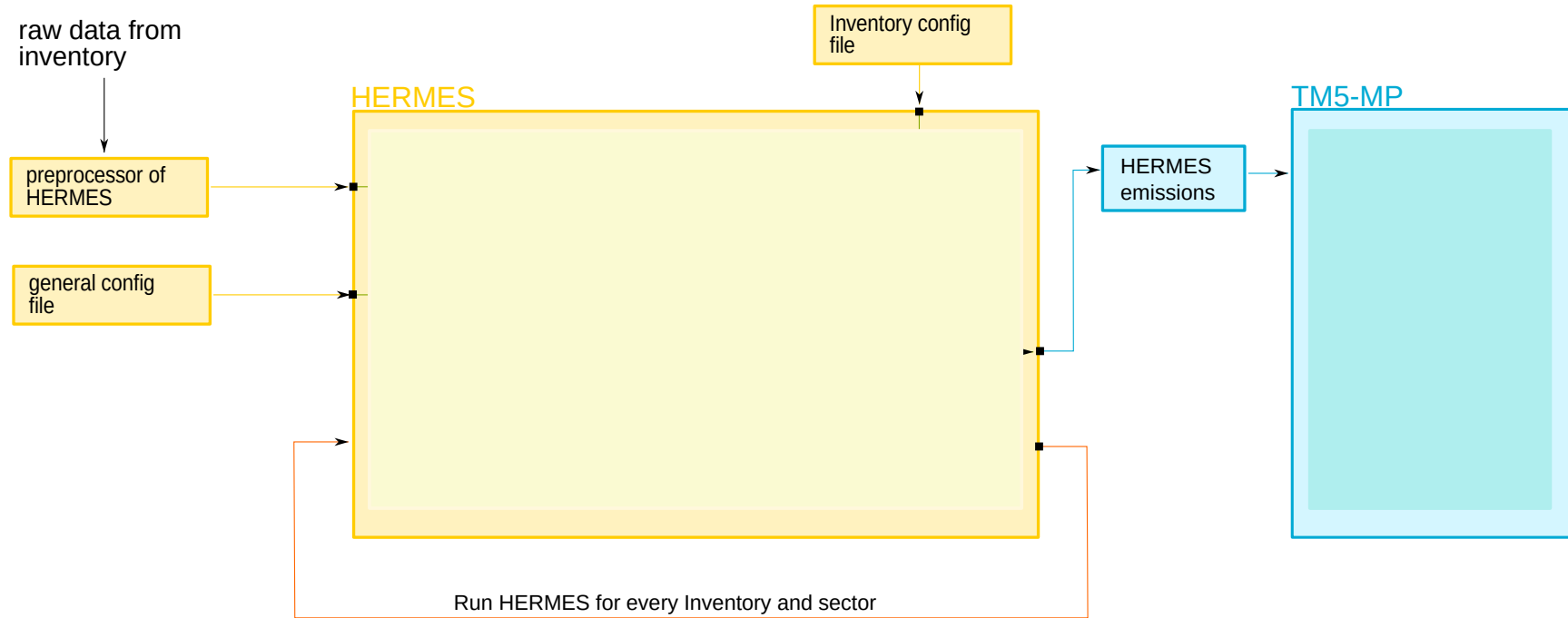
Current status

- First tests were successful:

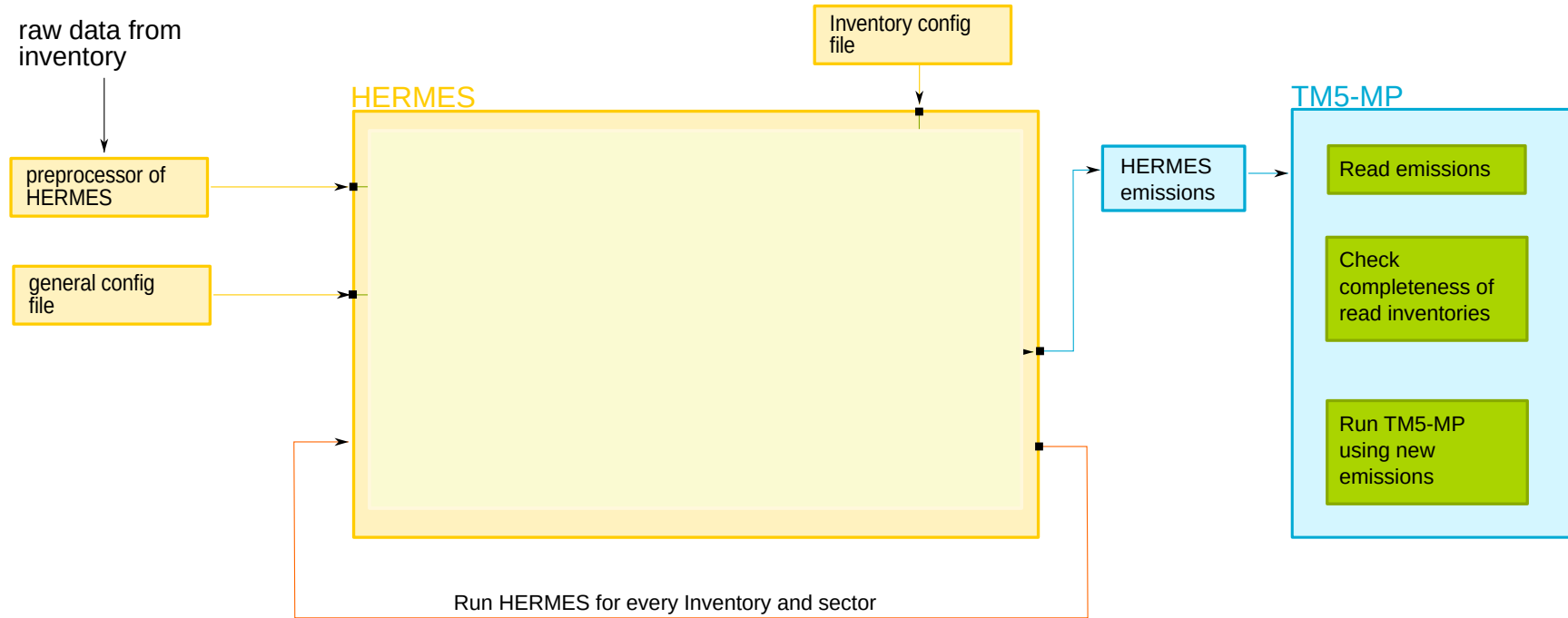
The summed mass for every species from HERMES output (scaled to 1 month) is the same as the mass/month for each species given in TM5-MP log-file

- Able to create output suitable for TM5-MP

Future workflow



Future workflow



Summary

- TM5-MP should read emission files prepared by HERMES
- So far first TM5-MP ready output data can be created using HERMES

Future plans

- Include HERMES output in TM5-MP
 - Add missing preprocessors
 - Include python script to run HERMES for TM5-MP
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- Aim: First version end of 2021 ready to use
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- Case studies

Thanks a lot for your attention

Any question? Let me know!

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