

# Automated Machine Learning for Earth Observation

## AutoAI4EO

Julia Wasala – December 9, 2022



Universiteit  
Leiden  
The Netherlands

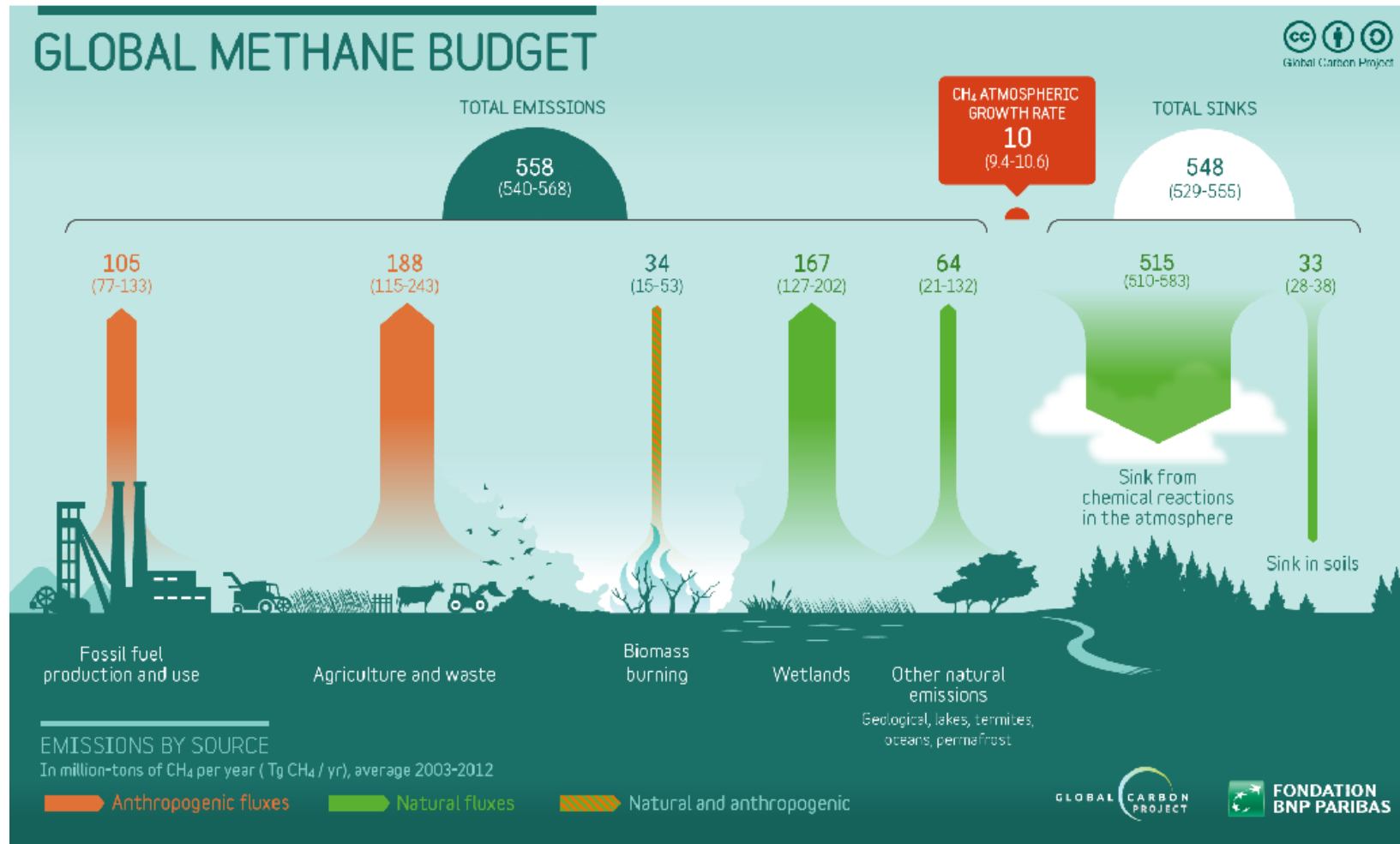


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### In collaboration with:

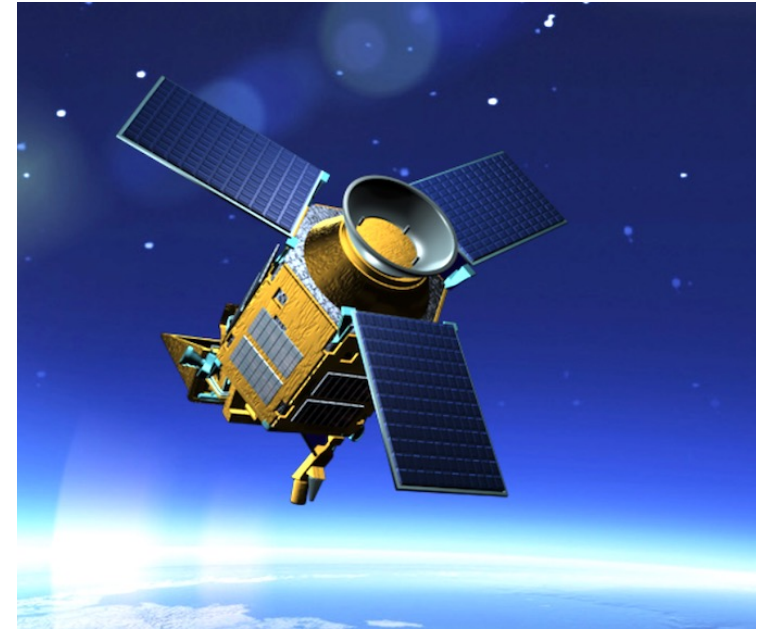
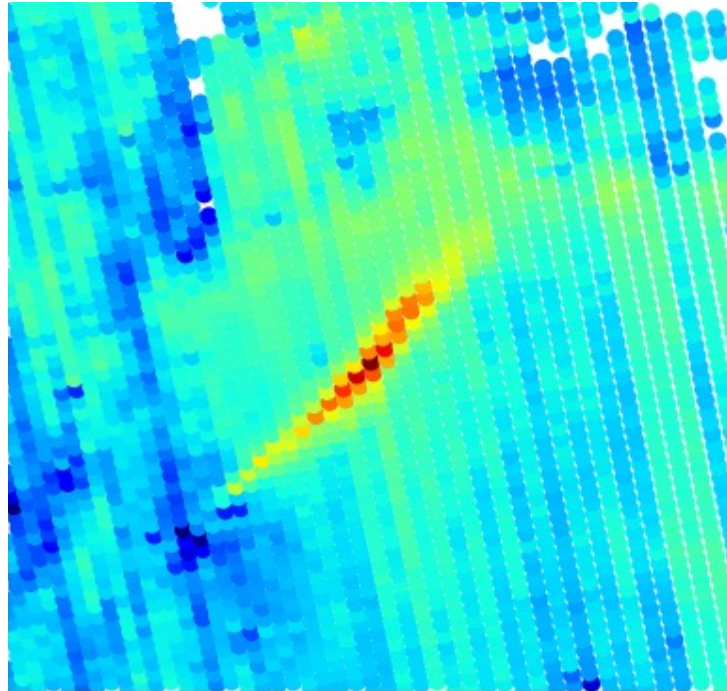
Dr. Mitra Baratchi (LIACS)  
Prof.dr. Holger Hoos (LIACS)  
Dr. Bram Maasackers (SRON)  
Prof.dr. Ilse Aben (SRON)  
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# The methane problem

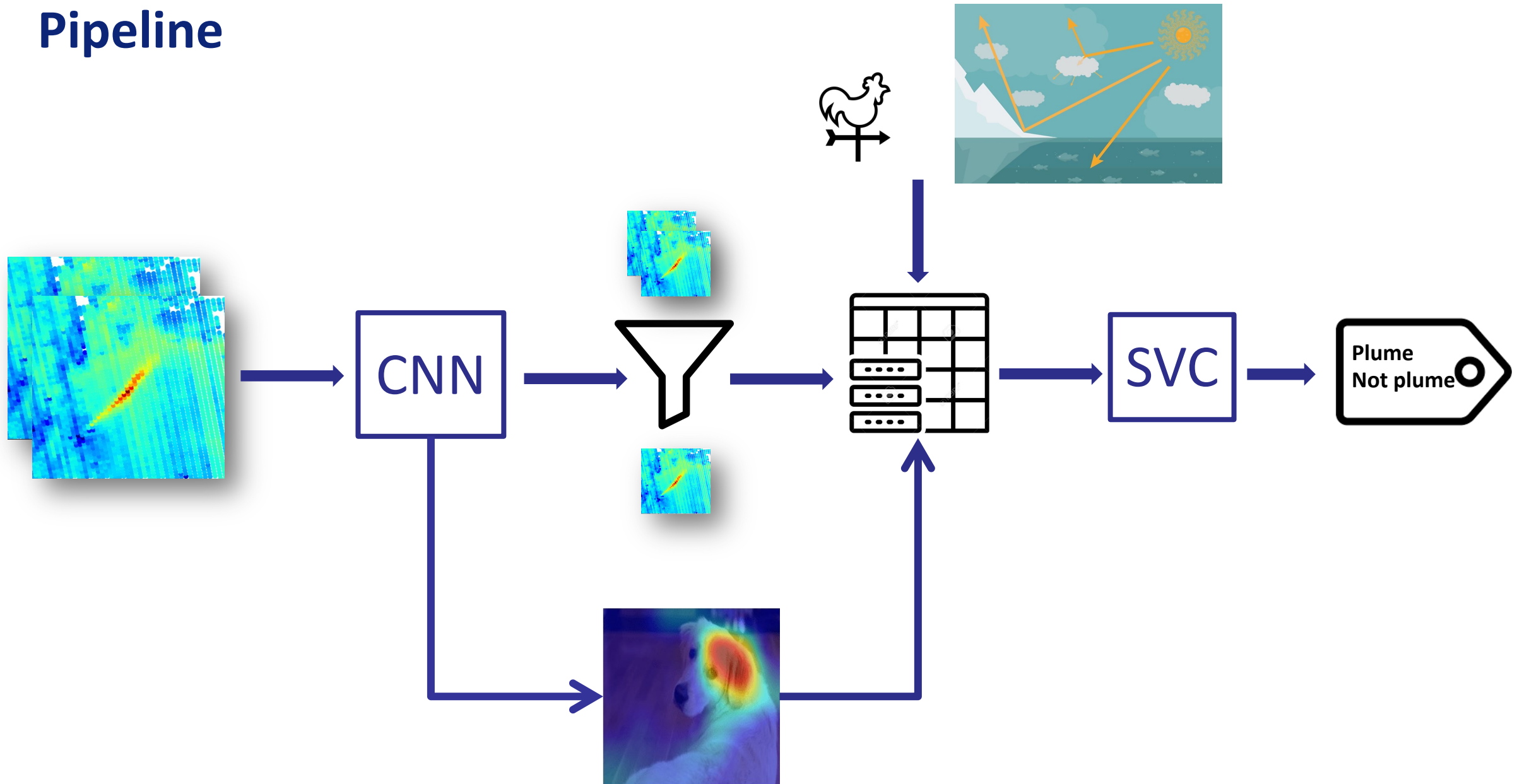


# Detecting methane plumes

- TROPOMI
- Challenges:
  - Water
  - Noise
  - Terrain
  - Resolution
  - Wind direction



# Pipeline



# Research questions

- What kind of improvements can be achieved with AutoML?
- Which techniques are most suitable for this problem?
- Do you really need all of the additional data/features?

# Optimise pipeline using AutoML techniques

## 1. Optimize SVC

- Hyperparameter tuning (SMAC)
- Model selection (auto-sklearn, hyperopt-sklearn, etc)

## 2. Optimize CNN

- AutoKeras
- Auto-pytorch

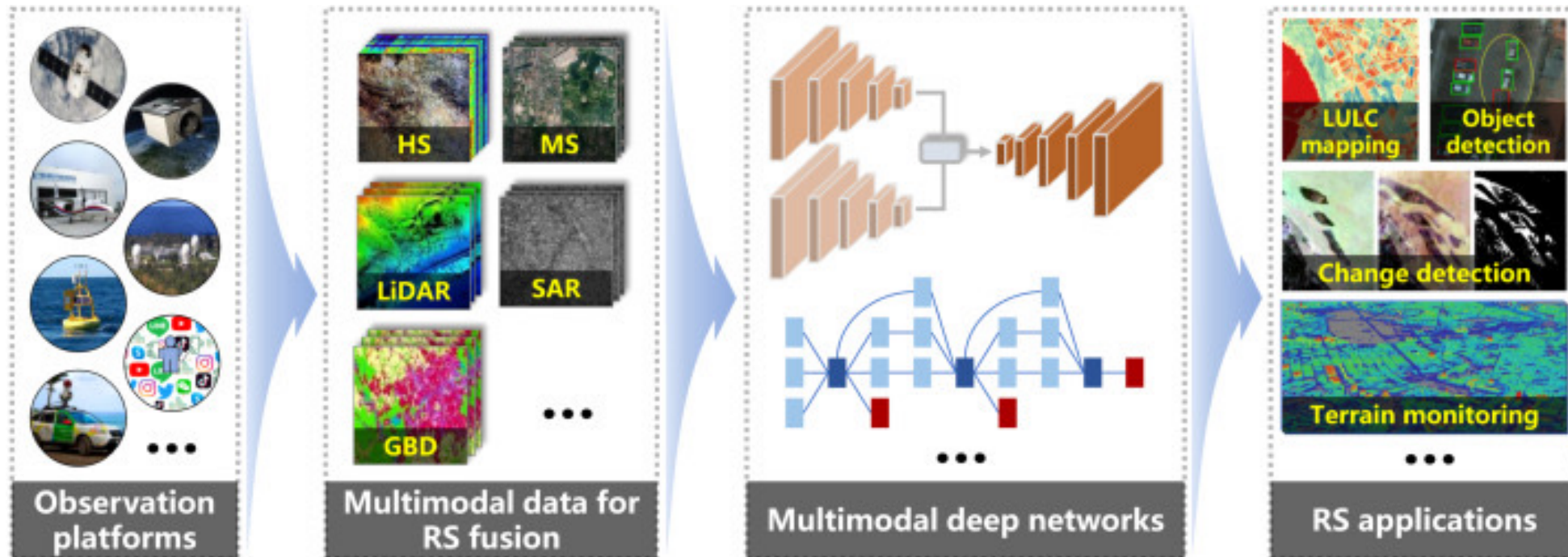
## 3. End-to-end AutoML pipeline

- Additional features necessary?



# Outlook

- Outlook: AutoML system for data fusion applicable to different tasks
  - Automatically create neural networks to combine different modalities
  - For instance: Sentinel-2 /Sentinel-1 fusion for vegetation height mapping, TROPOMI/windfield/albedo for plume detection



Source: Li et al. (2022). Deep learning in multimodal remote sensing data fusion: A comprehensive review.

# Thank you!

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