

Using satellites to support governments and companies to reduce methane emissions

*focus on landfills/waste dumps*



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<sup>1</sup>SRON Netherlands Institute for Space Research, Netherlands

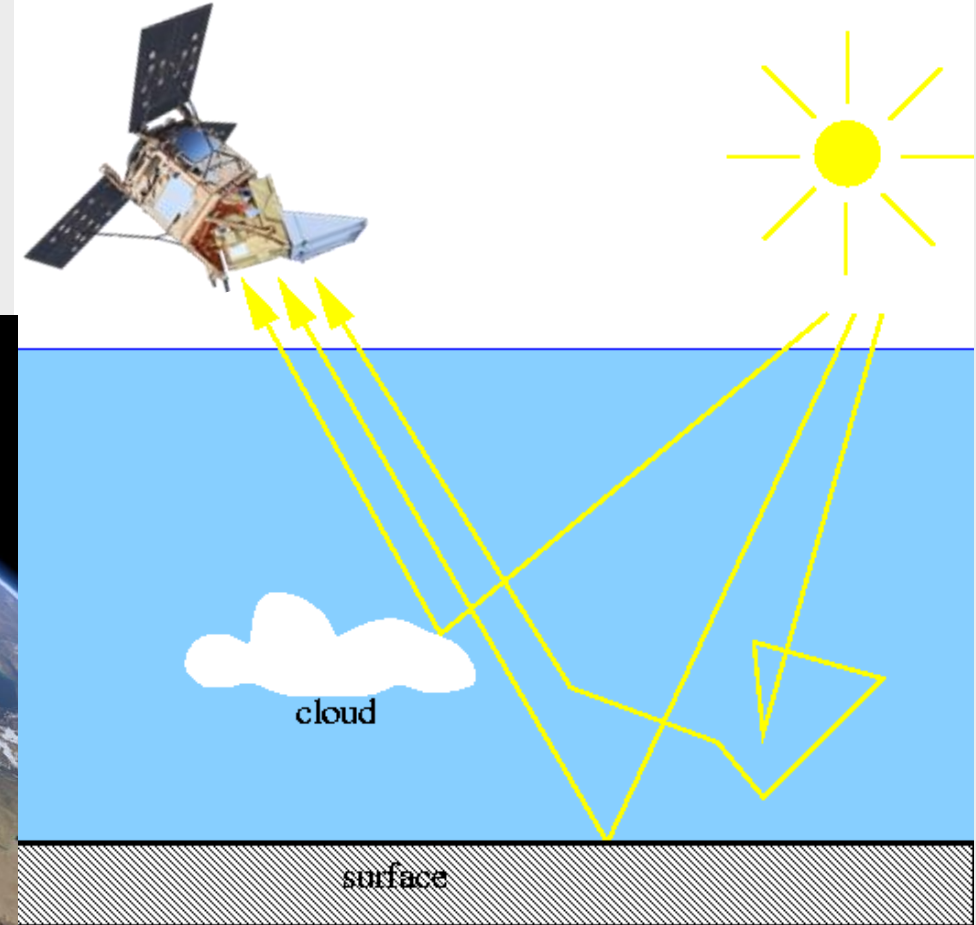
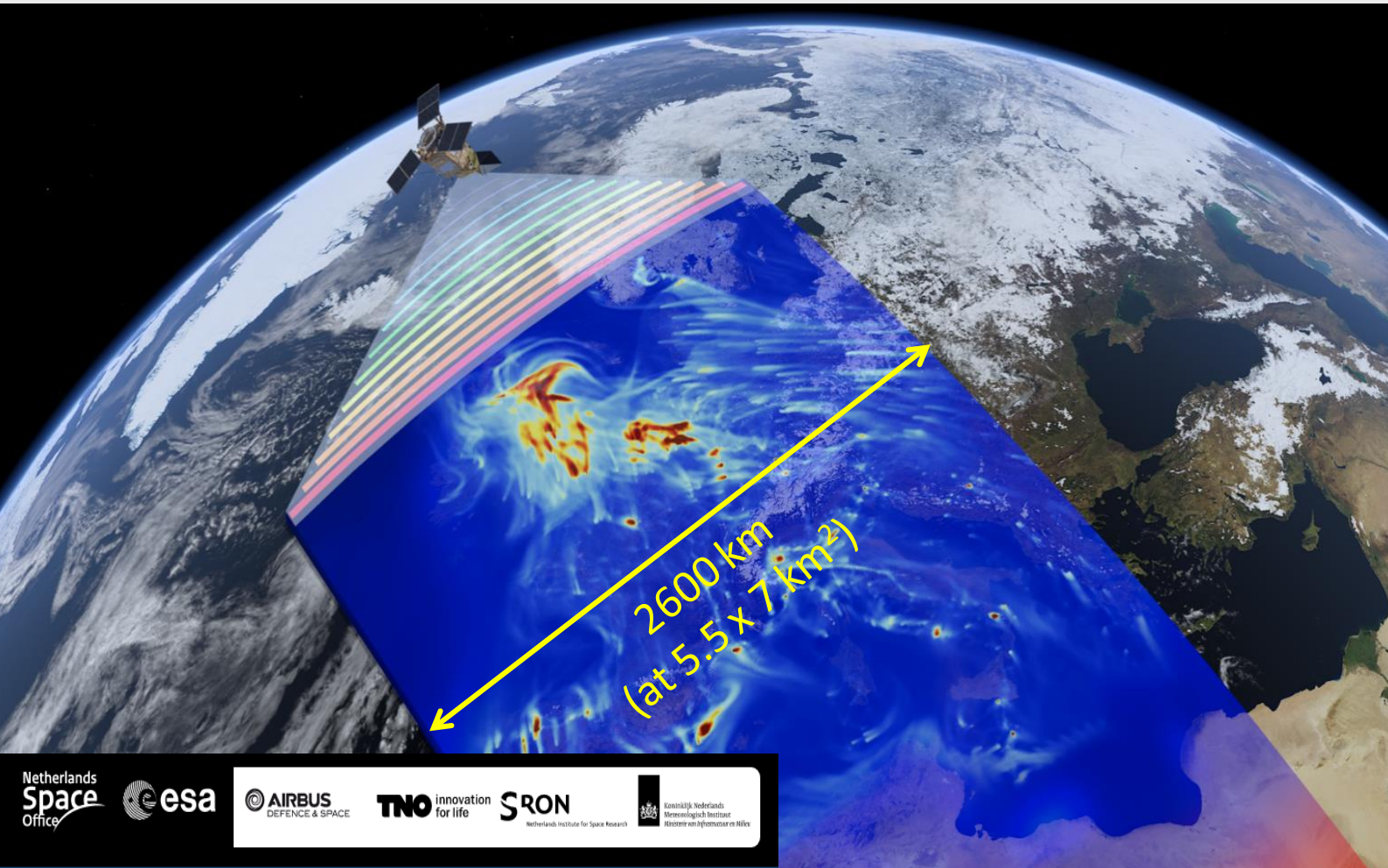
<sup>2</sup>Vrije Universiteit Amsterdam, Netherlands

& SRON TROPOMI-team and collaborators



# TROPOMI on ESA's Sentinel-5 Precursor

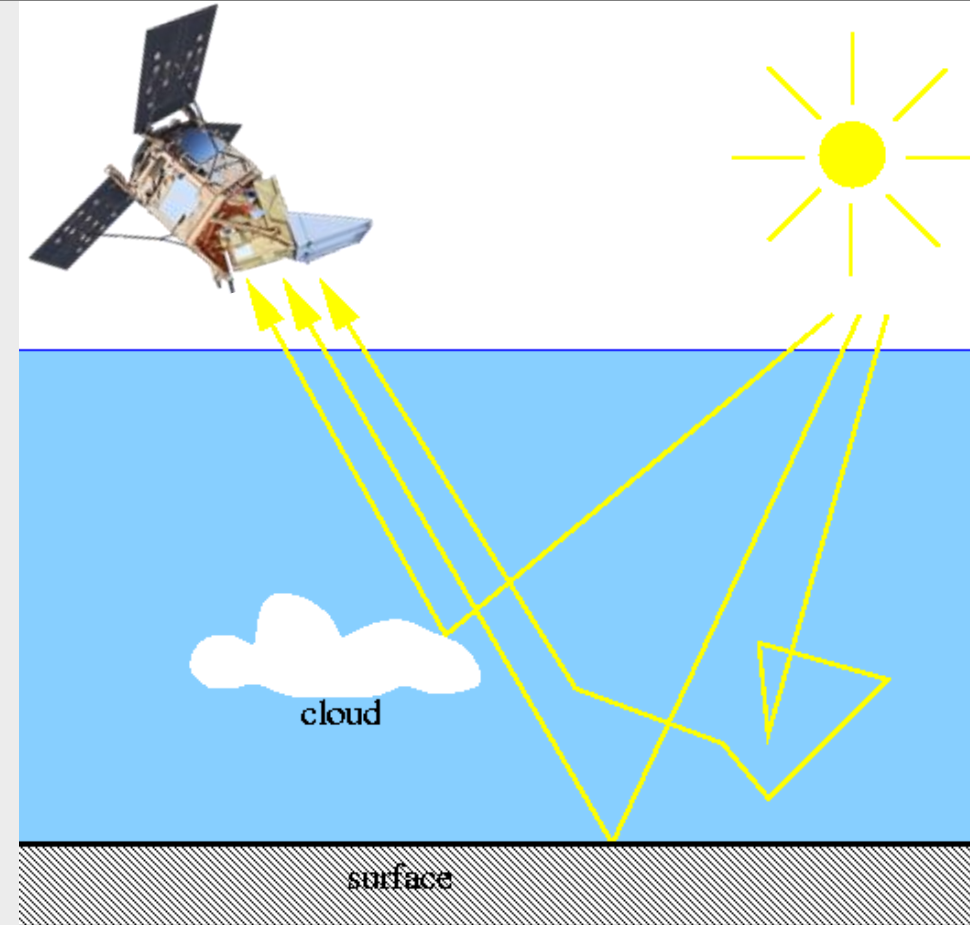
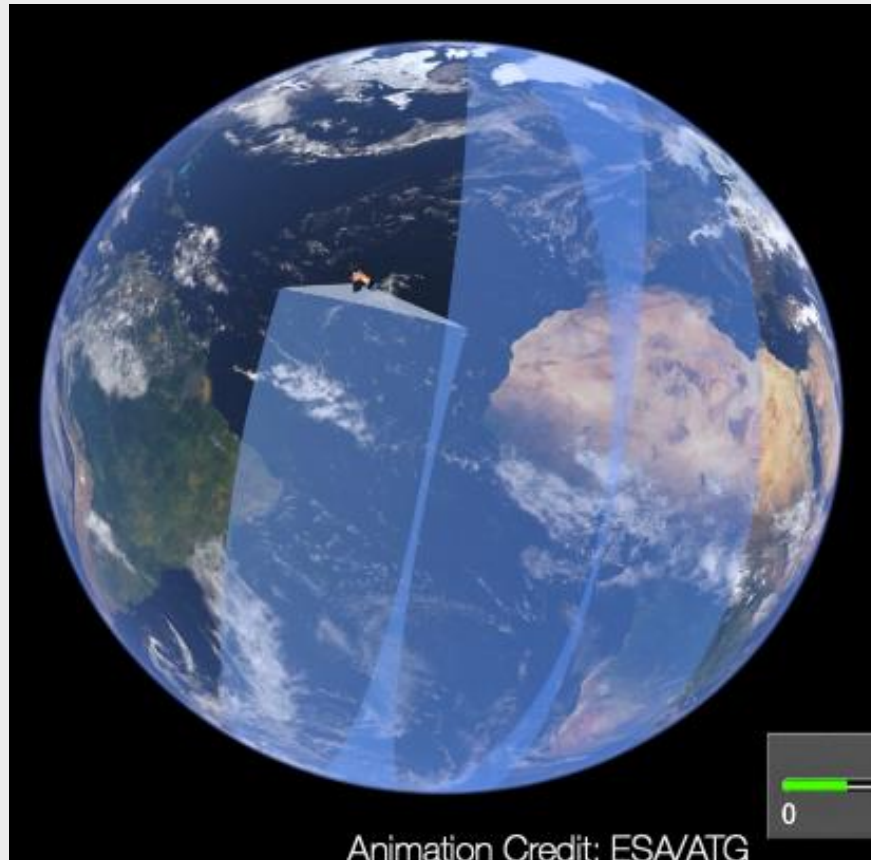
- Collaboration between the Netherlands and ESA
- Launched Oct. 2017, ESA's precursor Sentinel-5
- Part of EU Copernicus programme, data publicly available (free)
- Measures many species : Ozone, NO<sub>2</sub>, SO<sub>2</sub>, CO, **methane**, ...



- Unique: **daily global coverage** & high spatial resolution (5.5 x 7 km<sup>2</sup>)
- Ideal for the detection of so-called **methane super emitters**

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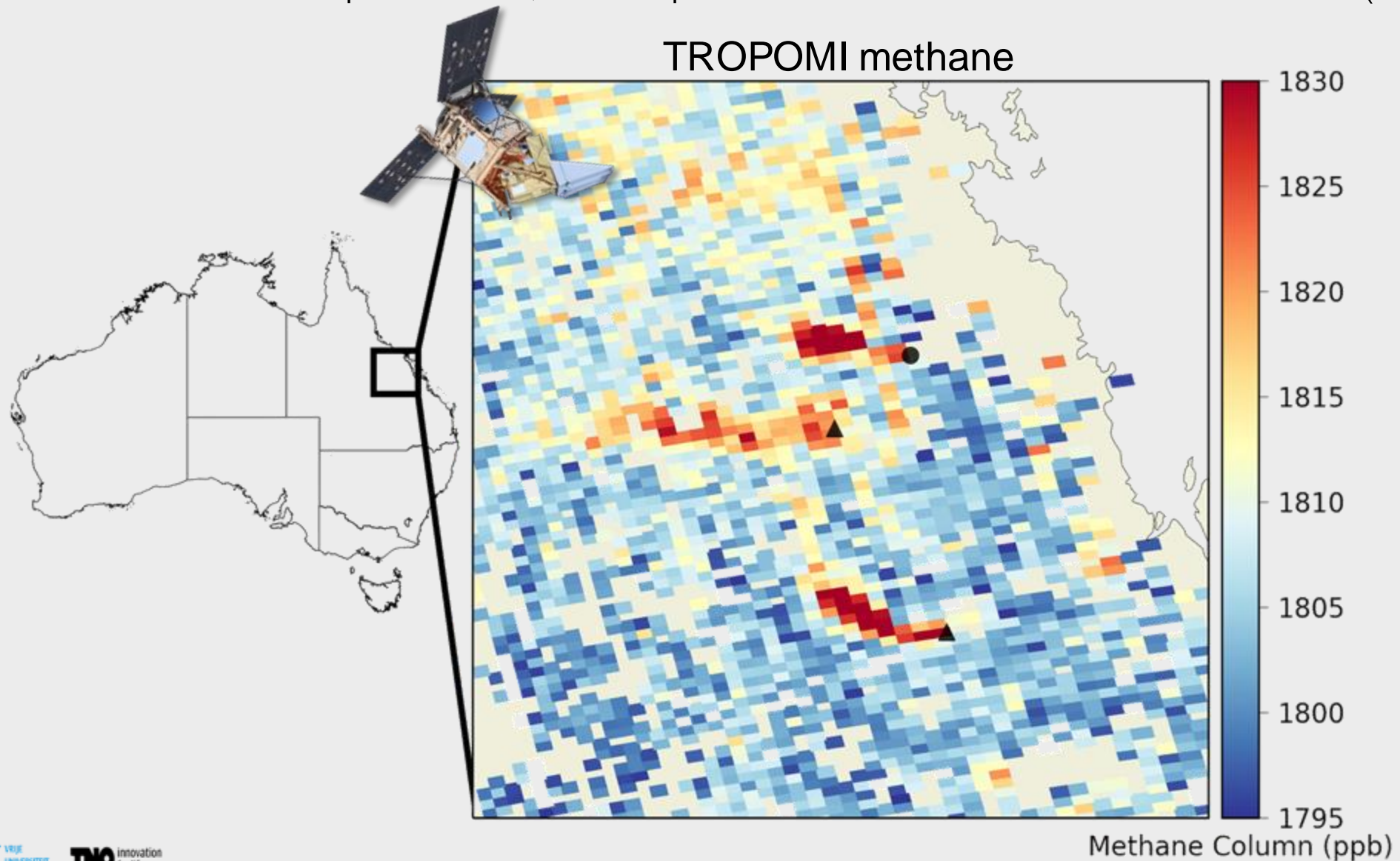


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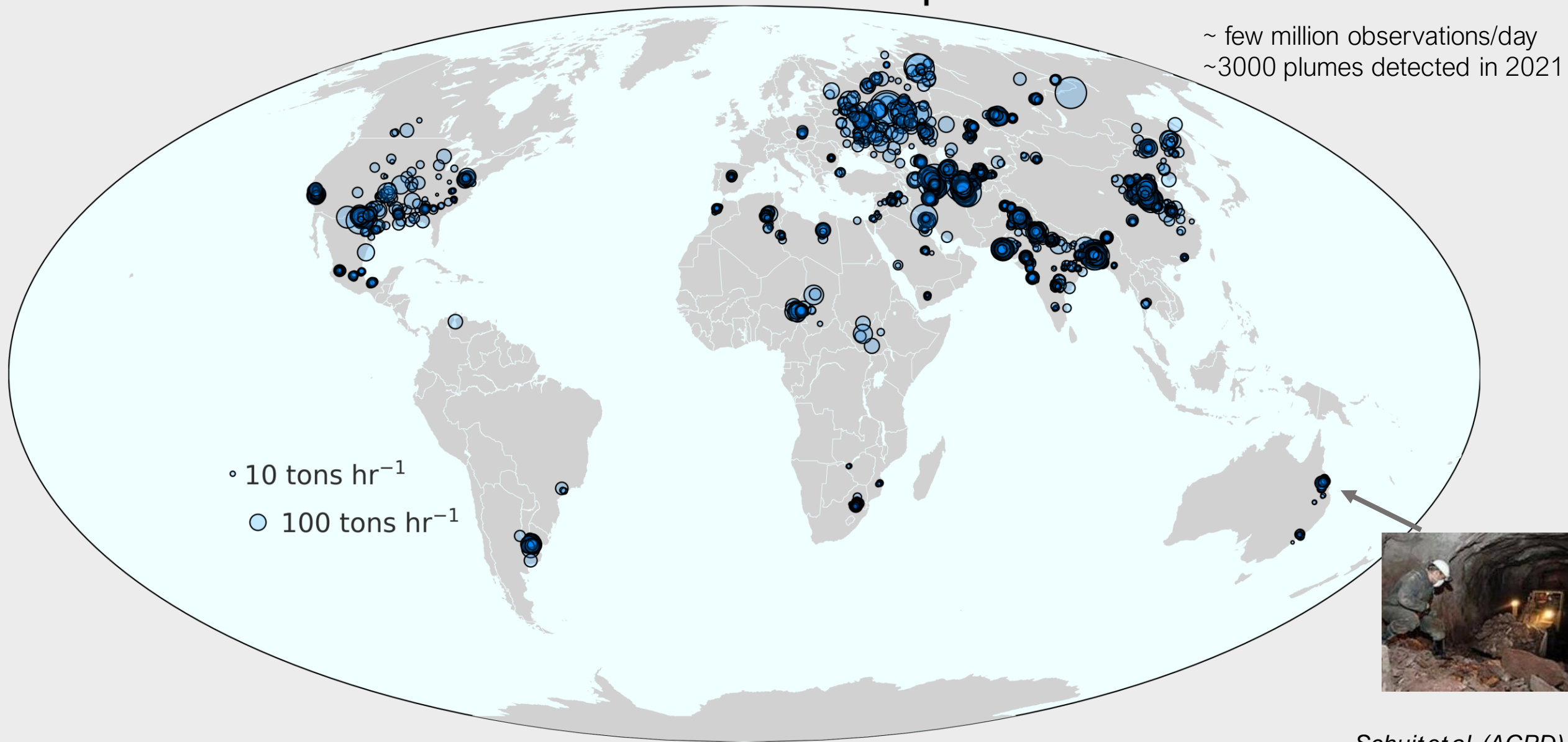
# Detecting methane plumes from space, e.g. emissions from coal mines

One surface coal mine: 1% coal production, 24% reported emissions from all Australian coal (**super emitter**)



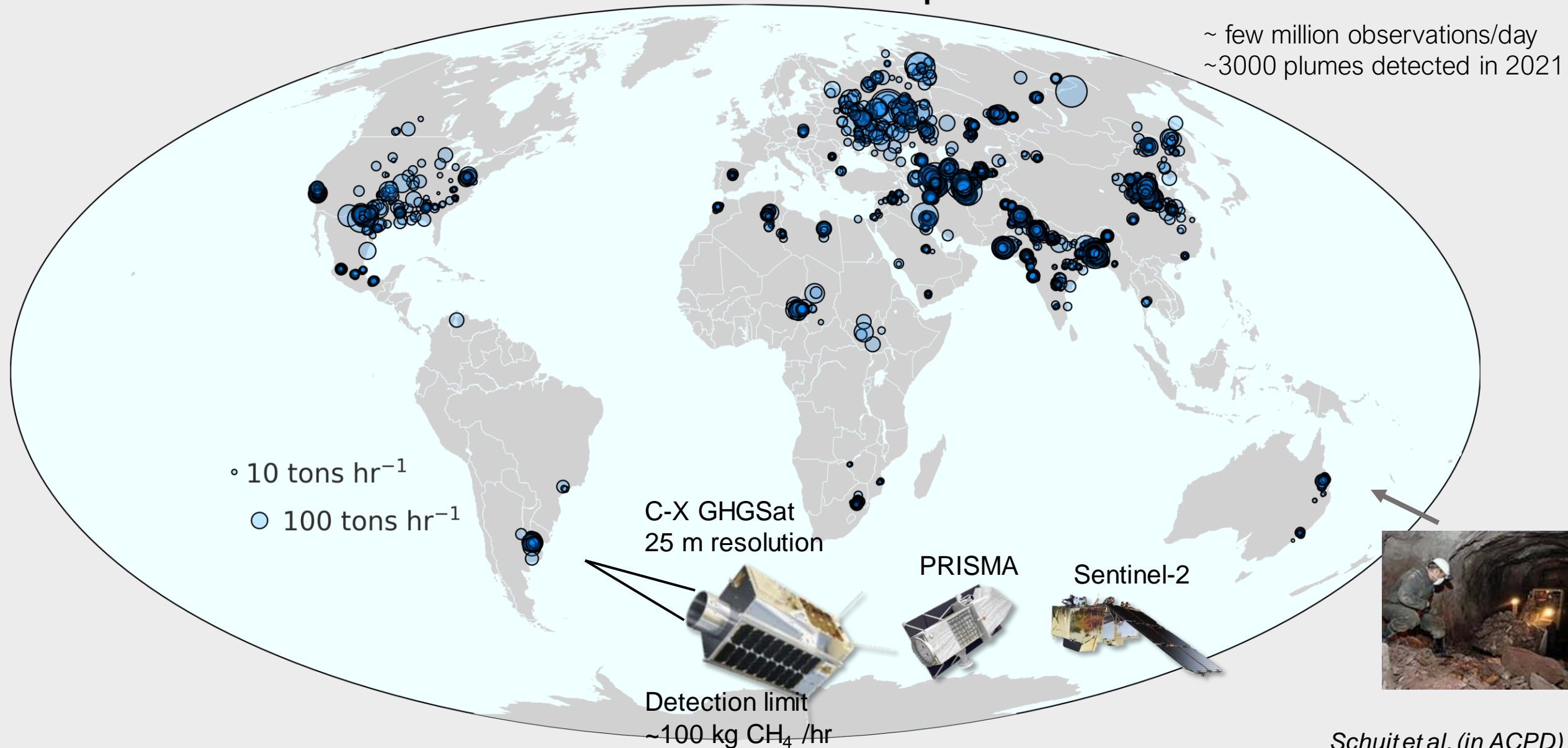
# TROPOMI : 1<sup>st</sup> global view on super emitters

## 2021 TROPOMI-detected super-emitters



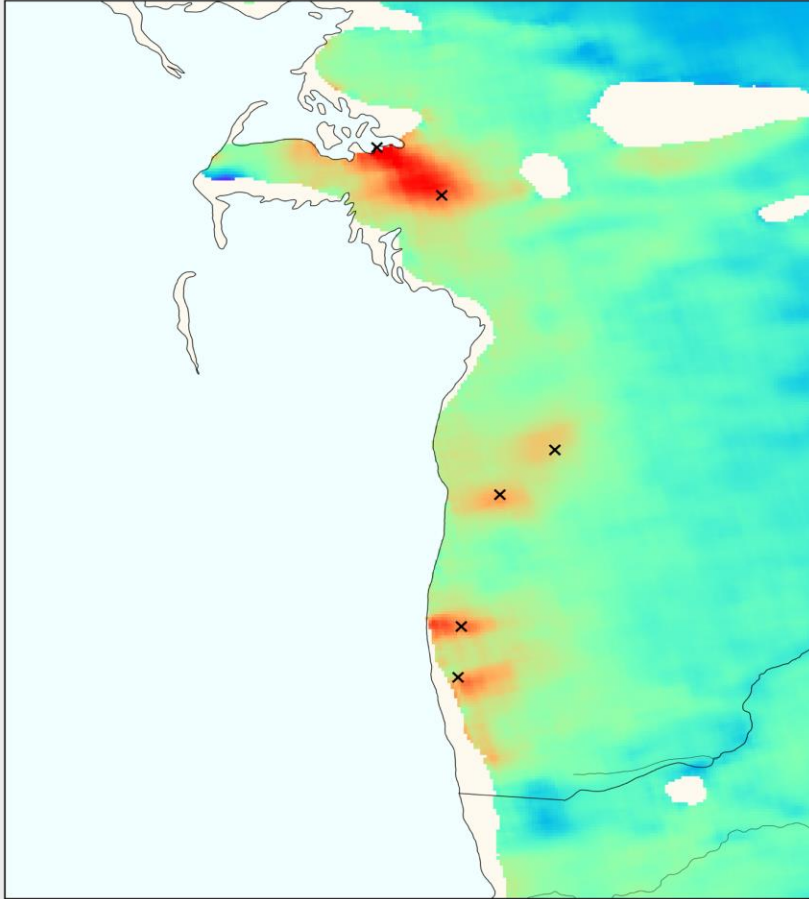
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# TROPOMI tip-and-cue PRISMA

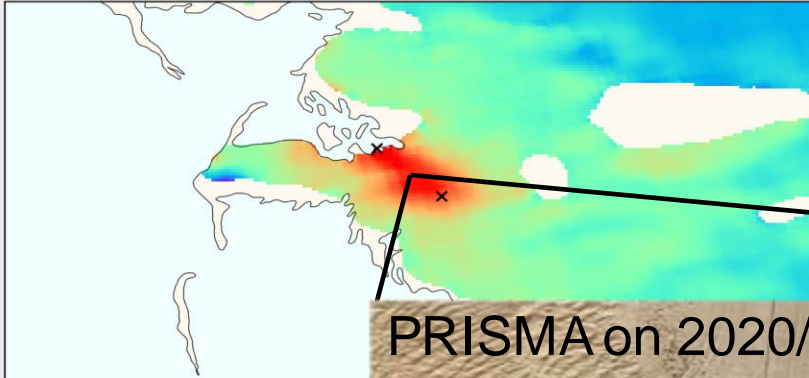
TROPOMI 2019 - 2020





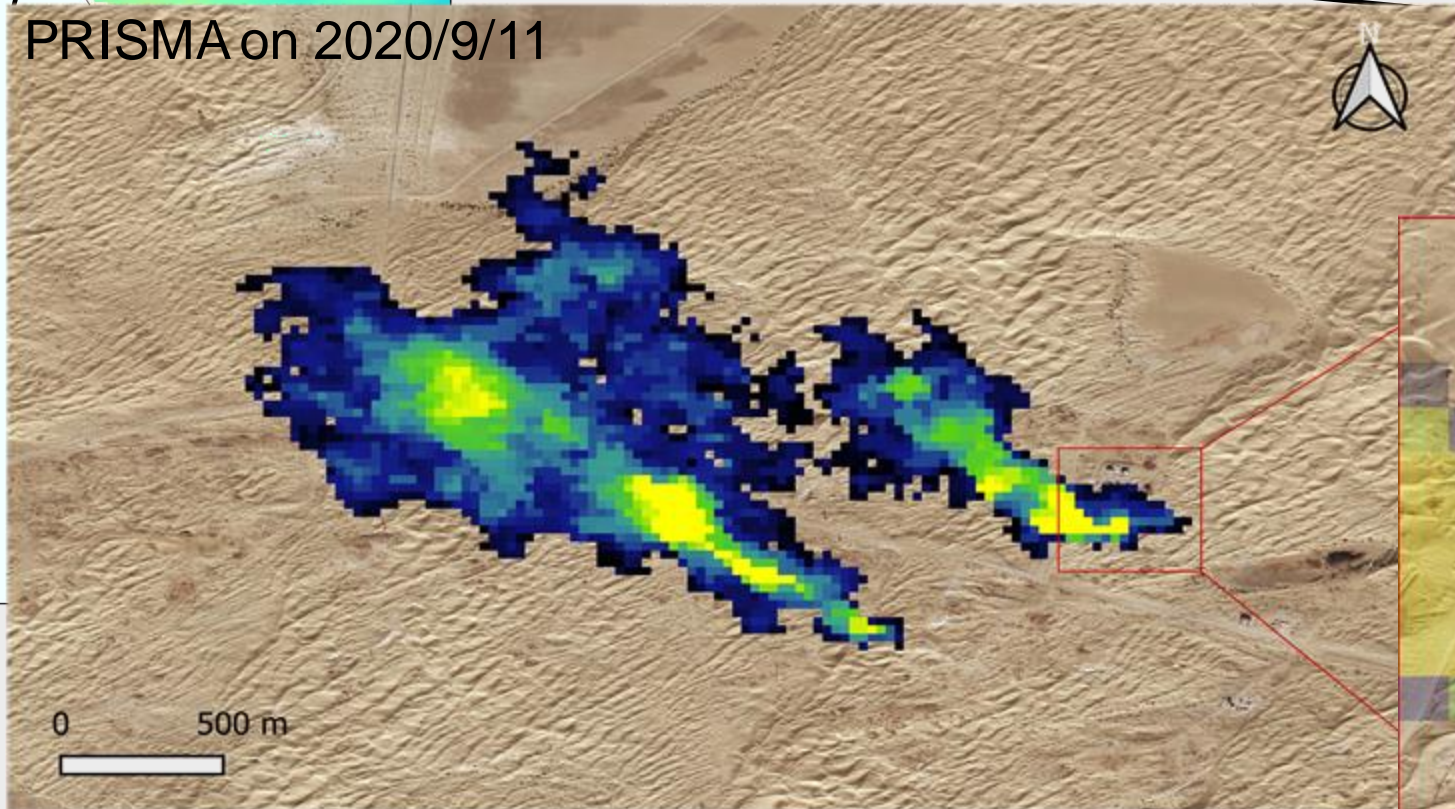
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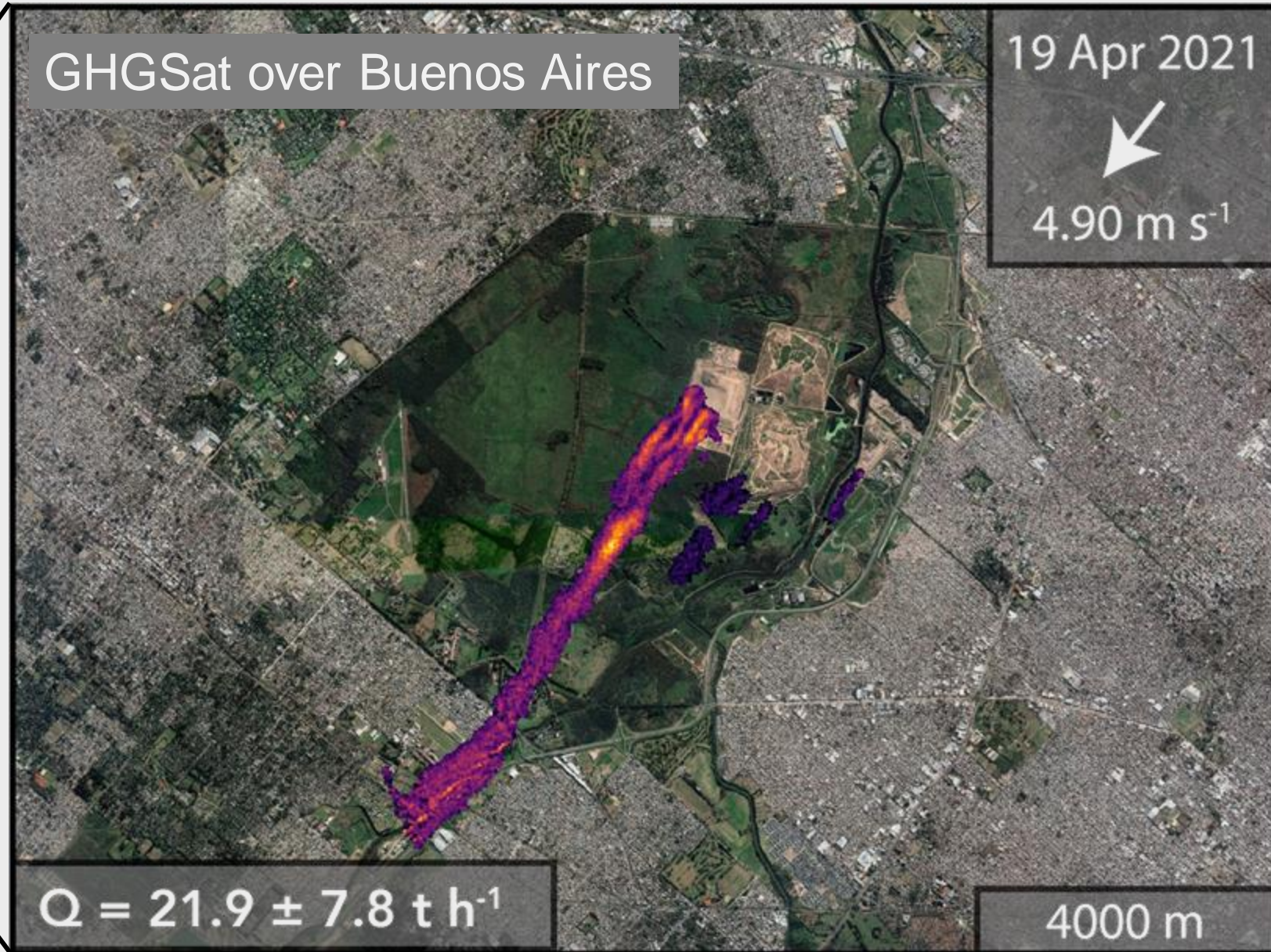
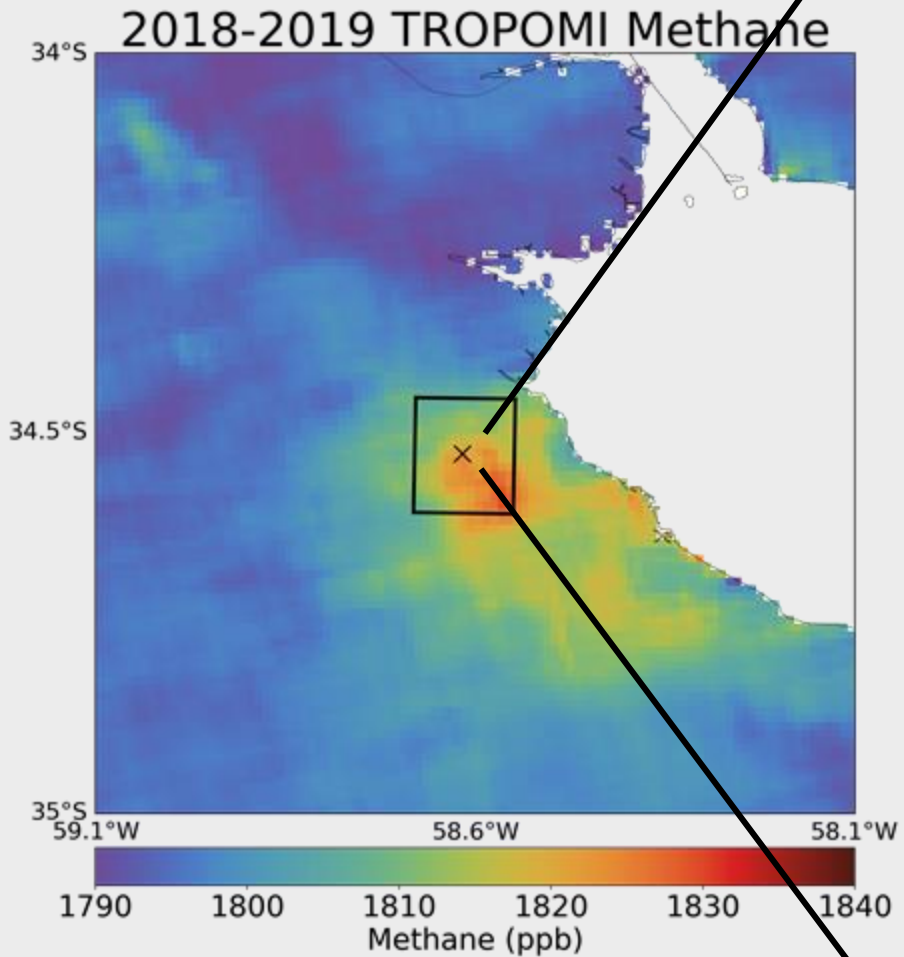
24 not burning flares !

PRISMA on 2020/9/11



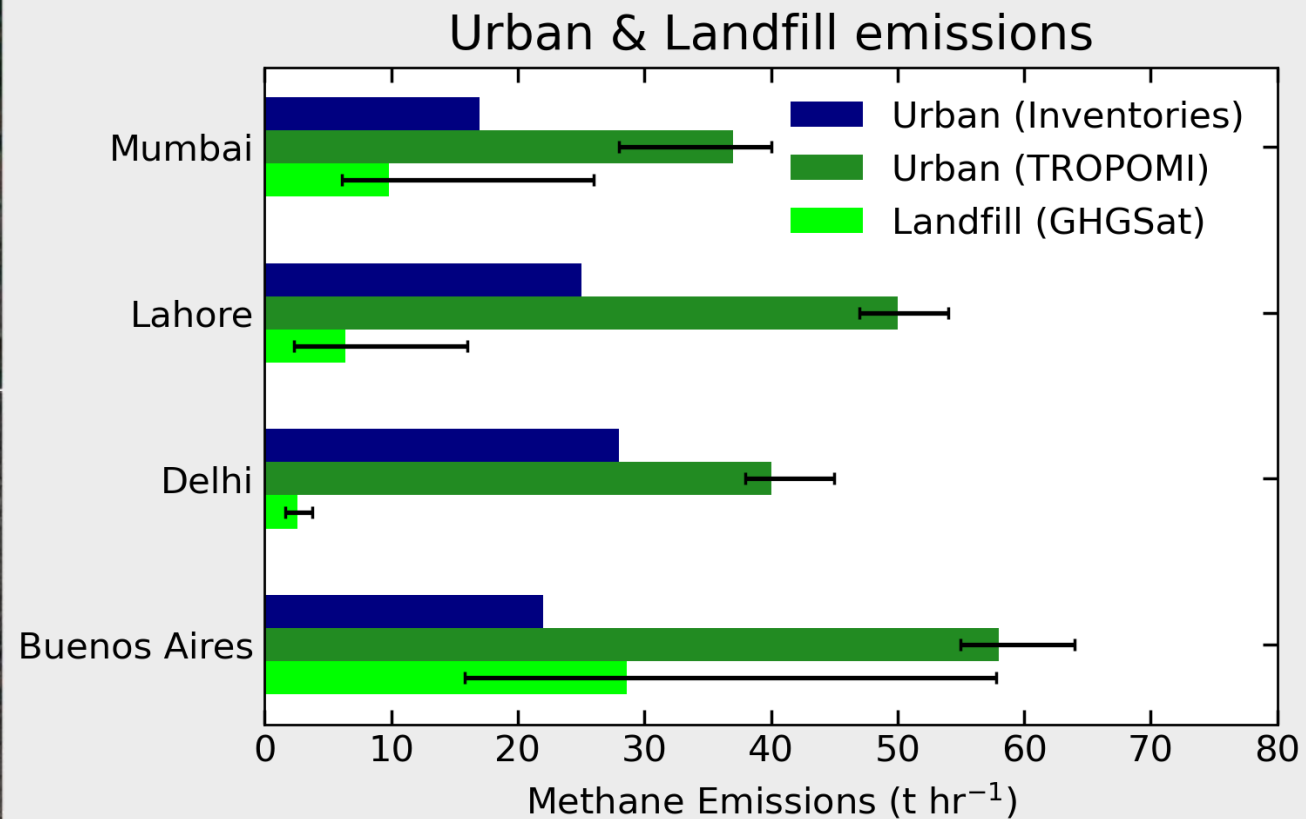
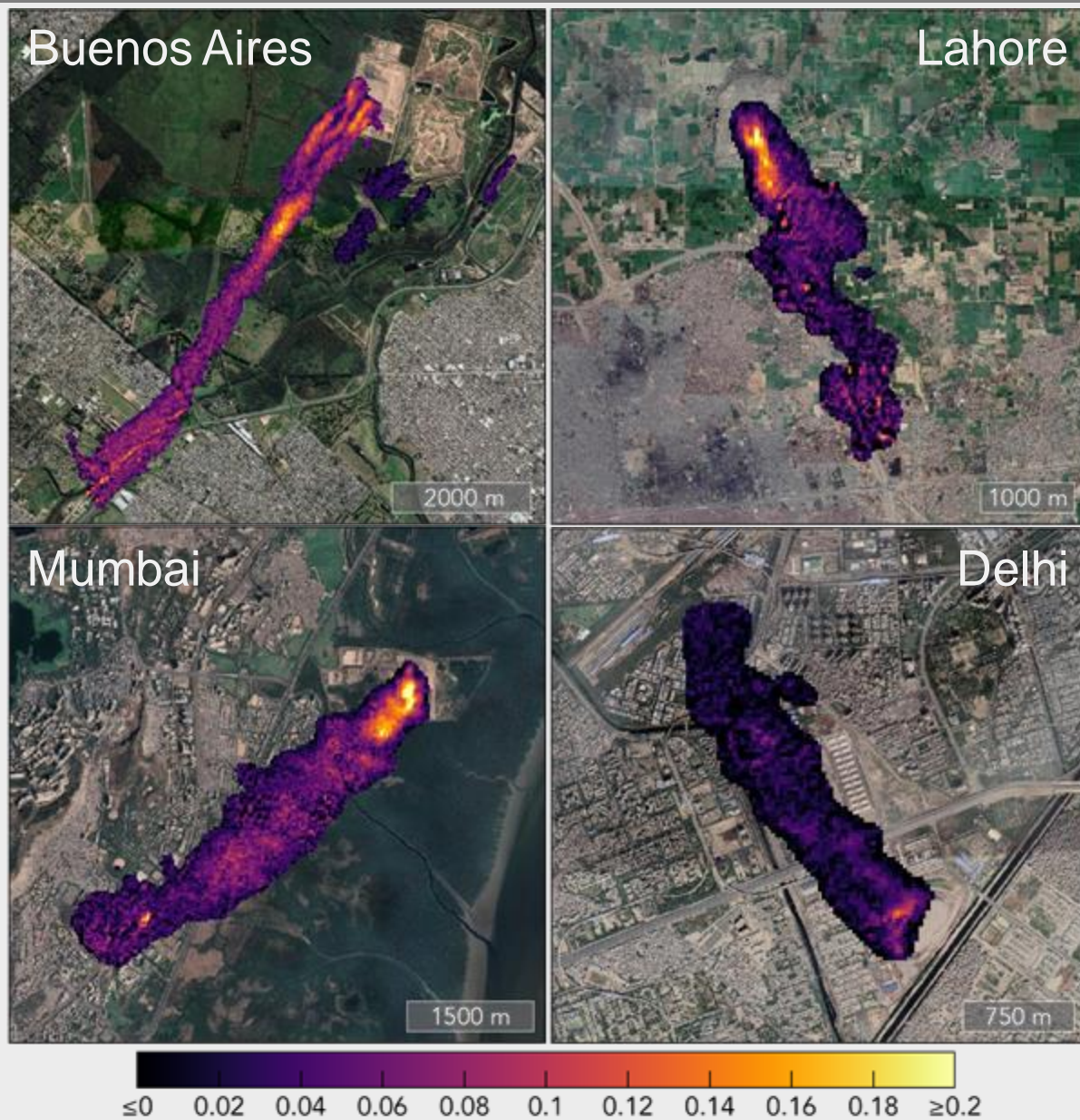


# TROPOMI & GHGSat: emissions landfills





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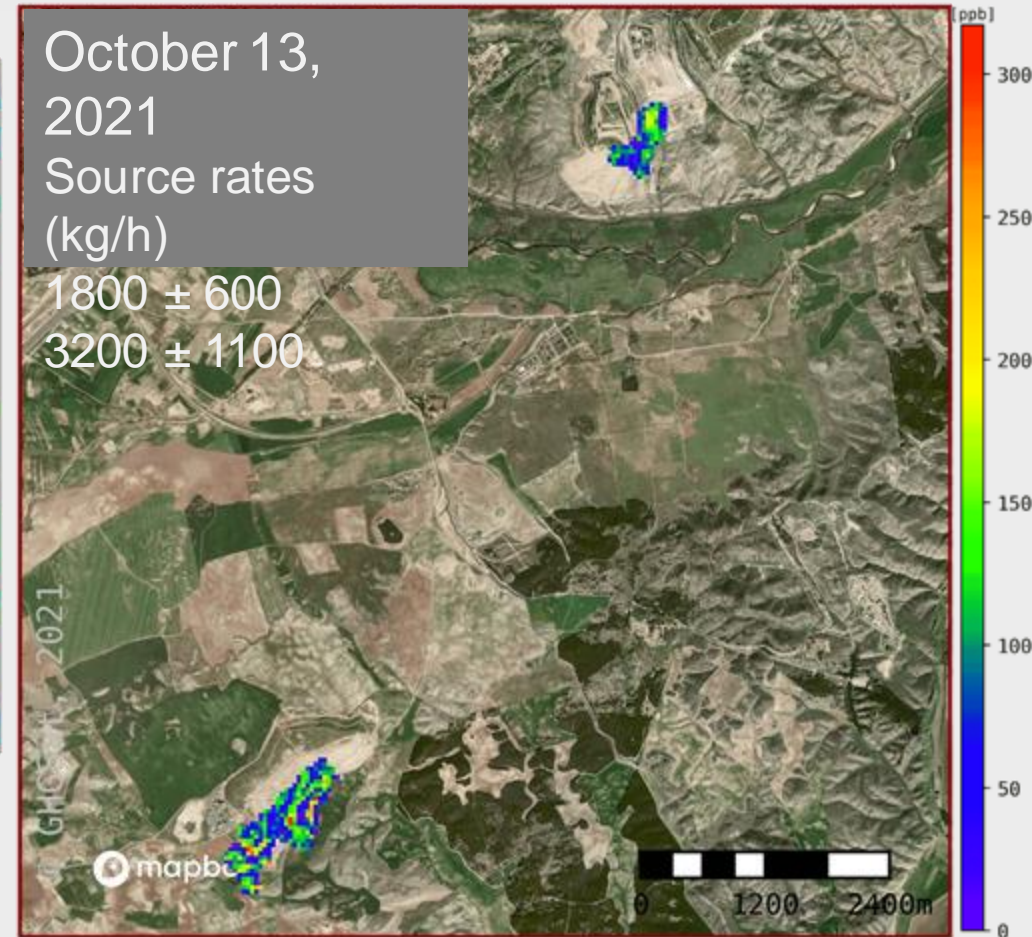
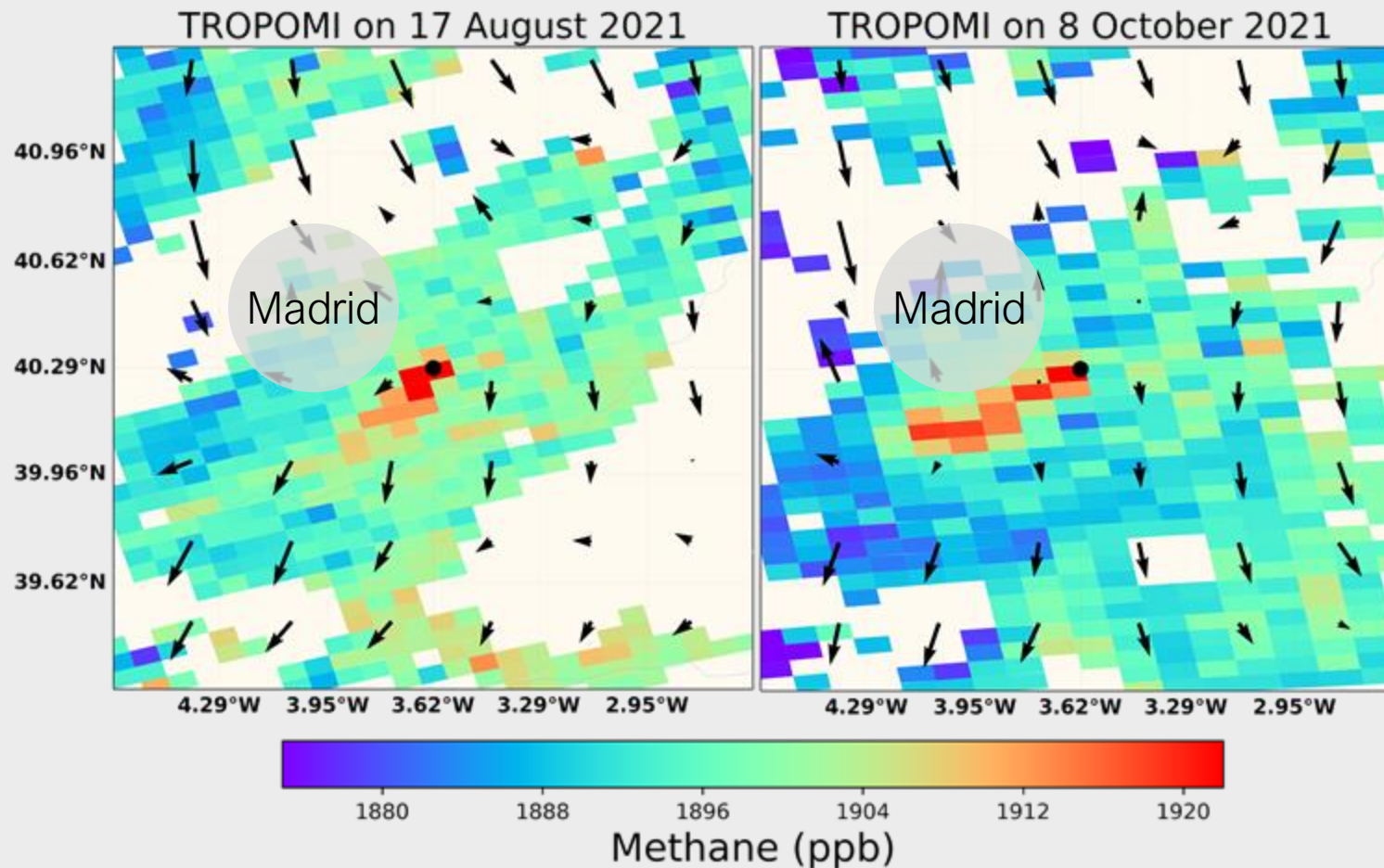


# Landfill emissions are also detected in Europe

Guided by long-term TROPOMI data, GHGSat detected large emissions from landfills near Madrid on multiple days in 2021.



## Landfill - Madrid, Spain CH<sub>4</sub> Concentration Map



Background Image:  
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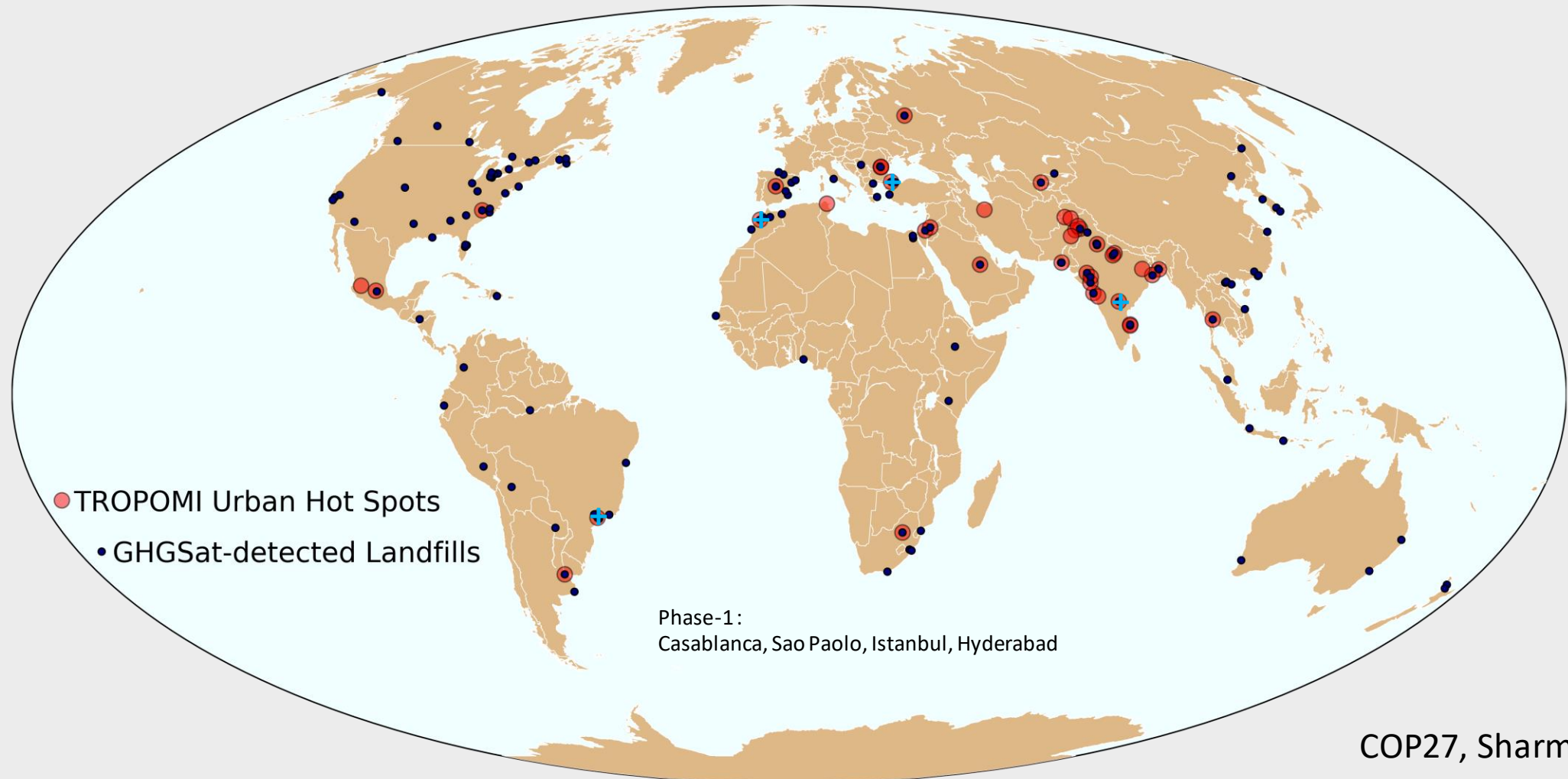
ESA funded aircraft campaign summer 2022

ESA web story November 11, 2021

# NEW initiative : study emissions from landfills globally

Global Methane Hub, SRON and GHGSat started new project to characterize, study and monitor landfills globally, working with NGOs and local partners on mitigation

## Satellite-detected urban and landfill methane emissions

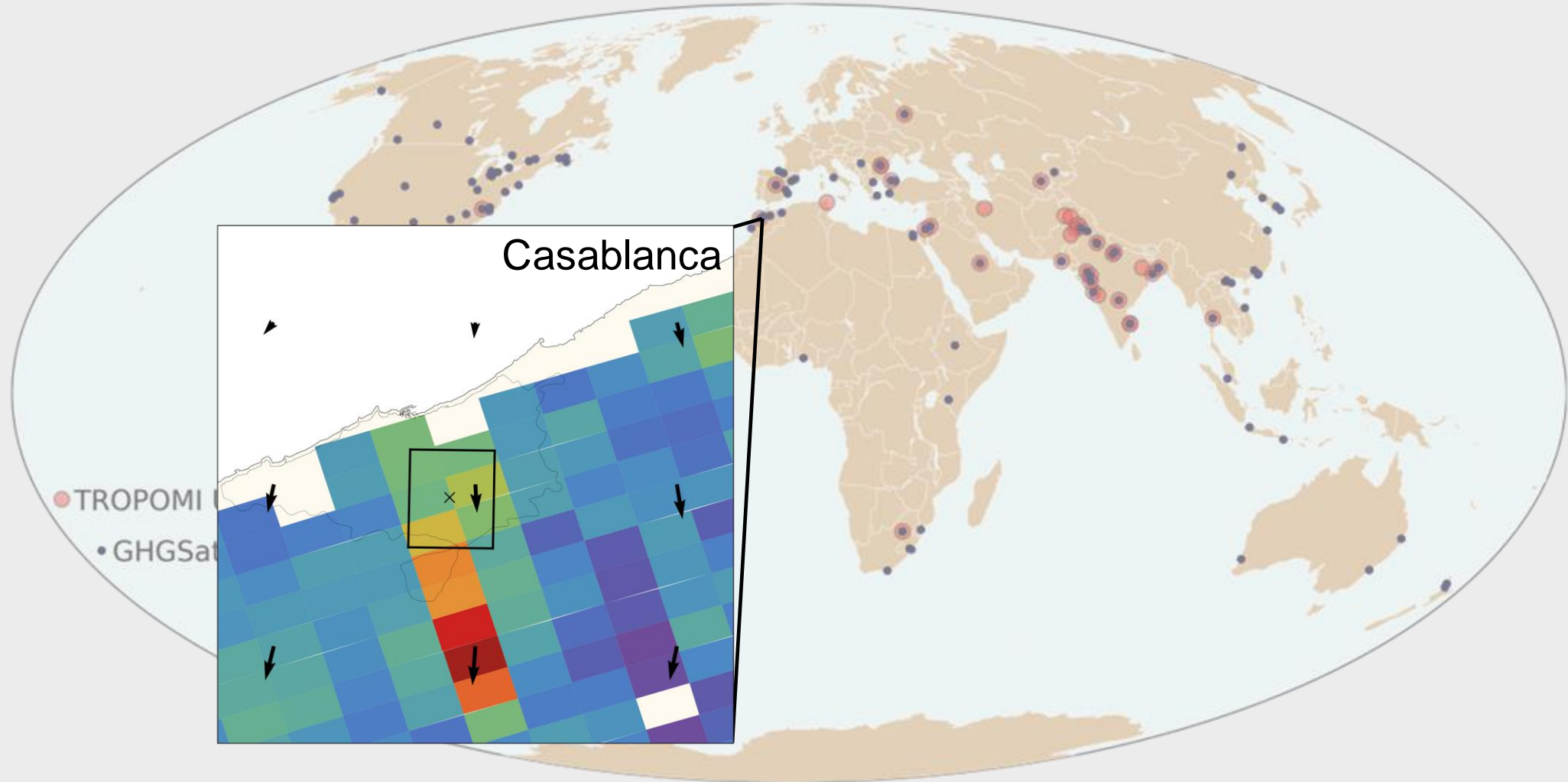




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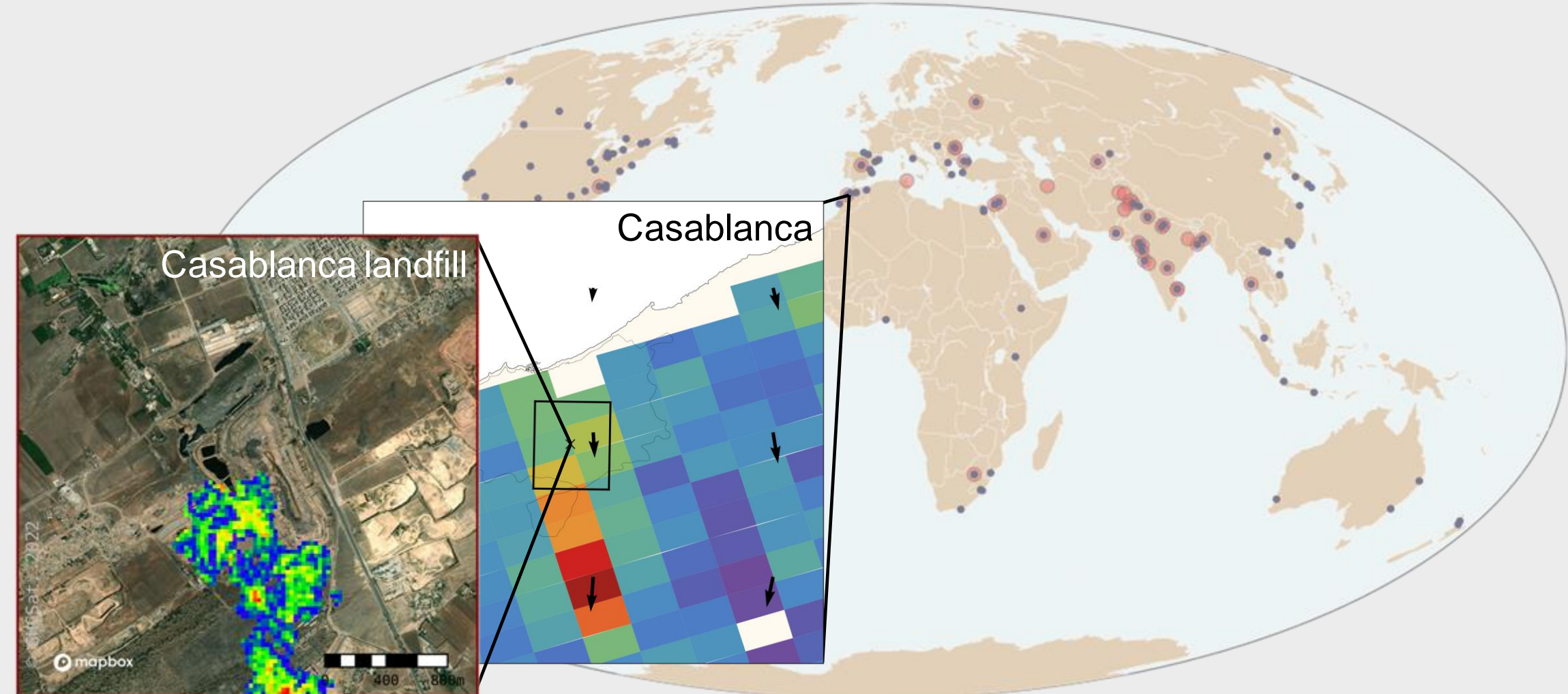
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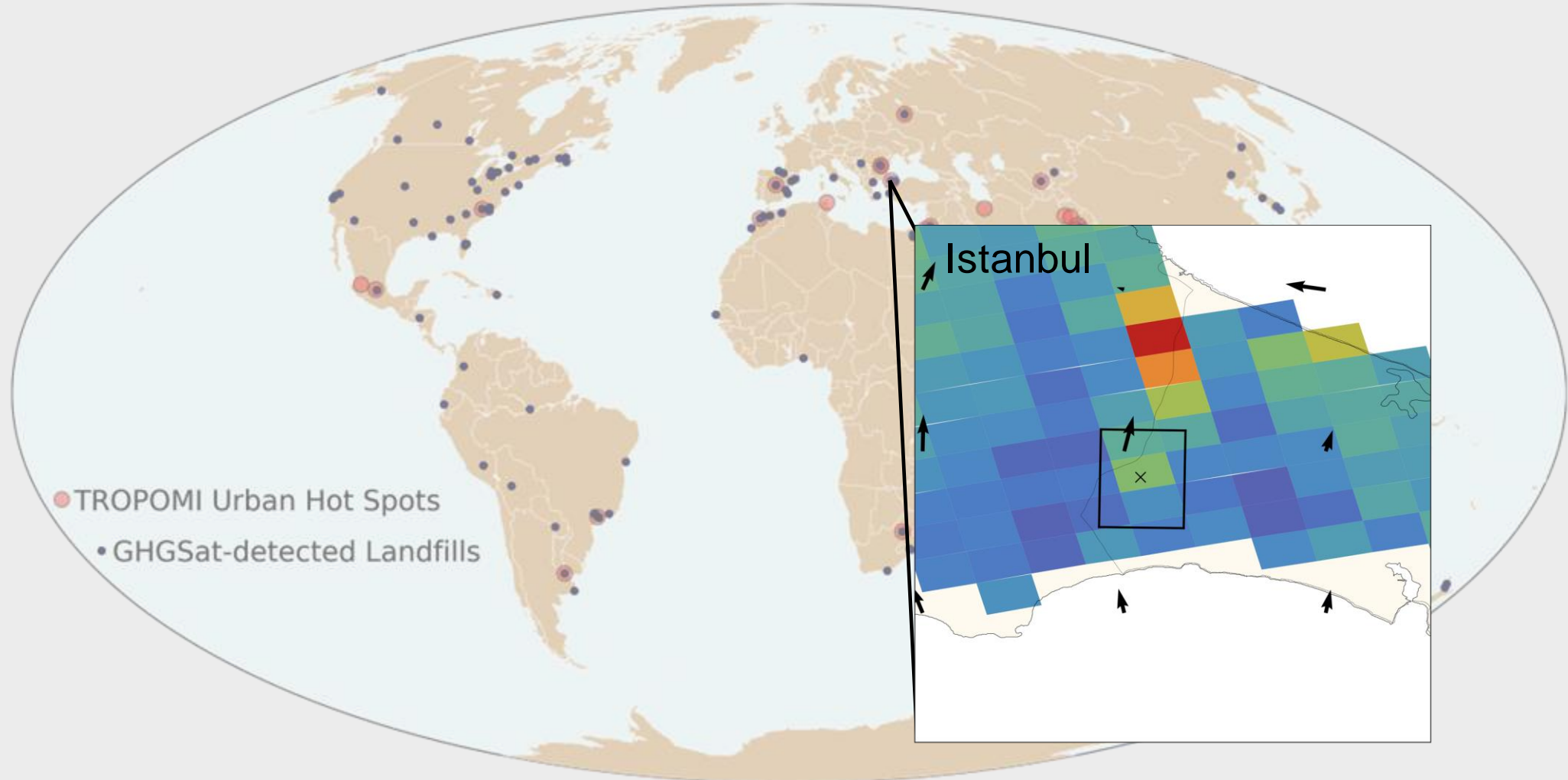




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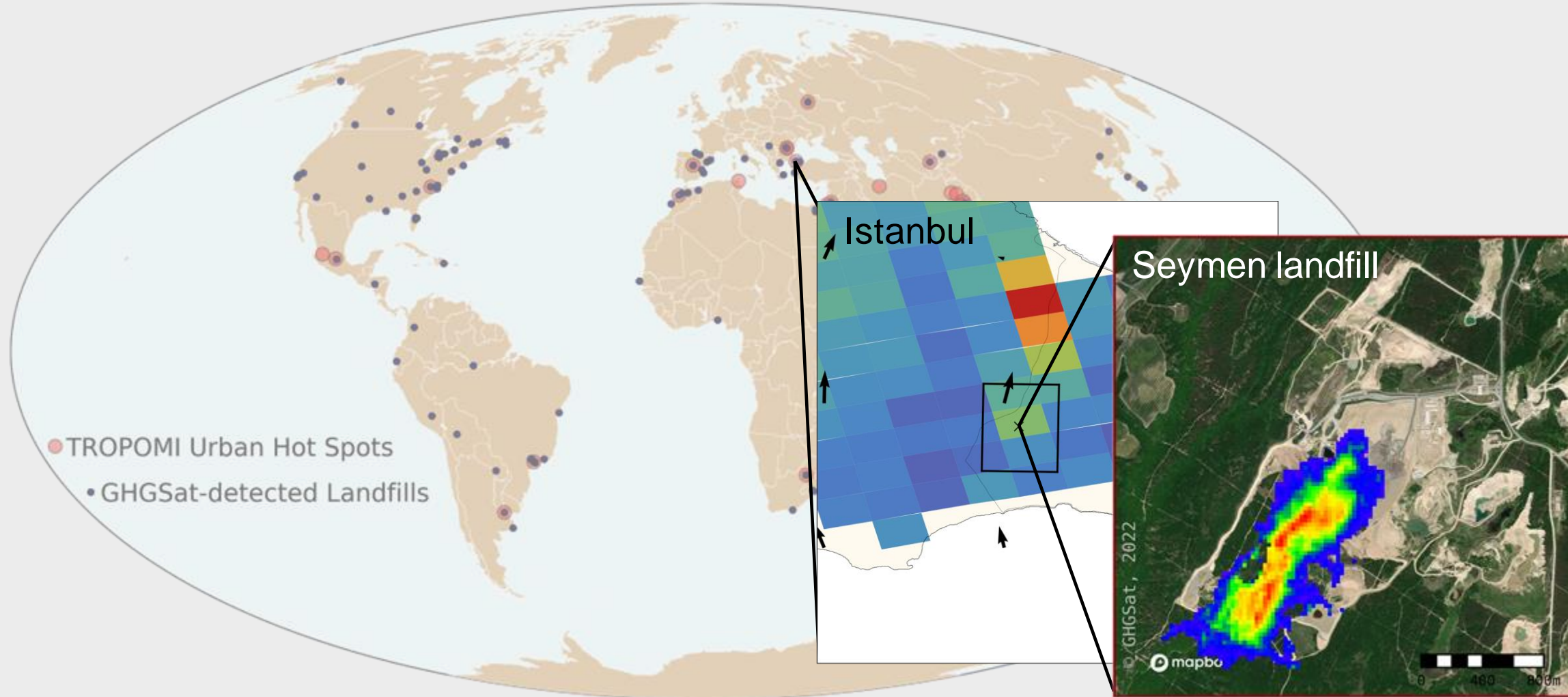
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Footage: BBC News

# NO TIME TO WASTE

Team-up with GMH and NGOs where we provide information/analysis from satellites on emissions from urban areas (TROPOMI) and landfills (GHGSat, ...) while NGOs coordinate action on the ground (with our support with satellite analysis)

- **Phase-1** : 4 months, until end Jan'23. Raised awareness wrt large methane emissions landfills and the capability of state-of-the-art satellite observations (e.g. COP27, C40, ..); 4 landfills – 12 months obs. (Casablanca, Istanbul, Sao Paolo, Hyderabad).
- **Phase-2 – ‘scale up’** Asked to provide proposal to monitor 10 landfills (Africa, Latin America, Asia) over 3 years using both TROPOMI and GHGSat observations, before and after interventions to also measure effectiveness
  - Unique opportunity to develop full chain from satellite observations, expert NGOs, and local engagement and interventions
  - Serve as/contribute to first blueprint for future satellite supported emission mitigation in waste sector
  - Success-stories will catalyse mitigation interest and activities at other landfills