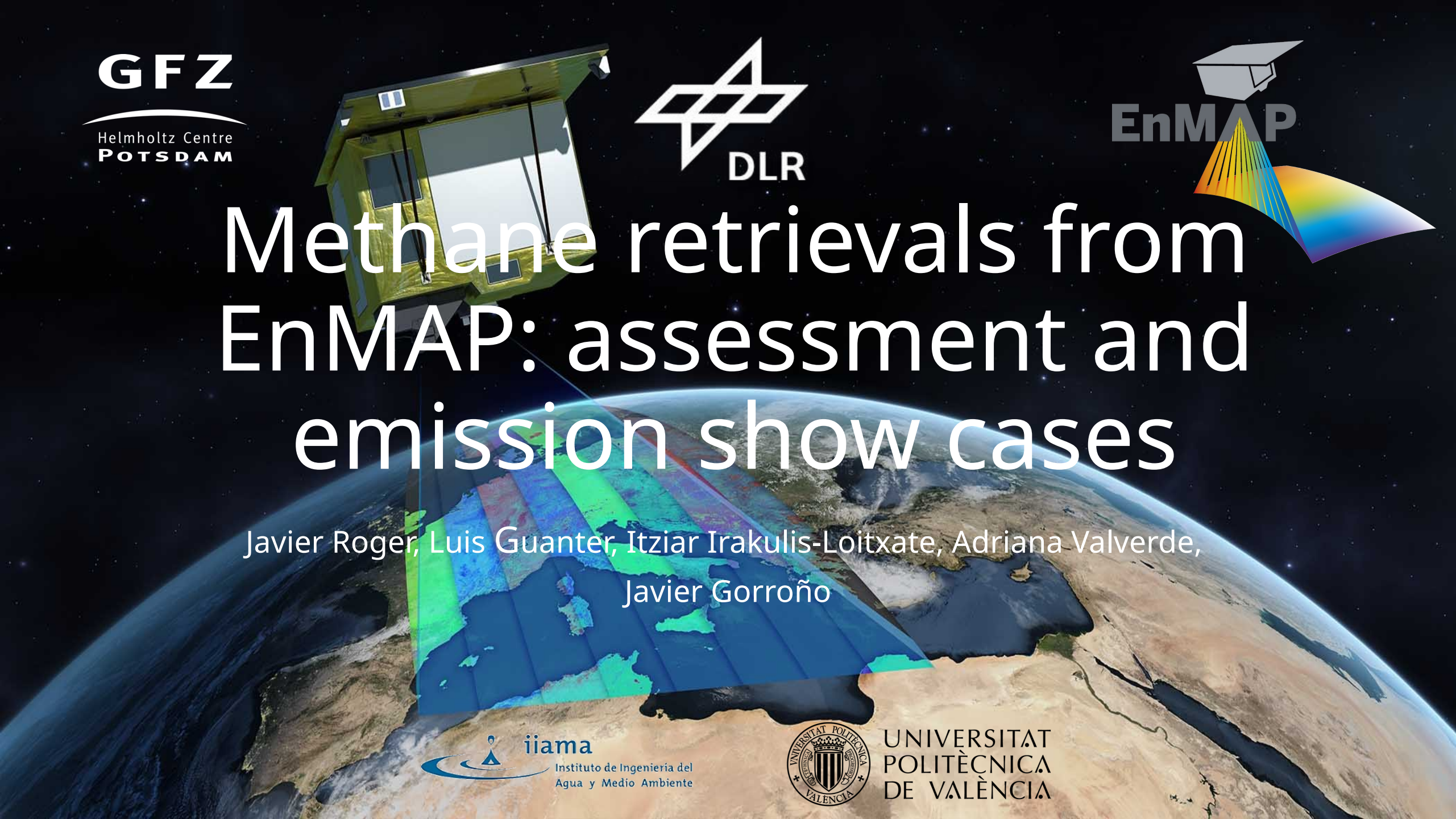


Methane retrievals from EnMAP: assessment and emission show cases

Javier Roger, Luis Guanter, Itziar Irakulis-Loitxate, Adriana Valverde, Javier Gorroño

Why is methane (CH_4) important?

- Responsible of ~1/3 of the global warming
- Lifetime in atmosphere ~ 10 years
- Global warming potential x86 higher than CO_2 in the near future

CH_4 emission mitigation = high impact

- 50% emissions – anthropogenic sources
- O&G industry:

  Typically point-sources: easier to detect

  Cost-effective

- Requires of emission detection and monitoring…

REMOTE SENSING

Agriculture (~40%)

Waste (~20%)

Oil & Gas (O&G) (~35%)

EnMAP to detect methane emissions

- EnMAP SWIR spectrometer:

  GSD = 30 m, λ ϵ [900, 2450] nm, FWHM ~ 8 nm

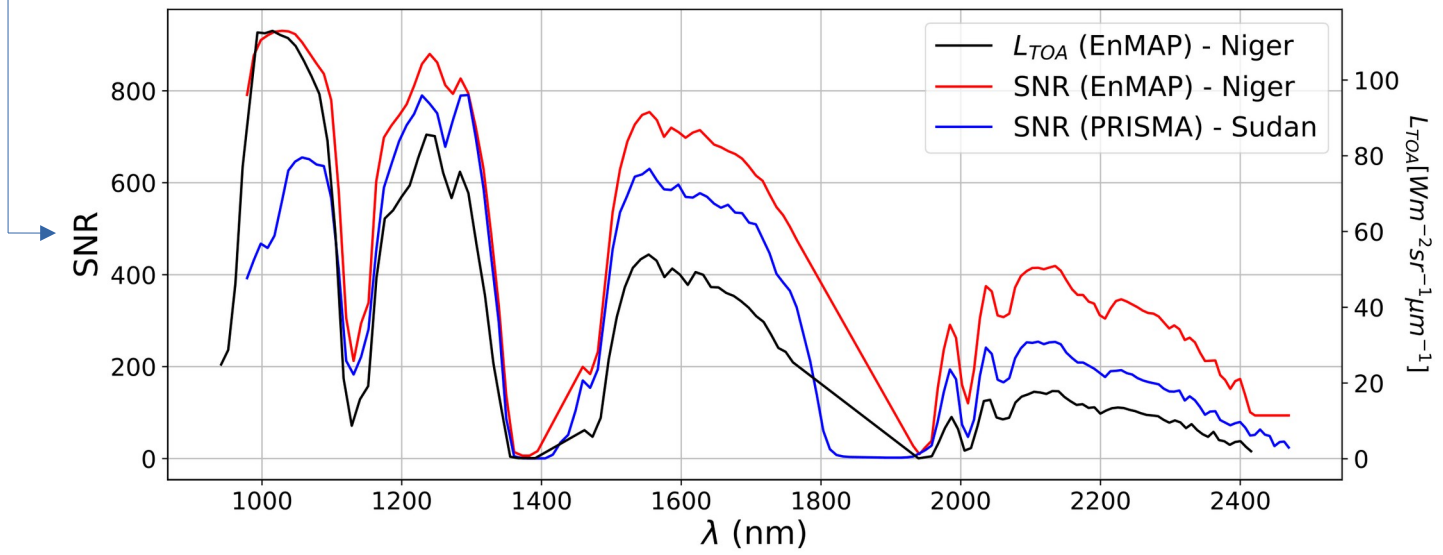
- Matched filter method – methane retrievals
- PRISMA SWIR spectrometer:

  Similar to the EnMAP one

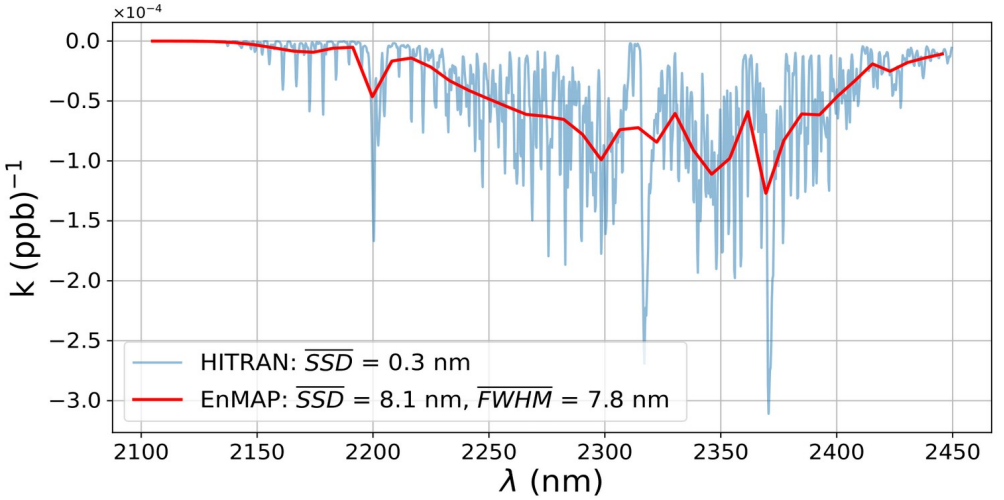
  Succeded in detecting emissions (Guanter et al., 2021)

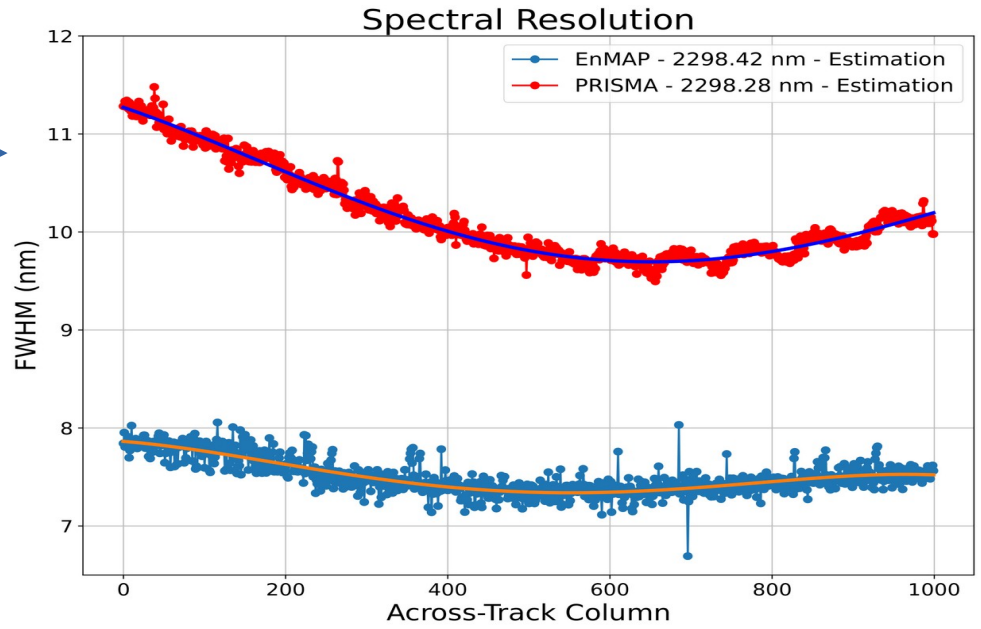
- Comparison: EnMAP presents more sensitivity to CH_4

$SNR_{EnMAP} > SNR_{PRISMA}$, $FWHM_{EnMAP} < FWHM_{PRISMA}$



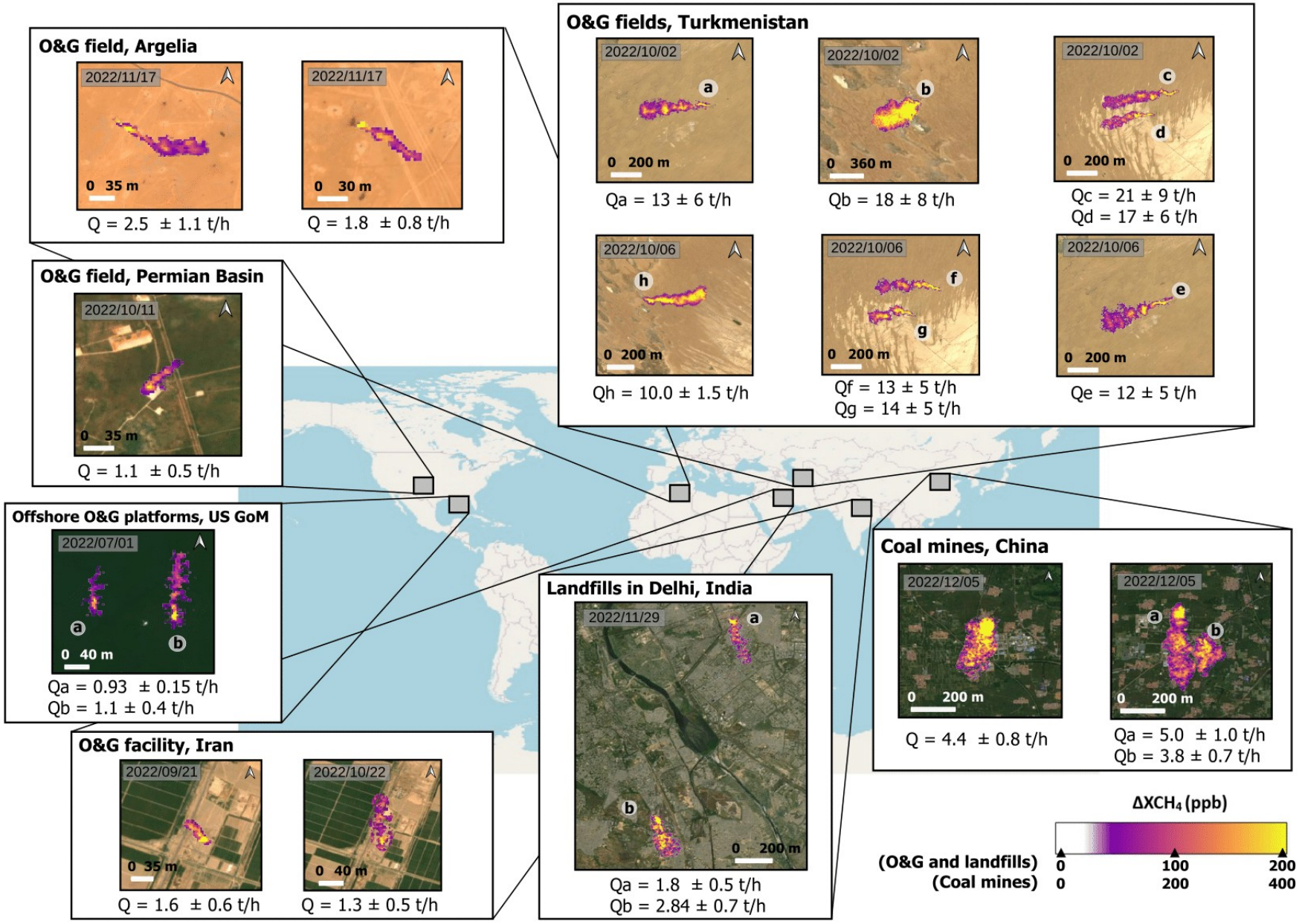
CH_4 absorption window ~ 2300 nm





EnMAP detected plumes around the world

- 20 plumes
- 6 countries
- Flux rate: Qϵ[1, 20] t/h
- Sectors:
  - Coal mining
  - Onshore O&G
  - Offshore O&G
  - Landfills



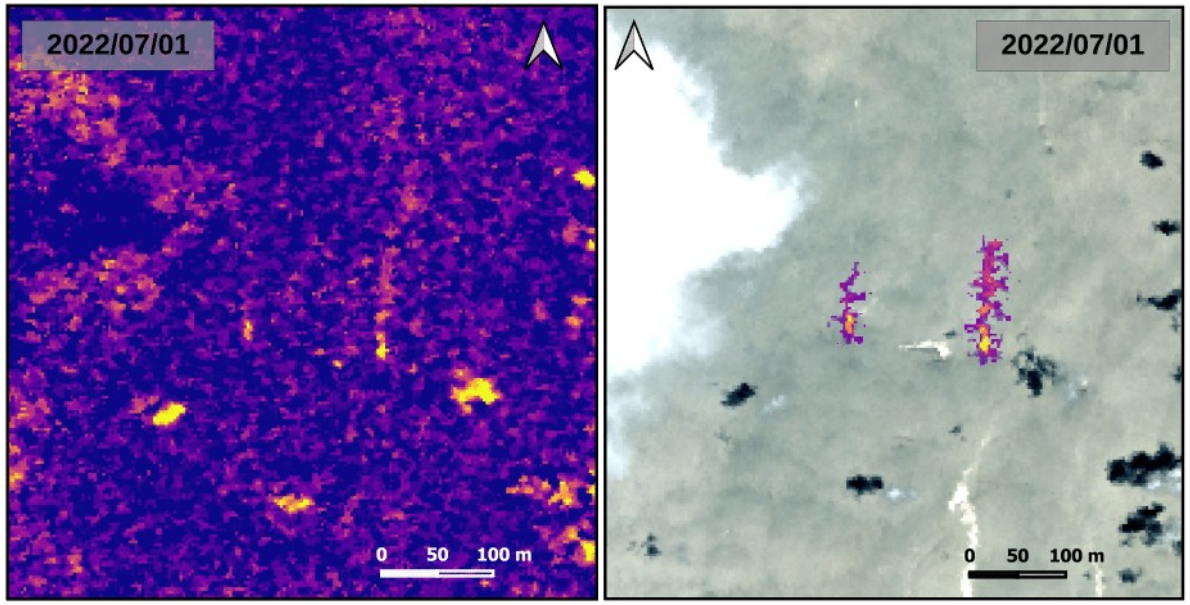
Plumes detected in offshore and landfill areas

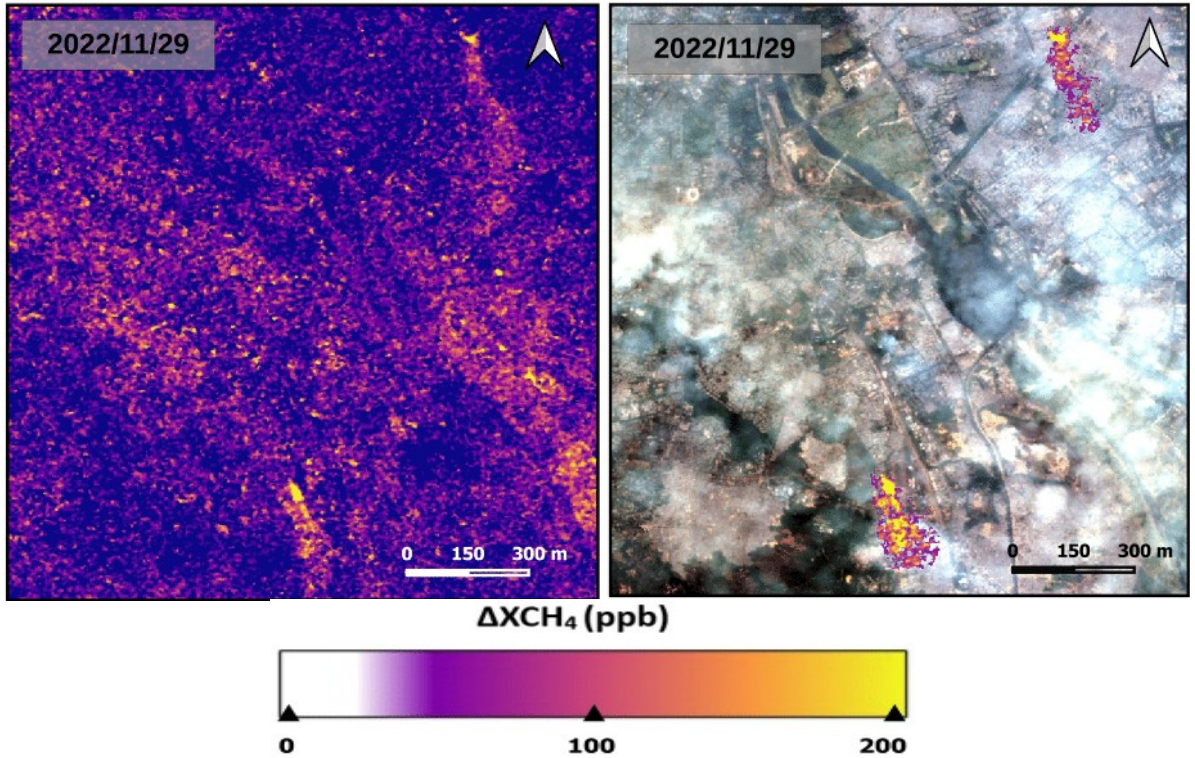
Offshore

- Difficult to detect in water: ↑ absorption
- Sunglint effect for higher radiance
- EnMAP across-track pointing
- Ex: U.S. Gulf of Mexico (01/07/2022)

Landfills

- ↓ concentrated plumes (more difficult to detect)
- Ex: Delhi, India (29/11/2022)
- Gazhipur (top) and Okhla (bottom)





Conclusions

- The EnMAP mission can detect CH_4 emissions
- EnMAP presents higher sensitivity to CH_4 in comparison to PRISMA
- EnMAP can be useful to monitor a wide range of potential emitting sites.

* Preprint available at ‘https://eartharxiv.org/repository/view/5235/’

Thank you for listening.
Any questions?