Constraining global methane emissions using TROPOMI data

- ESA Methane+ TROPOMI inversions using TM5-4DVAR and Jena Carboscope
- Time window: May 2018 – April 2020 (2 years, excluding spin-up/spin-down)
- TROPOMI data used: Operational, SRON-scientific, iUP WFMD
- Encouraging consistency between TM5-4DVAR and Jena Carboscope
- Surface data show increasing emissions in northern high-latitudes, but less clear from TROPOMI
TM5-4DAR: Comparison with surface data

Inversion using TROPOMI SRON Scientific product, incl. bias correction

apos: dust problem?

apos: improved fit

apos: underestimation

apos: OK over Sahara
TM5-4DVAR: Comparison with total column data

TM5 doesn’t catch instances of low XCH4
Comparison with CAMS reanalysis

- CAMS v19 reanalysis using GOSAT or surface data
- Averaging period: 201807 - 201906
Comparing TM5-4DVAR - Carboscope

- **CH$_4$ emission Globe**
- **CH$_4$ NH Temperate & Boreal**
- **CH$_4$ Tropics, incl. Africa**
- **CH$_4$ SH, excl. Africa**

Upward correction NH summer

... driven by NH wetland emissions
Comparison between the 2 years

• Results from TM5-4DVAR

Emission increase:

Surface data: 10 TgCH$_4$/yr
TROPOMI: 5.5 TgCH$_4$/yr

Surface results show an increase in high northern latitudes, that is less clear using TROPOMI.