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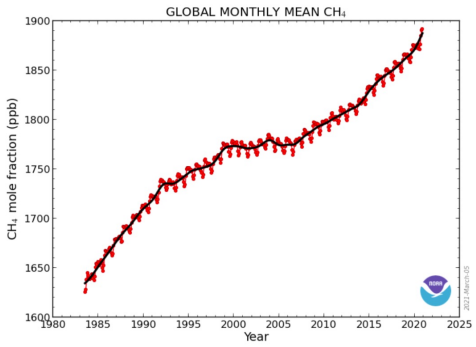
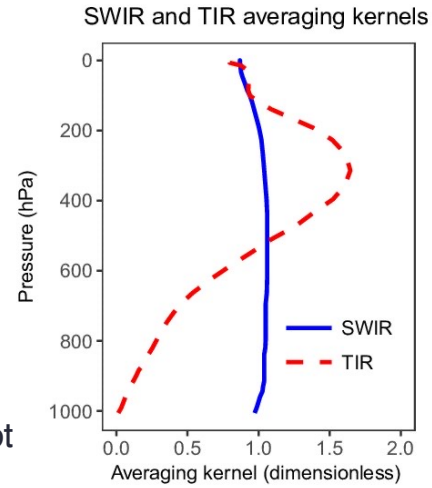
A.Lorente, T. Borsdorff, I. Aben (SRON), M.Buchwitz, O.Schneising, Steffen Vanselow (IUP), Brian Kerridge, Richard Siddans, Diane Knappett,Lucy Ventress (RAL),Cyril Crevoisier,Nicolas Meilhac (LMD),Julia Marshall,Tonatiuh Nunez Ramirez (MPI-BGC), Jacob van Peet, Sander Houweling (VU), Christian Retscher (ESA)



- Methane (CH_4) concentrations show large variations in time which in large part are not understood in detail (yet)



TROPOMI S5P

METOP-B IASI

CrIS Suomi NPP

- Aim to combine **SWIR** and **TIR** sat. observations (2 years) in global inversions (and as sat. product) to separate different sources and sink (**OH**)

- Look at 3 cases to determine added-value using both SWIR and TIR data

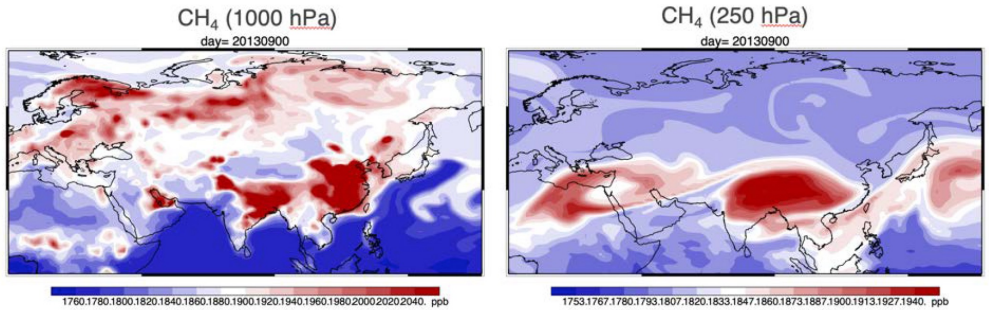


Figure 3: TM5 simulated CH_4 over Asia at 1000 hPa and 250 hPa

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STUDY OBJECTIVES :

WP-2000

- (support to) **algorithm development and generation of CH4 products** for the SWIR from TROPOMI, TIR from IASI-B/CrIS, and joint SWIR-TIR from TROPOMI and IASI-B/CrIS.
- Assess the quality of the TROPOMI, IASI-B and CrIS CH4 retrieval: **comparing algorithms and validation** using independent 'ground'-based data.

WP-3000

- Investigate the **added value** of combining SWIR and TIR in regional case studies
- **Infer global sources and sinks** of CH4 from inverse modelling of **2 years** of TROPOMI and IASI-B (and/or CrIS) data, investigating the added value of the combined use of SWIR and TIR

WP-4000

- **Formulate a road map** for future CH4 remote sensing based on the outcomes of this study as well as parallel studies covering the use of methane from TROPOMI across the full range of scales.

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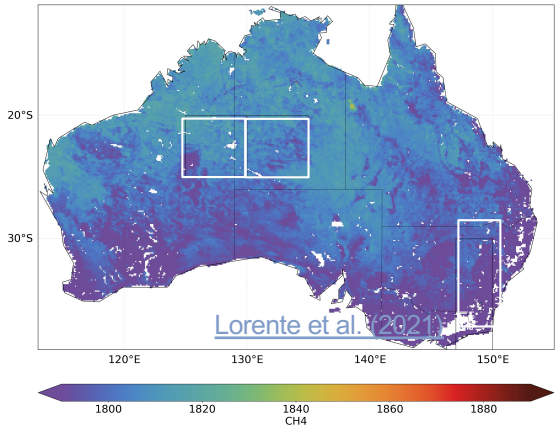
TROPOMI CH_4 SWIR dataproducts and comparisons

- Operational and scientific beta RemoTeC product from SRON
- WFMD IUP dataproduct

Intercompare and use TCCON and GOSAT data for validation and comparisons → improve dataproducts

- Both products compare very well with TCCON
- Difference in coverages WFMD and RemoTeC products. Stricter filtering RemoTeC product.



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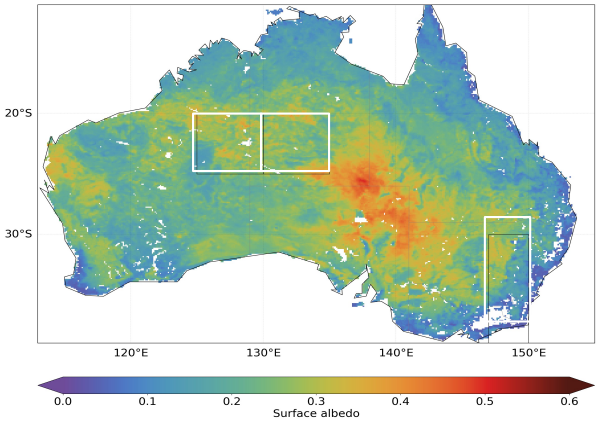
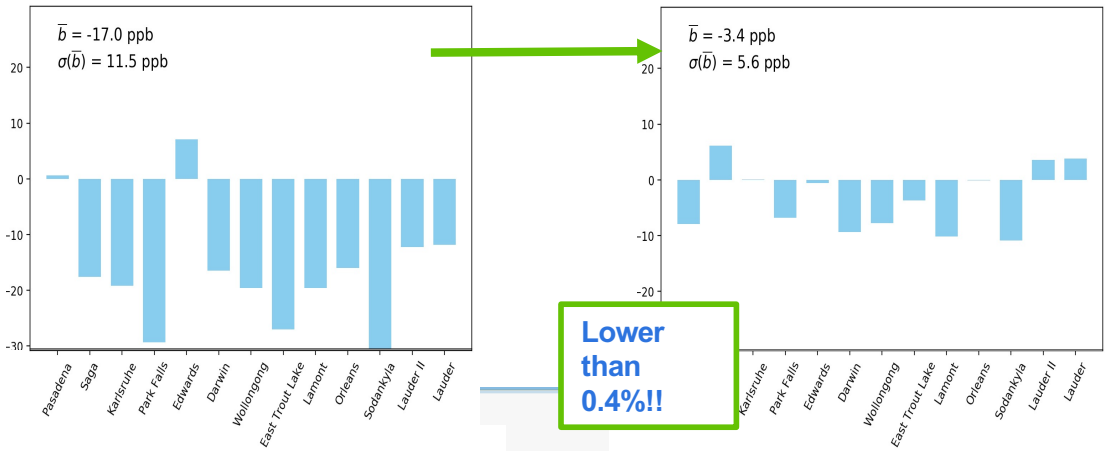


Surface albedo

Lorente et al, 2021



Lower than 0.4%!!

See also poster presentation :
Session 3.2c,Wednesday 9:45, M.Buchwitz

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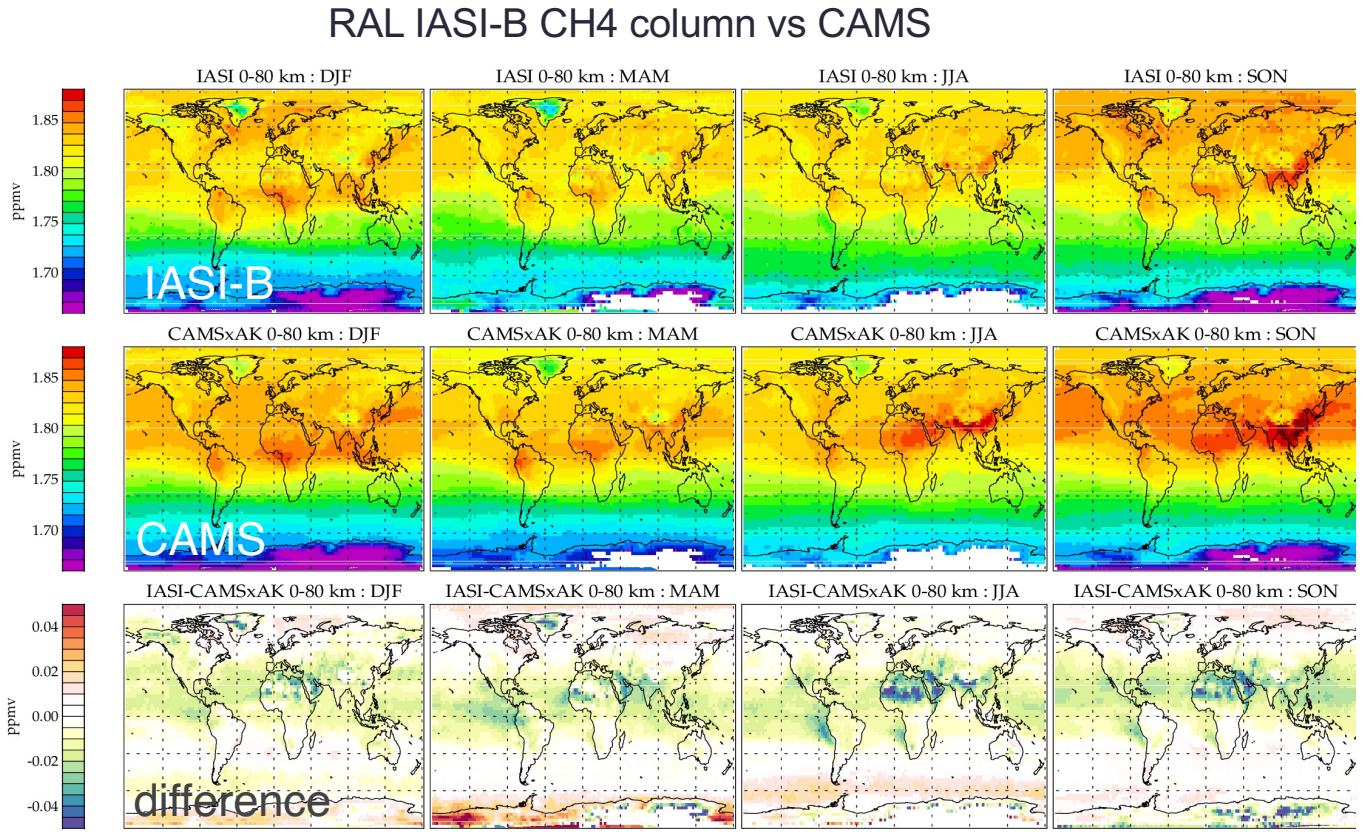
IASI CH_4 TIR dataproducts and comparisons

- IASI-B products from RAL and LMD
- Validation/comparisons with CAMS, TCCON, Atom-4, AirCore

Global distribution and seasonal variation agree well with CAMS (surface data assimilated)

Systematic differences could be due in part to representation stratospheric N2O, CH4 and water vapor interference



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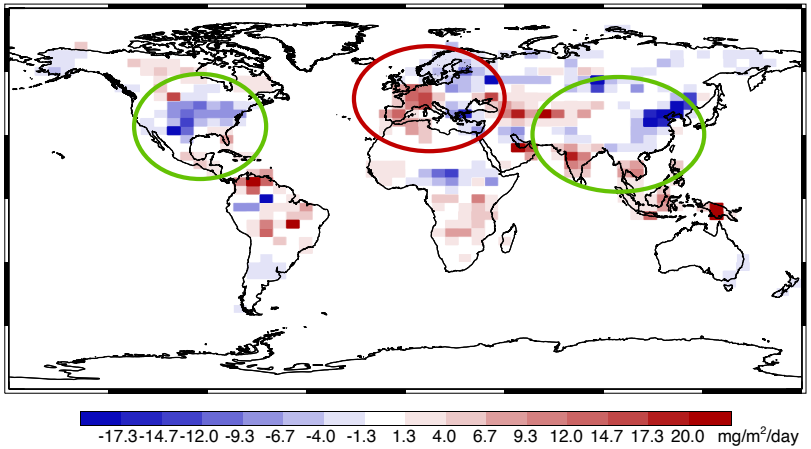
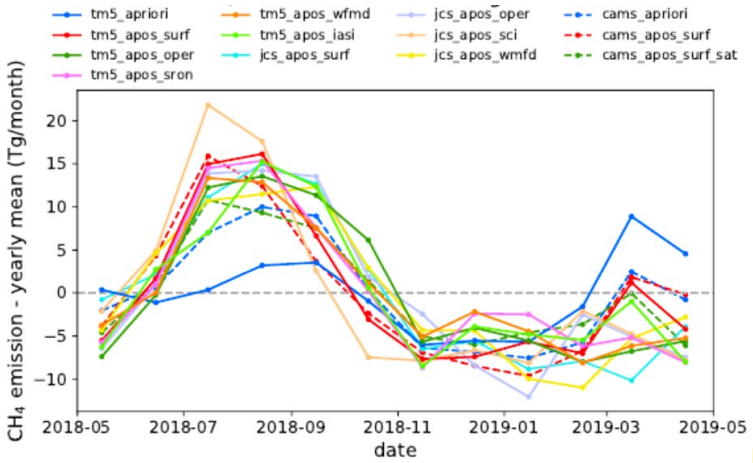
Global inverse modelling TROPOMI CH_4

- Inverse modelling systems: TM5-4DVAR, Jena CarboScope
- TROPOMI Datasets: Operational, SRON-scientific, WFMD (iUP)
- Inversion set-up close the CAMS CH4 reanalysis (GOSAT)
- Shown here: 201807 – 201906 (2 years in the pipeline)
- Discrepancy with GOSAT over Europe: To be investigated further in the VERIFY-IG^{3}IS/COCO2 national experiment

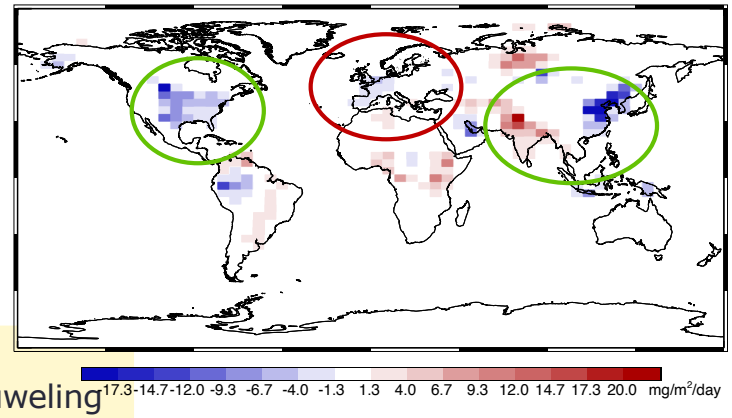
TM5-4DVAR: TROPOMI – Surface data



Inversion comparison: Seasonality of global emissions



TM5-4DVAR: GOSAT – Surface data



Also very useful feedback on issues in sat. data

See also poster presentation :
Session 3.2b,Wednesday 9:45, S,Houweling

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