GHG-CCI+ project: Overview and selected achievements

greenhouse gases cci

esa climate change initiative

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aeronomie.be — Validation

DLR — System engineering

LSCE — CRG lead, user assessments XCO_2

Max-Planck-Institut für Biogeochemie — User assessments XCH_4

Overview

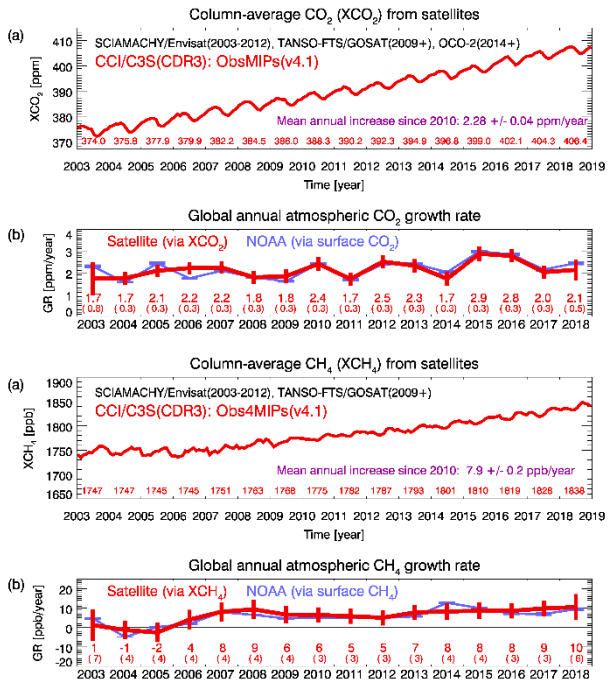
Focus of GHG-CCI+ (start: March 2019) is R&D to develop and/or improve retrieval algorithms and to generate new data products useful for C3S and other climate and carbon services and applications.

GHG-CCI+ ECV data products:

- Column-averaged dry-air mole fractions of carbon dioxide (CO_2) and methane (CH_4) - denoted XCO_2 and XCH_4 - from OCO-2, Sentinel-5 Precursor, TanSat, and GOSAT-2
- Products are available from http://cci.esa.int/data

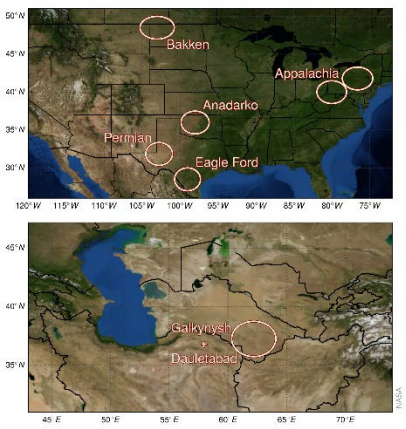
Growth rates

GHG-CCI pre-cursor products are now extended & generated operationally via Copernicus Climate Change Service (C3S) and are available via Copernicus Climate Data Store (CDS). Here we show time series and corresponding growth rates. Details see Reuter et al., 2020.

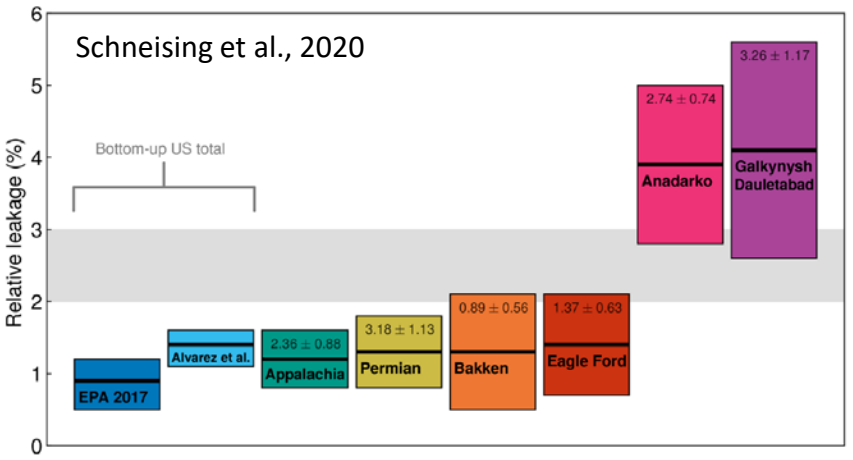


Methane emissions gas & oil fields

Methane emissions of major gas and oil fields in Turkmenistan and the USA and corresponding leakage rates relative to energy production have been derived from the new GHG-CCI+ Sentinel-5-Precursor XCH_4 product as generated with the WFMD retrieval algorithm (Schneising et al., 2019).



Energy production from burning natural gas or oil produces less CO_2 per unit of energy compared to burning coal but this requires (depending on time scale) that leakage rates are not too high. Therefore, quantification of leakage rates is important.



Immediate climate benefit relative to burning coal?

No

Yes

GHG-CCI+ documents:

- URD (update), ATBDs, PUGs, E3UB, PVIR: Available from http://cci.esa.int/ghg

Selected references

- Chevallier et al., ESA Climate Change Initiative (CCI) User Requirements Document (URD) for the Essential Climate Variable (ECV) Greenhouse Gases (GHG), version 2.1, 2016.
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- Reuter et al., A Fast Atmospheric Trace Gas Retrieval for Hyperspectral Instruments Approximating Multiple Scattering - Part 2: Application to XCO2 Retrievals from OCO-2, RS, 2017.
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- Schneising et al., A scientific algorithm to simultaneously retrieve carbon monoxide and methane from TROPOMI onboard Sentinel-5 Precursor, ACP, 2019.
- Schneising et al., Remote sensing of methane leakage from natural gas and petroleum systems revisited, ACP, 2020.
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http://cci.esa.int/ghg

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