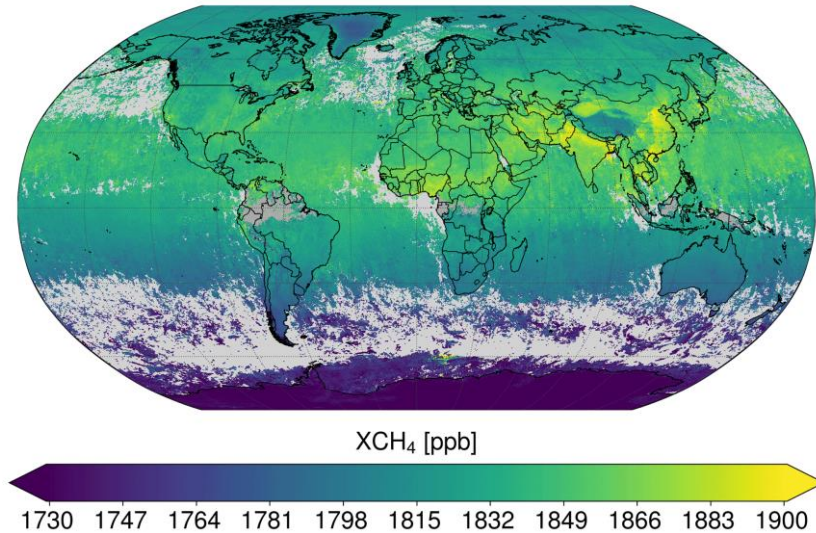




GHG Emissions Monitoring

TROPOMI/WFMD XCH₄ 2018



Global yearly average of TROPOMI/WFMD XCH₄ for 2018 (Source: Schneising, O., Buchwitz, M., Reuter, M., Bovensmann, H., Burrows, J.P., Borsdorff, T., Deutscher, N.M., Feist, D.G., Griffith, D.W., Hase, F. and Hermans, C., 2019. A scientific algorithm to simultaneously retrieve carbon monoxide and methane from TROPOMI onboard Sentinel-5 Precursor. Atmospheric Measurement Techniques, 12(12), pp.6771-6802.).

Product Category

- | | | | |
|-------------------------------------|--|---|---|
| <input type="checkbox"/> Land Use | <input type="checkbox"/> Natural Disaster | <input type="checkbox"/> Coast Management | <input type="checkbox"/> Earth's Surface Motion |
| <input type="checkbox"/> Land Cover | <input checked="" type="checkbox"/> Climate Change | <input type="checkbox"/> Marine | |

Financial Domain(s)

- | | | | |
|---|--|---|---|
| <input checked="" type="checkbox"/> Investment management | <input type="checkbox"/> Risk analysis | <input type="checkbox"/> Insurance management | <input checked="" type="checkbox"/> Green finance |
|---|--|---|---|

User requirements

- UN15: Need to monitor carbon intensity of portfolio assets.
 UN26: Need to monitor GHG emissions of projects funded.

Description

Accurate and continuous monitoring of Green House Gases (GHG) such as Co₂, No₂, and CH₄ is crucial for making informed decisions about green finance investments. It enables financial institutions to assess the environmental impact of projects, identify emission reduction opportunities, and prioritize funding for sustainable initiatives. Following the approval of loans and/or investments for projects supporting environmentally friendly activities, it is crucial to monitor these projects to ensure that the funds are effectively utilized to achieve their environmental objectives. EO data offers valuable oversight for specific types of projects. There are several validated and mature EO products (most of them use SWIR and TIR bands) that provide comprehensive monitoring of GHG emissions with global coverage and appropriate spatial and temporal resolutions. In this document, we will focus on products used to monitor three important GHGs which are Co₂, No₂, and CH₄.

Spatial Coverage Target

Asset and Project level

Data Throughput

- | | | |
|-------------------|-------------------------------|---|
| Rapid tasking | <input type="checkbox"/> High | <input checked="" type="checkbox"/> Low |
| Data availability | <input type="checkbox"/> High | <input checked="" type="checkbox"/> Low |
-



EO-FIN

Product specifications	
Main processing steps	Data for GHG emissions can be easily accessed through many satellite-based products. These data can be used directly or with simple preprocessing.
Input data sources	Satellite-based products (Optical): GHG. Sentinel-5P (TROPOMI): Co2, No2, and CH4 Metop-A/B/C (IASI): Co2, No2, and CH4 GEOSAT-2: Co2 and CH4 OCO-2: Co2 OCO-3: Co2
Accessibility	Sentinel-5P (TROPOMI): freely and publicly available from European Commission, ESA, Netherlands Space Office (NSO). Metop-A/B/C (IASI): freely and publicly available from EUMETSAT GEOSAT-2: freely and publicly available from JAXA, MOE Japan, National Institute for Environmental Studies of Japan (NIES). OCO-2: freely and publicly available from NASA. OCO-3: freely and publicly available from NASA.
Spatial resolution	Sentinel-5P (TROPOMI): 7 km x 3.5 km Metop-A/B/C (IASI): 100 km GEOSAT-2: 460 m OCO-2: 2.25 km x 1.29 km OCO-3: 2.25 km x 0.7 km
Frequency (Temporal resolution)	Sentinel-5P (TROPOMI): Daily Metop-A/B/C (IASI): Daily GEOSAT-2: 2 days OCO-2: 16 days OCO-3: 1-3 days
Latency	N.A
Geographical scale coverage	Globally
Delivery/ output format	Data type: Raster File format: GeoTIFF, NetCDF, HDF
Accuracies	Thematic accuracy: 80-90% Spatial accuracy: 1.5-2 pixels of input data
Constraints and limitations	<ul style="list-style-type: none"> ■ Satellite sensors may have limitations in spatial resolution, making it challenging to capture emissions from small sources or accurately distinguish between localized emissions and background levels. ■ Cloud presence ■ Vertical sensitivity as satellite measurements generally provides information on total column concentrations of GHGs. While this is useful for many applications, it may not provide a complete understanding of vertical distributions, which are essential for certain scientific studies and policy decisions. ■ Distinguishing between anthropogenic (human caused) GHG emissions and natural sources (e.g., wetlands, volcanic activity) can be complex. ■ Low spatial resolution
User's level of knowledge and skills to extract information and perform further analysis on the EO products.	Skills: Essential Knowledge: Essential