Product Specification Document (PSD)

Product: Methane column averaged mixing ratios
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Product description

The product contains vertical column densities of methane and carbon dioxide as retrieved from SCIAMACHY near infrared spectra. The coverage is global and all available data from 2003 through 2005 have been processed.
As partial cloud cover and aerosol scattering influences the light path and thereby the retrieved vertical columns, the final product is the ratio of methane by carbon dioxide:

$$\overline{VMR}(\mathrm{CH_4}) = \frac{V_{\mathrm{meas}}(\mathrm{CH_4})}{V_{\mathrm{meas}}(\mathrm{CO_2})} \cdot \overline{VMR}(\mathrm{CO_2})$$

Product format specification

The vertical columns are provided separately in the data product. VMR(CO_2) has to be estimated from a climatology or a model, input from the CarbonTracker model is included in the result files. The product is provided in (self-explainable) hdf5-format. If questions arise about the data format or specific fields, please contact Christian Frankenberg , Christian.Frankenberg@jpl.nasa.gov

Software release history

This is a substantial upgrade compared to the previous version (IMAPv1.1). The current data set is named IMAPv5.0.
The following changes have been applied with respect to the previous version:

- ECMWF pressure, temperature and water vapour profile as a priori input
- Updated methane and water vapour spectroscopy as detailed in the auxiliary data section of the AD document.
- Change in result file format from plain ASCII to HDF5
- Incorporation of CarbonTracker CO_2 fields in the result file

Implementation details, filter criteria

When using the data, the following selection criteria should be taken as a guideline
Selection criteria for SCIAMACHY measurements:
1) Geolocation/ScanRange < 8 (large scan range indicates backscan pixels!)
2) Geolocation/SolarZenithAngle < 70 (large SZA's give higher uncertainty)
3) Auxiliary/residual_ch4 < 0.005 (and >0) (FIT RMS of CH4 microwindow)
4) Auxiliary/residual_co2 < 0.0015 (and >0) (FIT RMS of CO2 microwindow)
from FitResults:
5) VCD_CO2/VCD_CO2_MODEL >0.9 (simple cloud filter)

6) Auxiliary/BU_ch4_window > 1500 (minimal signal required, otherwise unreliable)
7) Auxiliary/pixels_ch4 >32 (minimal scia ch4 fit pixels required)

List of known issues / Data quality assessment

Clouds could introduce a systematic bias. Adjusting selection criteria 5 (effective cloud top height) might help evaluate this effect. Further, adjusting criteria 2,3,4,6 and 7 mainly determines the data quality while there is always a trade-off between data quality and quantity.
Instrument degradation sometimes causes an erratic behavior of detector pixels which might result in increased retrieval noise as observed at the end of the year 2005. If any irregularities are observed, please contact C. Frankenberg (Christian.Frankenberg@jpl.nasa.gov) in order to analyse the impact of changes in detector quality in more detail for specific time-periods.