

Detailed product description

TEMIS columnar CH₂O is made available in HDF4. The HDF files contain CH₂O data for one day, and are organised as follows:

- SDS global attributes, containing information on the file.
- Vdata, i.e. the actual data

The SDS global attributes (meta data) is described in more detail in the following table:

Product Specification Table : SDS global attributes

Attribute name	Type	Description
Authors	string	Name of the persons responsible for the data.
Affiliation	string	Affiliation of the authors
Email	string	E-mail addresses of the authors
Data_created_by	string	The assimilation code and version that produced the fields.
Creation_date	string	Date of the creation of the data
Unit_of_CH2O_column	string	The unit of the CH2O field
Remark	string	A brief description how the data is generated

The Vdata contain the data product, and consists of one generic and 3 repeating data fields:

- Pressure grid (the generic field)
- CH2O_ymmdttt (contains the main CH2O retrieval data for one GOME orbit)
- GEO_ymmdttt (contains all geometric data associated with the retrievals in this orbit)
- ANC_ymmdttt (contains all ancillary data associated with the retrievals in this orbit)

The Vdata contains only one generic pressure grid field. This table defines the pressure grid at which the averaging kernel is provided. The Vdata table attribute also provides the recipe to convert the level constants, a_{lev} , b_{lev} , and surface pressure p_{surf} into the hybrid level pressures p (in Pascal). The equation is:

$$p = a_{lev} + p_{surf} \cdot b_{lev}$$

and the variable p_{surf} is stored in CH2O_ymmdttt: the surface pressure is provided for each individual satellite pixel.

The VData may contain as many as 15 (maximum number of GOME orbits in one day) pieces of CH2O_ymmdttt, GEO_ymmdttt and ANC_ymmdttt. The array CH2O_ymmdttt is accompanied by a VData Table Attribute that contains the name of the state, and the start- and end time (year, month, day, hour, minutes, and seconds) as follows:

Name	Value
track_identifier	30101071
start_time	2003, 1, 1, 7, 5, 59
end_time	2003, 1, 1, 7, 35, 3

The main data table is CH2O_ymmdttt and it contains 11 fields. They are summarized below and commented on.

Product Specification Table : HDF - Data Fields

Name	Type	Range	Description
date	char*8		Date of retrieval (yyyymmdd) e.g. 20030101 for 1 Jan. 2003
time	char*6		Time of retrieval (hhmmsshu) e.g. 070559 for 7:05'59"
lon	real	[0.0 – 360.0]	Centre longitude of pixel [degree]
lat	real	[-90.0 – 90.0]	Centre latitude of pixel [degree]
vcd	real	[0.0 – 500.0]	Retrieved total vertical column density [10^{15} molec. cm^{-2}]
sigvcd	real	[0.0 – 1e3]	Error in the total vertical column density [10^{15} molec. cm^{-2}]
fltrop	integer	[-1,0]	Flag that indicates whether tropospheric retrieval was meaningful, 0 =yes, -1 = no.
psurf	float	-	Surface pressure of the pixel (in Pa)
sigvcdak	float	-	Error in total vertical column density when averaging kernel information is used in 10^{15} molec. cm^{-2} (without profile error contribution)
kernel	float	-	Averaging kernel vector, corresponding to the kernel values at the pressure levels as defined above
ghost column	float	[0.0 – 500.0]	Ghost column of formaldehyde [10^{15} molec. cm^{-2}]

Product Specification Table : HDF - Geolocation Fields

Name	Type	Range	Description
sza	real	[0.0 – 85.0]	Satellite solar zenith angle
vza	real	[0.0 – 32.0]	Satellite viewing nadir angle
raa	real	[0.0 – 360.0]	Satellite relative azimuth angle
ssc	real	[0,3]	GOME subset counter (0,1,2 = forward scan, 3 = backscan)
loncorn	4*real	[0.0 – 360.0]	Longitudes of the four corners of the pixel
latcorn	4*real	[-90.0 – 90.0]	Latitudes of the four corners of the pixel

Additional retrieval data is provided by the ancillary data table ANC_yymmddttt, and it contains 7 columns:

Product Specification Table : HDF – Ancillary Data

Name	Type	Range	Description
scd	real	[0.0 – 100.0]	Slant column density, in 10^{15} molec. cm^{-2}
amf	real	[2.0 – 15.0]	Total air mass factor used to compute vcd (=scd/amf)
amfgeo	real	[2.0 – 25.0]	Geometrical air mass factor
clfrac	real	[-1, 0.0-1.0]	Cloud fraction from FRESCO, -1 = snow or ice covered
cltpress	real	[1.05e5 – 1.3e4]	Cloud top pressure from FRESCO, 1.3e4 corresponds to tropopause cloud
albclr	real	[0.0 – 1.0]	Surface albedo for clear part of the pixel from TOMS/GOME database
crfrac	integer	[0.0-100.0]	Cloud radiance fraction, i.e. percentage of the light coming from cloudy part of the scene

Monthly mean data of CH₂O is available in ASCII-TOMS format and ESRI-ASCII grid format.