

Name	Description	Required	Group	format	Example
site_code	Nominal 3 letter site code. Sites should be registered with gawsis if possible	Yes	siteinfo	string	ALT
site_name	Standard site name (e.g., Park Falls, Wisconsin)	Yes	siteinfo	string	Alert, Nunavut
site_country	Country in which site is located	No	siteinfo	string	Canada
site_country_flag	Path to image of flag	No	siteinfo	string	/images/flags/CANA0001.GIF
site_latitude	Latitude (decimal degree) at representative site location. -90 to 90	No	siteinfo	float	82.4508
site_longitude	Longitude (decimal degree) at representative site location. -180 to 180	No	siteinfo	float	-62.5072
site_elevation	Ground or surface elevation at representative site location	No	siteinfo	float	185.0
site_position_comment	Position Comment	No	siteinfo	string	This is the nominal location of the site. The sampling location at many sites has changed over time, and we report here the most recent nominal location. The actual sampling location for each observation is not necessarily the site location. The sampling locations for each observation are reported in the latitude, longitude, and altitude variables.
site_utc2lst	Hour conversion from UTC (Coordinated Universal Time) to LST (Local Standard Time)	No	siteinfo	signed float	-5
site_utc2lst_comment	Time zone conversion comment	No	siteinfo	string	Add 'site_utc2lst' hours to convert a time stamp in UTC (Coordinated Universal Time) to LST (Local Standard Time).
site_url	URL to site web page	No	siteinfo	string	https://gml.noaa.gov/obop/mlo/
site_comment	Additional relevant site information	No	siteinfo	string	Mauna Loa Observatory (MLO) is located on the north flank of Mauna Loa Volcano, on the Big Island of Hawaii, at an elevation of 3397 meters, or 11,135 feet above sea level. The observatory is a premier atmospheric research facility that has been continuously monitoring and collecting data related to atmospheric change since the 1950's.
site_oscar_id	GAWSIS Oscar ID	No	siteinfo	string	0-20008-0-SSL
warning_dataset_scale	Information on scale adjustments or normalization that may have been made to included datasets	No	dataset	string	In Feb 2021, NOAA updated the WMO CO2 scale from version X2007 to X2019 (Hall et al., 2021). The X2019 scale supersedes all previous versions of the WMO scale and is used in this GV+ release. Values contributed on scales other than X2019 have been adjusted by either known scale offsets or with the known X2019 to X2007 relationship to account for changes in the scale relationship caused by the X2019 revision.
dataset_creation_date	String representing the creation date of the dataset	Yes	dataset	ISO 8601	2021-08-18T13:54:02.056Z
dataset_num	Integer that uniquely identifies the data set in the ObsPack data product	Yes	dataset	integer	116
dataset_name	Character string that uniquely identifies the data set in the ObsPack data product.	Yes	dataset	string	co2_mlo_surface-insitu_1_allvalid
dataset_process	String description of ObsPack data preparation (e.g., PassThru, TimeStepAverage)	No	dataset	string	passthru
dataset_alternative_names	Alternate names for dataset in ObsPack product. Dataset records may be broken into multiple dataset files due to site name changes or changes to operating laboratory.	No	dataset	string	co2_ams_surface-insitu_11_representative
dataset_alternative_names_description	Describe need for alternative names	No	dataset	string	The attribute dataset_alternative_names is used to identify all other dataset names that have been used for the record in this dataset. To obtain the full record for this dataset please use all alternatively named datasets that appear in this ObsPack product and the corresponding release of either the CO2 GLOBALVIEWplus or CO2 NRT ObsPacks if applicable.
dataset_alternative_names_comment	Comment to give context to this dataset's alternative names	No	dataset	string	This dataset record changed names due to source data no longer being filtered for marine background conditions
dataset_parameter	Identifies trace gas species included in data set (e.g., co2, c13co2)	Yes	dataset	string	co2
dataset_project	Identifies sampling platform and strategy (e.g., surface-flask, tower-insitu, aircraft-pfp)	Yes	dataset	string	surface-insitu
dataset_platform	Fixed or Mobile	No	dataset	string	fixed
dataset_map	Path to world map highlighting the data set sampling location	No	dataset	string	/images/maps/map_ams_surface-insitu_11.png
dataset_selection	Brief description of how data have been selected by data contributor or prepared	Yes	dataset	string	Atmospheric Methane Dry Air Mole Fractions from quasi-continuous measurements at Barrow, Alaska.
dataset_selection_tag	Short descriptor to help convey how data have been selected by data contributor or prepared. The selection tag is included in the dataset name.	Yes	dataset	string	allvalid

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dataset_comment	Additional relevant site information	No	dataset	string	The observatory protrudes through the strong marine temperature inversion layer present in the region, which separates the more polluted lower portions of the atmosphere from the much cleaner free troposphere. The undisturbed air, remote location, and minimal influences of vegetation and human activity at MLO are ideal for monitoring constituents in the atmosphere that can cause climate change.
dataset_calibration_scale	Measurements are relative to reported calibration scale	Yes	dataset	string	WMO CO2 X2019
dataset_start_date	Date of first item in data set	Yes	dataset	ISO 8601	1981-01-01T00:30:00Z
dataset_stop_date	Date of last item in data set	Yes	dataset	ISO 8601	2020-12-31T23:30:00Z
dataset_data_frequency	Measurement frequency of source data	No	dataset	integer	1
dataset_data_frequency_unit	Indicates the time unit of the data set_data_frequency attribute	No	dataset	string	hour
dataset_time_window_lst	Attribute set when necessary to subset source data by sample collection time (LST)	No	dataset	time range; 24 hr	12-16
dataset_time_window_utc	Attribute set when necessary to subset source data by sample collection time (UTC)	No	dataset	time range; 24 hr	23.0-3.0
dataset_time_window_exclusion	T or F for determining if data are excluded based on time_window	No	dataset	boolean T/F	F
dataset_time_fill	T or F for determining if dataset has time filled values	No	dataset	boolean T/F	F
dataset_intake_ht	This attribute is set when it is necessary to subset source data by sample intake height	No	dataset	decimal or decim	20.0
dataset_intake_ht_unit	dataset_intake_ht is reported in meters above ground level (magl)	No	dataset	string	magl
dataset_description	Description of the dataset. This may be the ObsPack product's description or additional relevant descriptive information regarding the specific dataset	No	dataset	string	This data package is intended for use in carbon cycle inverse modeling, model evaluation, and satellite validation studies. Please report errors and send comments regarding this product to the ObsPack originators. Please read carefully the ObsPack Fair Use statement and cite appropriately. This is the sixth release of the GLOBALVIEWplus (GV+) cooperative data product. Please review the release notes for this product www.esrl.noaa.gov/gmd/ccgg/obspack/release_notes.html . DOI metadata for this product are available at https://search.datacite.org/works/10.25925/20201204 .
dataset_warning	Warning text for use of dataset	No	dataset	string	Every effort is made to produce the most accurate and precise measurements possible. However, we reserve the right to make corrections to the data based on recalibration of standard gases or for other reasons deemed scientifically justified. We are not responsible for results and conclusions based on use of these data without regard to this warning.
dataset_fair_use	Dataset specific fair use requirements	No	dataset	string	These data are made freely available to the public and the scientific community in the belief that their wide dissemination will lead to greater understanding and new scientific insights. The availability of these data does not constitute publication of the data. NOAA relies on the ethics and integrity of the user to ensure that GML receives fair credit for their work. If the data are obtained for potential use in a publication or presentation, GML should be informed at the outset of the nature of this work. If the GML data are essential to the work, or if an important result or conclusion depends on the GML data, co-authorship may be appropriate. This should be discussed at an early stage in the work. Manuscripts using the GML data should be sent to GML for review before they are submitted for publication so we can ensure that the quality and limitations of the data are accurately represented.
dataset_reciprocity	Statement on the reciprocity of the data within a dataset.	No	dataset	string	Use of these data implies an agreement to reciprocate. Laboratories making similar measurements agree to make their own data available to the general public and to the scientific community in an equally complete and easily accessible form. Modelers are encouraged to make available to the community, upon request, their own tools used in the interpretation of the GML data, namely well documented model code, transport fields, and additional information necessary for other scientists to repeat the work and to run modified versions. Model availability includes collaborative support for new users of the models.
dataset_usage_url	URL to detailed explanation of dataset usage requirements	No	dataset	string	https://www.gml.noaa.gov/ccgg/obspack/citation.php?product=obspack_co2_1_GLOBALVIEWplus_v7_0_2021-08-18
dataset_usage_description	Text describing dataset usage requirements	No	dataset	string	Please cite the product's citation when using data from this dataset. Relevant literature references for this dataset are listed below for convenience.
dataset_provider_citation_total	Total number of dataset required citations	Yes	dataset	string	2
dataset_provider_citation_[#]	1+ dataset provider citations	No	dataset	string	ICOS RI. (2021). ICOS Atmosphere Release 2021-1 of Level 2 Greenhouse Gas Mole Fractions of CO2, CH4, N2O, CO, meteorology and 14CO2 (1.0). ICOS ERIC - Carbon Portal. https://doi.org/10.18160/WJY7-5D06

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dataset_provider_citation_identifier_[#]	1+ dataset provider citation identifiers (e.g. dataset DOI for corresponding citation text)	No	dataset	string	https://hdl.handle.net/10.18160/wjy7-5d06
dataset_provider_license	Provider license for this dataset	No	dataset	string	DATA POLICY: ICOS DATA is licensed under a Creative Commons Attribution 4.0 international licence (http://creativecommons.org/licenses/by/4.0/). The ICOS data licence is described at https://data.icos-cp.eu/licence .
dataset_reference_total_listed	Total number of references	Yes	dataset	integer	1
dataset_reference_[#]_name	1+ dataset references	No	dataset	integer	Matsueda, H., T. Machida, Y. Sawa, Y. Niwa, Long-term change of CO2 latitudinal distribution in the upper troposphere, Geophys. Res. Lett., 42,2015. doi:10.1002/2014GL062768.
dataset_contribution	A short text summary of those responsible for the data set	No	dataset	string	These data are provided by ICOS-ATC AND ENEA. Principal investigators include Alcide Giorgio di Sarra (ENEA) AND Salvatore Piacentino (ENEA). Arctic Research of the Composition of the Troposphere from Aircraft and Satellites
campaign_name	Name of campaign	No	campaign_info	string	ARCTAS
campaign_abbr	Campaign abbreviation or acronym	No	campaign_info	string	ARCTAS
campaign_logo	URL to image of campaign logo	No	campaign_info	string	/images/logos/discoveraq_medium.png
campaign_url	URL of campaign website	No	campaign_info	string	https://www.nasa.gov/mission_pages/arctas/index.html
lab_total_listed	Number of contributing laboratories associated with the dataset, minimum 1	Yes	labinfo	integer	2
lab_[#]_number	Unique laboratory identification number.	Yes	labinfo	integer	20
lab_[#]_abbr	Laboratory abbreviation or acronym (e.g., CONTRAIL, UHEI-IUP)	Yes	labinfo	string	NIES
lab_[#]_name	Laboratory name	Yes	labinfo	string	National Institute for Environmental Studies
lab_[#]_address1	Laboratory address line 1	No	labinfo	string	Center for Global Environmental Research
lab_[#]_address2	Laboratory address line 2	No	labinfo	string	16-2 Onogawa, Tsukuba, Ibaraki, 305-8506
lab_[#]_address3	Laboratory address line 3	No	labinfo	string	
lab_[#]_country	Laboratory country	No	labinfo	string	Japan
lab_[#]_country_flag	URL to image of laboratory country flag	No	labinfo	string	/images/flags/JAPA0001.GIF
lab_[#]_parameter	Attributes which parameter(s) in the dataset this lab has contibuted	Yes	labinfo	string	co2
lab_[#]_url	URL to laboratory website	No	labinfo	string	http://www.nies.go.jp/
lab_[#]_logo	URL to laboratory logo	No	labinfo	string	/images/logos/nies_medium.png
lab_[#]_ongoing_atmospheric_air_comparison	If "T", lab participates in at least one ongoing direct atmospheric air comparison experiment.	No	labinfo	boolean T/F	T
lab_[#]_comparison_activity	Brief description of measurement comparison activities	No	labinfo	string	WMO ROUND-ROBIN; sausage; cucumber; NIES-NOAA flask comparison; iceGGO (http://occco.nies.go.jp/e_index.html)
program_total_listed	Number of contributing programs associated with the dataset	Yes	labinfo	integer	1
program_[#]_abbr	Program abbreviation or acronym (e.g., CONTRAIL, UHEI-IUP)	No	program_info	string	HIPPO
program_[#]_name	Program name	No	program_info	string	HIAPER Pole-to-Pole Observations project
program_[#]_address1	Program address line 1	No	program_info	string	Earth Observing Laboratory (EOL) of the National Center for Atmospheric Research (NCAR)
program_[#]_address2	Program address line 2	No	program_info	string	10802 Airport Court Rocky Mountain Metropolitan Airport
program_[#]_address3	Program address line 3	No	program_info	string	Broomfield, CO 80021
program_[#]_country	Program country	No	program_info	string	United States
program_[#]_country_flag	URL to image of program country flag	No	program_info	string	/images/flag/UNST0001.GIF
program_[#]_url	URL to program website	No	program_info	string	http://hippo.ucar.edu/
program_[#]_logo	URL to program logo	No	program_info	string	/images/logos/hippo_medium.png
provider_total_listed	Number of contributing providers associated with the dataset, minimum 1	Yes	provider_info	integer	8
provider_[#]_name	Provider name	Yes	provider_info	string	Stephen Montzka
provider_[#]_address1	Provider address line 1	No	provider_info	string	NOAA GML
provider_[#]_address2	Provider address line 2	No	provider_info	string	325 Broadway R/GML-1
provider_[#]_address3	Provider address line 3	No	provider_info	string	Boulder, CO 80305
provider_[#]_country	Provider country	No	provider_info	string	United States
provider_[#]_affiliation	Provider affiliation	No	provider_info	string	National Oceanic and Atmospheric Administration
provider_[#]_affiliation_abbr	Provider affiliation abbreviation	No	provider_info	string	NOAA

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provider_[#]_email	Provider email	Yes	provider_info	string	stephen.a.montzka@noaa.gov
provider_[#]_tel	Provider telephone number	No	provider_info	string	303-497-9999
provider_[#]_parameter	Attributes which parameter(s) in the dataset this provider has contributed	No	provider_info	string	co2
partner_total_listed	Number of contributing partners associated with the dataset	Yes	partner_info	integer	1
partner_[#]_name	Partner name	No	partner_info	string	Ray Langenfelds
partner_[#]_address1	Partner address line 1	No	partner_info	string	CSIRO Oceans and Atmosphere - Climate Science Centre
partner_[#]_address2	Partner address line 2	No	partner_info	string	Private Bag 1 (street address: 107-121 Station St.)
partner_[#]_address3	Partner address line 3	No	partner_info	string	Aspendale, Victoria 3195
partner_[#]_country	Partner country	No	partner_info	string	Australia
partner_[#]_affiliation	Partner affiliation	No	partner_info	string	Commonwealth Scientific and Industrial Research Organisation, Oceans and Atmosphere, Aspendale, Victoria, Australia
partner_[#]_affiliation_abbr	Partner affiliation abbreviation	No	partner_info	string	CSIRO
partner_[#]_email	Partner email	No	partner_info	string	Ray.Langensfelds@csiro.au
partner_[#]_tel	Partner telephone number	No	partner_info	string	55 5 55 5555
partner_[#]_parameter	Attributes which parameter(s) in the dataset this partner has contributed	No	partner_info	string	co2
partner_[#]_url	URL to partner website	No	partner_info	string	www.nws.noaa.gov
partner_[#]_country_flag	URL to image of partner country flag	No	partner_info	string	/images/flags/UNST0001.GIF
partner_[#]_logo	URL to partner logo	No	partner_info	string	/images/logos/usnws_medium.png
obspace_organator_lab_total_listed	Number of laboratories responsible for preparing the ObsPack product	Yes	obspace_info	integer	2
obspace_organator_lab_[#]_abbr	Obspace lab originator abbreviation	No	obspace_info	string	WU
obspace_organator_lab_[#]_name	Obspace lab originator name	No	obspace_info	string	Wageningen University
obspace_organator_lab_[#]_number	Obspace lab originator unique number	No	obspace_info	string	111
obspace_variables_and_attributes	Description or URL for further information describing ObsPack variables and attributes	No	obspace_info	string	ObsPack variables and attributes are described at www.gml.noaa.gov/ccgg/obspace/documentation.html#MetaData
obspace_name	Unique ObsPack identification string. Structure is obspace_<parameter>_<preparation/distribution lab number>_<product name>_<version number>_<preparation date> (e. g., obspace_co2_1_PROTOCOLYPE_v0.9.1_2012-07-20).	Yes	obspace_info	string	obspace_co2_1_GLOBALVIEWplus_v7.0_2021-08-18
obspace_description	Brief description of data product contents	No	obspace_info	string	This data package is intended for use in carbon cycle inverse modeling, model evaluation, and satellite validation studies. Please report errors and send comments regarding this product to the ObsPack originators. Please read carefully the ObsPack Fair Use statement and cite appropriately. This is the sixth release of the GLOBALVIEWplus (GV+) cooperative data product. Please review the release notes for this product www.esrl.noaa.gov/gmd/ccgg/obspace/release_notes.html . DOI metadata for this product are available at https://search.datacite.org/works/10.25925/20201204 . Please visit http://www.gml.noaa.gov/ccgg/obspace/ for more information.
obspace_creation_date	Date when the ObsPack data product was prepared	Yes	obspace_info	ISO 8601	2021-08-18T13:54:02.056239
obspace_warning	Warning text for use of product	No	obspace_info	string	Every effort is made to create the most accurate and precise data product possible. Contributors reserve the right to make corrections to this product and data based on recalibration of standard gases or for other reasons deemed scientifically justified. Contributors to this product are not responsible for results and conclusions based on use of this product without regard to this warning.

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obspack_fair_use	Fair use restrictions for product	No	obspack_info	string	This cooperative data product is made freely available to the scientific community and is intended to stimulate and support carbon cycle modeling studies. We rely on the ethics and integrity of the user to assure that each contributing national and university laboratory receives fair credit for their work. Fair credit will depend on the nature of the work and the requirements of the institutions involved. Your use of this data product implies an agreement to contact each contributing laboratory for data sets used to discuss the nature of the work and the appropriate level of acknowledgement. If this product is essential to the work, or if an important result or conclusion depends on this product, co-authorship may be appropriate. This should be discussed with the appropriate data providers at an early stage in the work. Contacting the data providers is not optional; if you use this data product, you must contact the applicable data providers. To help you meet your obligation, the data product includes an e-mail distribution list of all data providers. This data product must be obtained directly from the ObsPack Data Portal at https://gml.noaa.gov/ccgg/obspace/ and may not be re-distributed. In addition to the conditions of fair use as stated above, users must also include the ObsPack product citation in any publication or presentation using the product. The required citation is included in every data product and in the automated e-mail sent to the user during product download.
obspace_usage_policy	Detailed usage policy or urls to websites with further details	No	obspace_info	string	www.gml.noaa.gov/ccgg/obspace/citation.php?product=obspace_co2_1_GLOBALVIEWplus_v7_0_2021-08-18
obspace_identifier_link	Resolvable URL for product DOI	No	obspace_info	string	http://doi.org/10.25925/20210801
obspace_citation	Citation text for use of data product	Yes	obspace_info	string	Kenneth N. Schuldt, John Mund, Ingrid T. Luijckx, Tuula Aalto, James B. Abshire, Ken Aikin, Arlyn Andrews, Shuji Aoki, Francesco Apadula, Bianca Baier, Peter Bakwin, Jakub Bartyzel, Gilles Bentz, Peter Bergamaschi, Andreas Beyersdorf, Tobias Biermann, Sebastien C. Biraud, Harald Boenisch, David Bowling, Gordon Brailsford, Gao Chen, Huijin Chen, Lukasz Chmura, Shane Clark, Sites Climadat, Aurelie Colomb, Roisin Commane, Sébastien Conil, Adam Cox, Paolo Cristofanelli, Emilio Cuevas, Roger Curcoll, Bruce Daube, Kenneth Davis, Martine De Mazière, Stephan De Wekker, Julian Della Coletta, Marc Delmotte, Joshua P. DiGangi, Ed Dlugokencky, James W. Elkins, Lukas Emmenegger, Shuangxi Fang, Marc L. Fischer, Grant Forster, Arnaud Frumau, Michal Galkowski, Luciana V. Gatti, Torsten Gehrlein, Christoph Gerbig, Francois Gheusi, Emanuel Gloor, Vanessa Gomez-Trueba, Daisuke Goto, Tim Griffis, Samuel Hammer, Chad Hanson, László Haszpra, Juha Hatakka, Martin Heimann, Michal Heliász, Arjan Hensen, Ove Hermanssen, Eric Hintsa, Jutta Holst, Viktor Ivakhov, Dan Jaffe, Warren Joubert, Anna Karion, Stephan R. Kawa, Victor Kazan, Ralph Keeling, Petri Keronen, Pasi Kolari, Katerina Kominkova, Eric Kort, Elena Kozlova, Paul Krummel, Dagmar Kubistin, Casper Labuschagne, David H. Lam, Ray Langenfelds, Olivier Laurent, Tuomas Laurila, Thomas Lauvaux, Jost Lavric, Bev Law, Olivia S. Lee, John Lee, Irene Lehner, Reimo Leppert, Markus Leuenberger, Ingeborg Levin, Janne Levula, John Lin, Matthias Lindauer, Zoe Loh, Morgan Lopez, Toshinobu Machida, Ivan Mammarella, Giovanni Manca, Andrew Manning, Alistair Manning, Michal V. Marek, Melissa Y. Martin, Hidekazu Matsueda, Kathryn McKain, Harro Meijer, Frank Meinhardt, Lynne Merchant, N. Mihalopoulos, Natasha Miles, Charles E. Miller, John B. Miller, Logan Mitchell, Stephen Montzka, Fred Moore, Eric Morgan, Josep-Anton Morgui, Shinji Morimoto, Bill Munger, David Munro, Cathrine L. Myhre, Meelis Mölder, Jennifer Müller-Williams, Jaroslaw Necki, Sally Newman, Sylvia Nichol, Yosuke Niwa, Simon O'Doherty, Florian Obersteiner, Bill Paplawsky, Jeff Peischl, Olli Peltola, Salvatore Piacentino, Jean M. Pichon, Steve Piper, Christian Plass-Duelmer, Michel Ramonet, Ramon Ramos, Enrique Reyes-Sanchez, Scott Richardson, Haris Riris, Pedro P. Rivas, Thomas Ryerson, Kazuyuki Saito, Maryann Sargent, Motoki Sasakawa, Daniel Say, Bert Scheeren, Tanja Schuck, Marcus Schumacher, Thomas Seifert, Mahesh K. Sha, Paul Shepson, Michael Shook, Christopher D. Sloop, Paul Smith, Martin Steinbacher, Britton Stephens, Colm Sweeney, Pieter Tans, Kirk Thoning, Helder Timas, Margaret Torn, Pamela Trisolino, Jocelyn Turnbull, Kjetil Tørseth, Alex Vermeulen, Brian Viner, Gabriela Vitkova, Stephen Walker, Andrew Watson, Steve Wofsy, Justin Worsley, Doug Worthy, Dickon Young, Sönke Zaehle, Andreas Zahn, Miroslaw Zimnoch, Alcide G. di Sarra, Danielle van Dinter, Pim van den Bulk; (2021): Multi-laboratory compilation of atmospheric carbon dioxide data for the period 1957-2020; obspace_co2_1_GLOBALVIEWplus_v7_0_2021-08-18; NOAA Earth System Research Laboratory, Global Monitoring Laboratory. http://doi.org/10.25925/20210801 .