



## **Global Modeling and Assimilation Office**

*GMAO Office Note No. 16 (Version 1.0)*

### **GEOS S2S-2\_1 File Specification**

*GMAO Seasonal and Sub-Seasonal Forecast Output*

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# S2S-2\_1: File Specification

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## REVISION HISTORY

Version	Revision	Extent of Changes
1.0	04/20/2018	Baseline

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# 1. Introduction

The NASA GMAO seasonal (9 months) and subseasonal (45 days) forecasts are produced with the Goddard Earth Observing System (GEOS) Atmosphere-Ocean General Circulation Model and Data Assimilation System Version S2S-2\_1. The new system replaces version S2S-1.0 described in Borovikov et al (2017), and includes upgrades to many components of the system.

The atmospheric model includes an upgrade from a pre-MERRA-2 version running on a latitude-longitude grid at ~1 degree resolution to a current version running on a cubed sphere grid at approximately 1/2 degree resolution. The important developments are related to the dynamical core (Putman et al., 2011), the moist physics (“two-moment microphysics” of Barahona et al., 2014) and the cryosphere (Cullather et al., 2014). As in the previous GMAO S2S system, the land model is that of Koster et al (2000).

GMAO S2S-2\_1 now includes the Goddard Chemistry Aerosol Radiation and Transport (GOCART, Colarco et al., 2010) single moment interactive aerosol model that includes predictive aerosols including dust, sea salt and several species of carbon and sulfate. The previous version of GMAO S2S specified aerosol amounts from climatology, which were used to inform the atmospheric radiation only.

The ocean model includes an upgrade from MOM4 to MOM5 (Griffies 2012), and continues to be run on the tripolar grid at approximately 1/2 degree resolution in the tropics with 40 vertical levels. As in S2S-1.0, the sea ice model is from the Los Alamos Sea Ice model (CICE4, Hunke and Lipscomb 2010). The Ocean Data Assimilation System (ODAS) has been upgraded from the one described in Borovikov et al., 2017 to one that uses a modified version of the Penny, 2014 Local Ensemble Transform Kalman Filter (LETKF), and now assimilates along-track altimetry. The ODAS also does a nudging to MERRA-2 SST and sea ice boundary conditions. The atmospheric data assimilation fields used to constrain the atmosphere in the ODAS have been upgraded from MERRA to a MERRA-2 like system. The system is initialized using a MERRA-2-like atmospheric reanalysis (Gelaro et al. 2017) and the GMAO S2S-2\_1 ocean analysis. Additional ensemble members for forecasts are produced with initial states at 5-day intervals, with additional members based on perturbations of the atmospheric and ocean states.

Both subseasonal and seasonal forecasts are submitted to the National MultiModel Ensemble (NMME) project, and are part of the US/Canada multimodel seasonal forecasts (<http://www.cpc.ncep.noaa.gov/products/NMME/>). A large suite of retrospective forecasts (“hindcasts”) have been completed, and contribute to the calculation of the model’s baseline climatology and drift, anomalies from which are the basis of the seasonal forecasts.



## 2. Format and File Organization

S2S-2\_1 data files are provided in netCDF-4 format. Since netCDF-4 files are actually HDF-5 files that are structured in a special way, netCDF-4 files can also be read by HDF-5 tools. The data files adhere to the netCDF “classic” data model, which will allow source code used to read older netCDF formats to still work when compiled with the netCDF-4 and HDF-5 libraries. The data products will adhere to the older COARDS metadata conventions and many of the CF metadata conventions, although the files are not fully CF-compliant. The conventions for identifying dimension information are followed, which should allow S2S\_2\_1 files to be used by many tools that are CF-compliant.

### 2.1 Dimensions

Every S2S\_2\_1 collection contains variables that define the dimensions of longitude, latitude, and time. Product collections that contain three-dimensional data will also have a vertical dimension that defines either pressure levels or the index associated with the model level (see 4 Section 4.2). Dimension variables have an attribute named “units,” set to an appropriate string defined by the COARDS conventions that can be used by applications to identify the dimension. The 2D LON and LAT fields are for collections with an irregular horizontal grid, such as a tri-polar grid.

**Table 2.1-1. Dimension Variables Contained in GMAO NetCDF Files**

<b>Name</b>	<b>Description</b>	<b>Type</b>	<b><i>units</i> attribute</b>
lon	Longitude	double	degrees_east
lat	Latitude	double	degrees_north
LON	2D Longitude	double	degrees_east
LAT	2D Latitude	double	degrees_north
lev	pressure or layer index	double	hPa or layer
time	minutes since first time in file	int	minutes

### 2.2 Variables

Variable names are listed in Section 6 along with the number and sizes of dimensions. One can quickly list the variables in the file by using common utilities such as ncdump, which is distributed with the netCDF-4 library. With the ‘-h’ flag, this utility will display all information about the file and its contents, including metadata associated with each variable. A short description of the variable is provided in the long\_name and standard\_name metadata parameters.

Each variable has several useful metadata attributes. Many of these attributes are required by the CF and COARDS conventions, while others are specific for GMAO products. The following table lists required attributes. Other attributes may be included for internal GMAO use and can be ignored.

**Table 2.2-1 Metadata attributes associated with each variable.**

<b>Name</b>	<b>Type</b>	<b>Description</b>
_FillValue	32-bit float	Floating-point value used to identify missing data. Normally set to 1e15. Required by CF.
missing_value	32-bit float	Same as _FillValue. Required for COARDS backwards compatibility.
long_name	string	A brief description of the variable contents taken from the Description column of the tables in Section 6.
units	string	The units of the variable. Must be a string that can be recognized by UNIDATA's Uunits package.
scale_factor	32-bit float	If variable is packed as 16-bit integers, this is the scale_factor for expanding to floating-point. Currently data are not packed, thus value is 1.0.
add_offset	32-bit float	If variable is packed as 16-bit integers, this is the offset for expanding to floating-point. Currently, data are not packed, thus value is 0.0.

### 2.3 Global Attributes

In addition to dataset variables and dimension scales, global metadata is also stored in GMAO netCDF-4 files. Some metadata are required by the CF/COARDS conventions and others as a convenience to users of GMAO products. A summary of global attributes present in all S2S\_2\_1 files is shown in Table 2.3-1. All global metadata parameters are of type character.

**Table 2.3-1 Global metadata attributes associated with each SDS.**

<b>Name</b>	<b>Description</b>
History	Production/creation of the file.
Conventions	Identification of the file convention used, currently COARDS
Title	Description of product type.
Source	Description of product source.
Contact	Contact information.

## 3. Instantaneous versus Time-Averaged Products

Each file collection listed in Section 6 contains either instantaneous or time-averaged products.

Six-hourly instantaneous collections include snapshots at 00 GMT, 06 GMT, 12 GMT, and 18 GMT (*oletkf\_onc2d*, *oletkf\_seaice*, and *geosgcm\_6hrins*). These collections are stored in a monthly tar files that contain a file for each 6-hourly time stamp when unpacked.

Time-averaged collections contain six-hourly, daily, monthly, or monthly diurnal means, but not mixtures of these. Each time-averaged collection consists of a continuous sequence of data

averaged over the indicated interval and time stamped with the central time of the interval. Monthly files represent averages for the calendar months, accounting for leap years. For monthly means, each file contains a single month.

Collections that are at higher than monthly temporal resolution are stored in tar files. The *oletkf\_ocn2d*, *oletkf\_seaice*, *geosgcm\_6hrins*, and *geosgcm\_6hravg* collections are stored in monthly tar files that contain a file for each 6-hourly time stamp when unpacked. The *geosgcm\_00zins* collection is stored in a monthly tar file that contains a file for each day of that month. The *geosgcm\_fwimetx* collection is stored in a monthly tar file that contains a file for each hourly time stamp of that month.

For collections of monthly or seasonal means, each month or season is in a separate file, and file names also include the year and month in the file name. Monthly means also include certain quadratic information (such as the variance of all variables and covariances of certain pairs of variables).

## 4. Grid Structure

### 4.1 Horizontal Structure

In S2S-2\_1, output fields are provided on three different grids. We note here that the native grid for the atmosphere is a cubed sphere, and for the ocean is a tripolar grid. The output grids are:

1. 1/2° longitude by 1/2° latitude regularly spaced grid (720x361)
2. 1/2° longitude by ~1/2° latitude irregularly spaced tripolar grid (720x410)
3. 1° longitude by 1° latitude regularly spaced grid (360x181)

The gridded output is interpolated from the native cubed sphere grid to a global horizontal grid consisting of **IMn=720** points in the longitudinal direction and **JMn=361** points in the latitudinal direction. The horizontal grid origin, associated with variables indexed ( $i=1, j=1$ ) represents a grid point located at (180°W, 90°S). Latitude ( $\varphi$ ) and longitude ( $\lambda$ ) of grid points as a function of their indices ( $i, j$ ) can be determined by:

$$\begin{aligned}\lambda_i &= -180 + (\Delta\lambda)_n(i - 1), i = 1, \text{IMn} \\ \varphi_j &= -90 + (\Delta\varphi)_n(j - 1), j = 1, \text{JMn}\end{aligned}$$

Where  $(\Delta\lambda) = 1/2^\circ$  and  $(\Delta\varphi)_n = 1/2^\circ$ . For example, ( $i = 361, j = 181$ ) corresponds to a grid point at ( $\lambda=0, \varphi=0$ ). For collection on this grid, the 1-dimensional longitude and latitude dimensions are sufficient to read and plot the data.

For the collections on the tripolar grid, the user must read the 2-dimensional longitude and latitude variables to correctly interpret the data.

For the one-degree collections, the gridded output is interpolated from the native cubed sphere grid to a global horizontal grid, consisting of **IMn=360** points in the longitudinal direction and **JMn=181** points in the latitudinal direction. The horizontal grid origin, associated with variables indexed ( $i=1, j=1$ ) represents a grid point located at (180°W, 90°S).

$$\lambda_i = -180 + (\Delta\lambda)_n(i - 1), i = 1, \text{IMn}$$

$$\varphi_i = -90 + (\Delta\varphi)_n(j - 1), j = 1, IMn$$

Where  $(\Delta\lambda) = 1^\circ$  and  $(\Delta\varphi)_n = 1^\circ$ . For example,  $(i = 181, j = 91)$  corresponds to a grid point at  $(\lambda=0, \varphi=0)$ . For collection on this grid, the 1-dimensional longitude and latitude dimensions are sufficient to read and plot the data.

## 4.2 Vertical Structure

Gridded products are represented using three different vertical configurations: Horizontal-only (can be vertical integrals, single level, or surface values), pressure-level, or model-level. Horizontal-only data for a given variable appear as 3-dimensional fields (x, y, time), while pressure-level or model-level data appear as 4-dimensional fields (x, y, z, time). In most cases the time dimension spans multiple files with one time in each file.

Pressure-level data in different files is output on five different sets of pressure levels, shown in Tables 4.1 through 4.5. Note that the indexing for the GEOS-5 pressure level data in the vertical is bottom to top, i.e., level 1 is the bottom layer of the atmosphere, while the model level data are indexed top to bottom, i.e., model level 1 is at the top of the atmosphere and model level LM is adjacent to the earth's surface.

The ocean grid model-level data will be output on the **LM=40** layers shown in Table 4.6. Note that the indexing for this vertical coordinate system in the vertical is top to bottom, i.e., level 1 is the top layer of the ocean, while level LM is at the depth of the ocean.

**Table 4.1 Pressure-level data on 48 pressure levels for geosgcm\_moist, geosgcm\_turb, geosgcm\_gwd, and geosgcm\_tend:**

Level	P (hpa)	Level	P (hpa)	Level	P (hpa)	Level	P (hpa)	Level	P (hpa)	Level	P (hpa)
1	1000	9	800	17	500	25	100	33	5	41	0.3
2	975	10	775	18	450	26	70	34	4	42	0.2
3	950	11	750	19	400	27	50	35	3	43	0.1
4	925	12	725	20	350	28	40	36	2	44	0.07
5	900	13	700	21	300	29	30	37	1	45	0.05
6	875	14	650	22	250	30	20	38	0.7	46	0.04
7	850	15	600	23	200	31	10	39	0.5	47	0.03
8	825	16	550	24	150	32	7	40	0.4	48	0.02

**Table 4.2 Pressure-level data on 29 pressure levels for geosgcm\_vis2d:**

Level	P (hpa)	Level	P (hpa)	Level	P (hpa)	Level	P (hpa)	Level	P (hpa)
1	1000	7	850	13	700	19	400	25	100
2	975	8	825	14	650	20	350	26	10
3	950	9	800	15	600	21	300	27	4
4	925	10	775	16	550	22	250	28	2
5	900	11	750	17	500	23	200	29	1
6	875	12	725	18	450	24	150		

**Table 4.3 Pressure-level data on 15 pressure levels for geosgcm\_00ins:**

Level	P (hpa)	Level	P (hpa)	Level	P (hpa)	Level	P (hpa)	Level	P (hpa)
1	1000	4	700	7	250	10	50	13	4
2	925	5	500	8	200	11	30	14	2
3	850	6	300	9	100	12	10	15	1

**Table 4.4 Pressure-level data on 7 pressure levels for geosgcm\_6hrins:**

Level	P (hpa)	Level	P (hpa)	Level
1	850	4	100	10
2	500	5	50	
3	200	6	30	

**Table 4.5 Pressure-level on 4 pressure levels for geosgcm\_subxps:**

Level	P (hpa)	Level	P (hpa)
1	100	3	30
2	50	4	10

**Table 4.6 Products on the ocean vertical grid at 8 levels. Levels refer to depth in meters, positive down.**

Level	Z (m)	Level	Z (m)	Level	Z (m)	Level	Z (m)	Level	Z (m)
1	5	9	85	17	165	25	262.3	33	1479.6
2	15	10	98	18	175	26	303	34	1807.2
3	25	11	105	19	185	27	366.8	35	2174.6
4	35	12	115	20	195	28	459.1	36	2579.1
5	45	13	125	21	205	29	584.6	37	3016.8
6	55	14	135	22	215	30	747.2	38	3483

7	65	15	145	23	225	31	949.6	39	3972.3
8	75	16	155	24	238.5	32	1193.5	40	4478.5

## 5. File Naming Conventions

### 5.1 File Names

The standard full name for the GEOS-5 S2S\_2\_1 products will consist of three dot-delimited nodes, appended with “nc4”:

*runid.collection.[descriptor.]timestamp.nc4*

The node fields, which vary from file to file, are defined as follows:

#### *runid*

All S2S-2\_1 forecast runs are identified by the initialization date of each 5-day forecast in the format of mmmdd. All ocean analysis output files are identified by the runid “S2S-2\_1\_ANA\_001”. Table 5.1 lists all the runid numbers for the forecasts and hindcasts.

**Table 5.1 Run Identifier (runid) for the Forecast and Hindcast Output**

mmmdd	mmmdd	mmmdd	mmmdd	mmmdd	mmmdd	mmmdd
jan01	mar02	may01	jun30	aug29	oct28	dec 27
jan06	mar07	may06	jul05	sep03	nov02	
jan11	mar12	may11	jul10	sep08	nov07	
jan16	mar17	may16	jul15	sep13	nov12	
jan21	mar22	may21	jul20	sep18	nov17	
jan26	mar27	may26	jul25	sep23	nov22	
jan31	apr01	may31	jul30	sep28	nov27	
feb05	apr06	jun05	aug04	oct03	dec02	
feb10	apr11	jun10	aug09	oct08	dec07	
feb15	apr16	jun15	aug14	oct13	dec12	
feb20	apr21	jun20	aug19	oct18	dec17	
feb25	apr26	jun25	aug24	oct23	dec22	

#### *collection:*

All S2S-2\_1 data are organized into file collections that contain fields with common characteristics. These collections are used to make the data more accessible for specific purposes. Fields may appear in more than one collection. Collection names are of the form *geosgcm\_desc* where *desc* is a short descriptive name.

#### *[descriptor.]timestamp:*

This node defines the date and time associated with the data in the file. It can be in the form

yyyymmdd\_hhMMz for hourly or 6-hourly data, yyyymmdd for either instantaneous or time-averaged daily files, or yyyymm for monthly-mean files. For monthly or daily mean files, the additional descriptor “monthly” or “daily” is appended to the timestamp.

**yyyy** - year string (e.g. , "2002")  
**mm** - month string (e.g., "09" for September)  
**dd** - day of the month string (optional)  
**hh** – hour of the day (optional)  
**MM** – minute of the day (optional)

**EXAMPLE:**

**dec27.geosgcm\_ocn3d.monthly.201712.nc4**

This is an example of an S2S-2\_1 filename from the dec27 initial condition forecast experiment. The collection is “geosgcm\_ocn3d” and the descriptor designates that it is a monthly file containing monthly average for December 2017.

Daily, hourly and 6-hourly data are in a “tar” files following this same naming convention:

***runid.collection.daily.timestamp.nc4.tar***

To unpack, the command is:

```
tar -xvf runid.collection.daily.timestamp.nc4.tar
```

**EXAMPLE (geosgcm\_6hrins, geosgcm\_6hravg):**

```
tar -xvf dec27.geosgcm_6hrins.daily.201712.nc4.tar
```

will unpack this tar file into 21 6-hourly data files from

**dec27.geosgcm\_6hrins.20171227\_0000z.nc4 to dec27.geosgcm\_6hrins.20171231\_1800z.nc4**

**EXAMPLE (geosgcm\_00zins):**

```
tar -xvf dec27.geosgcm_00ins.daily.201712.nc4.tar
```

will unpack this tar file into 5 daily data files from

**dec27.geosgcm\_00zins.20171227\_0000z.nc4 to dec27.geosgcm\_00zins.20171231\_0000z.nc4**

**EXAMPLE (geosgcm\_fwimetx):**

```
tar -xvf dec27.geosgcm_fwimetx.daily.201712.nc4.tar
```

will unpack this tar file into 123 daily data files from

**dec27.geosgcm\_00zins.20171227\_0000z.nc4 to dec27.geosgcm\_00zins.20171231\_0000z.nc4**

## 6. Data Collections

This section lists the variables in each data collection.

### *Instantaneous Two-Dimensional Collections*

#### *oletkf\_ocn2d: 2d\_OLETKF\_State\_High\_Res*

**Frequency:** 6-hourly from 00:00 UTC (instantaneous)  
**Spatial Grid:** 2D, single-level, full horizontal resolution  
**Dimensions:** longitude=720, latitude=361, time=1  
**Granule Size:** ~5 MB

Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”.

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
SLV	tyx	sea level with ice loading	m

**Frequency:** monthly mean from 00:00 UTC (instantaneous)  
**Granule Size:** ~6 MB

Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_SLV	tyx	Variance of SLV	m m

#### *oletkf\_seaice: 2d\_OLETKF\_State\_Seaice\_High\_Res*

**Frequency:** 6-hourly from 00:00 UTC (instantaneous)  
**Spatial Grid:** 2D, single-level, full horizontal resolution  
**Dimensions:** longitude=720, latitude=361, time=1  
**Granule Size:** ~8 MB

Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”.

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
-------------	------------	--------------------	--------------



AICE	tyx	ice concentration of grid cell	1
DRAFT	tyx	mean ice draft of grid cell	m
HICE	tyx	mean ice thickness of grid cell	m
HSNO	tyx	mean snow thickness of grid cell	m

**Frequency:** *monthly mean from 00:00 UTC (instantaneous)*

**Granule Size:** *~12 MB*

**Note -Variables in the monthly mean files include the ones listed above in addition to those listed below:**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_AICE	tyx	Variance of AICE	1 1
Var_DRAFT	tyx	Variance of DRAFT	m m
Var_HICE	tyx	Variance of HICE	m m
Var_HSNO	tyx	Variance of HSNO	m m

### ***Instantaneous Three-Dimensional Collections***

***geosgcm\_00zins: 3d\_Daily\_Instantaneous\_at\_00Z***

**Frequency:** *daily value from 00:00 UTC (instantaneous)*

**Spatial Grid:** *3D, pressure-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, level=15, time=1*

**Granule Size:** *~98 MB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
H	tzyx	edge heights	m
OMEGA	tzyx	vertical pressure velocity	Pa s-1
PHIS	tyx	surface geopotential height	m+2 s-2
PS	tyx	surface pressure	Pa
QV	tzyx	specific humidity	kg kg-1
SLP	tyx	sea level pressure	Pa
T	tzyx	air temperature	K

U	tzyx	eastward wind	m s-1
U10M	tyx	10-meter eastward wind	m s-1
V	tzyx	northward wind	m s-1
V10M	tyx	10-meter northward wind	m s-1

**Frequency:** *monthly mean from 00:00 UTC (instantaneous)*

**Granule Size:** *~431 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Cov_OMEGA_Q V	tzyx	Covariance of OMEGA and QV	Pa s-1 kg kg-1
Cov_OMEGA_T	tzyx	Covariance of OMEGA and T	Pa s-1 K
Cov_OMEGA_U	tzyx	Covariance of OMEGA and U	Pa s-1 m s-1
Cov_OMEGA_V	tzyx	Covariance of OMEGA and V	Pa s-1 m s-1
Cov_U_H	tzyx	Covariance of U and H	m s-1 m
Cov_U_QV	tzyx	Covariance of U and QV	m s-1 kg kg-1
Cov_U_T	tzyx	Covariance of U and T	m s-1 K
Cov_U_V	tzyx	Covariance of U and V	m s-1 m s-1
Cov_V_H	tzyx	Covariance of V and H	m s-1 m
Cov_V_QV	tzyx	Covariance of V and QV	m s-1 kg kg-1
Cov_V_T	tzyx	Covariance of V and T	m s-1 K
USVS	tzyx	Product of Zonal Mean Deviations of U and V	m s-1 m s-1
VSQS	tzyx	Product of Zonal Mean Deviations of V and QV	m s-1 kg kg-1
VSTS	tzyx	Product of Zonal Mean Deviations of V and T	m s-1 K
Var_H	tzyx	Variance of H	m m
Var_OMEGA	tzyx	Variance of OMEGA	Pa s-1 Pa s-1
Var_PHIS	tyx	Variance of PHIS	m+2 s-2 m+2 s-2
Var_PS	tyx	Variance of PS	Pa Pa
Var_QV	tzyx	Variance of QV	kg kg-1 kg kg-1
Var_SLP	tyx	Variance of SLP	Pa Pa
Var_T	tzyx	Variance of T	K K
Var_U	tzyx	Variance of U	m s-1 m s-1

Var_U10M	tyx	Variance of U10M	m s-1 m s-1
Var_V	tzyx	Variance of V	m s-1 m s-1
Var_V10M	tyx	Variance of V10M	m s-1 m s-1
WSQS	tzyx	Product of Zonal Mean Deviations of OMEGA and QV	Pa s-1 kg kg-1
WSTS	tzyx	Product of Zonal Mean Deviations of OMEGA and T	Pa s-1 K

***geosgcm\_6hrins: 3d\_6-Hourly\_Instantaneous***

**Frequency:** 6-hourly from 00:00 UTC (instantaneous)

**Spatial Grid:** 3D, pressure-level, full horizontal resolution

**Dimensions:** longitude=720, latitude=361, level=7, time=1

**Granule Size:** ~51 MB

**Note – Forecast only collection**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
H	tzyx	edge heights	m
OMEGA	tzyx	vertical pressure velocity	Pa s-1
PHIS	tyx	surface geopotential height	m+2 s-2
PS	tyx	surface pressure	Pa
QV	tzyx	specific humidity	kg kg-1
SLP	tyx	sea level pressure	Pa
T	tzyx	air temperature	K
U	tzyx	eastward wind	m s-1
U10M	tyx	10-meter eastward wind	m s-1
V	tzyx	northward wind	m s-1
V10M	tyx	10-meter northward wind	m s-1

**Frequency:** monthly mean from 00:00 UTC (instantaneous)

**Granule Size:** ~208 MB

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
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Cov_OMEGA_Q V	tzyx	Covariance of OMEGA and QV	Pa s-1 kg kg-1
Cov_OMEGA_T	tzyx	Covariance of OMEGA and T	Pa s-1 K
Cov_OMEGA_U	tzyx	Covariance of OMEGA and U	Pa s-1 m s-1
Cov_OMEGA_V	tzyx	Covariance of OMEGA and V	Pa s-1 m s-1
Cov_U_H	tzyx	Covariance of U and H	m s-1 m
Cov_U_QV	tzyx	Covariance of U and QV	m s-1 kg kg-1
Cov_U_T	tzyx	Covariance of U and T	m s-1 K
Cov_U_V	tzyx	Covariance of U and V	m s-1 m s-1
Cov_V_H	tzyx	Covariance of V and H	m s-1 m
Cov_V_QV	tzyx	Covariance of V and QV	m s-1 kg kg-1
Cov_V_T	tzyx	Covariance of V and T	m s-1 K
VSQS	tzyx	Product of Zonal Mean Deviations of V and QV	m s-1 kg kg-1
VSTS	tzyx	Product of Zonal Mean Deviations of V and T	m s-1 K
Var_H	tzyx	Variance of H	m m
Var_OMEGA	tzyx	Variance of OMEGA	Pa s-1 Pa s-1
Var_PHIS	tyx	Variance of PHIS	m+2 s-2 m+2 s-2
Var_PS	tyx	Variance of PS	Pa Pa
Var_QV	tzyx	Variance of QV	kg kg-1 kg kg-1
Var_SLP	tyx	Variance of SLP	Pa Pa
Var_T	tzyx	Variance of T	K K
Var_U	tzyx	Variance of U	m s-1 m s-1
Var_U10M	tyx	Variance of U10M	m s-1 m s-1
Var_V	tzyx	Variance of V	m s-1 m s-1
Var_V10M	tyx	Variance of V10M	m s-1 m s-1
WSQS	tzyx	Product of Zonal Mean Deviations of OMEGA and QV	Pa s-1 kg kg-1
WSTS	tzyx	Product of Zonal Mean Deviations of OMEGA and T	Pa s-1 K

***oletkf\_ctrl: 3d\_OLETKF\_State\_Tripolar\_Grid***

**Frequency:** 6-hourly from 00:00 UTC (instantaneous)

**Spatial Grid:** 3D, model-level, full horizontal resolution

**Dimensions:** Fake Longitude for GrADS Compatibility=720, Fake Latitude for GrADS

Compatibility=410, level=40, time=1

Granule Size: ~99 MB

Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Xdim	x	Fake Longitude for GrADS Compatibility	degrees_east
Ydim	y	Fake Latitude for GrADS Compatibility	degrees_north
lats	yx	latitude	degrees_north
lev	z	vertical level	layer
lons	yx	longitude	degrees_east
salt	tzyx	salinity	psu
temp	tzyx	potential temperature	K
time	t	time	minutes since 2017-12-01 00:00:00

Frequency: monthly mean 00:00 UTC (instantaneous)

Granule Size: ~189 MB

Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
LAT	yx	latitude	degrees_north
LON	yx	longitude	degrees_east
Var_salt	tzyx	Variance of salt	psu psu
Var_temp	tzyx	Variance of temp	K K
lat	y	Fake Latitude for GrADS Compatibility	degrees_north
lon	x	Fake Longitude for GrADS Compatibility	degrees_east

***oletkf\_ocn3d: 3d\_OLETKF\_State\_HighRes***

Frequency: 6-hourly from 00:00 UTC (instantaneous)

Spatial Grid: 3D, model-level, full horizontal resolution

Dimensions: longitude=720, latitude=361, level=40, time=1

**Granule Size:** ~83 MB

**Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
S	tzyx	salinity	psu
T	tzyx	potential temperature	K

**Frequency:** *monthly mean from 00:00 UTC (instantaneous)*

**Granule Size:** ~163 MB

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_S	tzyx	Variance of S	psu psu
Var_T	tzyx	Variance of T	K K

## ***Two-Dimensional Time-Averaged Collections***

### ***geosgcm\_6hravg: 2d\_Average***

**Frequency:** *6-hourly from 00:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** ~5 MB

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
PRECTOT	tyx	total precipitation	kg m-2 s-1

**Frequency:** *monthly mean from 00:00 UTC (time-averaged)*

**Granule Size:** ~6 MB

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_PRECTOT	tyx	Variance of PRECTOT	kg m-2 s-1 kg m-2 s-1

***geosgcm\_aero: 2d\_Aerosol\_Diagnostics***

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** *~206 MB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
BCANGSTR	tyx	Black Carbon Angstrom parameter [470-870 nm]	1
BCCMASS	tyx	Black Carbon Column Mass Density	kg m-2
BCDP001	tyx	Black Carbon Dry Deposition Bin 001	kg m-2 s-1
BCDP002	tyx	Black Carbon Dry Deposition Bin 002	kg m-2 s-1
BCEM001	tyx	Black Carbon Emission Bin 001	kg m-2 s-1
BCEM002	tyx	Black Carbon Emission Bin 002	kg m-2 s-1
BCEMAN	tyx	Black Carbon Anthropogenic Emissions	kg m-2 s-1
BCEMBB	tyx	Black Carbon Biomass Burning Emissions	kg m-2 s-1
BCEMBF	tyx	Black Carbon Biofuel Emissions	kg m-2 s-1
BCEXTTAU	tyx	Black Carbon Extinction AOT [550 nm]	1
BCFLUXU	tyx	Black Carbon column u-wind mass flux	kg m-1 s-1
BCFLUXV	tyx	Black Carbon column v-wind mass flux	kg m-1 s-1
BCHYPHIL	tyx	Black Carbon Hydrophobic to Hydrophilic	kg m-2 s-1
BCSCATAU	tyx	Black Carbon Scattering AOT [550 nm]	1
BCSMASS	tyx	Black Carbon Surface Mass Concentration	kg m-3
BCSV	tyx	black carbon tendency due to conv scav	kg m-2 s-1
BCWT001	tyx	Black Carbon Wet Deposition Bin 001	kg m-2 s-1
BCWT002	tyx	Black Carbon Wet Deposition Bin 002	kg m-2 s-1
DMSCMASS	tyx	DMS Column Mass Density	kg m-2
DMSSMASS	tyx	DMS Surface Mass Concentration	kg m-3

DUAERIDX	tyx	Dust TOMS UV Aerosol Index	1
DUANGSTR	tyx	Dust Angstrom parameter [470-870 nm]	1
DUCMASS	tyx	Dust Column Mass Density	kg m <sup>-2</sup>
DUCMASS25	tyx	Dust Column Mass Density - PM 2.5	kg m <sup>-2</sup>
DUDP001	tyx	Dust Dry Deposition Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
DUDP002	tyx	Dust Dry Deposition Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
DUDP003	tyx	Dust Dry Deposition Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
DUDP004	tyx	Dust Dry Deposition Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
DUDP005	tyx	Dust Dry Deposition Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
DUEM001	tyx	Dust Emission Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
DUEM002	tyx	Dust Emission Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
DUEM003	tyx	Dust Emission Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
DUEM004	tyx	Dust Emission Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
DUEM005	tyx	Dust Emission Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
DUEXTT25	tyx	Dust Extinction AOT [550 nm] - PM 2.5	1
DUEXTTAU	tyx	Dust Extinction AOT [550 nm]	1
DUEXTTFM	tyx	Dust Extinction AOT [550 nm] - PM 1.0 um	1
DUFLUXU	tyx	Dust column u-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
DUFLUXV	tyx	Dust column v-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
DUSCAT25	tyx	Dust Scattering AOT [550 nm] - PM 2.5	1
DUSCATAU	tyx	Dust Scattering AOT [550 nm]	1
DUSCATFM	tyx	Dust Scattering AOT [550 nm] - PM 1.0 um	1
DUSD001	tyx	Dust Sedimentation Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
DUSD002	tyx	Dust Sedimentation Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
DUSD003	tyx	Dust Sedimentation Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
DUSD004	tyx	Dust Sedimentation Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
DUSD005	tyx	Dust Sedimentation Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
DUSMASS	tyx	Dust Surface Mass Concentration	kg m <sup>-3</sup>
DUSMASS25	tyx	Dust Surface Mass Concentration - PM 2.5	kg m <sup>-3</sup>
DUSV	tyx	dust tendency due to conv scav	kg m <sup>-2</sup> s <sup>-1</sup>
DUSV001	tyx	Dust Convective Scavenging Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
DUSV002	tyx	Dust Convective Scavenging Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
DUSV003	tyx	Dust Convective Scavenging Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
DUSV004	tyx	Dust Convective Scavenging Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>



DUSV005	tyx	Dust Convective Scavenging Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
DUWT001	tyx	Dust Wet Deposition Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
DUWT002	tyx	Dust Wet Deposition Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
DUWT003	tyx	Dust Wet Deposition Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
DUWT004	tyx	Dust Wet Deposition Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
DUWT005	tyx	Dust Wet Deposition Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
HNO3CMASS	tyx	Nitric Acid Column Mass Density	kg m <sup>-3</sup>
HNO3SMASS	tyx	Nitric Acid Surface Mass Concentration	kg m <sup>-3</sup>
LWI	tyx	land(1) water(0) ice(2) flag	1
NH3CMASS	tyx	Ammonia Column Mass Density	kg m <sup>-3</sup>
NH3DP	tyx	Ammonia Dry Deposition	kg m <sup>-2</sup> s <sup>-1</sup>
NH3EM	tyx	Ammonia Emission	kg m <sup>-2</sup> s <sup>-1</sup>
NH3SMASS	tyx	Ammonia Surface Mass Concentration	kg m <sup>-3</sup>
NH3SV	tyx	Ammonia Convective Scavenging	kg m <sup>-2</sup> s <sup>-1</sup>
NH3WT	tyx	Ammonia Wet Deposition	kg m <sup>-2</sup> s <sup>-1</sup>
NH4CMASS	tyx	Ammonium Column Mass Density	kg m <sup>-3</sup>
NH4DP	tyx	Ammonium Dry Deposition	kg m <sup>-2</sup> s <sup>-1</sup>
NH4SD	tyx	Ammonium Settling	kg m <sup>-2</sup> s <sup>-1</sup>
NH4SMASS	tyx	Ammonium Surface Mass Concentration	kg m <sup>-3</sup>
NH4SV	tyx	Ammonium Convective Scavenging	kg m <sup>-2</sup> s <sup>-1</sup>
NH4WT	tyx	Ammonium Wet Deposition	kg m <sup>-2</sup> s <sup>-1</sup>
NIANGSTR	tyx	Nitrate Angstrom parameter [470-870 nm]	1
NICMASS	tyx	Nitrate Column Mass Density	kg m <sup>-2</sup>
NICMASS25	tyx	Nitrate Column Mass Density [PM2.5]	kg m <sup>-2</sup>
NIDP001	tyx	Nitrate Dry Deposition Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
NIDP002	tyx	Nitrate Dry Deposition Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
NIDP003	tyx	Nitrate Dry Deposition Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
NIEXTTAU	tyx	Nitrate Extinction AOT [550 nm]	1
NIEXTTFM	tyx	Nitrate Extinction AOT [550 nm] - PM 1.0 um	1
NIFLUXU	tyx	Nitrate column u-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
NIFLUXV	tyx	Nitrate column v-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
NIHT001	tyx	Nitrate Production from Het Chem Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
NIHT002	tyx	Nitrate Production from Het Chem Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
NIHT003	tyx	Nitrate Production from Het Chem Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>

NIPNH3AQ	tyx	Ammonia Change from Aqueous Chemistry	kg m <sup>-2</sup> s <sup>-1</sup>
NIPNH4AQ	tyx	Ammonium Production from Aqueous Chemistry	kg m <sup>-2</sup> s <sup>-1</sup>
NIPNO3AQ	tyx	Nitrate Production from Aqueous Chemistry	kg m <sup>-2</sup> s <sup>-1</sup>
NISCATAU	tyx	Nitrate Scattering AOT [550 nm]	1
NISCATFM	tyx	Nitrate Scattering AOT [550 nm] - PM 1.0 um	1
NISD001	tyx	Nitrate Sedimentation Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
NISD002	tyx	Nitrate Sedimentation Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
NISD003	tyx	Nitrate Sedimentation Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
NISMASS	tyx	Nitrate Surface Mass Concentration	kg m <sup>-3</sup>
NISMASS25	tyx	Nitrate Surface Mass Concentration [PM2.5]	kg m <sup>-3</sup>
NISV001	tyx	Nitrate Convective Scavenging Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
NISV002	tyx	Nitrate Convective Scavenging Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
NISV003	tyx	Nitrate Convective Scavenging Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
NIWT001	tyx	Nitrate Wet Deposition Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
NIWT002	tyx	Nitrate Wet Deposition Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
NIWT003	tyx	Nitrate Wet Deposition Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
OCANGSTR	tyx	Organic Carbon Angstrom parameter [470-870 nm]	1
OCCMASS	tyx	Organic Carbon Column Mass Density	kg m <sup>-2</sup>
OCDP001	tyx	Organic Carbon Dry Deposition Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
OCDP002	tyx	Organic Carbon Dry Deposition Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
OCEM001	tyx	Organic Carbon Emission Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
OCEM002	tyx	Organic Carbon Emission Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
OCEMAN	tyx	Organic Carbon Anthropogenic Emissions	kg m <sup>-2</sup> s <sup>-1</sup>
OCEMBB	tyx	Organic Carbon Biomass Burning Emissions	kg m <sup>-2</sup> s <sup>-1</sup>
OCEMBF	tyx	Organic Carbon Biofuel Emissions	kg m <sup>-2</sup> s <sup>-1</sup>
OCEMBG	tyx	Organic Carbon Biogenic Emissions	kg m <sup>-2</sup> s <sup>-1</sup>
OCEXTTAU	tyx	Organic Carbon Extinction AOT [550 nm]	1
OCFLUXU	tyx	Organic Carbon column u-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
OCFLUXV	tyx	Organic Carbon column v-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
OCHYPHIL	tyx	Organic Carbon Hydrophobic to Hydrophilic	kg m <sup>-2</sup> s <sup>-1</sup>
OCSCATAU	tyx	Organic Carbon Scattering AOT [550 nm]	1
OCSMASS	tyx	Organic Carbon Surface Mass Concentration	kg m <sup>-3</sup>
OCSV	tyx	organic carbon tendency due to conv scav	kg m <sup>-2</sup> s <sup>-1</sup>
OCWT001	tyx	Organic Carbon Wet Deposition Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>

OCWT002	tyx	Organic Carbon Wet Deposition Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
SO2CMASS	tyx	SO2 Column Mass Density	kg m <sup>-2</sup>
SO2EMAN	tyx	SO2 Anthropogenic Emissions	kg m <sup>-2</sup> s <sup>-1</sup>
SO2EMBB	tyx	SO2 Biomass Burning Emissions	kg m <sup>-2</sup> s <sup>-1</sup>
SO2EMVE	tyx	SO2 Volcanic (explosive) Emissions	kg m <sup>-2</sup> s <sup>-1</sup>
SO2EMVN	tyx	SO2 Volcanic (non-explosive) Emissions	kg m <sup>-2</sup> s <sup>-1</sup>
SO2SMASS	tyx	SO2 Surface Mass Concentration	kg m <sup>-3</sup>
SO4CMASS	tyx	SO4 Column Mass Density	kg m <sup>-2</sup>
SO4EMAN	tyx	SO4 Anthropogenic Emissions	kg m <sup>-2</sup> s <sup>-1</sup>
SO4SMASS	tyx	SO4 Surface Mass Concentration	kg m <sup>-3</sup>
SSAERIDX	tyx	Sea Salt TOMS UV Aerosol Index	1
SSANGSTR	tyx	Sea Salt Angstrom parameter [470-870 nm]	1
SSCMASS	tyx	Sea Salt Column Mass Density	kg m <sup>-2</sup>
SSCMASS25	tyx	Sea Salt Column Mass Density - PM 2.5	kg m <sup>-2</sup>
SSDP001	tyx	Sea Salt Dry Deposition Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
SSDP002	tyx	Sea Salt Dry Deposition Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
SSDP003	tyx	Sea Salt Dry Deposition Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
SSDP004	tyx	Sea Salt Dry Deposition Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
SSDP005	tyx	Sea Salt Dry Deposition Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
SSEM001	tyx	Sea Salt Emission Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
SSEM002	tyx	Sea Salt Emission Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
SSEM003	tyx	Sea Salt Emission Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
SSEM004	tyx	Sea Salt Emission Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
SSEM005	tyx	Sea Salt Emission Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
SSEXTT25	tyx	Sea Salt Extinction AOT [550 nm] - PM 2.5	1
SSEXTTAU	tyx	Sea Salt Extinction AOT [550 nm]	1
SSEXTTFM	tyx	Sea Salt Extinction AOT [550 nm] - PM 1.0 um	1
SSFLUXU	tyx	Sea Salt column u-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
SSFLUXV	tyx	Sea Salt column v-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
SSSCAT25	tyx	Sea Salt Scattering AOT [550 nm] - PM 2.5	1
SSSCATAU	tyx	Sea Salt Scattering AOT [550 nm]	1
SSSCATFM	tyx	Sea Salt Scattering AOT [550 nm] - PM 1.0 um	1
SSSD001	tyx	Sea Salt Sedimentation Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
SSSD002	tyx	Sea Salt Sedimentation Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>

SSSD003	tyx	Sea Salt Sedimentation Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
SSSD004	tyx	Sea Salt Sedimentation Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
SSSD005	tyx	Sea Salt Sedimentation Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
SSSMASS	tyx	Sea Salt Surface Mass Concentration	kg m <sup>-3</sup>
SSSMASS25	tyx	Sea Salt Surface Mass Concentration - PM 2.5	kg m <sup>-3</sup>
SSSV	tyx	sea salt tendency due to conv scav	kg m <sup>-2</sup> s <sup>-1</sup>
SSSV001	tyx	Sea Salt Convective Scavenging Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
SSSV002	tyx	Sea Salt Convective Scavenging Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
SSSV003	tyx	Sea Salt Convective Scavenging Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
SSSV004	tyx	Sea Salt Convective Scavenging Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
SSSV005	tyx	Sea Salt Convective Scavenging Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
SSWT001	tyx	Sea Salt Wet Deposition Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
SSWT002	tyx	Sea Salt Wet Deposition Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
SSWT003	tyx	Sea Salt Wet Deposition Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
SSWT004	tyx	Sea Salt Wet Deposition Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
SSWT005	tyx	Sea Salt Wet Deposition Bin 005	kg m <sup>-2</sup> s <sup>-1</sup>
SUANGSTR	tyx	SO4 Angstrom parameter [470-870 nm]	1
SUDP001	tyx	Sulfate Dry Deposition Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
SUDP002	tyx	Sulfate Dry Deposition Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
SUDP003	tyx	Sulfate Dry Deposition Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
SUDP004	tyx	Sulfate Dry Deposition Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
SUEM001	tyx	Sulfate Emission Bin 001	kg m <sup>-2</sup> s <sup>-1</sup>
SUEM002	tyx	Sulfate Emission Bin 002	kg m <sup>-2</sup> s <sup>-1</sup>
SUEM003	tyx	Sulfate Emission Bin 003	kg m <sup>-2</sup> s <sup>-1</sup>
SUEM004	tyx	Sulfate Emission Bin 004	kg m <sup>-2</sup> s <sup>-1</sup>
SUEXTTAU	tyx	SO4 Extinction AOT [550 nm]	1
SUFLUXU	tyx	SO4 column u-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
SUFLUXV	tyx	SO4 column v-wind mass flux	kg m <sup>-1</sup> s <sup>-1</sup>
SUPMSA	tyx	MSA Prod from DMS Oxidation [column]	kg m <sup>-2</sup> s <sup>-1</sup>
SUPSO2	tyx	SO2 Prod from DMS Oxidation [column]	kg m <sup>-2</sup> s <sup>-1</sup>
SUPSO4AQ	tyx	SO4 Prod from Aqueous SO2 Oxidation [column]	kg m <sup>-2</sup> s <sup>-1</sup>
SUPSO4G	tyx	SO4 Prod from Gaseous SO2 Oxidation [column]	kg m <sup>-2</sup> s <sup>-1</sup>
SUPSO4WT	tyx	SO4 Prod from Aqueous SO2 Oxidation (wet dep) [column]	kg m <sup>-2</sup> s <sup>-1</sup>

SUSCATAU	tyx	SO4 Scattering AOT [550 nm]	1
SUSV	tyx	sulfate tendency due to conv scav	kg m-2 s-1
SUSV001	tyx	Sulfate Convective Scavenging Bin 001	kg m-2 s-1
SUSV002	tyx	Sulfate Convective Scavenging Bin 002	kg m-2 s-1
SUSV003	tyx	Sulfate Convective Scavenging Bin 003	kg m-2 s-1
SUSV004	tyx	Sulfate Convective Scavenging Bin 004	kg m-2 s-1
SUWT001	tyx	Sulfate Wet Deposition Bin 001	kg m-2 s-1
SUWT002	tyx	Sulfate Wet Deposition Bin 002	kg m-2 s-1
SUWT003	tyx	Sulfate Wet Deposition Bin 003	kg m-2 s-1
SUWT004	tyx	Sulfate Wet Deposition Bin 004	kg m-2 s-1
TOTANGSTR	tyx	Total Aerosol Angstrom parameter [470-870 nm]	1
TOTEXTTAU	tyx	Total Aerosol Extinction AOT [550 nm]	1
TOTSCATAU	tyx	Total Aerosol Scattering AOT [550 nm]	1

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~407 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:**

Name	Dim	Description	Units
Var_BCANGSTR	tyx	Variance of BCANGSTR	1 1
Var_BCCMASS	tyx	Variance of BCCMASS	kg m-2 kg m-2
Var_BCDP001	tyx	Variance of BCDP001	kg m-2 s-1 kg m-2 s-1
Var_BCDP002	tyx	Variance of BCDP002	kg m-2 s-1 kg m-2 s-1
Var_BCEM001	tyx	Variance of BCEM001	kg m-2 s-1 kg m-2 s-1
Var_BCEM002	tyx	Variance of BCEM002	kg m-2 s-1 kg m-2 s-1
Var_BCEMAN	tyx	Variance of BCEMAN	kg m-2 s-1 kg m-2 s-1
Var_BCEMBB	tyx	Variance of BCEMBB	kg m-2 s-1 kg m-2 s-1
Var_BCEMBF	tyx	Variance of BCEMBF	kg m-2 s-1 kg m-2 s-1
Var_BCEXTTAU	tyx	Variance of BCEXTTAU	1 1
Var_BCFLUXU	tyx	Variance of BCFLUXU	kg m-1 s-1 kg m-1 s-1
Var_BCFLUXV	tyx	Variance of BCFLUXV	kg m-1 s-1 kg m-1 s-1
Var_BCHYPHIL	tyx	Variance of BCHYPHIL	kg m-2 s-1 kg m-2 s-1
Var_BCSCATAU	tyx	Variance of BCSCATAU	1 1

Var_BCSMASS	tyx	Variance of BCSMASS	kg m-3 kg m-3
Var_BCSV	tyx	Variance of BCSV	kg m-2 s-1 kg m-2 s-1
Var_BCWT001	tyx	Variance of BCWT001	kg m-2 s-1 kg m-2 s-1
Var_BCWT002	tyx	Variance of BCWT002	kg m-2 s-1 kg m-2 s-1
Var_DMSCMASS	tyx	Variance of DMSCMASS	kg m-2 kg m-2
Var_DMSSMASS	tyx	Variance of DMSSMASS	kg m-3 kg m-3
Var_DUAERIDX	tyx	Variance of DUAERIDX	1 1
Var_DUANGSTR	tyx	Variance of DUANGSTR	1 1
Var_DUCMASS	tyx	Variance of DUCMASS	kg m-2 kg m-2
Var_DUCMASS25	tyx	Variance of DUCMASS25	kg m-2 kg m-2
Var_DUDP001	tyx	Variance of DUDP001	kg m-2 s-1 kg m-2 s-1
Var_DUDP002	tyx	Variance of DUDP002	kg m-2 s-1 kg m-2 s-1
Var_DUDP003	tyx	Variance of DUDP003	kg m-2 s-1 kg m-2 s-1
Var_DUDP004	tyx	Variance of DUDP004	kg m-2 s-1 kg m-2 s-1
Var_DUDP005	tyx	Variance of DUDP005	kg m-2 s-1 kg m-2 s-1
Var_DUEM001	tyx	Variance of DUEM001	kg m-2 s-1 kg m-2 s-1
Var_DUEM002	tyx	Variance of DUEM002	kg m-2 s-1 kg m-2 s-1
Var_DUEM003	tyx	Variance of DUEM003	kg m-2 s-1 kg m-2 s-1
Var_DUEM004	tyx	Variance of DUEM004	kg m-2 s-1 kg m-2 s-1
Var_DUEM005	tyx	Variance of DUEM005	kg m-2 s-1 kg m-2 s-1
Var_DUEXTT25	tyx	Variance of DUEXTT25	1 1
Var_DUEXTTAU	tyx	Variance of DUEXTTAU	1 1
Var_DUEXTTFM	tyx	Variance of DUEXTTFM	1 1
Var_DUFLUXU	tyx	Variance of DUFLUXU	kg m-1 s-1 kg m-1 s-1
Var_DUFLUXV	tyx	Variance of DUFLUXV	kg m-1 s-1 kg m-1 s-1
Var_DUSCAT25	tyx	Variance of DUSCAT25	1 1
Var_DUSCATAU	tyx	Variance of DUSCATAU	1 1
Var_DUSCATFM	tyx	Variance of DUSCATFM	1 1
Var_DUSD001	tyx	Variance of DUSD001	kg m-2 s-1 kg m-2 s-1
Var_DUSD002	tyx	Variance of DUSD002	kg m-2 s-1 kg m-2 s-1
Var_DUSD003	tyx	Variance of DUSD003	kg m-2 s-1 kg m-2 s-1
Var_DUSD004	tyx	Variance of DUSD004	kg m-2 s-1 kg m-2 s-1
Var_DUSD005	tyx	Variance of DUSD005	kg m-2 s-1 kg m-2 s-1

Var_DUSMASS	tyx	Variance of DUSMASS	kg m-3 kg m-3
Var_DUSMASS25	tyx	Variance of DUSMASS25	kg m-3 kg m-3
Var_DUSV	tyx	Variance of DUSV	kg m-2 s-1 kg m-2 s-1
Var_DUSV001	tyx	Variance of DUSV001	kg m-2 s-1 kg m-2 s-1
Var_DUSV002	tyx	Variance of DUSV002	kg m-2 s-1 kg m-2 s-1
Var_DUSV003	tyx	Variance of DUSV003	kg m-2 s-1 kg m-2 s-1
Var_DUSV004	tyx	Variance of DUSV004	kg m-2 s-1 kg m-2 s-1
Var_DUSV005	tyx	Variance of DUSV005	kg m-2 s-1 kg m-2 s-1
Var_DUWT001	tyx	Variance of DUWT001	kg m-2 s-1 kg m-2 s-1
Var_DUWT002	tyx	Variance of DUWT002	kg m-2 s-1 kg m-2 s-1
Var_DUWT003	tyx	Variance of DUWT003	kg m-2 s-1 kg m-2 s-1
Var_DUWT004	tyx	Variance of DUWT004	kg m-2 s-1 kg m-2 s-1
Var_DUWT005	tyx	Variance of DUWT005	kg m-2 s-1 kg m-2 s-1
Var_HNO3CMASS	tyx	Variance of HNO3CMASS	kg m-3 kg m-3
Var_HNO3SMASS	tyx	Variance of HNO3SMASS	kg m-3 kg m-3
Var_LWI	tyx	Variance of LWI	1 1
Var_NH3CMASS	tyx	Variance of NH3CMASS	kg m-3 kg m-3
Var_NH3DP	tyx	Variance of NH3DP	kg m-2 s-1 kg m-2 s-1
Var_NH3EM	tyx	Variance of NH3EM	kg m-2 s-1 kg m-2 s-1
Var_NH3SMASS	tyx	Variance of NH3SMASS	kg m-3 kg m-3
Var_NH3SV	tyx	Variance of NH3SV	kg m-2 s-1 kg m-2 s-1
Var_NH3WT	tyx	Variance of NH3WT	kg m-2 s-1 kg m-2 s-1
Var_NH4CMASS	tyx	Variance of NH4CMASS	kg m-3 kg m-3
Var_NH4DP	tyx	Variance of NH4DP	kg m-2 s-1 kg m-2 s-1
Var_NH4SD	tyx	Variance of NH4SD	kg m-2 s-1 kg m-2 s-1
Var_NH4SMASS	tyx	Variance of NH4SMASS	kg m-3 kg m-3
Var_NH4SV	tyx	Variance of NH4SV	kg m-2 s-1 kg m-2 s-1
Var_NH4WT	tyx	Variance of NH4WT	kg m-2 s-1 kg m-2 s-1
Var_NIANGSTR	tyx	Variance of NIANGSTR	1 1
Var_NICMASS	tyx	Variance of NICMASS	kg m-2 kg m-2
Var_NICMASS25	tyx	Variance of NICMASS25	kg m-2 kg m-2
Var_NIDP001	tyx	Variance of NIDP001	kg m-2 s-1 kg m-2 s-1
Var_NIDP002	tyx	Variance of NIDP002	kg m-2 s-1 kg m-2 s-1

Var_NIDP003	tyx	Variance of NIDP003	kg m-2 s-1 kg m-2 s-1
Var_NIEXTTAU	tyx	Variance of NIEXTTAU	1 1
Var_NIEXTTFM	tyx	Variance of NIEXTTFM	1 1
Var_NIFLUXU	tyx	Variance of NIFLUXU	kg m-1 s-1 kg m-1 s-1
Var_NIFLUXV	tyx	Variance of NIFLUXV	kg m-1 s-1 kg m-1 s-1
Var_NIHT001	tyx	Variance of NIHT001	kg m-2 s-1 kg m-2 s-1
Var_NIHT002	tyx	Variance of NIHT002	kg m-2 s-1 kg m-2 s-1
Var_NIHT003	tyx	Variance of NIHT003	kg m-2 s-1 kg m-2 s-1
Var_NIPNH3AQ	tyx	Variance of NIPNH3AQ	kg m-2 s-1 kg m-2 s-1
Var_NIPNH4AQ	tyx	Variance of NIPNH4AQ	kg m-2 s-1 kg m-2 s-1
Var_NIPNO3AQ	tyx	Variance of NIPNO3AQ	kg m-2 s-1 kg m-2 s-1
Var_NISCATAU	tyx	Variance of NISCATAU	1 1
Var_NISCATFM	tyx	Variance of NISCATFM	1 1
Var_NISD001	tyx	Variance of NISD001	kg m-2 s-1 kg m-2 s-1
Var_NISD002	tyx	Variance of NISD002	kg m-2 s-1 kg m-2 s-1
Var_NISD003	tyx	Variance of NISD003	kg m-2 s-1 kg m-2 s-1
Var_NISMASS	tyx	Variance of NISMASS	kg m-3 kg m-3
Var_NISMASS25	tyx	Variance of NISMASS25	kg m-3 kg m-3
Var_NISV001	tyx	Variance of NISV001	kg m-2 s-1 kg m-2 s-1
Var_NISV002	tyx	Variance of NISV002	kg m-2 s-1 kg m-2 s-1
Var_NISV003	tyx	Variance of NISV003	kg m-2 s-1 kg m-2 s-1
Var_NIWT001	tyx	Variance of NIWT001	kg m-2 s-1 kg m-2 s-1
Var_NIWT002	tyx	Variance of NIWT002	kg m-2 s-1 kg m-2 s-1
Var_NIWT003	tyx	Variance of NIWT003	kg m-2 s-1 kg m-2 s-1
Var_OCANGSTR	tyx	Variance of OCANGSTR	1 1
Var_OCCMASS	tyx	Variance of OCCMASS	kg m-2 kg m-2
Var_OCDP001	tyx	Variance of OCPD001	kg m-2 s-1 kg m-2 s-1
Var_OCDP002	tyx	Variance of OCPD002	kg m-2 s-1 kg m-2 s-1
Var_OCEM001	tyx	Variance of OCEM001	kg m-2 s-1 kg m-2 s-1
Var_OCEM002	tyx	Variance of OCEM002	kg m-2 s-1 kg m-2 s-1
Var_OCEMAN	tyx	Variance of OCEMAN	kg m-2 s-1 kg m-2 s-1
Var_OCEMBB	tyx	Variance of OCEMBB	kg m-2 s-1 kg m-2 s-1
Var_OCEMBF	tyx	Variance of OCEMBF	kg m-2 s-1 kg m-2 s-1



Var_OCEMBG	tyx	Variance of OCEMBG	kg m-2 s-1 kg m-2 s-1
Var_OCEXTTAU	tyx	Variance of OCEXTTAU	1 1
Var_OCFLUXU	tyx	Variance of OCFLUXU	kg m-1 s-1 kg m-1 s-1
Var_OCFLUXV	tyx	Variance of OCFLUXV	kg m-1 s-1 kg m-1 s-1
Var_OCHYPHIL	tyx	Variance of OCHYPHIL	kg m-2 s-1 kg m-2 s-1
Var_OCSCATAU	tyx	Variance of OCSCATAU	1 1
Var_OCSMASS	tyx	Variance of OCSMASS	kg m-3 kg m-3
Var_OCSV	tyx	Variance of OCSV	kg m-2 s-1 kg m-2 s-1
Var_OCWT001	tyx	Variance of OCWT001	kg m-2 s-1 kg m-2 s-1
Var_OCWT002	tyx	Variance of OCWT002	kg m-2 s-1 kg m-2 s-1
Var_SO2CMASS	tyx	Variance of SO2CMASS	kg m-2 kg m-2
Var_SO2EMAN	tyx	Variance of SO2EMAN	kg m-2 s-1 kg m-2 s-1
Var_SO2EMBB	tyx	Variance of SO2EMBB	kg m-2 s-1 kg m-2 s-1
Var_SO2EMVE	tyx	Variance of SO2EMVE	kg m-2 s-1 kg m-2 s-1
Var_SO2EMVN	tyx	Variance of SO2EMVN	kg m-2 s-1 kg m-2 s-1
Var_SO2SMASS	tyx	Variance of SO2SMASS	kg m-3 kg m-3
Var_SO4CMASS	tyx	Variance of SO4CMASS	kg m-2 kg m-2
Var_SO4EMAN	tyx	Variance of SO4EMAN	kg m-2 s-1 kg m-2 s-1
Var_SO4SMASS	tyx	Variance of SO4SMASS	kg m-3 kg m-3
Var_SSAERIDX	tyx	Variance of SSAERIDX	1 1
Var_SSANGSTR	tyx	Variance of SSANGSTR	1 1
Var_SSCMASS	tyx	Variance of SSCMASS	kg m-2 kg m-2
Var_SSCMASS25	tyx	Variance of SSCMASS25	kg m-2 kg m-2
Var_SSDP001	tyx	Variance of SSDP001	kg m-2 s-1 kg m-2 s-1
Var_SSDP002	tyx	Variance of SSDP002	kg m-2 s-1 kg m-2 s-1
Var_SSDP003	tyx	Variance of SSDP003	kg m-2 s-1 kg m-2 s-1
Var_SSDP004	tyx	Variance of SSDP004	kg m-2 s-1 kg m-2 s-1
Var_SSDP005	tyx	Variance of SSDP005	kg m-2 s-1 kg m-2 s-1
Var_SSEM001	tyx	Variance of SSEM001	kg m-2 s-1 kg m-2 s-1
Var_SSEM002	tyx	Variance of SSEM002	kg m-2 s-1 kg m-2 s-1
Var_SSEM003	tyx	Variance of SSEM003	kg m-2 s-1 kg m-2 s-1
Var_SSEM004	tyx	Variance of SSEM004	kg m-2 s-1 kg m-2 s-1
Var_SSEM005	tyx	Variance of SSEM005	kg m-2 s-1 kg m-2 s-1

Var_SSEXTT25	tyx	Variance of SSEXTT25	1 1
Var_SSEXTTAU	tyx	Variance of SSEXTTAU	1 1
Var_SSEXTTFM	tyx	Variance of SSEXTTFM	1 1
Var_SSFLUXU	tyx	Variance of SSFLUXU	kg m-1 s-1 kg m-1 s-1
Var_SSFLUXV	tyx	Variance of SSFLUXV	kg m-1 s-1 kg m-1 s-1
Var_SSSCAT25	tyx	Variance of SSSCAT25	1 1
Var_SSSCATAU	tyx	Variance of SSSCATAU	1 1
Var_SSSCATFM	tyx	Variance of SSSCATFM	1 1
Var_SSSD001	tyx	Variance of SSSD001	kg m-2 s-1 kg m-2 s-1
Var_SSSD002	tyx	Variance of SSSD002	kg m-2 s-1 kg m-2 s-1
Var_SSSD003	tyx	Variance of SSSD003	kg m-2 s-1 kg m-2 s-1
Var_SSSD004	tyx	Variance of SSSD004	kg m-2 s-1 kg m-2 s-1
Var_SSSD005	tyx	Variance of SSSD005	kg m-2 s-1 kg m-2 s-1
Var_SSSMASS	tyx	Variance of SSSMASS	kg m-3 kg m-3
Var_SSSMASS25	tyx	Variance of SSSMASS25	kg m-3 kg m-3
Var_SSSV	tyx	Variance of SSSV	kg m-2 s-1 kg m-2 s-1
Var_SSSV001	tyx	Variance of SSSV001	kg m-2 s-1 kg m-2 s-1
Var_SSSV002	tyx	Variance of SSSV002	kg m-2 s-1 kg m-2 s-1
Var_SSSV003	tyx	Variance of SSSV003	kg m-2 s-1 kg m-2 s-1
Var_SSSV004	tyx	Variance of SSSV004	kg m-2 s-1 kg m-2 s-1
Var_SSSV005	tyx	Variance of SSSV005	kg m-2 s-1 kg m-2 s-1
Var_SSWT001	tyx	Variance of SSWT001	kg m-2 s-1 kg m-2 s-1
Var_SSWT002	tyx	Variance of SSWT002	kg m-2 s-1 kg m-2 s-1
Var_SSWT003	tyx	Variance of SSWT003	kg m-2 s-1 kg m-2 s-1
Var_SSWT004	tyx	Variance of SSWT004	kg m-2 s-1 kg m-2 s-1
Var_SSWT005	tyx	Variance of SSWT005	kg m-2 s-1 kg m-2 s-1
Var_SUANGSTR	tyx	Variance of SUANGSTR	1 1
Var_SUDP001	tyx	Variance of SUDP001	kg m-2 s-1 kg m-2 s-1
Var_SUDP002	tyx	Variance of SUDP002	kg m-2 s-1 kg m-2 s-1
Var_SUDP003	tyx	Variance of SUDP003	kg m-2 s-1 kg m-2 s-1
Var_SUDP004	tyx	Variance of SUDP004	kg m-2 s-1 kg m-2 s-1
Var_SUEM001	tyx	Variance of SUEM001	kg m-2 s-1 kg m-2 s-1
Var_SUEM002	tyx	Variance of SUEM002	kg m-2 s-1 kg m-2 s-1

Var_SUEM003	tyx	Variance of SUEM003	kg m-2 s-1 kg m-2 s-1
Var_SUEM004	tyx	Variance of SUEM004	kg m-2 s-1 kg m-2 s-1
Var_SUEXTTAU	tyx	Variance of SUEXTTAU	1 1
Var_SUFLUXU	tyx	Variance of SUFLUXU	kg m-1 s-1 kg m-1 s-1
Var_SUFLUXV	tyx	Variance of SUFLUXV	kg m-1 s-1 kg m-1 s-1
Var_SUPMSA	tyx	Variance of SUPMSA	kg m-2 s-1 kg m-2 s-1
Var_SUPSO2	tyx	Variance of SUPSO2	kg m-2 s-1 kg m-2 s-1
Var_SUPSO4AQ	tyx	Variance of SUPSO4AQ	kg m-2 s-1 kg m-2 s-1
Var_SUPSO4G	tyx	Variance of SUPSO4G	kg m-2 s-1 kg m-2 s-1
Var_SUPSO4WT	tyx	Variance of SUPSO4WT	kg m-2 s-1 kg m-2 s-1
Var_SUSCATAU	tyx	Variance of SUSCATAU	1 1
Var_SUSV	tyx	Variance of SUSV	kg m-2 s-1 kg m-2 s-1
Var_SUSV001	tyx	Variance of SUSV001	kg m-2 s-1 kg m-2 s-1
Var_SUSV002	tyx	Variance of SUSV002	kg m-2 s-1 kg m-2 s-1
Var_SUSV003	tyx	Variance of SUSV003	kg m-2 s-1 kg m-2 s-1
Var_SUSV004	tyx	Variance of SUSV004	kg m-2 s-1 kg m-2 s-1
Var_SUWT001	tyx	Variance of SUWT001	kg m-2 s-1 kg m-2 s-1
Var_SUWT002	tyx	Variance of SUWT002	kg m-2 s-1 kg m-2 s-1
Var_SUWT003	tyx	Variance of SUWT003	kg m-2 s-1 kg m-2 s-1
Var_SUWT004	tyx	Variance of SUWT004	kg m-2 s-1 kg m-2 s-1
Var_TOTANGSTR	tyx	Variance of TOTANGSTR	1 1
Var_TOTEXTTAU	tyx	Variance of TOTEXTTAU	1 1
Var_TOTSCATAU	tyx	Variance of TOTSCATAU	1 1

***geosgcm\_chmx: Aerosols/Constituents\_Chemistry***

**Frequency:** *daily value from 12:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** *~10 MB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
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COCL	tyx	CO Column Burden	kg m-2
COEM	tyx	CO Emission	kg m-2 s-1
COLS	tyx	CO Chemical Loss	kg m-2 s-1
COPD	tyx	CO Chemical Production	kg m-2 s-1
COSC	tyx	CO Surface Concentration in ppbv	1e-9
LWI	tyx	land(1) water(0) ice(2) flag	1

**Frequency:** *monthly mean from 12:00 UTC (time-averaged)*

**Granule Size:** *~16 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:**

Name	Dim	Description	Units
Var_COCL	tyx	Variance of COCL	kg m-2 kg m-2
Var_COEM	tyx	Variance of COEM	kg m-2 s-1 kg m-2 s-1
Var_COLS	tyx	Variance of COLS	kg m-2 s-1 kg m-2 s-1
Var_COPD	tyx	Variance of COPD	kg m-2 s-1 kg m-2 s-1
Var_COSC	tyx	Variance of COSC	1e-9 1e-9
Var_LWI	tyx	Variance of LWI	1 1

***geosgcm\_fwimetx: Fire Weather Index***

**Frequency:** *1-hourly from 21:30 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** *~15 MB*

**Note – Forecast only collection.**

Name	Dim	Description	Units
PRECTOT	tyx	total precipitation	kg m-2 s-1
Q10M	tyx	10-meter specific humidity	kg kg-1
Q2M	tyx	2-meter specific humidity	kg kg-1
RH2M	tyx	near-surface relative humidity	%
T10M	tyx	10-meter air temperature	K

T2M	tyx	2-meter air temperature	K
U10M	tyx	10-meter eastward wind	m s-1
U2M	tyx	2-meter eastward wind	m s-1
V10M	tyx	10-meter northward wind	m s-1
V2M	tyx	2-meter northward wind	m s-1
ps	tyx	surface pressure	Pa

**Frequency:** *monthly mean from 21:30 UTC (time-averaged)*

**Granule Size:** *~26 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:**

Name	Dim	Description	Units
Var_PRECTOT	tyx	Variance of PRECTOT	kg m-2 s-1 kg m-2 s-1
Var_Q10M	tyx	Variance of Q10M	kg kg-1 kg kg-1
Var_Q2M	tyx	Variance of Q2M	kg kg-1 kg kg-1
Var_RH2M	tyx	Variance of RH2M	% %
Var_T10M	tyx	Variance of T10M	K K
Var_T2M	tyx	Variance of T2M	K K
Var_U10M	tyx	Variance of U10M	m s-1 m s-1
Var_U2M	tyx	Variance of U2M	m s-1 m s-1
Var_V10M	tyx	Variance of V10M	m s-1 m s-1
Var_V2M	tyx	Variance of V2M	m s-1 m s-1
Var_ps	tyx	Variance of ps	Pa Pa

***geosgcm\_ices2s: 2d\_Ice\_S2S***

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** *~6 MB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
sic	tyx	sea ice area fraction	%
sit	tyx	sea ice thickness	m

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~8 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below:**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_sic	tyx	Variance of sic	% %
Var_sit	tyx	Variance of sit	m m

***geosgcm\_icethm: 2d\_Ice\_Thermodynamics***

**Frequency:** *daily value from 12:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *Fake Longitude for GrADS Compatibility=720, Fake Latitude for GrADS Compatibility=410, time=1*

**Granule Size:** *~16 MB (for forecast)*

**Granule Size:** *~40 MB (for analysis)*

**Note – The fields below are present in both forecast and analysis files. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
CONGEL	tyx	congelation ice growth	m s-1
DAIDTT	tyx	ice area tendency due to thermodynamics	% day-1
DVIDTT	tyx	ice volume tendency due to thermodynamics	cm day-1
FRAZIL	tyx	frazil ice growth	m s-1
MELTB	tyx	basal ice melt	m s-1
MELTL	tyx	lateral ice melt	m s-1
MELTT	tyx	top ice melt	m s-1
Xdim	x	Fake Longitude for GrADS Compatibility	degrees_east
Ydim	y	Fake Latitude for GrADS Compatibility	degrees_north

lats	yx	latitude	degrees_north
lons	yx	longitude	degrees_east
time	t	time	minutes since 2017-12-27 09:00:00

**The fields below are present in analysis files only. Also, fields are on tripolar grid so require 2-dimensional 'lats' and 'lons' for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
AHTFLX	tyx	atmospheric heat flux into skin	W m-2
FRESH	tyx	fresh water flux to ocean	kg m-2 s-1
FSALT	tyx	salt flux to ocean	kg m-2 s-1
FWFLUX	tyx	fresh water flux weighted by fr	kg m-2 s-1
MELTS	tyx	snow melt	m s-1
PENPAF	tyx	downwelling par diffuse flux at skin base	W m-2
PENPAR	tyx	downwelling par direct flux at skin base	W m-2
PENUVF	tyx	downwelling uvr diffuse flux at skin base	W m-2
PENUVR	tyx	downwelling uvr direct flux at skin base	W m-2
SNOICE	tyx	snow ice formation	m s-1
SNOONICE	tyx	snow fall on top of ice	kg m-2 s-1
SNOWOCN	tyx	ocean snowfall	kg m-2 s-1
SUBLIM	tyx	sublimation	kg m-2 s-1
fbot	tyx	net downward heat flux from ice to ocean	W m-2
fcondbot	tyx	conductive heat flux at ice bottom surface	W m-2
fcondtop	tyx	conductive heat flux at ice top surface	W m-2
fhocn	tyx	actual ocean ice flux	W m-2
fswabs	tyx	SW flux absorbed by skin layer	W m-2
fswthru	tyx	SW flux thru ice to ocean	W m-2
ghtskin	tyx	Ground heating for skin temp	W m-2
ustari	tyx	ice ocean friction velocity	m s-1

**Frequency:** *monthly mean from 12:00 UTC (time-averaged)*

**Granule Size:** *~24 MB (for forecast)*

**Granule Size:** *~72 MB (for analysis)*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below. These fields are in both analysis and forecast monthly mean files:**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
LAT	yx	Fake Latitude for GrADS Compatibility	degrees_north
LON	yx	Fake Longitude for GrADS Compatibility	degrees_east
Var_CONGEL	tyx	Variance of CONGEL	m s-1 m s-1
Var_D AidTT	tyx	Variance of DAIDTT	% day-1 % day-1
Var_DVIDTT	tyx	Variance of DVIDTT	cm day-1 cm day-1
Var_FRAZIL	tyx	Variance of FRAZIL	m s-1 m s-1
Var_MELTB	tyx	Variance of MELTB	m s-1 m s-1
Var_MELTL	tyx	Variance of MELTL	m s-1 m s-1
Var_MELTT	tyx	Variance of MELTT	m s-1 m s-1
lat	y	latitude	degrees_north
lon	x	longitude	degrees_east

**Note - Variables in the monthly mean files include the ones listed above in the daily collection in addition to those listed below. These fields are in analysis monthly mean files only:**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_AHTFLX	tyx	Variance of AHTFLX	W m-2 W m-2
Var_FRESH	tyx	Variance of FRESH	kg m-2 s-1 kg m-2 s-1
Var_FSALT	tyx	Variance of FSALT	kg m-2 s-1 kg m-2 s-1
Var_FWFLUX	tyx	Variance of FWFLUX	kg m-2 s-1 kg m-2 s-1
Var_MELTS	tyx	Variance of MELTS	m s-1 m s-1
Var_PENPAF	tyx	Variance of PENPAF	W m-2 W m-2
Var_PENPAR	tyx	Variance of PENPAR	W m-2 W m-2
Var_PENUVF	tyx	Variance of PENUVF	W m-2 W m-2
Var_PENUVR	tyx	Variance of PENUVR	W m-2 W m-2
Var_SNOICE	tyx	Variance of SNOICE	m s-1 m s-1
Var_SNOONICE	tyx	Variance of SNOONICE	kg m-2 s-1 kg m-2 s-1
Var_SNOWOCN	tyx	Variance of SNOWOCN	kg m-2 s-1 kg m-2 s-1
Var_SUBLIM	tyx	Variance of SUBLIM	kg m-2 s-1 kg m-2 s-1
Var_fbot	tyx	Variance of fbot	W m-2 W m-2
Var_fcondbot	tyx	Variance of fcondbot	W m-2 W m-2
Var_fcondtop	tyx	Variance of fcondtop	W m-2 W m-2
Var_fhocn	tyx	Variance of fhocn	W m-2 W m-2



Var_fswabs	tyx	Variance of fswabs	W m-2 W m-2
Var_fswthru	tyx	Variance of fswthru	W m-2 W m-2
Var_ghtskin	tyx	Variance of ghtskin	W m-2 W m-2
Var_ustari	tyx	Product of Zonal Mean Deviations of ustari and ustari	m s-1 m s-1

***geosgcm\_int: 2d\_Vertically\_Integrated\_Diagnostics***

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** *~16 MB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
UFLXCPT	tyx	eastward flux of atmospheric enthalpy	J m-1 s-1
UFLXKE	tyx	eastward flux of atmospheric kinetic energy	J m-1 s-1
UFLXPHI	tyx	eastward flux of atmospheric potential energy	J m-1 s-1
UFLXQI	tyx	eastward flux of atmospheric ice	kg m-1 s-1
UFLXQL	tyx	eastward flux of atmospheric liquid water	kg m-1 s-1
UFLXQV	tyx	eastward flux of atmospheric water vapor	kg m-1 s-1
VFLXCPT	tyx	northward flux of atmospheric enthalpy	J m-1 s-1
VFLXKE	tyx	northward flux of atmospheric kinetic energy	J m-1 s-1
VFLXPHI	tyx	northward flux of atmospheric potential energy	J m-1 s-1
VFLXQI	tyx	northward flux of atmospheric ice	kg m-1 s-1
VFLXQL	tyx	northward flux of atmospheric liquid water	kg m-1 s-1
VFLXQV	tyx	northward flux of atmospheric water vapor	kg m-1 s-1

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~28 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_UFLXCPT	tyx	Variance of UFLXCPT	J m-1 s-1 J m-1 s-1

Var_UFLXKE	tyx	Variance of UFLXKE	J m-1 s-1 J m-1 s-1
Var_UFLXPHI	tyx	Variance of UFLXPHI	J m-1 s-1 J m-1 s-1
Var_UFLXQI	tyx	Variance of UFLXQI	kg m-1 s-1 kg m-1 s-1
Var_UFLXQL	tyx	Variance of UFLXQL	kg m-1 s-1 kg m-1 s-1
Var_UFLXQV	tyx	Variance of UFLXQV	kg m-1 s-1 kg m-1 s-1
Var_VFLXCPT	tyx	Variance of VFLXCPT	J m-1 s-1 J m-1 s-1
Var_VFLXKE	tyx	Variance of VFLXKE	J m-1 s-1 J m-1 s-1
Var_VFLXPHI	tyx	Variance of VFLXPHI	J m-1 s-1 J m-1 s-1
Var_VFLXQI	tyx	Variance of VFLXQI	kg m-1 s-1 kg m-1 s-1
Var_VFLXQL	tyx	Variance of VFLXQL	kg m-1 s-1 kg m-1 s-1
Var_VFLXQV	tyx	Variance of VFLXQV	kg m-1 s-1 kg m-1 s-1

***geosgm\_ocn2d: 2d\_Ocean\_Diagnostics***

**Frequency:** *daily value from 09:00 UTC (for forecast)*

**Frequency:** *daily value from 12:00 UTC (for analysis)*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Dimensions:** *longitude=360, latitude=181, time=1 (for analysis)*

**Granule Size:** *~31 MB (for forecast)*

**Granule Size:** *~10 MB (for analysis)*

**Note** – Present in both forecast and analysis: monthly and daily.

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
DISCHARGE	tyx	river discharge at ocean points	kg m-2 s-1
FRO	tyx	fraction of gridbox covered by skin	1
HFLUX	tyx	turbulent heat flux from skin to ocean	W m-2
HW0	tyx	water skin layer mass	kg m-2
HW1	tyx	water skin layer mass	kg m-2
MASKO	tyx	ocean mask	1
MLD	tyx	mixed layer depth	m
QFLUX	tyx	freshwater flux from skin to ocean	kg m-2 s-1
RFLUX	tyx	downward radiative heat flux at ocean bottom	W m-2
SFLUX	tyx	salt flux from skin to ocean	kg m-2 s-1
SLV	tyx	sea level with ice loading	m

SS	tyx	surface salinity	psu
SW0	tyx	water skin salinity	psu
SW1	tyx	water skin salinity	psu
TAUX	tyx	Agrid eastward stress on skin	N m-2
TAUY	tyx	Agrid northward stress on skin	N m-2
TS	tyx	surface temperature	K
TSCALE	tyx	relaxation time scale	sec
TW0	tyx	water skin temperature	K
TW1	tyx	water skin temperature	K
US	tyx	surface Agrid eastward velocity	m s-1
VS	tyx	surface Agrid northward velocity	m s-1

**Note** – Present in forecast only: monthly and daily.

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
AICE	tyx	ice concentration of grid cell	1
DRAFT	tyx	mean ice draft of grid cell	m
HICE	tyx	mean ice thickness of grid cell	m
HSNO	tyx	mean snow thickness of grid cell	m
PBO	tyx	pressure at sea floor	dbar

**Note** – Present in analysis only: monthly and daily.

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
SSH	tyx	sea level height	m

**Frequency:** *monthly mean from 09:00 UTC (time-averaged; forecast)*

**Frequency:** *daily value from 12:00 UTC (time-averaged; analysis)*

**Granule Size:** *~58 MB (for forecast)*

**Granule Size:** *~16 MB (for analysis)*

**Note** – Present in forecast and analysis: monthly mean files.

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_DISCHARGE	tyx	Variance of DISCHARGE	kg m-2 s-1 kg m-2 s-1

Var_FRO	tyx	Variance of FRO	1 1
Var_HFLUX	tyx	Variance of HFLUX	W m-2 W m-2
Var_HW0	tyx	Variance of HW0	kg m-2 kg m-2
Var_HW1	tyx	Variance of HW1	kg m-2 kg m-2
Var_MASKO	tyx	Variance of MASKO	1 1
Var_MLD	tyx	Variance of MLD	m m
Var_QFLUX	tyx	Variance of QFLUX	kg m-2 s-1 kg m-2 s-1
Var_RFLUX	tyx	Variance of RFLUX	W m-2 W m-2
Var_SFLUX	tyx	Variance of SFLUX	kg m-2 s-1 kg m-2 s-1
Var_SLV	tyx	Variance of SLV	m m
Var_SS	tyx	Variance of SS	psu psu
Var_SW0	tyx	Variance of SW0	psu psu
Var_SW1	tyx	Variance of SW1	psu psu
Var_TAUx	tyx	Variance of TAUx	N m-2 N m-2
Var_TAUy	tyx	Variance of TAUy	N m-2 N m-2
Var_TS	tyx	Variance of TS	K K
Var_TSCALE	tyx	Variance of TSCALE	sec sec
Var_TW0	tyx	Variance of TW0	K K
Var_TW1	tyx	Variance of TW1	K K
Var_US	tyx	Variance of US	m s-1 m s-1
Var_VS	tyx	Variance of VS	m s-1 m s-1

**Note** – Present in forecast only: monthly.

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_AICE	tyx	Variance of AICE	1 1
Var_DRAFT	tyx	Variance of DRAFT	m m
Var_HICE	tyx	Variance of HICE	m m
Var_HSNO	tyx	Variance of HSNO	m m
Var_PBO	tyx	Variance of PBO	dbar dbar

**Note** – Present in analysis only: monthly.

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_SSH	tyx	Variance of SSH	m m

***geogcm\_ocn2d\_720x361: 2d\_Ocean\_Diagnostics\_HighRes***

**Frequency:** *daily value from 12:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** *~14 MB*

**Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
DISCHARGE	tyx	river discharge at ocean points	kg m-2 s-1
MLD	tyx	mixed layer depth	m
SLV	tyx	sea level with ice loading	m
SS	tyx	surface salinity	psu
SSH	tyx	sea level height	m
TAUX	tyx	Agrid eastward stress on skin	N m-2
TAUY	tyx	Agrid northward stress on skin	N m-2
TS	tyx	surface temperature	K
US	tyx	surface Agrid eastward velocity	m s-1
VS	tyx	surface Agrid northward velocity	m s-1

**Frequency:** *monthly mean from 12:00 UTC (time-averaged)*

**Granule Size:** *~24 MB*

**Note Variables in the monthly mean files include the ones listed above in addition to those listed below:**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_DISCHARGE	tyx	Variance of DISCHARGE	kg m-2 s-1
Var_MLD	tyx	Variance of MLD	m m
Var_SLV	tyx	Variance of SLV	m m
Var_SS	tyx	Variance of SS	psu psu
Var_SSH	tyx	Variance of SSH	m m

Var_TAUX	tyx	Variance of TAUX	N m-2 N m-2
Var_TAUY	tyx	Variance of TAUY	N m-2 N m-2
Var_TS	tyx	Variance of TS	K K
Var_US	tyx	Variance of US	m s-1 m s-1
Var_VS	tyx	Variance of VS	m s-1 m s-1

***geosgcm\_ocn2dT: 2d\_Ocean\_Diagnostics\_Tripolar\_Grid***

**Frequency:** *daily value from 12:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *Fake Longitude for GrADS Compatibility=720, Fake Latitude for GrADS Compatibility=410, time=1*

**Granule Size:** *~36 MB*

**Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
DISCHARGE	tyx	river discharge at ocean points	kg m-2 s-1
FRO	tyx	fraction of gridbox covered by skin	1
HFLUX	tyx	turbulent heat flux from skin to ocean	W m-2
HW0	tyx	water skin layer mass	kg m-2
HW1	tyx	water skin layer mass	kg m-2
MASKO	tyx	ocean mask	1
MLD	tyx	mixed layer depth	m
PBO	tyx	pressure at sea floor	dbar
QFLUX	tyx	freshwater flux from skin to ocean	kg m-2 s-1
RFLUX	tyx	downward radiative heat flux at ocean bottom	W m-2
SFLUX	tyx	salt flux from skin to ocean	kg m-2 s-1
SLV	tyx	sea level with ice loading	m
SS	tyx	surface salinity	psu
SSH	tyx	sea level height	m
SW0	tyx	water skin salinity	psu
SW1	tyx	water skin salinity	psu
TAUX	tyx	Agrid eastward stress on skin	N m-2

TAUY	tyx	Agrid northward stress on skin	N m-2
TS	tyx	surface temperature	K
TSCALE	tyx	relaxation time scale	sec
TW0	tyx	water skin temperature	K
TW1	tyx	water skin temperature	K
US	tyx	surface Agrid eastward velocity	m s-1
VS	tyx	surface Agrid northward velocity	m s-1
Xdim	x	Fake Longitude for GrADS Compatibility	degrees_east
Ydim	y	Fake Latitude for GrADS Compatibility	degrees_north
lats	yx	latitude	degrees_north
lons	yx	longitude	degrees_east
time	t	time	minutes since 2017-12-01 12:00:00

**Frequency:** *monthly mean from 12:00 UTC (time-averaged)*

**Granule Size:** *~63 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below. Also, fields are on tripolar grid so require 2-dimensional 'lats' and 'lons' for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
LAT	yx	latitude	degrees_north
LON	yx	longitude	degrees_east
Var_DISCHARGE	tyx	Variance of DISCHARGE	kg m-2 s-1 kg m-2 s-1
Var_FRO	tyx	Variance of FRO	1 1
Var_HFLUX	tyx	Variance of HFLUX	W m-2 W m-2
Var_HW0	tyx	Variance of HW0	kg m-2 kg m-2
Var_HW1	tyx	Variance of HW1	kg m-2 kg m-2
Var_MASKO	tyx	Variance of MASKO	1 1

Var_MLD	tyx	Variance of MLD	m m
Var_PBO	tyx	Variance of PBO	dbar dbar
Var_QFLUX	tyx	Variance of QFLUX	kg m-2 s-1 kg m-2 s-1
Var_RFLUX	tyx	Variance of RFLUX	W m-2 W m-2
Var_SFLUX	tyx	Variance of SFLUX	kg m-2 s-1 kg m-2 s-1
Var_SLV	tyx	Variance of SLV	m m
Var_SS	tyx	Variance of SS	psu psu
Var_SSH	tyx	Variance of SSH	m m
Var_SW0	tyx	Variance of SW0	psu psu
Var_SW1	tyx	Variance of SW1	psu psu
Var_TAUX	tyx	Variance of TAUX	N m-2 N m-2
Var_TAUY	tyx	Variance of TAUY	N m-2 N m-2
Var_TS	tyx	Variance of TS	K K
Var_TSCALE	tyx	Variance of TSCALE	sec sec
Var_TW0	tyx	Variance of TW0	K K
Var_TW1	tyx	Variance of TW1	K K
Var_US	tyx	Variance of US	m s-1 m s-1
Var_VS	tyx	Variance of VS	m s-1 m s-1
lat	y	Fake Latitude for GrADS Compatibility	degrees_north
lon	x	Fake Longitude for GrADS Compatibility	degrees_east

### ***geosgcm\_rad: 2d\_Radiation\_Diagnostics***

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** *~46 MB*

**Note – These fields are present in both forecast and analysis files.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
ALBEDO	tyx	surface albedo	1



ALBNF	tyx	surface albedo for near infrared diffuse	1
ALBNR	tyx	surface albedo for near infrared beam	1
ALBVF	tyx	surface albedo for visible diffuse	1
ALBVR	tyx	surface albedo for visible beam	1
CLDHI	tyx	cloud area fraction for high clouds	1
CLDLO	tyx	cloud area fraction for low clouds	1
CLDMD	tyx	cloud area fraction for middle clouds	1
CLDTT	tyx	total cloud area fraction	1
COSZ	tyx	cosine of the solar zenith angle	1
EMIS	tyx	surface emissivity	1
FLNS	tyx	surface net downward longwave flux	W m-2
FLNSC	tyx	surface net downward longwave flux assuming clear sky	W m-2
FLNSCNA	tyx	surface net downward longwave flux assuming clear sky and no aerosol	W m-2
LWS	tyx	surface absorbed longwave radiation	W m-2
LWSC	tyx	surface absorbed longwave radiation assuming clear sky	W m-2
LWSCNA	tyx	surface absorbed longwave radiation assuming clear sky and no aerosol	W m-2
OLR	tyx	upwelling longwave flux at toa	W m-2
OLRC	tyx	upwelling longwave flux at toa assuming clear sky	W m-2
OLRCNA	tyx	upwelling longwave flux at toa assuming clear sky and no aerosol	W m-2
OSR	tyx	toa outgoing shortwave flux	W m-2
OSRCLR	tyx	toa outgoing shortwave flux assuming clear sky	W m-2
PHIS	tyx	surface geopotential height	m+2 s-2
RADSRF	tyx	net downwelling radiation at surface	W m-2
RADSWT	tyx	toa incoming shortwave flux	W m-2
SFCEM	tyx	longwave flux emitted from surface	W m-2
SWCLDPRS	tyx	cloud top pressure	Pa
SWCLDTMP	tyx	cloud top temperature	K
SWGDNW	tyx	surface incoming shortwave flux	W m-2
SWGDNWC	tyx	surface incoming shortwave flux assuming clear sky	W m-2
SWGNET	tyx	surface net downward shortwave flux	W m-2
SWGNETC	tyx	surface net downward shortwave flux assuming clear sky	W m-2
SWGNETCNA	tyx	surface net downward shortwave flux assuming clear sky	W m-2

		and no aerosol	
SWGNETNA	tyx	surface net downward shortwave flux assuming no aerosol	W m-2
SWTNET	tyx	toa net downward shortwave flux	W m-2
SWTNETC	tyx	toa net downward shortwave flux assuming clear sky	W m-2
SWTNETCNA	tyx	toa net downward shortwave flux assuming clear sky and no aerosol	W m-2
SWTNETNA	tyx	toa net downward shortwave flux assuming no aerosol	W m-2
TAUHI	tyx	in cloud optical thickness of high clouds(EXPORT)	1
TAULO	tyx	in cloud optical thickness of low clouds	1
TAUMD	tyx	in cloud optical thickness of middle clouds	1
TAUTT	tyx	in cloud optical thickness of all clouds	1

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~88 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_ALBEDO	tyx	Variance of ALBEDO	1 1
Var_ALBNF	tyx	Variance of ALBNF	1 1
Var_ALBNR	tyx	Variance of ALBNR	1 1
Var_ALBVF	tyx	Variance of ALBVF	1 1
Var_ALBVR	tyx	Variance of ALBVR	1 1
Var_CLDHI	tyx	Variance of CLDHI	1 1
Var_CLDLO	tyx	Variance of CLDLO	1 1
Var_CLDMD	tyx	Variance of CLDMD	1 1
Var_CLDTT	tyx	Variance of CLDTT	1 1
Var_COSZ	tyx	Variance of COSZ	1 1
Var_EMIS	tyx	Variance of EMIS	1 1
Var_FLNS	tyx	Variance of FLNS	W m-2 W m-2
Var_FLNSC	tyx	Variance of FLNSC	W m-2 W m-2
Var_FLNSCNA	tyx	Variance of FLNSCNA	W m-2 W m-2
Var_LWS	tyx	Variance of LWS	W m-2 W m-2
Var_LWSC	tyx	Variance of LWSC	W m-2 W m-2

Var_LWSCNA	tyx	Variance of LWSCNA	W m-2 W m-2
Var_OLR	tyx	Variance of OLR	W m-2 W m-2
Var_OLRC	tyx	Variance of OLRC	W m-2 W m-2
Var_OLRCNA	tyx	Variance of OLRCNA	W m-2 W m-2
Var_OSR	tyx	Variance of OSR	W m-2 W m-2
Var_OSRCRLR	tyx	Variance of OSRCRLR	W m-2 W m-2
Var_PHS	tyx	Variance of PHS	m+2 s-2 m+2 s-2
Var_RADSRF	tyx	Variance of RADSRF	W m-2 W m-2
Var_RADSWT	tyx	Variance of RADSWT	W m-2 W m-2
Var_SFCEM	tyx	Variance of SFCEM	W m-2 W m-2
Var_SWCLDPRS	tyx	Variance of SWCLDPRS	Pa Pa
Var_SWCLDTMP	tyx	Variance of SWCLDTMP	K K
Var_SWGDWN	tyx	Variance of SWGDWN	W m-2 W m-2
Var_SWGDWNC	tyx	Variance of SWGDWNC	W m-2 W m-2
Var_SWGNET	tyx	Variance of SWGNET	W m-2 W m-2
Var_SWGNETC	tyx	Variance of SWGNETC	W m-2 W m-2
Var_SWGNETCNA	tyx	Variance of SWGNETCNA	W m-2 W m-2
Var_SWGNETNA	tyx	Variance of SWGNETNA	W m-2 W m-2
Var_SWTNET	tyx	Variance of SWTNET	W m-2 W m-2
Var_SWTNETC	tyx	Variance of SWTNETC	W m-2 W m-2
Var_SWTNETCNA	tyx	Variance of SWTNETCNA	W m-2 W m-2
Var_SWTNETNA	tyx	Variance of SWTNETNA	W m-2 W m-2
Var_TAUHI	tyx	Variance of TAUHI	1 1
Var_TAULO	tyx	Variance of TAULO	1 1
Var_TAUMD	tyx	Variance of TAUMD	1 1
Var_TAUTT	tyx	Variance of TAUTT	1 1

### *geosgcm\_seaice: 2d\_Seaice\_Dynamics*

**Frequency:** *daily value from 09:00 UTC (for forecast)*

**Frequency:** *daily value from 12:00 UTC (for analysis)*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *Fake Longitude for GrADS Compatibility=720, Fake Latitude for GrADS Compatibility=410, time=1*

**Granule Size:** *~20 MB (for forecast)*

**Granule Size:** ~50 MB (for analysis)

**Note – The fields below are present in both forecast and analysis files. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
AICE	tyx	ice concentration of grid cell	1
AREA	tyx	area of grid cell	m <sup>2</sup>
DAIDTD	tyx	ice area tendency dueto dynamics	% day-1
DRAFT	tyx	mean ice draft of grid cell	m
DVIDTD	tyx	ice volume tendency dueto dynamics	cm day-1
HICE	tyx	mean ice thickness of grid cell	m
HSNO	tyx	mean snow thickness of grid cell	m
TMASK	tyx	ocean mask for sea ice	1
UI	tyx	zonal velocity of surface seaice	m s-1
VI	tyx	meridional velocity of surface seaice	m s-1
Xdim	x	Fake Longitude for GrADS Compatibility	degrees_east
Ydim	y	Fake Latitude for GrADS Compatibility	degrees_north
lats	yx	latitude	degrees_north
lons	yx	longitude	degrees_east
time	t	time	minutes since 2017-12-27 09:00:00

**Note – The fields below are present in analysis files only. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
DIVU	tyx	strain rate I component velocity divergence	s-1
DRAFT0	tyx	mean ice draft of grid cell covered by ice	m
DVIRDGDT	tyx	rate of ice volume ridged	cm day-1
FROCEAN	tyx	open water fraction of grid cell	1
HICE0	tyx	mean ice thickness of grid cell covered by ice	m
HSNO0	tyx	mean snow thickness of grid cell covered by ice	m
SHEAR	tyx	strain rate II component	s-1
SLV	tyx	sea level with ice loading	m

SSH	tyx	sea surface height	m
STRCORX	tyx	stress due to coriolis effect x direction	N m-2
STRCORY	tyx	stress due to coriolis effect y direction	N m-2
STRENGTH	tyx	ice strength	N m-1
STRINTX	tyx	divergence of internal ice stress x direction	N m-2
STRINTY	tyx	divergence of internal ice stress y direction	N m-2
STRTLTX	tyx	stress due to sea surface slope x direction	N m-2
STRTLTY	tyx	stress due to sea surface slope y direction	N m-2
TAUXBOT	tyx	eastward stress at base of ice	N m-2
TAUXI	tyx	eastward stress on ice	N m-2
TAUXIB	tyx	x stress on ice Bgrid	N m-2
TAUXOCNB	tyx	x stress at base of ice	N m-2
TAUYBOT	tyx	northward stress at base of ice	N m-2
TAUYI	tyx	northward stress on ice	N m-2
TAUYIB	tyx	y stress on ice Bgrid	N m-2
TAUYOCNB	tyx	y stress at base of ice	N m-2
UOCN	tyx	water skin eastward velocity	m s-1
VEL	tyx	ice drift speed	m s-1
VOCN	tyx	water skin northward velocity	m s-1

**Frequency:** *monthly mean from 09:00 UTC (time-averaged; forecast)*

**Frequency:** *monthly value from 12:00 UTC (time-averaged; analysis)*

**Granule Size:** *~31 MB (for forecast)*

**Granule Size:** *~92 MB (for analysis)*

**Note - Variables in the monthly mean files include the ones listed above in the daily files in addition to those listed below. The fields below are present in forecast and analysis monthly mean files. Also, fields are on tripolar grid so require 2-dimensional 'lats' and 'lons' for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
LAT	yx	Fake Latitude for GrADS Compatibility	degrees_north
LON	yx	Fake Longitude for GrADS Compatibility	degrees_east
Var_AICE	tyx	Variance of AICE	1 1
Var_AREA	tyx	Variance of AREA	m2 m2
Var_D AidTD	tyx	Variance of DAIDTD	% day-1 % day-1

Var_DRAFT	tyx	Variance of DRAFT	m m
Var_DVIDTD	tyx	Variance of DVIDTD	cm day-1 cm day-1
Var_HICE	tyx	Variance of HICE	m m
Var_HSNO	tyx	Variance of HSNO	m m
Var_TMASK	tyx	Variance of TMASK	1 1
Var_UI	tyx	Variance of UI	m s-1 m s-1
Var_VI	tyx	Variance of VI	m s-1 m s-1
lat	y	latitude	degrees_north
lon	x	longitude	degrees_east

**Note - Variables in the monthly mean files include the ones listed above in the daily files in addition to those listed below. The fields below are present in forecast monthly mean files only. Also, fields are on tripolar grid so require 2-dimensional 'lats' and 'lons' for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_DIVU	tyx	Variance of DIVU	s-1 s-1
Var_DRAFT0	tyx	Variance of DRAFT0	m m
Var_DVIRDGDT	tyx	Variance of DVIRDGDT	cm day-1 cm day-1
Var_FROCEAN	tyx	Variance of FROCEAN	1 1
Var_HICE0	tyx	Variance of HICE0	m m
Var_HSNO0	tyx	Variance of HSNO0	m m
Var_SHEAR	tyx	Variance of SHEAR	s-1 s-1
Var_SLV	tyx	Variance of SLV	m m
Var_SSH	tyx	Variance of SSH	m m
Var_STRCORX	tyx	Variance of STRCORX	N m-2 N m-2
Var_STRCORY	tyx	Variance of STRCORY	N m-2 N m-2
Var_STRENGTH	tyx	Variance of STRENGTH	N m-1 N m-1
Var_STRINTX	tyx	Variance of STRINTX	N m-2 N m-2
Var_STRINTY	tyx	Variance of STRINTY	N m-2 N m-2
Var_STRTLTX	tyx	Variance of STRTLTX	N m-2 N m-2
Var_STRTLTY	tyx	Variance of STRTLTY	N m-2 N m-2
Var_TAUXBOT	tyx	Variance of TAUXBOT	N m-2 N m-2
Var_TAUXI	tyx	Variance of TAUXI	N m-2 N m-2
Var_TAUXIB	tyx	Variance of TAUXIB	N m-2 N m-2

Var_TAUXOCNB	tyx	Variance of TAUXOCNB	N m-2 N m-2
Var_TAUYBOT	tyx	Variance of TAUYBOT	N m-2 N m-2
Var_TAUYI	tyx	Variance of TAUYI	N m-2 N m-2
Var_TAUYIB	tyx	Variance of TAUYIB	N m-2 N m-2
Var_TAUYOCNB	tyx	Variance of TAUYOCNB	N m-2 N m-2
Var_UOCN	tyx	Variance of UOCN	m s-1 m s-1
Var_VEL	tyx	Variance of VEL	m s-1 m s-1
Var_VOCN	tyx	Variance of VOCN	m s-1 m s-1

***geosgcm\_surf: 2d\_Surface\_Diagnostics***

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** *~95 MB*

**Note – These fields are present in both forecast and analysis collections.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
ANPRCP	tyx	anvil precipitation	kg m-2 s-1
ASNOW	tyx	fractional area of land snowcover	1
BASEFLOW	tyx	baseflow flux	kg m-2 s-1
CCWP	tyx	grid mean conv cond water path diagnostic	kg m-2
CM	tyx	surface exchange coefficient for momentum	kg m-2 s-1
CN	tyx	surface neutral drag coefficient	1
CNPRCP	tyx	convective precipitation	kg m-2 s-1
CQ	tyx	surface exchange coefficient for moisture	kg m-2 s-1
CT	tyx	surface exchange coefficient for heat	kg m-2 s-1
DISCHARGE	tyx	river discharge at ocean points	kg m-2 s-1
EVAP	tyx	evaporation from turbulence	kg m-2 s-1
EVLAND	tyx	Evaporation land	kg m-2 s-1
FRLAKE	tyx	fraction of lake	1
FRLAND	tyx	fraction of land	1
FRLANDICE	tyx	fraction of land ice	1

FROCEAN	tyx	fraction of ocean	1
FRSEAICE	tyx	ice covered fraction of tile	1
GHLAND	tyx	Ground heating land	W m-2
GRN	tyx	greenness fraction	1
GUST	tyx	gustiness	m s-1
HLML	tyx	surface layer height	m
LAI	tyx	leaf area index	1
LHFX	tyx	total latent energy flux	W m-2
LHLAND	tyx	Latent heat flux land	W m-2
LSPRCP	tyx	nonanvil large scale precipitation	kg m-2 s-1
LWLAND	tyx	Net longwave land	W m-2
LWP	tyx	liquid water path	kg m-2
OXFILL	tyx	vertically integrated ox adjustment from filling	kg m-2 s-1
PBLH	tyx	planetary boundary layer height	m
PCU	tyx	convective rainfall	kg m-2 s-1
PHIS	tyx	surface geopotential height	m+2 s-2
PLS	tyx	large scale rainfall	kg m-2 s-1
PS	tyx	surface pressure	Pa
Q10M	tyx	10-meter specific humidity	kg kg-1
Q2M	tyx	2-meter specific humidity	kg kg-1
QA	tyx	surface specific humidity	1
QHAT	tyx	effective surface specific humidity	kg kg-1
QS	tyx	surface specific humidity	kg kg-1
QVFILL	tyx	vertically integrated qv adjustment from filling	kg m-2 s-1
RASPBLQ	tyx	sqrt of integral KH dz	(m+3 s-1)+1/2
RASTIME	tyx	timescale for deep RAS plumes	s
RHOS	tyx	air density at surface	kg m-3
RISFC	tyx	surface bulk richardson number	1
RUNOFF	tyx	runoff flux	kg m-2 s-1
RUNSURF	tyx	overland runoff including throughflow	kg m-2 s-1
SGH	tyx	isotropic stdv of GWD topography	m
SHFX	tyx	sensible heat flux from turbulence	W m-2
SHLAND	tyx	Sensible heat flux land	W m-2
SMLAND	tyx	Snowmelt flux land	kg m-2 s-1



SNO	tyx	snowfall	kg m <sup>-2</sup> s <sup>-1</sup>
SNOMAS	tyx	snow mass	kg m <sup>-2</sup>
SPEED	tyx	surface wind speed	m s <sup>-1</sup>
SPLAND	tyx	rate of spurious land energy source	W m <sup>-2</sup>
SPWATR	tyx	rate of spurious land water source	kg m <sup>-2</sup> s <sup>-1</sup>
SWLAND	tyx	Net shortwave land	W m <sup>-2</sup>
T10M	tyx	10-meter air temperature	K
T2M	tyx	2-meter air temperature	K
TA	tyx	surface air temperature	K
TAUX	tyx	eastward surface stress	N m <sup>-2</sup>
TAUY	tyx	northward surface stress	N m <sup>-2</sup>
TELAND	tyx	Total energy storage land	J m <sup>-2</sup>
THAT	tyx	effective surface skin temperature	K
TPREC	tyx	total precipitation	kg m <sup>-2</sup> s <sup>-1</sup>
TROPPB	tyx	tropopause pressure based on blended estimate	Pa
TROPPT	tyx	tropopause pressure based on thermal estimate	Pa
TROPPV	tyx	tropopause pressure based on EPV estimate	Pa
TROPQ	tyx	tropopause specific humidity using blended TROPP estimate	kg kg <sup>-1</sup>
TROPT	tyx	tropopause temperature using blended TROPP estimate	K
TS	tyx	surface skin temperature	K
TSOIL1	tyx	soil temperatures layer 1	K
TSOIL2	tyx	soil temperatures layer 2	K
TWLAND	tyx	Avail water storage land	kg m <sup>-2</sup>
U10M	tyx	10-meter eastward wind	m s <sup>-1</sup>
U10N	tyx	equivalent neutral 10-meter eastward wind	m s <sup>-1</sup>
U2M	tyx	2-meter eastward wind	m s <sup>-1</sup>
U50M	tyx	50-meter eastward wind	m s <sup>-1</sup>
US	tyx	surface eastward wind	m s <sup>-1</sup>
USTAR	tyx	surface velocity scale	m s <sup>-1</sup>
V10M	tyx	10-meter northward wind	m s <sup>-1</sup>
V10N	tyx	equivalent neutral 10-meter northward wind	m s <sup>-1</sup>
V2M	tyx	2-meter northward wind	m s <sup>-1</sup>

V50M	tyx	50-meter northward wind	m s-1
VARFLT	tyx	isotropic variance of filtered topography	m+2
VEGTYPE	tyx	vegetation type	1
VENT	tyx	surface ventilation velocity	m s-1
VS	tyx	surface northward wind	m s-1
WET1	tyx	surface soil wetness	1
WET2	tyx	root zone soil wetness	1
WET3	tyx	ave prof soil moisture	1
Z0	tyx	surface roughness	m
Z0H	tyx	surface roughness for heat	m

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_ANPRCP	tyx	Variance of ANPRCP	kg m-2 s-1 kg m-2 s-1
Var_ASNOW	tyx	Variance of ASNOW	1 1
Var_BASEFLOW	tyx	Variance of BASEFLOW	kg m-2 s-1 kg m-2 s-1
Var_CCWP	tyx	Variance of CCWP	kg m-2 kg m-2
Var_CM	tyx	Variance of CM	kg m-2 s-1 kg m-2 s-1
Var_CN	tyx	Variance of CN	1 1
Var_CNPRCP	tyx	Variance of CNPRCP	kg m-2 s-1 kg m-2 s-1
Var_CQ	tyx	Variance of CQ	kg m-2 s-1 kg m-2 s-1
Var_CT	tyx	Variance of CT	kg m-2 s-1 kg m-2 s-1
Var_DISCHARGE	tyx	Variance of DISCHARGE	kg m-2 s-1 kg m-2 s-1
Var_EVAP	tyx	Variance of EVAP	kg m-2 s-1 kg m-2 s-1
Var_EVLAND	tyx	Variance of EVLAND	kg m-2 s-1 kg m-2 s-1
Var_FRLAKE	tyx	Variance of FRLAKE	1 1
Var_FRLAND	tyx	Variance of FRLAND	1 1
Var_FRLANDICE	tyx	Variance of FRLANDICE	1 1
Var_FROCEAN	tyx	Variance of FROCEAN	1 1
Var_FRSEAICE	tyx	Variance of FRSEAICE	1 1
Var_GHLAND	tyx	Variance of GHLAND	W m-2 W m-2

Var_GRN	tyx	Variance of GRN	1 1
Var_GUST	tyx	Variance of GUST	m s-1 m s-1
Var_HLML	tyx	Variance of HLML	m m
Var_LAI	tyx	Variance of LAI	1 1
Var_LHFX	tyx	Variance of LHFX	W m-2 W m-2
Var_LHLAND	tyx	Variance of LHLAND	W m-2 W m-2
Var_LSPRCP	tyx	Variance of LSPRCP	kg m-2 s-1 kg m-2 s-1
Var_LWLAND	tyx	Variance of LWLAND	W m-2 W m-2
Var_LWP	tyx	Variance of LWP	kg m-2 kg m-2
Var_OXFILL	tyx	Variance of OXFILL	kg m-2 s-1 kg m-2 s-1
Var_PBLH	tyx	Variance of PBLH	m m
Var_PCU	tyx	Variance of PCU	kg m-2 s-1 kg m-2 s-1
Var_PHIS	tyx	Variance of PHIS	m+2 s-2 m+2 s-2
Var_PLS	tyx	Variance of PLS	kg m-2 s-1 kg m-2 s-1
Var_PS	tyx	Variance of PS	Pa Pa
Var_Q10M	tyx	Variance of Q10M	kg kg-1 kg kg-1
Var_Q2M	tyx	Variance of Q2M	kg kg-1 kg kg-1
Var_QA	tyx	Variance of QA	1 1
Var_QHAT	tyx	Variance of QHAT	kg kg-1 kg kg-1
Var_QS	tyx	Variance of QS	kg kg-1 kg kg-1
Var_QVFILL	tyx	Variance of QVFILL	kg m-2 s-1 kg m-2 s-1
Var_RASPBLQ	tyx	Variance of RASPBLQ	$(m+3 s-1)+1/2 (m+3 s-1)+1/2$
Var_RASTIME	tyx	Variance of RASTIME	s s
Var_RHOS	tyx	Variance of RHOS	kg m-3 kg m-3
Var_RISFC	tyx	Variance of RISFC	1 1
Var_RUNOFF	tyx	Variance of RUNOFF	kg m-2 s-1 kg m-2 s-1
Var_RUNSURF	tyx	Variance of RUNSURF	kg m-2 s-1 kg m-2 s-1
Var_SGH	tyx	Variance of SGH	m m
Var_SHFX	tyx	Variance of SHFX	W m-2 W m-2
Var_SHLAND	tyx	Variance of SHLAND	W m-2 W m-2
Var_SMLAND	tyx	Variance of SMLAND	kg m-2 s-1 kg m-2 s-1

Var_SNO	tyx	Variance of SNO	kg m-2 s-1 kg m-2 s-1
Var_SNOMAS	tyx	Variance of SNOMAS	kg m-2 kg m-2
Var_SPEED	tyx	Variance of SPEED	m s-1 m s-1
Var_SPLAND	tyx	Variance of SPLAND	W m-2 W m-2
Var_SPWATR	tyx	Variance of SPWATR	kg m-2 s-1 kg m-2 s-1
Var_SWLAND	tyx	Variance of SWLAND	W m-2 W m-2
Var_T10M	tyx	Variance of T10M	K K
Var_T2M	tyx	Variance of T2M	K K
Var_TA	tyx	Variance of TA	K K
Var_TAUX	tyx	Variance of TAUX	N m-2 N m-2
Var_TAUU	tyx	Variance of TAUU	N m-2 N m-2
Var_TELAND	tyx	Variance of TELAND	J m-2 J m-2
Var_THAT	tyx	Variance of THAT	K K
Var_TPREC	tyx	Variance of TPREC	kg m-2 s-1 kg m-2 s-1
Var_TROPPB	tyx	Variance of TROPPB	Pa Pa
Var_TROPPT	tyx	Variance of TROPPT	Pa Pa
Var_TROPPV	tyx	Variance of TROPPV	Pa Pa
Var_TROPQ	tyx	Variance of TROPQ	kg kg-1 kg kg-1
Var_TROPT	tyx	Variance of TROPT	K K
Var_TS	tyx	Variance of TS	K K
Var_TSOIL1	tyx	Variance of TSOIL1	K K
Var_TSOIL2	tyx	Variance of TSOIL2	K K
Var_TWLAND	tyx	Variance of TWLAND	kg m-2 kg m-2
Var_U10M	tyx	Variance of U10M	m s-1 m s-1
Var_U10N	tyx	Variance of U10N	m s-1 m s-1
Var_U2M	tyx	Variance of U2M	m s-1 m s-1
Var_U50M	tyx	Variance of U50M	m s-1 m s-1
Var_US	tyx	Variance of US	m s-1 m s-1
Var_USTAR	tyx	Variance of USTAR	m s-1 m s-1
Var_V10M	tyx	Variance of V10M	m s-1 m s-1
Var_V10N	tyx	Variance of V10N	m s-1 m s-1
Var_V2M	tyx	Variance of V2M	m s-1 m s-1
Var_V50M	tyx	Variance of V50M	m s-1 m s-1

Var_VARFLT	tyx	Variance of VARFLT	m+2 m+2
Var_VEGTYPE	tyx	Variance of VEGTYPE	1 1
Var_VENT	tyx	Variance of VENT	m s-1 m s-1
Var_VS	tyx	Variance of VS	m s-1 m s-1
Var_WET1	tyx	Variance of WET1	1 1
Var_WET2	tyx	Variance of WET2	1 1
Var_WET3	tyx	Variance of WET3	1 1
Var_Z0	tyx	Variance of Z0	m m
Var_Z0H	tyx	Variance of Z0H	m m

*geosgcm\_vis2d: 2d\_Misc\_Diagnostics*

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *2D, single-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, time=1*

**Granule Size:** *~74 MB*

**Note - Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
ASNOW	tyx	fractional area of land snowcover	1
CAPE	tyx	cape for surface parcel	J kg-1
CLDTT	tyx	total cloud area fraction	1
CNPRCP	tyx	convective precipitation	kg m-2 s-1
CWP	tyx	condensed water path	kg m-2
EVPINTR	tyx	interception loss energy flux	W m-2
EVPSOIL	tyx	baresoil evap energy flux	W m-2
EVPTRNS	tyx	transpiration energy flux	W m-2
FLNS	tyx	surface net downward longwave flux	W m-2
GHLAND	tyx	Ground heating land	W m-2
H1000	tyx	height at 1000 mb	m
H250	tyx	height at 250 hPa	m
H500	tyx	height at 500 hPa	m
H850	tyx	height at 850 hPa	m

IWP	tyx	ice water path	kg m-2
LHFX	tyx	total latent energy flux	W m-2
LWS	tyx	surface absorbed longwave radiation	W m-2
OLR	tyx	upwelling longwave flux at toa	W m-2
OSR	tyx	toa outgoing shortwave flux	W m-2
PBLH	tyx	planetary boundary layer height	m
PHIS	tyx	surface geopotential height	m+2 s-2
PRECTOT	tyx	total precipitation	kg m-2 s-1
PS	tyx	surface pressure	Pa
Q2M	tyx	2-meter specific humidity	kg kg-1
Q850	tyx	specific humidity at 850 hPa	kg kg-1
QA	tyx	surface specific humidity	1
QS	tyx	surface specific humidity	kg kg-1
RADSWT	tyx	toa incoming shortwave flux	W m-2
RSR	tyx	toa net downward shortwave flux	W m-2
RSRS	tyx	surface net downward shortwave flux	W m-2
RUNOFF	tyx	runoff flux	kg m-2 s-1
SFCEM	tyx	longwave flux emitted from surface	W m-2
SHFX	tyx	sensible heat flux from turbulence	W m-2
SHOUT	tyx	upward sensible heat flux	W m-2
SLP	tyx	sea level pressure	Pa
SLRSF	tyx	surface incoming shortwave flux	W m-2
SLRSUF	tyx	surface outgoing shortwave flux	W m-2
SMELT	tyx	snowmelt flux	kg m-2 s-1
SNO	tyx	snowfall	kg m-2 s-1
SNODP	tyx	snow depth	m
SNOMAS	tyx	snow mass	kg m-2
SPEED	tyx	surface wind speed	m s-1
SUBLIM	tyx	sublimation	kg m-2 s-1
T2M	tyx	2-meter air temperature	K
T2MDEW	tyx	dew point temperature at 2 m	K
T2MMAX	tyx	2-meter air temperature	K
T2MMEAN	tyx	2-meter air temperature	K
T2MMIN	tyx	2-meter air temperature	K

TA	tyx	surface air temperature	K
TAUX	tyx	eastward surface stress	N m-2
TAUY	tyx	northward surface stress	N m-2
TO3	tyx	total column ozone	Dobsons
TPW	tyx	total precipitable water	kg m-2
TQV	tyx	total precipitable water vapor	kg m-2
TS	tyx	surface skin temperature	K
U10M	tyx	10-meter eastward wind	m s-1
U200	tyx	eastward wind at 200 hPa	m s-1
U250	tyx	eastward wind at 250 hPa	m s-1
U850	tyx	eastward wind at 850 hPa	m s-1
UQ300	tyx	300 mbar U moisture flux	kg m-1 s-1
V10M	tyx	10-meter northward wind	m s-1
V200	tyx	northward wind at 200 hPa	m s-1
V250	tyx	northward wind at 250 hPa	m s-1
V850	tyx	northward wind at 850 hPa	m s-1
VQ300	tyx	300 mbar V moisture flux	kg m-1 s-1
WATSOI	tyx	total soil moisture	kg m-2
WCRZ	tyx	water root zone	m-3 m-3
WET1	tyx	surface soil wetness	1
WET2	tyx	root zone soil wetness	1
WET3	tyx	ave prof soil moisture	1

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~143 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_ASNOW	tyx	Variance of ASNOW	1 1
Var_CAPE	tyx	Variance of CAPE	J kg-1 J kg-1
Var_CLDTT	tyx	Variance of CLDTT	1 1
Var_CNPRCP	tyx	Variance of CNPRCP	kg m-2 s-1 kg m-2 s-1
Var_CWP	tyx	Variance of CWP	kg m-2 kg m-2

Var_EVPINTR	tyx	Variance of EVPINTR	W m-2 W m-2
Var_EVPSOIL	tyx	Variance of EVPSOIL	W m-2 W m-2
Var_EVPTRNS	tyx	Variance of EVPTRNS	W m-2 W m-2
Var_FLNS	tyx	Variance of FLNS	W m-2 W m-2
Var_GHLAND	tyx	Variance of GHLAND	W m-2 W m-2
Var_H1000	tyx	Variance of H1000	m m
Var_H250	tyx	Variance of H250	m m
Var_H500	tyx	Variance of H500	m m
Var_H850	tyx	Variance of H850	m m
Var_IWP	tyx	Variance of IWP	kg m-2 kg m-2
Var_LHFX	tyx	Variance of LHFX	W m-2 W m-2
Var_LWS	tyx	Variance of LWS	W m-2 W m-2
Var_OLR	tyx	Variance of OLR	W m-2 W m-2
Var_OSR	tyx	Variance of OSR	W m-2 W m-2
Var_PBLH	tyx	Variance of PBLH	m m
Var_PHIS	tyx	Variance of PHIS	m+2 s-2 m+2 s-2
Var_PRECTOT	tyx	Variance of PRECTOT	kg m-2 s-1 kg m-2 s-1
Var_PS	tyx	Variance of PS	Pa Pa
Var_Q2M	tyx	Variance of Q2M	kg kg-1 kg kg-1
Var_Q850	tyx	Variance of Q850	kg kg-1 kg kg-1
Var_QA	tyx	Variance of QA	l l
Var_QS	tyx	Variance of QS	kg kg-1 kg kg-1
Var_RADSWT	tyx	Variance of RADSWT	W m-2 W m-2
Var_RSR	tyx	Variance of RSR	W m-2 W m-2
Var_RSRS	tyx	Variance of RSRS	W m-2 W m-2
Var_RUNOFF	tyx	Variance of RUNOFF	kg m-2 s-1 kg m-2 s-1
Var_SFCEM	tyx	Variance of SFCEM	W m-2 W m-2
Var_SHFX	tyx	Variance of SHFX	W m-2 W m-2
Var_SHOUT	tyx	Variance of SHOUT	W m-2 W m-2
Var_SLP	tyx	Variance of SLP	Pa Pa
Var_SLRSF	tyx	Variance of SLRSF	W m-2 W m-2
Var_SLRSUF	tyx	Variance of SLRSUF	W m-2 W m-2
Var_SMELT	tyx	Variance of SMELT	kg m-2 s-1 kg m-2 s-1
Var_SNO	tyx	Variance of SNO	kg m-2 s-1 kg m-2 s-1



Var_SNODP	tyx	Variance of SNODP	m m
Var_SNOMAS	tyx	Variance of SNOMAS	kg m-2 kg m-2
Var_SPEED	tyx	Variance of SPEED	m s-1 m s-1
Var_SUBLIM	tyx	Variance of SUBLIM	kg m-2 s-1 kg m-2 s-1
Var_T2M	tyx	Variance of T2M	K K
Var_T2MDEW	tyx	Variance of T2MDEW	K K
Var_T2MMAX	tyx	Variance of T2MMAX	K K
Var_T2MMEAN	tyx	Variance of T2MMEAN	K K
Var_T2MMIN	tyx	Variance of T2MMIN	K K
Var_TA	tyx	Variance of TA	K K
Var_TAUX	tyx	Variance of TAUX	N m-2 N m-2
Var_TAUY	tyx	Variance of TAUY	N m-2 N m-2
Var_TO3	tyx	Variance of TO3	Dobsons Dobsons
Var_TPW	tyx	Variance of TPW	kg m-2 kg m-2
Var_TQV	tyx	Variance of TQV	kg m-2 kg m-2
Var_TS	tyx	Variance of TS	K K
Var_U10M	tyx	Variance of U10M	m s-1 m s-1
Var_U200	tyx	Variance of U200	m s-1 m s-1
Var_U250	tyx	Variance of U250	m s-1 m s-1
Var_U850	tyx	Variance of U850	m s-1 m s-1
Var_UQ300	tyx	Variance of UQ300	kg m-1 s-1 kg m-1 s-1
Var_V10M	tyx	Variance of V10M	m s-1 m s-1
Var_V200	tyx	Variance of V200	m s-1 m s-1
Var_V250	tyx	Variance of V250	m s-1 m s-1
Var_V850	tyx	Variance of V850	m s-1 m s-1
Var_VQ300	tyx	Variance of VQ300	kg m-1 s-1 kg m-1 s-1
Var_WATSOI	tyx	Variance of WATSOI	kg m-2 kg m-2
Var_WCRZ	tyx	Variance of WCRZ	m-3 m-3 m-3 m-3
Var_WET1	tyx	Variance of WET1	1 1
Var_WET2	tyx	Variance of WET2	1 1
Var_WET3	tyx	Variance of WET3	1 1

## Three-Dimensional Time-Averaged Collections

### *geosgcm\_gwd: 3d\_Gravity\_Wave\_Drag*

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *3D, pressure-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, level=48, time=1*

**Granule Size:** *~436 MB*

**Note - Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
DTDTBKG	tzyx	air temperature tendency due to background GWD	K s-1
DTDTORO	tzyx	air temperature tendency due to orographic GWD	K s-1
DTDTRAY	tzyx	air temperature tendency due to Rayleigh friction	K s-1
DUDTBKG	tzyx	tendency of eastward wind due to background GWD	m s-2
DUDTORO	tzyx	tendency of eastward wind due to orographic GWD	m s-2
DUDTRAY	tzyx	tendency of eastward wind due to Rayleigh friction	m s-2
DVDTBKG	tzyx	tendency of northward wind due to background GWD	m s-2
DVDTORO	tzyx	tendency of northward wind due to orographic GWD	m s-2
DVDTRAY	tzyx	tendency of northward wind due to Rayleigh friction	m s-2
TAUBKGX	tyx	surface eastward background gravity wave stress	N m-2
TAUBKGY	tyx	surface northward background gravity wave stress	N m-2
TAUOROX	tyx	surface eastward orographic gravity wave stress	N m-2
TAUOROY	tyx	surface northward orographic gravity wave stress	N m-2

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~869 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_DTDTBKG	tzyx	Variance of DTDTBKG	K s-1 K s-1
Var_DTDTORO	tzyx	Variance of DTDTORO	K s-1 K s-1
Var/DTDTRAY	tzyx	Variance of DTDTRAY	K s-1 K s-1
Var_DUDTBKG	tzyx	Variance of DUDTBKG	m s-2 m s-2
Var_DUDTORO	tzyx	Variance of DUDTORO	m s-2 m s-2

Var_DUDTRAY	tzyx	Variance of DUDTRAY	m s-2 m s-2
Var_DVDTBKG	tzyx	Variance of DVDTBKG	m s-2 m s-2
Var_DVDTORO	tzyx	Variance of DVDTORO	m s-2 m s-2
Var_DVDTRAY	tzyx	Variance of DVDTRAY	m s-2 m s-2
Var_TAUBKGX	tyx	Variance of TAUBKGX	N m-2 N m-2
Var_TAUBKGY	tyx	Variance of TAUBKGY	N m-2 N m-2
Var_TAUOROX	tyx	Variance of TAUOROX	N m-2 N m-2
Var_TAUOROY	tyx	Variance of TAUOROY	N m-2 N m-2

***geosgcm\_icecat: 3d\_Ice\_Categories***

**Frequency:** *daily value from 12:00 UTC*

**Spatial Grid:** *3D, ice categories, full horizontal resolution*

**Dimensions:** *Fake Longitude for GrADS Compatibility=720, Fake Latitude for GrADS Compatibility=410, level=5, time=1*

**Granule Size:** *~31 MB*

**Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
AICEN	tzyx	seaice area for each category	1
HIFLXE	tzyx	ice volume transports across E cell edges	m3 s-1
HIFLXN	tzyx	ice volume transports across N cell edges	m3 s-1
VICEN	tzyx	seaice volume for each category	m
Xdim	x	Fake Longitude for GrADS Compatibility	degrees_east
Ydim	y	Fake Latitude for GrADS Compatibility	degrees_north
lats	yx	latitude	degrees_north
lev	z	vertical level	N/A
lons	yx	longitude	degrees_east
time	t	time	minutes since 2017-12-01 12:00:00

**Frequency:** *monthly mean from 12:00 UTC (time-averaged)*

**Granule Size:** *~54 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
LAT	yx	latitude	degrees_north
LON	yx	longitude	degrees_east
Var_AICEN	tzyx	Variance of AICEN	1 1
Var_HIFLXE	tzyx	Variance of HIFLXE	m3 s-1 m3 s-1
Var_HIFLXN	tzyx	Variance of HIFLXN	m3 s-1 m3 s-1
Var_VICEN	tzyx	Variance of VICEN	m m
lat	y	Fake Latitude for GrADS Compatibility	degrees_north
lon	x	Fake Longitude for GrADS Compatibility	degrees_east

***geosgcm\_iceflx: 3d\_Seaice\_Flux***

**Frequency:** *daily value from 12:00 UTC*

**Spatial Grid:** *3D, ice categories, full horizontal resolution*

**Dimensions:** *Fake Longitude for GrADS Compatibility=720, Fake Latitude for GrADS Compatibility=410, level=5, time=1*

**Granule Size:** *~14 MB*

**Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Xdim	x	Fake Longitude for GrADS Compatibility	degrees_east
Ydim	y	Fake Latitude for GrADS Compatibility	degrees_north
fcondbot	tzyx	conductive heat flux at ice bottom over ice categories	W m-2
lats	yx	latitude	degrees_north
lev	z	vertical level	N/A
lons	yx	longitude	degrees_east
time	t	time	minutes since 2017-12-01 12:00:00

**Frequency:** *monthly mean from 12:00 UTC (time-averaged)*

**Granule Size:** ~20 MB

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
LAT	yx	Latitude	degrees_north
LON	yx	longitude	degrees_east
Var_fcondbot	tzyx	Variance of fcondbot	W m-2 W m-2
lat	y	Fake Latitude for GrADS Compatibility	degrees_north
lon	x	Fake Longitude for GrADS Compatibility	degrees_east

***geosgcm\_iceint: 3d\_Seaice\_Internal***

**Frequency:** *daily value from 12:00 UTC*

**Spatial Grid:** *3D, ice categories and levels, full horizontal resolution*

**Dimensions:** *Fake Longitude for GrADS Compatibility=720, Fake Latitude for GrADS Compatibility=410, level=20, time=1*

**Granule Size:** ~31 MB

**Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Xdim	x	Fake Longitude for GrADS Compatibility	degrees_east
Ydim	y	Fake Latitude for GrADS Compatibility	degrees_north
lats	yx	latitude	degrees_north
lev	z	vertical level	N/A
lons	yx	longitude	degrees_east
time	t	time	minutes since 2017-12-01 12:00:00
tinz	tzyx	internal ice temperature over ice categories	degC

**Frequency:** *monthly mean from 12:00 UTC (time-averaged)*

**Granule Size:** ~54 MB

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
LAT	yx	Latitude	degrees_north
LON	yx	longitude	degrees_east
Var_tinz	tzyx	Variance of tinz	degC degC
lat	y	Fake Latitude for GrADS Compatibility	degrees_north
lon	x	Fake Longitude for GrADS Compatibility	degrees_east

### *geosgcm\_moist: 3d\_Moist\_Processes\_Diagnostics*

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *3D, pressure-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, level=48, time=1*

**Granule Size:** *~1.5 GB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
CAPE	tyx	cape for surface parcel	J kg-1
CCN04	tzyx	CCN conc at 0.4 % supersaturation (grid avg)	m-3
CDNC_NUC	tzyx	Nucleated cloud droplet concentration (grid avg)	m-3
CLCN	tzyx	convective cloud area fraction	1
CLLS	tzyx	large scale cloud area fraction	1
CNVMF0	tzyx	cloud base mass flux	kg m-2 s-1
CNVMFC	tzyx	cumulative mass flux	kg m-2 s-1
CNVMFD	tzyx	detraining mass flux	kg m-2 s-1
EVAPC	tzyx	evaporation of cloud liq	kg kg-1 s-1
FCLD	tzyx	cloud fraction for radiation	1
INC_NUC	tzyx	Nucleated ice crystal concentration (grid avg)	m-3
NCPI_VOL	tzyx	particle number for ice cloud	m-3
NCPL_VOL	tzyx	particle number for liquid cloud	m-3
NHET_IMM	tzyx	Immersion IN	m-3

PHIS	tyx	surface geopotential height	m+2 s-2
QI	tzyx	in cloud cloud ice for radiation	kg kg-1
QICN	tzyx	mass fraction of convective cloud ice water	kg kg-1
QILS	tzyx	mass fraction of large scale cloud ice water	kg kg-1
QL	tzyx	in cloud cloud liquid for radiation	kg kg-1
QLCN	tzyx	mass fraction of convective cloud liquid water	kg kg-1
QLLS	tzyx	mass fraction of large scale cloud liquid water	kg kg-1
QR	tzyx	Falling rain for radiation	kg kg-1
REVAN	tzyx	evaporation of anvil precipitation	kg kg-1 s-1
REVCN	tzyx	evaporation of convective precipitation	kg kg-1 s-1
REVLS	tzyx	evaporation of nonanvil large scale precipitation	kg kg-1 s-1
RH1	tzyx	relative humidity before moist	1
RICE	tzyx	ice phase cloud particle effective radius	m
RLIQ	tzyx	liquid cloud particle effective radius	m
RSUAN	tzyx	sublimation of anvil precipitation	kg kg-1 s-1
RSUCN	tzyx	sublimation of convective precipitation	kg kg-1 s-1
RSULS	tzyx	sublimation of nonanvil large scale precipitation	kg kg-1 s-1
SCF	tzyx	Supercooled cloud fraction	1
SUBLC	tzyx	sublimation of cloud ice	kg kg-1 s-1
THIM	tzyx	pressure weighted tendency of potential temperature due to moist processes	Pa K s-1
TPREC	tyx	total precipitation	kg m-2 s-1
UQ300	tyx	300 mbar U moisture flux	kg m-1 s-1
VQ300	tyx	300 mbar V moisture flux	kg m-1 s-1

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~3.0 GB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_CAPE	tyx	Variance of CAPE	J kg-1 J kg-1
Var_CCN04	tzyx	Variance of CCN04	m-3 m-3
Var_CDNC_NUC	tzyx	Variance of CDNC NUC	m-3 m-3

Var_CLCN	tzyx	Variance of CLCN	1 1
Var_CLLS	tzyx	Variance of CLLS	1 1
Var_CNVMF0	tzyx	Variance of CNVMF0	kg m <sup>-2</sup> s <sup>-1</sup> kg m <sup>-2</sup> s <sup>-1</sup>
Var_CNVMFC	tzyx	Variance of CNVMFC	kg m <sup>-2</sup> s <sup>-1</sup> kg m <sup>-2</sup> s <sup>-1</sup>
Var_CNVMFD	tzyx	Variance of CNVMFD	kg m <sup>-2</sup> s <sup>-1</sup> kg m <sup>-2</sup> s <sup>-1</sup>
Var_EVAPC	tzyx	Variance of EVAPC	kg kg <sup>-1</sup> s <sup>-1</sup> kg kg <sup>-1</sup> s <sup>-1</sup>
Var_FCLD	tzyx	Variance of FCLD	1 1
Var_INC_NUC	tzyx	Variance of INC NUC	m <sup>-3</sup> m <sup>-3</sup>
Var_NCPI_VOL	tzyx	Variance of NCPI VOL	m <sup>-3</sup> m <sup>-3</sup>
Var_NCPL_VOL	tzyx	Variance of NCPL VOL	m <sup>-3</sup> m <sup>-3</sup>
Var_NHET_IMM	tzyx	Variance of NHET IMM	m <sup>-3</sup> m <sup>-3</sup>
Var_PHIS	tyx	Variance of PHIS	m <sup>+2</sup> s <sup>-2</sup> m <sup>+2</sup> s <sup>-2</sup>
Var_QI	tzyx	Variance of QI	kg kg <sup>-1</sup> kg kg <sup>-1</sup>
Var_QICN	tzyx	Variance of QICN	kg kg <sup>-1</sup> kg kg <sup>-1</sup>
Var_QILS	tzyx	Variance of QILS	kg kg <sup>-1</sup> kg kg <sup>-1</sup>
Var_QL	tzyx	Variance of QL	kg kg <sup>-1</sup> kg kg <sup>-1</sup>
Var_QLCN	tzyx	Variance of QLCN	kg kg <sup>-1</sup> kg kg <sup>-1</sup>
Var_QLLS	tzyx	Variance of QLLS	kg kg <sup>-1</sup> kg kg <sup>-1</sup>
Var_QR	tzyx	Variance of QR	kg kg <sup>-1</sup> kg kg <sup>-1</sup>
Var_REVAN	tzyx	Variance of REVAN	kg kg <sup>-1</sup> s <sup>-1</sup> kg kg <sup>-1</sup> s <sup>-1</sup>
Var_REVCN	tzyx	Variance of REVCN	kg kg <sup>-1</sup> s <sup>-1</sup> kg kg <sup>-1</sup> s <sup>-1</sup>
Var_REVLS	tzyx	Variance of REVLS	kg kg <sup>-1</sup> s <sup>-1</sup> kg kg <sup>-1</sup> s <sup>-1</sup>
Var_RH1	tzyx	Variance of RH1	1 1
Var_RICE	tzyx	Variance of RICE	m m
Var_RLIQ	tzyx	Variance of RLIQ	m m
Var_RSUAN	tzyx	Variance of RSUAN	kg kg <sup>-1</sup> s <sup>-1</sup> kg kg <sup>-1</sup> s <sup>-1</sup>
Var_RSUCN	tzyx	Variance of RSUCN	kg kg <sup>-1</sup> s <sup>-1</sup> kg kg <sup>-1</sup> s <sup>-1</sup>
Var_RSULS	tzyx	Variance of RSULS	kg kg <sup>-1</sup> s <sup>-1</sup> kg kg <sup>-1</sup> s <sup>-1</sup>
Var_SCF	tzyx	Variance of SCF	1 1
Var_SUBLC	tzyx	Variance of SUBLC	kg kg <sup>-1</sup> s <sup>-1</sup> kg kg <sup>-1</sup> s <sup>-1</sup>
Var_THIM	tzyx	Variance of THIM	Pa K s <sup>-1</sup> Pa K s <sup>-1</sup>
Var_TPREC	tyx	Variance of TPREC	kg m <sup>-2</sup> s <sup>-1</sup> kg m <sup>-2</sup> s <sup>-1</sup>
Var_UQ300	tyx	Variance of UQ300	kg m <sup>-1</sup> s <sup>-1</sup> kg m <sup>-1</sup> s <sup>-1</sup>



Var_VQ300	tyx	Variance of VQ300	kg m-1 s-1 kg m-1 s-1
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### ***geosgcm\_ocn3d: 3d\_Ocean\_Diagnostics***

**Frequency:** *daily value from 09:00 UTC (for forecast)*

**Frequency:** *daily value from 12:00 UTC (for analysis)*

**Spatial Grid:** *3D, model-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, level=40, time=1 (for forecast)*

**Dimensions:** *longitude=360, latitude=181, level=40, time=1 (for analysis)*

**Granule Size:** *~282 MB (for forecast)*

**Granule Size:** *~84 MB (for analysis)*

**Note – These fields are present in both forecast and analysis files.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
RHO	tzyx	density	kg m-3
S	tzyx	salinity	psu
SWHEAT	tzyx	solar heating rate	W m-2
T	tzyx	potential temperature	K
TCON	tzyx	conservative temperature	K
U	tzyx	eastward current	m s-1
V	tzyx	northward current	m s-1

**Note – These fields are present in analysis files only.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
DH	tzyx	layer thickness	m

**Frequency:** *monthly ean from 09:00 UTC (time-averaged; forecast)*

**Frequency:** *monthly value from 12:00 UTC (time-averaged; analysis)*

**Granule Size:** *~758 MB (for forecast)*

**Granule Size:** *~213 MB (for analysis)*

**Note - Variables in the monthly mean files include the ones listed above in the daily files in addition to those listed below. These fields are present in monthly mean forecast and analysis files.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Cov_U_T	tzyx	Covariance of U and T	m s-1 K
Cov_U_V	tzyx	Covariance of U and V	m s-1 m s-1
Cov_V_T	tzyx	Covariance of V and T	m s-1 K
USVS	tzyx	Product of Zonal Mean Deviations of U and V	m s-1 m s-1
VSTS	tzyx	Product of Zonal Mean Deviations of V and T	m s-1 K
Var_RHO	tzyx	Variance of RHO	kg m-3 kg m-3
Var_S	tzyx	Variance of S	psu psu
Var_SWHEAT	tzyx	Variance of SWHEAT	W m-2 W m-2
Var_T	tzyx	Variance of T	K K
Var_TCON	tzyx	Variance of TCON	K K
Var_U	tzyx	Variance of U	m s-1 m s-1
Var_V	tzyx	Variance of V	m s-1 m s-1

**Note - Variables in the monthly mean files include the ones listed above in the daily files in addition to those listed below. These fields are present in monthly mean forecast files only.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_DH	tzyx	Variance of DH	m m

***geosgcm\_ocn3d\_720x361: 3d\_Ocean\_Diagnostics\_HighRes***

**Frequency:** *daily value from 12:00 UTC*

**Spatial Grid:** *3D, model-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, level=40, time=1*

**Granule Size:** *~163 MB*

**Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
S	tzyx	salinity	psu
T	tzyx	potential temperature	K
U	tzyx	eastward current	m s-1
V	tzyx	northward current	m s-1

**Frequency:** *monthly mean from 12:00 UTC (time-averaged)*

**Granule Size:** *~520 MB*

**Note - Variables in the monthly mean files include the ones listed above in the daily files in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Cov_U_T	tzyx	Covariance of U and T	m s-1 K
Cov_U_V	tzyx	Covariance of U and V	m s-1 m s-1
Cov_V_T	tzyx	Covariance of V and T	m s-1 K
USVS	tzyx	Product of Zonal Mean Deviations of U and V	m s-1 m s-1
VSTS	tzyx	Product of Zonal Mean Deviations of V and T	m s-1 K
Var_S	tzyx	Variance of S	psu psu
Var_T	tzyx	Variance of T	K K
Var_U	tzyx	Variance of U	m s-1 m s-1
Var_V	tzyx	Variance of V	m s-1 m s-1

***geosgm\_ocn3dT: 3d\_Ocean\_Diagnostics\_Tripolar\_Grid***

**Frequency:** *daily value from 12:00 UTC (time-averaged)*

**Spatial Grid:** *3D, model-level, full horizontal resolution*

**Dimensions:** *Fake Longitude for GrADS Compatibility=720, Fake Latitude for GrADS Compatibility=410, level=40, time=1*

**Granule Size:** *~189 MB*

**Note – Analysis only collection, only for runid of “S2S-2\_1\_ANA\_001”. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
S	tzyx	salinity	psu
T	tzyx	potential temperature	K
U	tzyx	eastward current	m s-1
V	tzyx	northward current	m s-1
Xdim	x	Fake Longitude for GrADS Compatibility	degrees_east
Ydim	y	Fake Latitude for GrADS Compatibility	degrees_north
lats	yx	latitude	degrees_north
lev	z	vertical level	layer

lons	yx	longitude	degrees_east
time	t	time	minutes since 2017-12-01 12:00:00

**Frequency:** *monthly mean from 12:00 UTC (time-averaged)*

**Granule Size:** *~594 MB*

**Note - Variables in the monthly mean files include the ones listed above in the daily files in addition to those listed below. Also, fields are on tripolar grid so require 2-dimensional ‘lats’ and ‘lons’ for interpretation.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Cov_U_T	tzyx	Covariance of U and T	m s-1 K
Cov_U_V	tzyx	Covariance of U and V	m s-1 m s-1
Cov_V_T	tzyx	Covariance of V and T	m s-1 K
LAT	Yx	Latitude	degrees_north
LON	Yx	longitude	degrees_east
USVS	tzyx	Product of Zonal Mean Deviations of U and V	m s-1 m s-1
VSTS	tzyx	Product of Zonal Mean Deviations of V and T	m s-1 K
Var_S	tzyx	Variance of S	psu psu
Var_T	tzyx	Variance of T	K K
Var_U	tzyx	Variance of U	m s-1 m s-1
Var_V	tzyx	Variance of V	m s-1 m s-1
lat	Y	Fake Latitude for GrADS Compatibility	degrees_north
lon	X	Fake Longitude for GrADS Compatibility	degrees_east

***geosgcm\_subxps: 3d\_Daily\_Mean\_on\_Pressure\_Levels***

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *3D, pressure-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, level=4, time=1*

**Granule Size:** *~12 MB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
H	tzyx	edge heights	m
ta	tzyx	air temperature	K

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~20 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_H	tzyx	Variance of H	m m
Var_ta	tzyx	Variance of ta	K K

### *geosgcm\_tend: 3d\_Tendencies*

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *3D, pressure-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, level=48, time=1*

**Granule Size:** *~1.2 GB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
DPDTPHY	tzyx	tendency of pressure at bottom edges levels due to physics	Pa s-1
DQVDTCHM	tzyx	tendency of water vapor mixing ratio due to chemistry	kg kg-1 s-1
DQVDTDYN	tzyx	tendency of specific humidity due to dynamics	kg/kg/s
DQVDTMST	tzyx	specific humidity tendency due to moist	kg kg-1 s-1
DQVDTTRB	tzyx	tendency of specific humidity due to turbulence	kg kg-1 s-1
DTDTDYN	tzyx	tendency of air temperature due to dynamics	K s-1
DTDTFRI	tzyx	tendency of air temperature due to friction	K s-1
DTDTGWD	tzyx	air temperature tendency due to GWD	K s-1
DTDTLW	tzyx	air temperature tendency due to longwave	K s-1
DTDTLWC	tzyx	air temperature tendency due to longwave for clear skies	K s-1
DTDTLWCNA	tzyx	air temperature tendency due to longwave for clear skies no aerosol	K s-1

DTDTMST	tzyx	tendency of air temperature due to moist processes	K s-1
DTDTSW	tzyx	air temperature tendency due to shortwave	K s-1
DTDTSWC	tzyx	air temperature tendency due to shortwave for clear skies	K s-1
DTDTSWCNA	tzyx	air temperature tendency due to shortwave for clear skies no aerosol	K s-1
DTDTSWNA	tzyx	air temperature tendency due to shortwave no aerosol	K s-1
DTDTTRB	tzyx	tendency of air temperature due to turbulence	K s-1
DUDTDYN	tzyx	tendency of eastward wind due to dynamics	m/s/s
DUDTGWD	tzyx	tendency of eastward wind due to GWD	m s-2
DUDTMST	tzyx	zonal wind tendency due to moist	m s-2
DUDTTRB	tzyx	tendency of eastward wind due to turbulence	m s-2
DVDTDYN	tzyx	tendency of northward wind due to dynamics	m/s/s
DVDTGWD	tzyx	tendency of northward wind due to GWD	m s-2
DVDTMST	tzyx	meridional wind tendency due to moist	m s-2
DVDTTRB	tzyx	tendency of northward wind due to turbulence	m s-2

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~2.4 GB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_DPDPHPHY	tzyx	Variance of DPDPHPHY	Pa s-1 Pa s-1
Var_DQVDTCHM	tzyx	Variance of DQVDTCHM	kg kg-1 s-1 kg kg-1 s-1
Var_DQVDTDYN	tzyx	Variance of DQVDTDYN	kg/kg/s kg/kg/s
Var_DQVDTMST	tzyx	Variance of DQVDTMST	kg kg-1 s-1 kg kg-1 s-1
Var_DQVDTTRB	tzyx	Variance of DQVDTTRB	kg kg-1 s-1 kg kg-1 s-1
Var_DTDTDYN	tzyx	Variance of DTDTDYN	K s-1 K s-1
Var_DTDTFRI	tzyx	Variance of DTDTFRI	K s-1 K s-1
Var_DTDTGWD	tzyx	Variance of DTDTGWD	K s-1 K s-1
Var_DTDTLW	tzyx	Variance of DTDTLW	K s-1 K s-1

Var_DTDTLWC	tzyx	Variance of DTDTLWC	K s-1 K s-1
Var_DTDTLWCNA	tzyx	Variance of DTDTLWCNA	K s-1 K s-1
Var_DTDTMST	tzyx	Variance of DTDTMST	K s-1 K s-1
Var_DTDTSW	tzyx	Variance of DTDTSW	K s-1 K s-1
Var_DTDTSWC	tzyx	Variance of DTDTSWC	K s-1 K s-1
Var_DTDTSWCNA	tzyx	Variance of DTDTSWCNA	K s-1 K s-1
Var_DTDTSWNA	tzyx	Variance of DTDTSWNA	K s-1 K s-1
Var_DTDTRB	tzyx	Variance of DTDTRB	K s-1 K s-1
Var_DUDTDYN	tzyx	Variance of DUDTDYN	m/s/s m/s/s
Var_DUDTGWD	tzyx	Variance of DUDTGWD	m s-2 m s-2
Var_DUDTMST	tzyx	Variance of DUDTMST	m s-2 m s-2
Var_DUDTTRB	tzyx	Variance of DUDTTRB	m s-2 m s-2
Var_DVDTDYN	tzyx	Variance of DVDTDYN	m/s/s m/s/s
Var_DVDTGWD	tzyx	Variance of DVDTGWD	m s-2 m s-2
Var_DVDTMST	tzyx	Variance of DVDTMST	m s-2 m s-2
Var_DVDTTRB	tzyx	Variance of DVDTTRB	m s-2 m s-2

### *geosgcm\_turb: 3d\_Turbulent*

**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *3D, pressure-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, level=48, time=1*

**Granule Size:** *~578 MB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
DBUOY	tyx	Buoyancy jump across inversion	m s-2
DU	tzyx	bulk shear from Louis	s-1
EKH	tzyx	entrainment heat diffusivity from Lock	m+2 s-1
EKM	tzyx	entrainment momentum diffusivity from Lock	m+2 s-1
INTDIS	tzyx	p-weighted frictional heating rate from diffusion	K s-1 Pa
KH	tzyx	total scalar diffusivity	m+2 s-1
KHLS	tzyx	scalar diffusivity from Louis	m+2 s-1

KHRAD	tzyx	radiation driven scalar diffusivity from Lock scheme	m+2 s-1
KHSFC	tzyx	surface driven scalar diffusivity from Lock scheme	m+2 s-1
KM	tzyx	total momentum diffusivity	m+2 s-1
KMLS	tzyx	momentum diffusivity from Louis	m+2 s-1
RI	tzyx	Richardson number from Louis	1
SRFDIS	tyx	p-weighted frictional heating rate from surface drag	K s-1 Pa
TOPDIS	tzyx	p-weighted frictional heating rate from orographic drag	K s-1 Pa
WERAD	tyx	entrainment velocity from radiation	m s-1

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~1.2 GB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Var_DBUOY	tyx	Variance of DBUOY	m s-2 m s-2
Var_DU	tzyx	Variance of DU	s-1 s-1
Var_EKH	tzyx	Variance of EKH	m+2 s-1 m+2 s-1
Var_EKM	tzyx	Variance of EKM	m+2 s-1 m+2 s-1
Var_INTDIS	tzyx	Variance of INTDIS	K s-1 Pa K s-1 Pa
Var_KH	tzyx	Variance of KH	m+2 s-1 m+2 s-1
Var_KHLS	tzyx	Variance of KHLS	m+2 s-1 m+2 s-1
Var_KHRAD	tzyx	Variance of KHRAD	m+2 s-1 m+2 s-1
Var_KHSFC	tzyx	Variance of KHSFC	m+2 s-1 m+2 s-1
Var_KM	tzyx	Variance of KM	m+2 s-1 m+2 s-1
Var_KMLS	tzyx	Variance of KMLS	m+2 s-1 m+2 s-1
Var_RI	tzyx	Variance of RI	1 1
Var_SRFDIS	tyx	Variance of SRFDIS	K s-1 Pa K s-1 Pa
Var_TOPDIS	tzyx	Variance of TOPDIS	K s-1 Pa K s-1 Pa
Var_WERAD	tyx	Variance of WERAD	m s-1 m s-1

*geosgm\_vis3d: 3d\_Miscellaneous\_Diagnostics*



**Frequency:** *daily value from 09:00 UTC*

**Spatial Grid:** *3D, pressure-level, full horizontal resolution*

**Dimensions:** *longitude=720, latitude=361, level=29, time=1*

**Granule Size:** *~177 MB*

**Note – Forecast only collection.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
H	tzyx	edge heights	m
OMEGA	tzyx	vertical pressure velocity	Pa s-1
QV	tzyx	specific humidity	kg kg-1
T	tzyx	air temperature	K
U	tzyx	eastward wind	m s-1
V	tzyx	northward wind	m s-1

**Frequency:** *monthly mean from 09:00 UTC (time-averaged)*

**Granule Size:** *~809 MB*

**Note - Variables in the monthly mean files include the ones listed above in addition to those listed below.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
Cov_OMEGA_QV	tzyx	Covariance of OMEGA and QV	Pa s-1 kg kg-1
Cov_OMEGA_T	tzyx	Covariance of OMEGA and T	Pa s-1 K
Cov_OMEGA_U	tzyx	Covariance of OMEGA and U	Pa s-1 m s-1
Cov_OMEGA_V	tzyx	Covariance of OMEGA and V	Pa s-1 m s-1
Cov_U_H	tzyx	Covariance of U and H	m s-1 m
Cov_U_QV	tzyx	Covariance of U and QV	m s-1 kg kg-1
Cov_U_T	tzyx	Covariance of U and T	m s-1 K
Cov_U_V	tzyx	Covariance of U and V	m s-1 m s-1
Cov_V_H	tzyx	Covariance of V and H	m s-1 m
Cov_V_QV	tzyx	Covariance of V and QV	m s-1 kg kg-1
Cov_V_T	tzyx	Covariance of V and T	m s-1 K
USVS	tzyx	Product of Zonal Mean Deviations of U and V	m s-1 m s-1
VSQS	tzyx	Product of Zonal Mean Deviations of V and QV	m s-1 kg kg-1
VSTS	tzyx	Product of Zonal Mean Deviations of V and T	m s-1 K
Var_H	tzyx	Variance of H	m m

Var_OMEGA	tzyx	Variance of OMEGA	Pa s-1 Pa s-1
Var_QV	tzyx	Variance of QV	kg kg-1 kg kg-1
Var_T	tzyx	Variance of T	K K
Var_U	tzyx	Variance of U	m s-1 m s-1
Var_V	tzyx	Variance of V	m s-1 m s-1
WSQS	tzyx	Product of Zonal Mean Deviations of OMEGA and QV	Pa s-1 kg kg-1
WSTS	tzyx	Product of Zonal Mean Deviations of OMEGA and T	Pa s-1 K

***ocean: MOM\_Diagnostics***

**Frequency:** *monthly mean from 09:00 UTC (time-averaged; forecast)*

**Frequency:** *monthly mean from 00:00 UTC (time-averaged; analysis)*

**Spatial Grid:** *3D, model-level, full horizontal resolution*

**Dimensions:** *ucell longitude=720, ucell latitude=410, tcell longitude=720, tcell latitude=410, tcell zstar depth=40, tcell zstar depth edges=41, vertex number=2, time=1*

**Granule Size:** *~1.9 GB (for forecast)*

**Granule Size:** *~2.0 GB (for analysis)*

**Note – Present in both forecast and analysis files. Also, fields are on tripolar grid so require 2-dimensional 'geolat\_t' and 'geolon\_t' for t-grid, and 'geolat\_u' and 'geolon\_u' for u-grid.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
average_DT	T	Length of average period	days
average_T1	T	Start time for average period	days since 0000-00-01 00:00:00
average_T2	T	End time for average period	days since 0000-00-01 00:00:00
cabbeling	TStYtXt	cabbeling parameter	(1/degC) <sup>2</sup>
cabbeling_tend	TStYtXt	(1/rho)*d(rho)/dt from cabbeling	s <sup>-1</sup>
diff_cbt_back	StYtXt	static background vertical diffusivity diff cbt	m <sup>2</sup> /s
diff_cbt_kpp_s	TStYtXt	vert diffusivity from kpp for salt	m <sup>2</sup> /sec
diff_cbt_kpp_t	TStYtXt	vert diffusivity from kpp for temp	m <sup>2</sup> /sec
evap_heat	TYtXt	latent heat flux into ocean (<0 cools ocean)	W/m <sup>2</sup>
frazil_2d	TYtXt	ocn frazil heat flux over time step	W/m <sup>2</sup>

geo_heat	YtXt	Geothermal heating	W/m <sup>2</sup>
geolat_c	YuXu	uv latitude	degrees_N
geolat_t	YtXt	tracer latitude	degrees_N
geolon_c	YuXu	uv longitude	degrees_E
geolon_t	YtXt	tracer longitude	degrees_E
ice_calving	TYtXt	mass flux of land ice calving into ocean	(kg/m <sup>3</sup> )*(m/sec)
lw_heat	TYtXt	longwave flux into ocean (<0 cools ocean)	W/m <sup>2</sup>
melt	TYtXt	water flux transferred with sea ice form/melt (>0 enters ocean)	(kg/m <sup>3</sup> )*(m/sec)
mixdownslope_salt	TStYtXt	mixdownslope*rho*dzt*tracer for salt	kg/(sec*m <sup>2</sup> )
mixdownslope_temp	TStYtXt	cp*mixdownslope*rho*dzt*temp	Watt/m <sup>2</sup>
neutral_diffusion_salt	TStYtXt	rho*dzt*explicit neutral diffusion tendency for salt	kg/(sec*m <sup>2</sup> )
neutral_diffusion_temp	TStYtXt	rho*dzt*cp*explicit neutral diffusion tendency (heating)	Watts/m <sup>2</sup>
neutral_gm_salt	TStYtXt	rho*dzt*GM stirring tendency for salt	kg/(sec*m <sup>2</sup> )
neutral_gm_temp	TStYtXt	rho*dzt*cp*GM stirring (heating)	Watts/m <sup>2</sup>
nv	Nv	vertex number	none
pme_river	TYtXt	mass flux of precip-evap+river via sbc (liquid, frozen, evaporation)	(kg/m <sup>3</sup> )*(m/sec)
psiu	TYtXu	quasi-barotropic strmfen psiu (compatible with tx trans)	Sv (10 <sup>9</sup> kg/s)
psiv	TYuXt	quasi-barotropic strmfen psiv (compatible with ty trans)	Sv (10 <sup>9</sup> kg/s)
rho_dzt	TStYtXt	t-cell rho*thickness	(kg/m <sup>3</sup> )*m
river	TYtXt	mass flux of river (runoff + calving) entering ocean	(kg/m <sup>3</sup> )*(m/sec)
runoff	TYtXt	mass flux of liquid river runoff entering ocean	(kg/m <sup>3</sup> )*(m/sec)
salt_advection	TStYtXt	rho*dzt*advection tendency	kg/(sec*m <sup>2</sup> )
salt_eta_smooth	TYtXt	surface smoother for salt	kg/(sec*m <sup>2</sup> )
salt_nonlocal_kpp	TStYtXt	rho*dzt*nonlocal tendency from KPP	kg/(sec*m <sup>2</sup> )
salt_runoffmix	TStYtXt	runoffmix*rho dzt*tracer for salt	kg/(sec*m <sup>2</sup> )
salt_sigma_diff	TStYtXt	thk wghtd sigma-diffusion on salt	kg/(sec*m <sup>2</sup> )
salt_submeso	TStYtXt	rho*dzt*submesoscale tendency for salt	kg/(sec*m <sup>2</sup> )
salt_tendency	TStYtXt	time tendency for tracer Practical Salinity	kg/(sec*m <sup>2</sup> )

salt_vdiffuse_diff_cbt	TStYtXt	vert diffusion due to diff cbt for Practical Salinity	kg/(sec*m^2)
salt_vdiffuse_impl	TStYtXt	implicit vert diffusion of Practical Salinity	kg/(sec*m^2)
salt_vdiffuse_k33	TStYtXt	vert diffusion due to K33 from neutral diffusion for Practical Salinity	kg/(sec*m^2)
sea_level	TYtXt	effective sea level (eta t + patm/(rho0*g)) on T cells	meter
sens_heat	TYtXt	sensible heat into ocean (<0 cools ocean)	W/m^2
sfc_hflux_pme	TYtXt	heat flux (relative to 0C) from pme transfer of water across ocean surface	Watts/m^2
sfc_hflux_total	TYtXt	surface heat flux from coupler plus restore (omits mass transfer heating)	Watts/m^2
sfc_salt_flux_coupler	TYtXt	sfc salt flux coupler: flux from the coupler	kg/(m^2*sec)
sfc_salt_flux_ice	TYtXt	sfc salt flux ice	kg/(m^2*sec)
sfc_salt_flux_runoff	TYtXt	sfc salt flux runoff	kg/(m^2*sec)
sfc_salt_flux_total	TYtXt	sfc salt flux total	kg/(m^2*sec)
st_edges_ocean	Ste	tcell zstar depth edges	meters
st_ocean	St	tcell zstar depth	meters
swflx	TYtXt	shortwave flux into ocean (>0 heats ocean)	W/m^2
tau_curl	TYuXt	wind stress curl averaged to U-point	N/m^3
tau_x	TYuXu	i-directed wind stress forcing u-velocity	N/m^2
tau_y	TYuXu	j-directed wind stress forcing v-velocity	N/m^2
temp_advection	TStYtXt	cp*rho*dzt*advection tendency	Watts/m^2
temp_eta_smooth	TYtXt	surface smoother for temp	Watts/m^2
temp_nonlocal_kpp	TStYtXt	cp*rho*dzt*nonlocal tendency from KPP	Watts/m^2
temp_rivermix	TStYtXt	cp*rivermix*rho dzt*temp	Watt/m^2
temp_runoffmix	TStYtXt	cp*runoffmix*rho dzt*temp	Watt/m^2
temp_sigma_diff	TStYtXt	thk wghtd sigma-diffusion heating	Watts/m^2
temp_submeso	TStYtXt	rho*dzt*cp*submesoscale tendency (heating)	Watts/m^2
temp_tendency	TStYtXt	time tendency for tracer Potential temperature	Watts/m^2
temp_tendency_expl	TStYtXt	explicit in time tendency for tracer Potential temperature	Watts/m^2
temp_vdiffuse_diff_cbt	TStYtXt	vert diffusion of heat due to diff cbt	Watts/m^2
temp_vdiffuse_impl	TStYtXt	implicit vert diffusion of heat	Watts/m^2

temp_vdiffuse_k33	TStYtXt	vert diffusion of heat due to K33 from neutral diffusion	Watts/m <sup>2</sup>
thermobaric_tend	TStYtXt	(1/rho)*d(rho)/dt from thermobaricity	s <sup>-1</sup>
thermobaricity	TStYtXt	thermobaricity parameter	1/(dbar*degC)
time	T	time	days since 0000-00-01 00:00:00
time_bounds	TNv	time axis boundaries	days
tx_trans	TStYtXu	T-cell i-mass transport	Sv (10 <sup>9</sup> kg/s)
tx_trans_gm	TStYtXu	T-cell mass i-transport from GM	Sv (10 <sup>9</sup> kg/s)
tx_trans_int_z	TYtXu	T-cell i-mass transport vertically summed	Sv (10 <sup>9</sup> kg/s)
ty_trans	TStYuXt	T-cell j-mass transport	Sv (10 <sup>9</sup> kg/s)
ty_trans_gm	TStYuXt	T-cell mass j-transport from GM	Sv (10 <sup>9</sup> kg/s)
ty_trans_int_z	TYuXt	T-cell j-mass transport vertically summed	Sv (10 <sup>9</sup> kg/s)
xt_ocean	Xt	tcell longitude	degrees_E
xu_ocean	Xu	ucell longitude	degrees_E
yt_ocean	Yt	tcell latitude	degrees_N
yu_ocean	Yu	ucell latitude	degrees_N

**Note – These fields are present in analysis files only.**

<i>Name</i>	<i>Dim</i>	<i>Description</i>	<i>Units</i>
salt_increment_tend	TStYtXt	rho*dzt*tendency due to increment	kg/(sec*m <sup>2</sup> )
temp_increment_tend	TStYtXt	rho*dzt*cp*heating due to increment	Watts/m <sup>2</sup>
temp_sponge_tend	TStYtXt	rho*dzt*cp*heating due to sponge	Watts/m <sup>2</sup>