CMIP6 Model Documentation

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Documentation Contents

1 Key Properties

Ocean Biogeochemistry key properties

1.1 Key Properties

Ocean Biogeochemistry key properties

1.1.1 Model Overview

Overview of ocean biogeochemistry model

Spec. ID: cmip6.ocnbgchem.key_properties.model_overview

Is Required ? TRUE

Enter TEXT value:

1.1.2 Model Name

Name of ocean biogeochemistry model code (PISCES 2.0,...)

Spec. ID: cmip6.ocnbgchem.key_properties.model_name

Is Required ? TRUE

Enter TEXT value:

1.1.3 Model Type

Type of ocean biogeochemistry model

Spec. ID: cmip6.ocnbgchem.key_properties.model_type

Is Required ? TRUE

Select value:

- ☐ Geochemical - No living compartments
- ☐ NPZD - No plankton types
- ☐ PFT - Several plankton types
- ☐ Other - please specify:

1.1.4 Elemental Stoichiometry

Describe elemental stoichiometry (fixed, variable, mix of the two)

Spec. ID: cmip6.ocnbgchem.key_properties.elemental_stoichiometry

Is Required ? TRUE

Select value:

- ☐ Fixed - Fixed stoichiometry

☐ Variable - Variable stoichiometry

☐ Mix of both - Both fixed and mixed stoichiometry

1.1.5 Elemental Stoichiometry Details

Describe which elements have fixed/variable stoichiometry

Spec. ID: cmip6.ocnbgchem.key_properties.elemental_stoichiometry_details

Is Required ? TRUE

Enter TEXT value:

1.1.6 Prognostic Variables

List of all prognostic tracer variables in the ocean biogeochemistry component

Spec. ID: cmip6.ocnbgchem.key_properties.prognostic_variables

Is Required ? TRUE

Enter TEXT value(s):

1.1.7 Diagnostic Variables

List of all diagnotic tracer variables in the ocean biogeochemistry component

Spec. ID: cmip6.ocnbgchem.key_properties.diagnostic_variables

Is Required ? TRUE

Enter TEXT value(s):

1.1.8 Damping

Describe any tracer damping used (such as artificial correction or relaxation to climatology,...)

Spec. ID: cmip6.ocnbgchem.key_properties.damping

Is Required ? FALSE

Enter TEXT value:

1.2 Passive Tracers Transport

Time stepping method for passive tracers transport in ocean biogeochemistry

1.2.1 Method

Time stepping framework for passive tracers

Spec. ID: cmip6.ocnbgchem.key_properties.time_stepping_framework.passive_tracers_transport.method

Is Required ? TRUE

Select value:

☐ Use ocean model transport time step

☐ Use specific time step

1.2.2 Timestep If Not From Ocean

Time step for passive tracers (if different from ocean)

Spec. ID: cmip6.ocnbgchem.key_properties.time_stepping_framework.passive_tracers_transport.timestep_if_not_from_ocean

Is Required ? FALSE

Enter INTEGER value:

1.3 Biology Sources Sinks

Time stepping framework for biology sources and sinks in ocean biogeochemistry

1.3.1 Method

Time stepping framework for biology sources and sinks

Spec. ID: cmip6.ocnbgchem.key_properties.time_stepping_framework.biology_sources_sinks.method

Is Required ? TRUE

Select value:

☐ Use ocean model transport time step

☐ Use specific time step

1.3.2 Timestep If Not From Ocean

Time step for biology sources and sinks (if different from ocean)

Spec. ID: cmip6.ocnbgchem.key_properties.time_stepping_framework.biology_sources_sinks.timestep_if_not_from_ocean

Is Required ? FALSE

Enter INTEGER value:

1.4 Transport Scheme

Transport scheme in ocean biogeochemistry

1.4.1 Type

Type of transport scheme

Spec. ID: cmip6.ocnbgchem.key_properties.transport_scheme.type

Is Required ? TRUE

Select value:

☐ Offline

☐ Online

1.4.2 Scheme

Transport scheme used

Spec. ID: cmip6.ocnbgchem.key_properties.transport_scheme.scheme

Is Required ? TRUE

Select value:

☐ Use that of ocean model

☐ Other - please specify:

1.4.3 Use Different Scheme

Decribe transport scheme if different than that of ocean model

Spec. ID: cmip6.ocnbgchem.key_properties.transport_scheme.use_different_scheme

Is Required ? FALSE

Enter TEXT value:

1.5 Boundary Forcing

Properties of biogeochemistry boundary forcing

1.5.1 Atmospheric Deposition

Describe how atmospheric deposition is modeled

Spec. ID: cmip6.ocnbgchem.key_properties.boundary_forcing.atmospheric_deposition

Is Required ? TRUE

Select value:

☐ From file (climatology)

☐ From file (interannual variations)

☐ From Atmospheric Chemistry model

1.5.2 River Input

Describe how river input is modeled

Spec. ID: cmip6.ocnbgchem.key_properties.boundary_forcing.river_input

Is Required ? TRUE

Select value:

☐ From file (climatology)

☐ From file (interannual variations)

☐ From Land Surface model

1.5.3 Sediments From Boundary Conditions

List which sediments are speficied from boundary condition

Spec. ID: cmip6.ocnbgchem.key_properties.boundary_forcing.sediments_from_boundary_conditions

Is Required ? FALSE

Enter TEXT value:

1.5.4 Sediments From Explicit Model

List which sediments are speficied from explicit sediment model

Spec. ID: cmip6.ocnbgchem.key_properties.boundary_forcing.sediments_from_explicit_model

Is Required ? FALSE

Enter TEXT value:

1.6 Gas Exchange

Properties of gas exchange in ocean biogeochemistry

1.6.1 CO2 Exchange Present

Is CO2 gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.co2_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.2 CO2 Exchange Type

Describe CO2 gas exchange

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.co2_exchange_type

Is Required ? FALSE

Select value:

☐ OMIP protocol

☐ Other - please specify:

1.6.3 O2 Exchange Present

Is O2 gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.o2_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.4 O2 Exchange Type

Describe O2 gas exchange

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.o2_exchange_type

Is Required ? FALSE

Select value:

☐ OMIP protocol

☐ Other - please specify:

1.6.5 DMS Exchange Present

Is DMS gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.dms_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.6 DMS Exchange Type

Specify DMS gas exchange scheme type

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.dms_exchange_type

Is Required ? FALSE

Enter TEXT value:

1.6.7 N2 Exchange Present

Is N2 gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.n2_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.8 N2 Exchange Type

Specify N2 gas exchange scheme type

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.n2_exchange_type

Is Required ? FALSE

Enter TEXT value:

1.6.9 N2O Exchange Present

Is N2O gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.n2o_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.10 N2O Exchange Type

Specify N2O gas exchange scheme type

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.n2o_exchange_type

Is Required ? FALSE

Enter TEXT value:

1.6.11 CFC11 Exchange Present

Is CFC11 gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.cfc11_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.12 CFC11 Exchange Type

Specify CFC11 gas exchange scheme type

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.cfc11_exchange_type

Is Required ? FALSE

Enter TEXT value:

1.6.13 CFC12 Exchange Present

Is CFC12 gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.cfc12_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.14 CFC12 Exchange Type

Specify CFC12 gas exchange scheme type

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.cfc12_exchange_type

Is Required ? FALSE

Enter TEXT value:

1.6.15 SF6 Exchange Present

Is SF6 gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.sf6_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.16 SF6 Exchange Type

Specify SF6 gas exchange scheme type

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.sf6_exchange_type

Is Required ? FALSE

Enter TEXT value:

1.6.17 13CO2 Exchange Present

Is 13CO2 gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.13co2_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.18 13CO2 Exchange Type

Specify 13CO2 gas exchange scheme type

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.13co2_exchange_type

Is Required ? FALSE

Enter TEXT value:

1.6.19 14CO2 Exchange Present

Is 14CO2 gas exchange modeled xxx?

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.14co2_exchange_present

Is Required ? TRUE

Select value:

☐ True ☐ False

1.6.20 14CO2 Exchange Type

Specify 14CO2 gas exchange scheme type

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.14co2_exchange_type

Is Required ? FALSE

Enter TEXT value:

1.6.21 Other Gases

Specify any other gas exchange

Spec. ID: cmip6.ocnbgchem.key_properties.gas_exchange.other_gases

Is Required ? FALSE

Enter TEXT value:

1.7 Carbon Chemistry

Properties of carbon chemistry biogeochemistry

1.7.1 Type

Describe how carbon chemistry is modeled

Spec. ID: cmip6.ocnbgchem.key_properties.carbon_chemistry.type

Is Required ? TRUE

Select value:

☐ OMIP protocol

☐ Other protocol

1.7.2 PH Scale

If NOT OMIP protocol, describe pH scale.

Spec. ID: cmip6.ocnbgchem.key_properties.carbon_chemistry.ph_scale

Is Required ? FALSE

Select value:

☐ Sea water

☐ Free

☐ Other - please specify:

1.7.3 Constants If Not OMIP

If NOT OMIP protocol, list carbon chemistry constants.

Spec. ID: cmip6.ocnbgchem.key_properties.carbon_chemistry.constants_if_not_omip

Is Required ? FALSE

Enter TEXT value:

2 Tracers

Ocean biogeochemistry tracers

2.1 Tracers

Ocean biogeochemistry tracers

2.1.1 Overview

Overview of tracers in ocean biogeochemistry

Spec. ID: cmip6.ocnbgchem.tracers.overview

Is Required ? TRUE

Enter TEXT value:

2.1.2 Sulfur Cycle Present

Is sulfur cycle modeled xxx?

Spec. ID: cmip6.ocnbgchem.tracers.sulfur_cycle_present

Is Required ? TRUE

Select value:

☐ True ☐ False

2.1.3 Nutrients Present

List nutrient species present in ocean biogeochemistry model

Spec. ID: cmip6.ocnbgchem.tracers.nutrients_present

Is Required ? TRUE

Select value(s):

☐ Nitrogen (N)

☐ Phosphorous (P)

☐ Silicium (S)

☐ Iron (Fe)

☐ Other - please specify:

2.1.4 Nitrous Species If N

If nitrogen present, list nitrous species.

Spec. ID: cmip6.ocnbgchem.tracers.nitrous_species_if_n

Is Required ? FALSE

Select value(s):

☐ Nitrates (NO3)

☐ Amonium (NH4)

☐ Other - please specify:

2.1.5 Nitrous Processes If N

If nitrogen present, list nitrous processes.

Spec. ID: cmip6.ocnbgchem.tracers.nitrous_processes_if_n

Is Required ? FALSE

Select value(s):

☐ Dentrification

☐ N fixation

☐ Other - please specify:

2.2 Ecosystem

Ecosystem properties in ocean biogeochemistry

2.2.1 Upper Trophic Levels Definition

Definition of upper trophic level (e.g. based on size) xxx?

Spec. ID: cmip6.ocnbgchem.tracers.ecosystem.upper_trophic_levels_definition

Is Required ? TRUE

Enter TEXT value:

2.2.2 Upper Trophic Levels Treatment

Define how upper trophic level are treated

Spec. ID: cmip6.ocnbgchem.tracers.ecosystem.upper_trophic_levels_treatment

Is Required ? TRUE

Enter TEXT value:

2.3 Phytoplankton

Phytoplankton properties in ocean biogeochemistry

2.3.1 Type

Type of phytoplankton

Spec. ID: cmip6.ocnbgchem.tracers.ecosystem.phytoplankton.type

Is Required ? TRUE

Select value:

- ☐ None
- ☐ Generic
- ☐ PFT including size based (specify both below) - Plankton functional type including size based
- ☐ Size based only (specify below)
- ☐ PFT only (specify below)

2.3.2 Pft

Phytoplankton functional types (PFT) (if applicable)

Spec. ID: cmip6.ocnbgchem.tracers.ecosystem.phytoplankton.pft

Is Required ? FALSE

Select value(s):

- ☐ Diatoms
- ☐ Nfixers
- ☐ Calcifiers
- ☐ Other - please specify:

2.3.3 Size Classes

Phytoplankton size classes (if applicable)

Spec. ID: cmip6.ocnbgchem.tracers.ecosystem.phytoplankton.size_classes

Is Required ? FALSE

Select value(s):

- ☐ Microphytoplankton
- ☐ Nanophytoplankton
- ☐ Picophytoplankton
- ☐ Other - please specify:

2.4 Zooplankton

Zooplankton properties in ocean biogeochemistry

2.4.1 Type

Type of zooplankton

Spec. ID: cmip6.ocnbgchem.tracers.ecosystem.zooplankton.type

Is Required ? TRUE

Select value:

☐ None

☐ Generic

☐ Size based (specify below)

☐ Other - please specify:

2.4.2 Size Classes

Zooplankton size classes (if applicable)

Spec. ID: cmip6.ocnbgchem.tracers.ecosystem.zooplankton.size_classes

Is Required ? FALSE

Select value(s):

☐ Microzooplankton

☐ Mesozooplankton

☐ Other - please specify:

2.5 Disolved Organic Matter

Disolved organic matter properties in ocean biogeochemistry

2.5.1 Bacteria Present

Is there bacteria representation xxx?

Spec. ID: cmip6.ocnbgchem.tracers.disolved_organic_matter.bacteria_present

Is Required ? TRUE

Select value:

☐ True ☐ False

2.5.2 Lability

Describe treatment of lability in dissolved organic matter

Spec. ID: cmip6.ocnbgchem.tracers.disolved_organic_matter.lability

Is Required ? TRUE

Select value:

- ☐ None
- ☐ Labile - Less than a few days
- ☐ Semi-labile - Few days to a few years
- ☐ Refractory - Over a few years
- ☐ Other - please specify:

2.6 Particules

Particulate carbon properties in ocean biogeochemistry

2.6.1 Method

How is particulate carbon represented in ocean biogeochemistryxxx?

Spec. ID: cmip6.ocnbgchem.tracers.particules.method

Is Required ? TRUE

Select value:

- ☐ Diagnostic
- ☐ Diagnostic (Martin profile)
- ☐ Diagnostic (Balast)
- ☐ Prognostic
- ☐ Other - please specify:

2.6.2 Types If Prognostic

If prognostic, type(s) of particulate matter taken into account

Spec. ID: cmip6.ocnbgchem.tracers.particules.types_if_prognostic

Is Required ? FALSE

Select value(s):

- ☐ POC
- ☐ PIC (calcite)
- ☐ PIC (aragonite
- ☐ BSi
- ☐ Other - please specify:

2.6.3 Size If Prognostic

If prognostic, describe if a particule size spectrum is used to represent distribution of particules in water volume

Spec. ID: cmip6.ocnbgchem.tracers.particules.size_if_prognostic

Is Required ? FALSE

Select value:

☐ No size spectrum used

☐ Full size spectrum

☐ Discrete size classes (specify which below)

2.6.4 Size If Discrete

If prognostic and discrete size, describe which size classes are used

Spec. ID: cmip6.ocnbgchem.tracers.particules.size_if_discrete

Is Required ? FALSE

Enter TEXT value:

2.6.5 Sinking Speed If Prognostic

If prognostic, method for calculation of sinking speed of particules

Spec. ID: cmip6.ocnbgchem.tracers.particules.sinking_speed_if_prognostic

Is Required ? FALSE

Select value:

☐ Constant

☐ Function of particule size

☐ Function of particule type (balast)

☐ Other - please specify:

2.7 Dic Alkalinity

DIC and alkalinity properties in ocean biogeochemistry

2.7.1 Carbon Isotopes

Which carbon isotopes are modelled (C13, C14)xxx?

Spec. ID: cmip6.ocnbgchem.tracers.dic_alkalinity.carbon_isotopes

Is Required ? TRUE

Select value(s):

☐ C13

☐ C14)

2.7.2 Abiotic Carbon

Is abiotic carbon modelled xxx?

Spec. ID: cmip6.ocnbgchem.tracers.dic_alkalinity.abiotic_carbon

Is Required ? TRUE

Select value:

☐ True ☐ False

2.7.3 Alkalinity

How is alkalinity modelled xxx?

Spec. ID: cmip6.ocnbgchem.tracers.dic_alkalinity.alkalinity

Is Required ? TRUE

Select value:

☐ Prognostic

☐ Diagnostic)