

CMIP6 Model Documentation

Institute:	CCCR-IITM
Model:	IITM-ESM
Topic:	Ocean Biogeochemistry
Doc. Generated:	2018-04-12
Doc. Seeded From:	N/A
Specialization Version:	1.0.2
Further Info:	https://es-doc.org/cmip6
Note:	* indicates a required property

Documentation Contents

1	Key Properties	1
1.1	Key Properties	1
1.2	Time Stepping Framework	2
1.3	Passive Tracers Transport	2
1.4	Biology Sources Sinks	2
1.5	Transport Scheme	3
1.6	Boundary Forcing	3
1.7	Gas Exchange	4
1.8	Carbon Chemistry	7
2	Tracers	9
2.1	Tracers	9
2.2	Ecosystem	10
2.3	Phytoplankton	10
2.4	Zooplankton	11
2.5	Disolved Organic Matter	12
2.6	Particules	12
2.7	Dic Alkalinity	13

1 Key Properties

Ocean Biogeochemistry key properties

1.1 Key Properties

Ocean Biogeochemistry key properties

1.1.1 Name *

Name of ocnbgchem model code

Enter TEXT:

1.1.2 Keywords *

Keywords associated with ocnbgchem model code

Enter COMMA SEPERATED list:

1.1.3 Overview *

Overview of ocnbgchem model.

Enter TEXT:

1.1.4 Model Type *

Type of ocean biogeochemistry model

Select SINGLE option:

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

1.1.5 Elemental Stoichiometry *

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

Select SINGLE option:

- ☐ Fixed - Fixed stoichiometry
- ☐ Variable - Variable stoichiometry
- ☐ Mix of both - Both fixed and mixed stoichiometry

1.1.6 Elemental Stoichiometry Details *

Describe which elements have fixed/variable stoichiometry

Enter COMMA SEPERATED list:

1.1.7 Prognostic Variables *

List of all prognostic tracer variables in the ocean biogeochemistry component

Enter COMMA SEPERATED list:

1.1.8 Diagnostic Variables *

List of all diagnostic tracer variables in the ocean biogeochemistry component (derived from prognostic variables)

Enter COMMA SEPERATED list:

1.1.9 Damping

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

Enter TEXT:

1.2 Time Stepping Framework

Time stepping framework for ocean biogeochemistry

1.2.1 Overview

Overview of time stepping framework for ocean biogeochemistry in ocnbgchem model.

Enter TEXT:

1.3 Passive Tracers Transport

Time stepping method for passive tracers transport in ocean biogeochemistry

1.3.1 Method *

Time stepping framework for passive tracers

Select SINGLE option:

- ☐ Use ocean model transport time step
- ☐ Use specific time step

1.3.2 Timestep If Not From Ocean

Time step for passive tracers (if different from ocean)

Enter INTEGER value:

1.4 Biology Sources Sinks

Time stepping framework for biology sources and sinks in ocean biogeochemistry

1.4.1 Method *

Time stepping framework for biology sources and sinks

Select SINGLE option:

- ☐ Use ocean model transport time step
- ☐ Use specific time step

1.4.2 Timestep If Not From Ocean

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

Enter INTEGER value:

1.5 Transport Scheme

Transport scheme in ocean biogeochemistry

1.5.1 Overview

Overview of transport scheme in ocean biogeochemistry in ocnbgchem model.

Enter TEXT:

1.5.2 Type *

Type of transport scheme

Select SINGLE option:

- ☐ Offline
- ☐ Online

1.5.3 Scheme *

Transport scheme used

Select SINGLE option:

- ☐ Use that of ocean model
- ☐ Other - please specify:

1.5.4 Use Different Scheme

Describe transport scheme if different than that of ocean model

Enter TEXT:

1.6 Boundary Forcing

Properties of biogeochemistry boundary forcing

1.6.1 Overview

Overview of properties of biogeochemistry boundary forcing in ocnbgchem model.

Enter TEXT:

1.6.2 Atmospheric Deposition *

Describe how atmospheric deposition is modeled

Select SINGLE option:

- ☐ From file (climatology)
- ☐ From file (interannual variations)
- ☐ From Atmospheric Chemistry model

1.6.3 River Input *

Describe how river input is modeled

Select SINGLE option:

- ☐ From file (climatology)
- ☐ From file (interannual variations)
- ☐ From Land Surface model

1.6.4 Sediments From Boundary Conditions

List which sediments are specified from boundary condition

Enter COMMA SEPERATED list:

1.6.5 Sediments From Explicit Model

List which sediments are specified from explicit sediment model

Enter COMMA SEPERATED list:

1.7 Gas Exchange

Properties of gas exchange in ocean biogeochemistry

1.7.1 Overview

Overview of properties of gas exchange in ocean biogeochemistry in ocnbgchem model.

Enter TEXT:

1.7.2 CO2 Exchange Present *

Is CO2 gas exchange modeled ?

Select either TRUE or FALSE:

- ☐ True
- ☐ False

1.7.3 CO2 Exchange Type

Describe CO2 gas exchange

Select SINGLE option:

- ☐ OMIP protocol
- ☐ Other - please specify:

1.7.4 O2 Exchange Present *

Is O2 gas exchange modeled ?

Select either TRUE or FALSE:

- ☐ True ☐ False

1.7.5 O2 Exchange Type

Describe O2 gas exchange

Select SINGLE option:

- ☐ OMIP protocol
- ☐ Other - please specify:

1.7.6 DMS Exchange Present *

Is DMS gas exchange modeled ?

Select either TRUE or FALSE:

- ☐ True ☐ False

1.7.7 DMS Exchange Type

Specify DMS gas exchange scheme type

Enter TEXT:

1.7.8 N2 Exchange Present *

Is N2 gas exchange modeled ?

Select either TRUE or FALSE:

- ☐ True ☐ False

1.7.9 N2 Exchange Type

Specify N2 gas exchange scheme type

Enter TEXT:

1.7.10 N2O Exchange Present *

Is N2O gas exchange modeled ?

Select either TRUE or FALSE:

☐ True ☐ False

1.7.11 N2O Exchange Type

Specify N2O gas exchange scheme type

Enter TEXT:

1.7.12 CFC11 Exchange Present *

Is CFC11 gas exchange modeled ?

Select either TRUE or FALSE:

☐ True ☐ False

1.7.13 CFC11 Exchange Type

Specify CFC11 gas exchange scheme type

Enter TEXT:

1.7.14 CFC12 Exchange Present *

Is CFC12 gas exchange modeled ?

Select either TRUE or FALSE:

☐ True ☐ False

1.7.15 CFC12 Exchange Type

Specify CFC12 gas exchange scheme type

Enter TEXT:

1.7.16 SF6 Exchange Present *

Is SF6 gas exchange modeled ?

Select either TRUE or FALSE:

☐ True ☐ False

1.7.17 SF6 Exchange Type

Specify SF6 gas exchange scheme type

Enter TEXT:

1.7.18 $^{13}\text{CO}_2$ Exchange Present *

Is $^{13}\text{CO}_2$ gas exchange modeled ?

Select either TRUE or FALSE:

☐ True ☐ False

1.7.19 $^{13}\text{CO}_2$ Exchange Type

Specify $^{13}\text{CO}_2$ gas exchange scheme type

Enter TEXT:

1.7.20 $^{14}\text{CO}_2$ Exchange Present *

Is $^{14}\text{CO}_2$ gas exchange modeled ?

Select either TRUE or FALSE:

☐ True ☐ False

1.7.21 $^{14}\text{CO}_2$ Exchange Type

Specify $^{14}\text{CO}_2$ gas exchange scheme type

Enter TEXT:

1.7.22 Other Gases

Specify any other gas exchange

Enter TEXT:

1.8 Carbon Chemistry

Properties of carbon chemistry biogeochemistry

1.8.1 Overview

Overview of properties of carbon chemistry biogeochemistry in ocnbgchem model.

Enter TEXT:

1.8.2 Type *

Describe how carbon chemistry is modeled

Select SINGLE option:

☐ OMIP protocol
☐ Other protocol

1.8.3 Ph Scale

If NOT OMIP protocol, describe pH scale.

Select SINGLE option:

- ☐ Sea water
- ☐ Free
- ☐ Other - please specify:

1.8.4 Constants If Not OMIP

If NOT OMIP protocol, list carbon chemistry constants.

Enter COMMA SEPERATED list:

2 Tracers

Ocean biogeochemistry tracers

2.1 Tracers

Ocean biogeochemistry tracers

2.1.1 Name

Commonly used name for the tracers in ocnbgchem model.

Enter TEXT:

2.1.2 Overview

Overview of ocean biogeochemistry tracers in ocnbgchem model.

Enter TEXT:

2.1.3 Sulfur Cycle Present *

Is sulfur cycle modeled ?

Select either TRUE or FALSE:

☐ True ☐ False

2.1.4 Nutrients Present *

List nutrient species present in ocean biogeochemistry model

Select MULTIPLE options:

- ☐ Nitrogen (N)
- ☐ Phosphorous (P)
- ☐ Silicium (S)
- ☐ Iron (Fe)
- ☐ Other - please specify:

2.1.5 Nitrous Species If N

If nitrogen present, list nitrous species.

Select MULTIPLE options:

- ☐ Nitrates (NO3)
- ☐ Amonium (NH4)
- ☐ Other - please specify:

2.1.6 Nitrous Processes If N

If nitrogen present, list nitrous processes.

Select MULTIPLE options:

- ☐ Dentrification
- ☐ N fixation
- ☐ Other - please specify:

2.2 Ecosystem

Ecosystem properties in ocean biogeochemistry

2.2.1 Overview

Overview of ecosystem properties in ocean biogeochemistry in ocnbgchem model.

Enter TEXT:

2.2.2 Upper Trophic Levels Definition *

Describe how upper trophic levels are defined in model (e.g. based on size)

Enter TEXT:

2.2.3 Upper Trophic Levels Treatment *

Describe how upper trophic levels are treated in model

Enter TEXT:

2.3 Phytoplankton

Phytoplankton properties in ocean biogeochemistry

2.3.1 Type *

Type of phytoplankton

Select SINGLE option:

- ☐ 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)

Select MULTIPLE options:

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

2.3.3 Size Classes

Phytoplankton size classes (if applicable)

Select MULTIPLE options:

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

2.4 Zooplankton

Zooplankton properties in ocean biogeochemistry

2.4.1 Type *

Type of zooplankton

Select SINGLE option:

- ☐ None
- ☐ Generic
- ☐ Size based (specify below)
- ☐ Other - please specify:

2.4.2 Size Classes

Zooplankton size classes (if applicable)

Select MULTIPLE options:

- ☐ Microzooplankton
- ☐ Mesozooplankton
- ☐ Other - please specify:

2.5 Dissolved Organic Matter

Dissolved organic matter properties in ocean biogeochemistry

2.5.1 Overview

Overview of dissolved organic matter properties in ocean biogeochemistry in ocnbgchem model.

Enter TEXT:

2.5.2 Bacteria Present *

Is there bacteria representation ?

Select either TRUE or FALSE:

☐ True ☐ False

2.5.3 Lability *

Describe treatment of lability in dissolved organic matter

Select SINGLE option:

- ☐ 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 Particles

Particulate carbon properties in ocean biogeochemistry

2.6.1 Overview

Overview of particulate carbon properties in ocean biogeochemistry in ocnbgchem model.

Enter TEXT:

2.6.2 Method *

How is particulate carbon represented in ocean biogeochemistry?

Select MULTIPLE options:

- ☐ Diagnostic
- ☐ Diagnostic (Martin profile)
- ☐ Diagnostic (Balast)
- ☐ Prognostic

☐ Other - please specify:

2.6.3 Types If Prognostic

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

Select **MULTIPLE** options:

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

2.6.4 Size If Prognostic

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

Select **SINGLE** option:

- ☐ No size spectrum used
- ☐ Full size spectrum
- ☐ Discrete size classes (specify which below)

2.6.5 Size If Discrete

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

Enter **TEXT**:

2.6.6 Sinking Speed If Prognostic

If prognostic, method for calculation of sinking speed of particles

Select **SINGLE** option:

- ☐ Constant
- ☐ Function of particle size
- ☐ Function of particle type (ballast)
- ☐ Other - please specify:

2.7 Dic Alkalinity

DIC and alkalinity properties in ocean biogeochemistry

2.7.1 Overview

Overview of dic and alkalinity properties in ocean biogeochemistry in ocnbgchem model.

Enter TEXT:

2.7.2 Carbon Isotopes *

Which carbon isotopes are modelled (C13, C14)?

Select MULTIPLE options:

☐ C13

☐ C14)

2.7.3 Abiotic Carbon *

Is abiotic carbon modelled ?

Select either TRUE or FALSE:

☐ True

☐ False

2.7.4 Alkalinity *

How is alkalinity modelled ?

Select SINGLE option:

☐ Prognostic

☐ Diagnostic)