CMIP6 Model Documentation

Institute:	CSIRO
Model:	ACCESS-ESM1-5
Topic:	land
Doc. Generated:	2020-04-08
Doc. Seeded From:	Spreadsheet
Specialization Version:	1.1.0
Further Info:	https://es-doc.org/cmip6
Note:	* indicates a required property

Documentation Contents

1 Key Properties

Land surface key properties

1.1.1 Top level properties

Land surface key properties

1.1.1.1 Name *

Name of land model code

CABLE2.4

1.1.1.2 Keywords *

Keywords associated with land model code

CABLE, CASA-CNP

1.1.1.3 Overview *

Overview of land model.

CABLE is a one layer two-leaf canopy model, as described in Wang and Leuning (1998) and was formulated on the basis of the multilayer model of Leuning et al. (1995). It accounts for turbulent exchange within the canopy (Raupach et al., 1997). Carbon cycling uses CASA-CNP (Wang et al 2010).

1.1.1.4 Description *

General description of the processes modelled (e.g. dymanic vegation, prognostic albedo, etc.)

Land atmosphere fluxes of water, carbon energy, momentum. Prognostic albedo dependent on vegetation type. LAI dependent on prognostic leaf carbon. Multi-layer snow.

1.1.1.5 Land Atmosphere Flux Exchanges

Fluxes exchanged with the atmopshere.

- ☒ Water
- ☒ Energy
- ☒ Carbon
- ☐ Nitrogen
- ☐ Phospherous
- ☐ Other - please specify:

1.1.1.6 Atmospheric Coupling Treatment *

Describe the treatment of land surface coupling with the Atmosphere model component, which may be different for different quantities (e.g. dust: semi-implicit, water vapour: explicit)

Semi-implicit

1.1.1.7 Land Cover *

Types of land cover defined in the land surface model

- ☒ Bare soil
- ☐ Urban
- ☒ Lake
- ☒ Land ice
- ☐ Lake ice
- ☒ Vegetated
- ☐ Other - please specify:

1.1.1.8 Land Cover Change

Describe how land cover change is managed (e.g. the use of net or gross transitions)

Use of net transitions

1.1.1.9 Tiling *

Describe the general tiling procedure used in the land surface (if any). Include treatment of physiography, land/sea, (dynamic) vegetation coverage and orography/roughness

Prescribed vegetation coverage. 13 surface types (10 vegetated). Vegetation types: evergreen needleleaf, evergreen broadleaf, deciduous needleleaf, deciduous broadleaf, shrub, C3 grass, C4 grass, tundra, crop.

1.2.1 Conservation Properties

Convservation

1.2.1.1 Energy

Describe if/how energy is conserved globally and to what level (e.g. within X [units]/year)

CABLE calculates the composite soil-vegetation energy balance, accounting for the radiative and aerodynamic interaction between soil and canopy.

1.2.1.2 Water

Describe if/how water is conserved globally and to what level (e.g. within X [units]/year)

Enter TEXT:

1.2.1.3 Carbon

Describe if/how carbon is conserved globally and to what level (e.g. within X [units]/year)

Enter TEXT:

1.3.1 Timestepping Framework

Timestepping

1.3.1.1 Timestep Dependent On Atmosphere *

Is a time step dependent on the frequency of atmosphere coupling?

☒ True ☐ False

1.3.1.2 Time Step *

Overall timestep of land surface model (i.e. time between calls)

1200

1.3.1.3 Timestepping Method *

General description of time stepping method and associated time step(s)

Enter TEXT:

1.4.1 Software Properties

Software properties of land surface code

1.4.1.1 Repository

Location of code for this component.

Enter TEXT:

1.4.1.2 Code Version

Code version identifier.

CABLE2.4

1.4.1.3 Code Languages

Code language(s).

Fortran90

1.5.1 Tuning Applied

Tuning methodology for land component

1.5.1.1 Description *

General overview description of tuning (if any): explain and motivate the main targets and metrics retained. andDocument the relative weight given to climate performance metrics versus process oriented metrics, andand on the possible conflicts with parameterization level tuning. In particular describe any struggle andwith a parameter value that required pushing it to its limits to solve a particular model deficiency.

Enter TEXT:

2 Grid

Land surface grid

2.1.1 Top level properties

Land surface grid

2.1.1.1 Name

Name of grid in land model.

N96L6

2.1.1.2 Overview

Overview of grid in land model.

Land surface grid same as atmospheric grid.

2.2.1 Horizontal

The horizontal grid in the land surface

2.2.1.1 Description *

Describe the general structure of the horizontal grid (not including any tiling)

Land surface grid same as atmospheric grid.

2.2.1.2 Matches Atmosphere Grid *

Does the horizontal grid match the atmosphere?

☒ True ☐ False

2.3.1 Vertical

The vertical grid in the soil

2.3.1.1 Description *

Describe the general structure of the vertical grid in the soil (not including any tiling)

The underlying soil has 6 layers, also tiled allowing for subsurface soil temperature and moisture tiling.

2.3.1.2 Total Depth *

The total depth of the soil (in metres)

Enter INTEGER value:

3 Soil

Land surface soil

3.1.1 Top level properties

Land surface soil

3.1.1.1 Name

Commonly used name for the soil in land model.

None

3.1.1.2 Overview

Overview of land surface soil in land model.

Enter TEXT:

3.1.1.3 Heat Water Coupling *

Describe the coupling between heat and water in the soil

Limited coupling. Heat capacity depends on soil moisture, latent heat of soil water freezing account for. No direct heat flux associated with soil water flow.

3.1.1.4 Number Of Soil layers *

The number of soil layers

6

3.1.1.5 Prognostic Variables *

List the prognostic variables of the soil scheme

Soil temperature, soil moisture, frozen fraction

3.2.1 Soil Map

Key properties of the land surface soil map

3.2.1.1 Description *

General description of soil map

Enter TEXT:

3.2.1.2 Structure

Describe the soil structure map

N/A

3.2.1.3 Texture

Describe the soil texture map

Soil texture map is from the Harmonized World Soil Database.

3.2.1.4 Organic Matter

Describe the soil organic matter map

Enter TEXT:

3.2.1.5 Albedo

Describe the soil albedo map

Soil albedo is prescribed.

3.2.1.6 Water Table

Describe the soil water table map, if any

N/A

3.2.1.7 Continuously Varying Soil Depth *

Does the soil properties vary continuously with depth?

☐ True ☒ False

3.2.1.8 Soil Depth

Describe the soil depth map

Six soil layers of depths 0.022, 0.058, 0.154, 0.409, 1.085, 2.872 m

3.3.1 Snow Free Albedo

Snow free albedo

3.3.1.1 Prognostic *

Is snow free albedo prognostic?

☒ True ☐ False

3.3.1.2 Functions

If prognostic, describe the dependancies on snow free albedo calculations

☒ Vegetation type

☒ Soil humidity

☐ Vegetation state

☐ Other - please specify:

3.3.1.3 Direct Diffuse

If prognostic, describe the distinction between direct and diffuse albedo

- ☒ Distinction between direct and diffuse albedo
- ☐ No distinction between direct and diffuse albedo
- ☐ Other - please specify:

3.3.1.4 Number Of Wavelength Bands

If prognostic, enter the number of wavelength bands used

2

3.4.1 Hydrology

Key properties of the soil hydrology

3.4.1.1 Description *

General description of the soil hydrological model

Enter TEXT:

3.4.1.2 Time Step *

Time step of river soil hydrology in seconds

1200

3.4.1.3 Tiling

Describe the soil hydrology tiling, if any.

Matches vegetation tiling.

3.4.1.4 Vertical Discretisation *

Describe the typical vertical discretisation

Six soil layers of depths 0.022, 0.058, 0.154, 0.409, 1.085, 2.872 m

3.4.1.5 Number Of Ground Water Layers *

The number of soil layers that may contain water

6

3.4.1.6 Lateral Connectivity *

Describe the lateral connectivity between tiles

- ☐ Perfect connectivity - Common soil for multiple tiles
- ☐ Darcian flow - Darcian flow among hillslope tiles
- ☐ Other - please specify:

3.4.1.7 Method *

The hydrological dynamics scheme in the land surface model

- ☐ Bucket
- ☐ Force-restore
- ☐ Choisnel
- ☒ Explicit diffusion
- ☐ Other - please specify:

3.4.2 Freezing

Frozen soil treatment

3.4.2.1 Number Of Ground Ice Layers *

How many soil layers may contain ground ice

6

3.4.2.2 Ice Storage Method *

Describe the method of ice storage

Prognostic frozen fraction of saturation

3.4.2.3 Permafrost *

Describe the treatment of permafrost, if any, within the land surface scheme

No permafrost.

3.4.3 Drainage

Drainage treatment in the soil

3.4.3.1 Description *

General describe how drainage is included in the land surface scheme

Differentiated drainage and runoff

3.4.3.2 Types

Different types of runoff represented by the land surface model

- ☒ Gravity drainage
- ☐ Horton mechanism
- ☐ Topmodel-based
- ☐ Dunne mechanism
- ☐ Lateral subsurface flow

☐ Baseflow from groundwater

☐ Other - please specify:

3.5.1 Heat Treatment

Soil heat treatment

3.5.1.1 Description *

General description of how heat treatment properties are defined

Enter TEXT:

3.5.1.2 Time Step *

Time step of soil heat scheme in seconds

1200

3.5.1.3 Tiling

Describe the soil heat treatment tiling, if any.

Tiling as per vegetation

3.5.1.4 Vertical Discretisation *

Describe the typical vertical discretisation

Six soil layers of depths 0.022, 0.058, 0.154, 0.409, 1.085, 2.872 m

3.5.1.5 Heat Storage *

Specify the method of heat storage

☐ Force-restore

☒ Explicit diffusion

☐ Other - please specify:

3.5.1.6 Processes *

Describe processes included in the treatment of soil heat

Select MULTIPLE options:

☐ Soil moisture freeze-thaw

☐ Coupling with snow temperature

☐ Other - please specify:

4 Snow

Land surface snow

4.1.1 Top level properties

Land surface snow

4.1.1.1 Name

Commonly used name for the snow in land model.

None

4.1.1.2 Overview

Overview of land surface snow in land model.

The model computes the snow density, temperature and thickness of three snowpack layers. The following processes are represented: snow deposition, snow albedo, snow accumulation, snow metamorphism and thermal properties, snow melting.

4.1.1.3 Tiling

Describe the snow tiling, if any.

As per vegetation tiling.

4.1.1.4 Number Of Snow Layers *

The number of snow levels used in the land surface scheme/model

3

4.1.1.5 Density *

Description of the treatment of snow density

- ☒ Prognostic
- ☐ Constant
- ☐ Other - please specify:

4.1.1.6 Water Equivalent *

Description of the treatment of the snow water equivalent

- ☒ Prognostic
- ☐ Diagnostic
- ☐ Other - please specify:

4.1.1.7 Heat Content *

Description of the treatment of the heat content of snow

- ☒ Prognostic
- ☐ Diagnostic
- ☐ Other - please specify:

4.1.1.8 Temperature *

Description of the treatment of snow temperature

- ☒ Prognostic
- ☐ Diagnostic
- ☐ Other - please specify:

4.1.1.9 Liquid Water Content *

Description of the treatment of snow liquid water

Select SINGLE option:

- ☐ Prognostic
- ☐ Diagnostic
- ☐ Other - please specify:

4.1.1.10 Snow Cover Fractions *

Specify cover fractions used in the surface snow scheme

- ☒ Ground snow fraction
- ☒ Vegetation snow fraction
- ☐ Other - please specify:

4.1.1.11 Processes *

Snow related processes in the land surface scheme

- ☐ Snow interception
- ☒ Snow melting
- ☒ Snow freezing
- ☐ Blowing snow
- ☐ Other - please specify:

4.1.1.12 Prognostic Variables *

List the prognostic variables of the snow scheme

Temperature, thickness, layers, age

4.2.1 Snow Albedo

Snow albedo

4.2.1.1 Type *

Describe the treatment of snow-covered land albedo

- ☒ Prognostic
- ☐ Prescribed
- ☐ Constant
- ☐ Other - please specify:

4.2.1.2 Functions

Describe the function types if prognostic snow albedo

Select MULTIPLE options:

- ☐ Vegetation type
- ☐ Snow age
- ☐ Snow density
- ☐ Snow grain type
- ☐ Aerosol deposition
- ☐ Other - please specify:

5 Vegetation

Land surface vegetation

5.1.1 Top level properties

Land surface vegetation

5.1.1.1 Name

Commonly used name for the vegetation in land model.

None

5.1.1.2 Overview

Overview of land surface vegetation in land model.

Enter TEXT:

5.1.1.3 Time Step *

Time step of vegetation scheme in seconds

1200

5.1.1.4 Dynamic Vegetation *

Is there dynamic evolution of vegetation?

☒ True ☐ False

5.1.1.5 Tiling

Describe the vegetation tiling, if any.

Static vegetation coverage. 13 surface types (10 vegetated). Vegetation types: evergreen needleleaf, evergreen broadleaf, deciduous needleleaf, deciduous broadleaf, shrub, C3 grass, C4 grass, tundra, crop.

5.1.1.6 Vegetation Representation *

Vegetation classification used

☒ Vegetation types

☐ Biome types

☐ Other - please specify:

5.1.1.7 Vegetation Types

List of vegetation types in the classification, if any

- ☐ Broadleaf tree
- ☐ Needleleaf tree
- ☒ C3 grass
- ☒ C4 grass
- ☐ Vegetated
- ☐ Other - please specify:

5.1.1.8 Biome Types

List of biome types in the classification, if any

Select MULTIPLE options:

- ☐ Evergreen needleleaf forest
- ☐ Evergreen broadleaf forest
- ☐ Deciduous needleleaf forest
- ☐ Deciduous broadleaf forest
- ☐ Mixed forest
- ☐ Woodland
- ☐ Wooded grassland
- ☐ Closed shrubland
- ☐ Opne shrubland
- ☐ Grassland
- ☐ Cropland
- ☐ Wetlands
- ☐ Other - please specify:

5.1.1.9 Vegetation Time Variation *

How the vegetation fractions in each tile are varying with time

- ☐ Fixed (not varying)
- ☒ Prescribed (varying from files)
- ☐ Dynamical (varying from simulation)
- ☐ Other - please specify:

5.1.1.10 Vegetation Map

If vegetation fractions are not dynamically updated , describe the vegetation map used (common name and reference, if possible)

Enter TEXT:

5.1.1.11 Interception *

Is vegetation interception of rainwater represented?

☒ True ☐ False

5.1.1.12 Phenology *

Treatment of vegetation phenology

☐ Prognostic

☒ Diagnostic (vegetation map)

☐ Other - please specify:

5.1.1.13 Phenology Description

General description of the treatment of vegetation phenology

Start and end of growing season prescribed by latitude and vegetation type.

5.1.1.14 Leaf Area Index *

Treatment of vegetation leaf area index

☐ Prescribed

☐ Prognostic

☒ Diagnostic

☐ Other - please specify:

5.1.1.15 Leaf Area Index Description

General description of the treatment of leaf area index

LAI dependent on prognostic leaf carbon pool and specific leaf area (dependent on vegetation type).

5.1.1.16 Biomass *

Treatment of vegetation biomass

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

5.1.1.17 Biomass Description

General description of the treatment of vegetation biomass

Canopy height prescribed by vegetation type.

5.1.1.18 Biogeography *

Treatment of vegetation biogeography

- ☐ Prognostic
- ☐ Diagnostic
- ☐ Other - please specify:

5.1.1.19 Biogeography Description

General description of the treatment of vegetation biogeography

Enter TEXT:

5.1.1.20 Stomatal Resistance *

Specify what the vegetation stomatal resistance depends on

- ☐ Light
- ☐ Temperature
- ☐ Water availability
- ☒ CO2
- ☐ O3
- ☐ Other - please specify:

5.1.1.21 Stomatal Resistance Description

General description of the treatment of vegetation stomatal resistance

Leuning scheme (Leuning, 1995)

5.1.1.22 Prognostic Variables *

List the prognostic variables of the vegetation scheme

Enter COMMA SEPARATED list:

6 Energy Balance

Land surface energy balance

6.1.1 Top level properties

Land surface energy balance

6.1.1.1 Name

Commonly used name for the energy balance in land model.

None

6.1.1.2 Overview

Overview of land surface energy balance in land model.

The energy balance equation is solved for the temperature of the surface which may consist of a combination of surface elements such as vegetation, bare ground, snow and ice.

6.1.1.3 Tiling

Describe the energy balance tiling, if any.

As per vegetation tiling.

6.1.1.4 Number Of Surface Temperatures *

The maximum number of distinct surface temperatures in a grid cell (for example, each subgrid tile may have its own temperature)

5

6.1.1.5 Evaporation *

Specify the formulation method for land surface evaporation, from soil and vegetation

- ☐ Alpha
- ☐ Beta
- ☒ Combined
- ☐ Monteith potential evaporation
- ☐ Other - please specify:

6.1.1.6 Processes *

Describe which processes are included in the energy balance scheme

Select MULTIPLE options:

- ☐ Transpiration
- ☐ Other - please specify:

7 Carbon Cycle

Land surface carbon cycle

7.1.1 Top level properties

Land surface carbon cycle

7.1.1.1 Name

Commonly used name for the carbon cycle in land model.

CASA-CNP

7.1.1.2 Overview

Overview of land surface carbon cycle in land model.

Fossil emissions and ocean exchange are modelled.

7.1.1.3 Tiling

Describe the carbon cycle tiling, if any.

As per vegetation tiling.

7.1.1.4 Time Step *

Time step of carbon cycle in seconds

1200

7.1.1.5 Anthropogenic Carbon

Describe the treament of the anthropogenic carbon pool

- ☐ Grand slam protocol
- ☐ Residence time
- ☐ Decay time
- ☐ Other - please specify:

7.1.1.6 Prognostic Variables *

List the prognostic variables of the carbon scheme

4 pool cSoil, Vegetation Fractional coverage, LAI and Canopy Height on PFTS. Vegetation Carbon density is a function of canopy height. 3 pool wood products scheme for land-use change.

7.2.1 Vegetation

Vegetation treatment in carbon cycle

7.2.1.1 Number Of Carbon Pools *

Enter the number of carbon pools used

4

7.2.1.2 Carbon Pools

List the carbon pools used

Leaf, wood, root, labile

7.2.1.3 Forest Stand Dynamics

Describe the treatment of forest stand dyanmics

No forest stand dynamics

7.2.2 Photosynthesis

Photosynthesis treatment in carbon cycle

7.2.2.1 Method

Describe the general method used for photosynthesis (e.g. type of photosynthesis, distinction between C3 and C4 grasses, Nitrogen depencence, etc.)

Enter TEXT:

7.2.3 Autotrophic Respiration

Autotrophic respiration treatment in carbon cycle

7.2.3.1 Maintainance Respiration

Describe the general method used for maintainence respiration

Enter TEXT:

7.2.3.2 Growth Respiration

Describe the general method used for growth respiration

Enter TEXT:

7.2.4 Allocation

Allocation treatment in carbon cycle

7.2.4.1 Method *

Describe the general principle behind the allocation scheme

Enter TEXT:

7.2.4.2 Allocation Bins *

Specify distinct carbon bins used in allocation

- ☒ Leaves + stems + roots
- ☐ Leaves + stems + roots (leafy + woody)
- ☐ Leaves + fine roots + coarse roots + stems
- ☐ Whole plant (no distinction)
- ☐ Other - please specify:

7.2.4.3 Allocation Fractions *

Describe how the fractions of allocation are calculated

- ☐ Fixed
- ☒ Function of vegetation type
- ☐ Function of plant allometry
- ☐ Explicitly calculated
- ☐ Other - please specify:

7.2.5 Phenology

Phenology treatment in carbon cycle

7.2.5.1 Method *

Describe the general principle behind the phenology scheme

Prescribed start and end of growing season by latitude and by plant functional type

7.2.6 Mortality

Vegetation mortality treatment in carbon cycle

7.2.6.1 Method *

Describe the general principle behind the mortality scheme

Enter TEXT:

7.3.1 Litter

Litter treatment in carbon cycle

7.3.1.1 Number Of Carbon Pools *

Enter the number of carbon pools used

3

7.3.1.2 Carbon Pools

List the carbon pools used

Metabolic, structural, coarse woody debris

7.3.1.3 Decomposition

List the decomposition methods used

Enter COMMA SEPARATED list:

7.3.1.4 Method

Describe the general method used

Enter TEXT:

7.4.1 Soil

Soil treatment in carbon cycle

7.4.1.1 Number Of Carbon Pools *

Enter the number of carbon pools used

3

7.4.1.2 Carbon Pools

List the carbon pools used

Microbial, slow, passive

7.4.1.3 Decomposition

List the decomposition methods used

Enter COMMA SEPARATED list:

7.4.1.4 Method

Describe the general method used

Enter TEXT:

7.5.1 Permafrost Carbon

Permafrost carbon treatment in carbon cycle

7.5.1.1 Is Permafrost Included *

Is permafrost included?

☐ True ☒ False

7.5.1.2 Emitted Greenhouse Gases

List the GHGs emitted

Enter COMMA SEPARATED list:

7.5.1.3 Decomposition

List the decomposition methods used

Enter COMMA SEPARATED list:

7.5.1.4 Impact On Soil Properties

Describe the impact of permafrost on soil properties

Enter TEXT:

8 Nitrogen Cycle

Land surface nitrogen cycle

8.1.1 Top level properties

Land surface nitrogen cycle

8.1.1.1 Name

Commonly used name for the nitrogen cycle in land model.

CASA-CNP

8.1.1.2 Overview

Overview of land surface nitrogen cycle in land model.

Enter TEXT:

8.1.1.3 Tiling

Describe the notrogen cycle tiling, if any.

Enter TEXT:

8.1.1.4 Time Step *

Time step of nitrogen cycle in seconds

1200

8.1.1.5 Prognostic Variables *

List the prognostic variables of the nitrogen scheme

Enter COMMA SEPARATED list:

9 River Routing

Land surface river routing

9.1.1 Top level properties

Land surface river routing

9.1.1.1 Name

Commonly used name for the river routing in land model.

Total Runoff Integrating Pathways (TRIP)

9.1.1.2 Overview

Overview of land surface river routing in land model.

Dynamic river routing scheme (Oki and Sud 1998). The surface and sub-surface runoff fluxes are supplied to an implementation of the TRIP river routing model.

9.1.1.3 Tiling

Describe the river routing, if any.

Kinematic wave model with constant velocity.

9.1.1.4 Time Step *

Time step of river routing scheme in seconds

3600

9.1.1.5 Grid Inherited From Land Surface *

Is the grid inherited from land surface?

☐ True ☒ False

9.1.1.6 Grid Description

General description of grid, if not inherited from land surface

Longitude, latitude grid 1.0 degrees in both directions.

9.1.1.7 Number Of Reservoirs *

Enter the number of reservoirs

0

9.1.1.8 Water Re Evaporation *

TODO

☐ Flood plains

☐ Irrigation

☐ Other - please specify:

9.1.1.9 Coupled To Atmosphere

Is river routing coupled to the atmosphere model component?

☐ True ☒ False

9.1.1.10 Coupled To Land

Describe the coupling between land and rivers

One way coupling surface and subsurface runoff into rivers.

9.1.1.11 Quantities Exchanged With Atmosphere

If couple to atmosphere, which quantities are exchanged between river routing and the atmosphere model components?

☐ Heat

☐ Water

☐ Tracers

☐ Other - please specify:

9.1.1.12 Basin Flow Direction Map *

What type of basin flow direction map is being used?

☒ Present day

☐ Adapted for other periods

☐ Other - please specify:

9.1.1.13 Flooding

Describe the representation of flooding, if any

N/A

9.1.1.14 Prognostic Variables *

List the prognostic variables of the river routing

Water storage

9.2.1 Oceanic Discharge

Oceanic discharge treatment in river routing

9.2.1.1 Discharge Type *

Specify how rivers are discharged to the ocean

- ☒ Direct (large rivers)
- ☐ Diffuse
- ☐ Other - please specify:

9.2.1.2 Quantities Transported *

Quantities that are exchanged from river-routing to the ocean model component

Select MULTIPLE options:

- ☐ Heat
- ☐ Water
- ☐ Tracers
- ☐ Other - please specify:

10 Lakes

Land surface lakes

10.1.1 Top level properties

Land surface lakes

10.1.1.1 Name

Commonly used name for the lakes in land model.

Enter TEXT:

10.1.1.2 Overview

Overview of land surface lakes in land model.

No explicit lakes model.

10.1.1.3 Coupling With Rivers *

Are lakes coupled to the river routing model component?

☐ True ☒ False

10.1.1.4 Time Step *

Time step of lake scheme in seconds

1200

10.1.1.5 Quantities Exchanged With Rivers

If coupling with rivers, which quantities are exchanged between the lakes and rivers

Select MULTIPLE options:

☐ Heat

☐ Water

☐ Tracers

☐ Other - please specify:

10.1.1.6 Vertical Grid

Describe the vertical grid of lakes

Enter TEXT:

10.1.1.7 Prognostic Variables *

List the prognostic variables of the lake scheme

Enter COMMA SEPARATED list:

10.2.1 Method

Lakes treatment

10.2.1.1 Ice Treatment *

Is lake ice included?

☐ True ☒ False

10.2.1.2 Albedo *

Describe the treatment of lake albedo

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

10.2.1.3 Dynamics *

Which dynamics of lakes are treated? horizontal, vertical, etc.

☒ No lake dynamics

☐ Vertical

☐ Horizontal

☐ Other - please specify:

10.2.1.4 Dynamic Lake Extent *

Is a dynamic lake extent scheme included?

☐ True ☒ False

10.2.1.5 Endorheic Basins *

Basins not flowing to ocean included?

☐ True ☒ False

10.3.1 Wetlands

Welands treatment

10.3.1.1 Description

Describe the treatment of wetlands, if any

Enter TEXT: