

N2PZDQ

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Chapter 1

N2PZDQ: 2-Nutrients, Quota resolveing NPZD model

1.1 General Overview

Description

State variables

N2PZDQ model resolves:

- 2 nutrients, nitrogen and phosphorus in dissolved and detrital form
- Phytoplankton with flexible C:N:P stoichiometry
- Zooplankton with fixed stoichiometry

Fluxes

The NPZD (nutrient-phytoplankton-zooplankton-detritus) model described here consists of $I=4$ state variables. Nutrient uptake (phytoplankton growth) is limited by light and nutrient availability, the latter of which is modelled by means of Michaelis-Menten kinetics, see eq. (dnp)}. The half-saturation nutrient concentration K_N used in this formulation has typically a value between 0.2 and 1.5 mmol N l⁻¹, m⁻³. Zooplankton grazing which is limited by the phytoplankton standing stock is modelled by means of an Ivlev formulation, see eq. (dpz)}. All other processes are based on linear first-order kinematics, see eqs. (dnp)} - (dzd)}.

For all details of the NPZD model implemented here, see[Burchardetal2005b]}.

Here is a diagram of fluxes:

maybe some script here

1.2 References

-?

Chapter 2

Data Type Index

2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

fabm_hzg_n2pzdq	9
type_base_model	
fabm_hzg_n2pzdq::type_hzg_n2pzdq	9

Chapter 3

Data Type Index

3.1 Data Types List

Here are the data types with brief descriptions:

fabm_hzg_n2pzdq	
Module "fabm_hzg_npzd_n2pzdq". this is the module to be included in the FABM library	9
fabm_hzg_n2pzdq::type_hzg_n2pzdq	9

Chapter 4

File Index

4.1 File List

Here is a list of all documented files with brief descriptions:

n2pzdq.F90	NPZD model extended with 2 nutrients and variable stoichiometry of phyto	13
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Chapter 5

Data Type Documentation

5.1 fabm_hzg_n2pzdq Module Reference

module "fabm_hzg_npzd_n2pzdq". this is the module to be included in the FABM library

Data Types

- type [type_hzg_n2pzdq](#)

Public Member Functions

- subroutine [initialize](#) (self, configunit)
here the n2pzdq namelist is read, variables exported by the model are registered in FABM and variables imported from FABM are made available

5.1.1 Detailed Description

module "fabm_hzg_npzd_n2pzdq". this is the module to be included in the FABM library

see Section 1 for a general overview to see what the model is about.

5.1.2 Member Function/Subroutine Documentation

5.1.2.1 subroutine fabm_hzg_n2pzdq::initialize (class (type_hzg_n2pzdq), intent(inout), target self, integer, intent(in) configunit)

here the n2pzdq namelist is read, variables exported by the model are registered in FABM and variables imported from FABM are made available

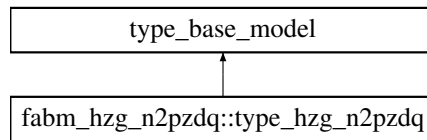
here a more detailed description can be provided

The documentation for this module was generated from the following file:

- [n2pzdq.F90](#)

5.2 fabm_hzg_n2pzdq::type_hzg_n2pzdq Type Reference

Inheritance diagram for fabm_hzg_n2pzdq::type_hzg_n2pzdq:



Public Member Functions

- procedure **initialize**
- procedure **do**
- procedure **get_light_extinction**

Public Attributes

- type(type_state_variable_id) **id_din**
- type(type_state_variable_id) **id_dip**
- type(type_state_variable_id) **id_phyc**
- type(type_state_variable_id) **id_phyn**
- type(type_state_variable_id) **id_phyp**
- type(type_state_variable_id) **id_detn**
- type(type_state_variable_id) **id_detp**
- type(type_state_variable_id) **id_zooc**
- type(type_state_variable_id) **id_dic**
- type(type_dependency_id) **id_par**
- type(type_dependency_id) **id_temp**
- type(type_horizontal_dependency_id) **id_i_0**
- type(type_diagnostic_variable_id) **id_gpp**
- type(type_diagnostic_variable_id) **id_ncp**
- type(type_diagnostic_variable_id) **id_ppr**
- type(type_diagnostic_variable_id) **id_npr**
- type(type_diagnostic_variable_id) **id_dpar**
- type(type_diagnostic_variable_id) **id_dmort**
- type(type_diagnostic_variable_id) **id_dllim**
- type(type_diagnostic_variable_id) **id_dnlm**
- type(type_diagnostic_variable_id) **id_dplm**
- type(type_diagnostic_variable_id) **id_dqnc**
- type(type_diagnostic_variable_id) **id_dqpc**
- type(type_diagnostic_variable_id) **id_den**
- type(type_diagnostic_variable_id) **id_dep**
- type(type_diagnostic_variable_id) **id_dec**
- type(type_diagnostic_variable_id) **id_dgraz**
- type(type_diagnostic_variable_id) **id_dmortz**
- type(type_conserved_quantity_id) **id_totn**
- type(type_conserved_quantity_id) **id_totp**
- real(rk) **p0**
- real(rk) **affin_par**
- real(rk) **upmax_n**
- real(rk) **upmax_p**
- real(rk) **grow_max**
- real(rk) **iv**
- real(rk) **halfsatn**
- real(rk) **halfsatp**
- real(rk) **rem_n**

- real(rk) **rem_p**
- real(rk) **mort0_phy**
- real(rk) **mortpar_phy**
- real(rk) **qmax_n**
- real(rk) **qmax_p**
- real(rk) **qmin_n**
- real(rk) **qmin_p**
- real(rk) **kc**
- real(rk) **w_p**
- real(rk) **w_d**
- real(rk) **rpn**
- real(rk) **grazmax**
- real(rk) **mort_zoo**
- real(rk) **n**
- real(rk) **qzn**
- real(rk) **qzp**
- real(rk) **eff**
- real(rk) **e_c**
- real(rk) **k_detn**
- real(rk) **k_detp**
- real(rk) **mort_zoo2**
- real(rk) **n2**
- real(rk) **zexcdefr**
- real(rk) **dic_per_n**
- logical **use_dic**

The documentation for this type was generated from the following file:

- [n2pzdq.F90](#)

Chapter 6

File Documentation

6.1 n2pzdq.F90 File Reference

NPZD model extended with 2 nutrients and variable stoichiometry of phyto.

```
#include "fabm_driver.h"
```

Data Types

- module [fabm_hzg_n2pzdq](#)
module "fabm_hzg_npzd_n2pzdq". this is the module to be included in the FABM library
- type [fabm_hzg_n2pzdq::type_hzg_n2pzdq](#)

6.1.1 Detailed Description

NPZD model extended with 2 nutrients and variable stoichiometry of phyto.

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HZG

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