How to write an Ariane namelist file?

January 2006

Ariane 1.3.0

Bruno.Blanke@univ-brest.fr – NicolasGrima@univ-brest.fr

Table of contents

This document is available on the official Ariane web pages at the URL[1]:

`http://www.univ-brest.fr/lpo/ariane`

[1] **U**niform **R**esource **L**ocator

1 Introduction

A *namelist* file is an ASCI file (readable and writtable by a human) which consists of a collection of items, where each item has a name, indexes and associated data values. Its format is known by Fortran langage and gives a solution to parametrize easely an application whithout to recompile it everytime.

In our case the *namelist* file is used as an input file to the ARIANE application to switch on or not some specific options, set parametrization and to specify the netcdf input data file names. In this document, all Ariane namelist items, indexes and data values are documented and the NetCDF file name coding stategy is detailed.

2 Ariane's *namelist* file(s)

A namelist file is build as following:

```
   &ITEM1
     index11 = value11,
     index12 = value12,
     index13 = value13,
     ...
     index1n = value1n,
   /
   &ITEM2
     index21 = value21,
     index22 = value22,
     index23 = value23,
     ...
     index2n = value2n,
   /

   …
   &ITEMN
     indexN1 = valueN1,
     indexN2 = valueN2,
     indexN3 = valueN3,
     ...
     indexNn = valueNn,
   /
```

Where *index*'s type could be real, integer, character, logical, etc.

In Ariane all the indexes have a default value coded in the source code, in this case it is not necessary to specified an index if the value is the same as the default value. Default values are in bold in all the examples described bellow.

The place of the items can be changed, however it is not possible to remove an item which has no index value set.

2.1 OPA and ROMS items

Because OPA[2] and ROMS[3] don't give the same output data, due in particular to their differences in the vertical level discretizations, the namelist item list is different. It is detailed in Table 1.

OPA items	*ROMS items*
&**ARIANE** ... / &**OPAPARAM** ... / &QUANTITATIVE (mode) ... / &QUALITATIVE (mode) ... / &**ZONALCRT** ... / &**MERIDCRT** ... / &*VERTICRT* (key_computew) ... / &*TEMPERAT* (key_alltracers) ... / &*SALINITY* (key_alltracers) ... / &*DENSITY* (key_alltracers) ... (and key_sigma) / &**MESH** ... /	&**ARIANE** ... / &**ROMSPARAM** ... / &QUANTITATIVE (mode) ... / &QUALITATIVE (mode) ... / &**ZONALCRT** ... / &**MERIDCRT** ... / &*TEMPERAT* (key_alltracers) ... / &*SALINITY* (key_alltracers) ... / &**ZETA** ... / &**GLOBALATT** ... / &**GRDROMS** ... /

Table 1: OPA and ROMS items

[2]The OPA system is an Ocean General Circulation modelling System shared by projects (research and operational) in oceanography and Climate change studies . It is developed at the Laboratoire d'Océanographie DYnamique et de Climatologie.

[3]ROMS is a Regional Ocean Modeling System (http://www.atmos.ucla.edu/cesr/ROMS_page.html).

Where **bold** *items* have to be present in the namelist file and *Italic items* are optional. The presence of the optional *items* depends of the *index* value (between brackets in the table) set in `ARIANE`, `OPAPARAMS` or `ROMSPARAMS` items.

2.2 The netcdf file name strategy

2.2.1Data

The Ariane application reads dynamics and tracers data generated by OGCM from *netcdf* files. Because data storage are different from one simulation to another one and/or from one OGCM to another one, Ariane support:

- Dynamics and tracers data in one file or in separate files (for example: OPA separates data following the referenced grid points T, U, V or W).
- Data time series stored in one file or in a set of files (for example: data are stored by year during ten years).
- Different number of time steps from one file to another one (for example: daily output data stored by month in netcdf files).

So it is possible to read data from OGCM output[4], stored in *netcdf* format, without duplicating them in a different format or in a specific file.

To do this we assume that the netcdf file names have to be structured as following:

```
[prefix][number][suffix]
    [prefix][number]
    [number][suffix]
  [prefix] or [suffix]
```

where *prefix* and *suffix* are a string of characters and *number* is an integer.

Number must be coded on a constant digit number and its value must increase one by one in agreement with time series evolution of the data. There is no restriction concerning the value of the first *number*.

Some good and bad examples are available in the table below:

[4]We assume that these data are on a C grid in the Arakawa classification [Arakawa, 1972].

GOOD: these netcdf file names are supported by Ariane			
[prefix][number][suffix]	[prefix][number]	[number][suffix]	[prefix] or [suffix]
tracers_01285_model.nc	Temp00001	10_data.nc	data.nc
tracers_01286_model.nc	Temp00002	11_data.nc	
tracers_01287_model.nc	Temp00003	12_data.nc	
tracers_01288_model.nc	Temp00004	13_data.nc	
tracers_01289_model.nc	Temp00005	14_data.nc	
tracers_01290_model.nc		15_data.nc	
tracers_01291_model.nc			
BAD: these netcdf file names are not supported by Ariane			
tracers_8_model.nc	m11y01_data.nc	data_010.nc	data_jan.nc
tracers_9_model.nc	m12y01_data.nc	data_015.nc	data_feb.nc
tracers_10_model.nc	m01y02_data.nc	data_020.nc	data_mar.nc
tracers_11_model.nc	m02y02_data.nc		

If your netcdf files don't follow one of these (good) forms you should and could (easely) **create symbolic links to respected it.**

The *netcdf* file names are coded by *indexes* in the *namelist* file. The item is generally structured as following:

```
&DYNAMIC_OR_TRACER_NAME
  c_dir_xx       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_xx    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_xx        = [begin_integer_value            |  -1   ],
  indn_xx        = [end_integer_value              |  -1   ],
  maxsize_xx     = [number_of_digits_integer_value |  -1   ],
  c_suffix_xx    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_xx      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_xx = ['mask_or_missing_value'        | 'NONE'],
/
```

Where *xx* is the dynamic or tracer shortname coded on 2 characters (for example: "zo" for zonal current, "me" for meridional current, etc).

2.2.2Grid or mesh

We assume that the grid or mesh data are stored in a single file. If it is not the case please use the netcdf tools *nco* (http://nco.sourceforge.net/) to merge all your data in a single file.

3 Ariane namelist items detailed

3.1 A common item: ARIANE

```
   &ARIANE
    key_roms       =[.TRUE.|.FALSE.],
    key_alltracers =[.TRUE.|.FALSE.],
    mode           =['qualitative' | 'quantitative' | 'NONE']
    forback        =['forward' | 'backward' | 'NONE']
    bin            =['nobin' | 'bin' | 'subbin' | 'NONE']
    nmax           =[ integer_value | -1 ],
    tunit          =[ real_value | 0. ],
    ntfic          =[ integer_value | -1 ],
    key_approximatesigma =[.TRUE.|.FALSE.],
   /
```

ARIANE indexes	
key_roms	By defaut Ariane was written to compute lagrangian diagnostics from the OPA OGCM outputs. If this index is activated (.TRUE.) Ariane computes lagrangian diagnostics from ROMS OGCM outputs.
key_alltracers	Temperature, salinity and density are taken into account in the lagrangian diagnostics.
mode	A character string to select one of the two modes available in the Ariane application – qualitative – or -quantitative- (all characters should be in lower or in upper case). The differences between these two modes are explained in the Ariane's Users' Guide.
forback	Lagrangian integrations can be done either forward or backward in time. Correct input is either 'forward' OR 'backward'.

ARIANE indexes	
`bin`	1. Initial positions can be diagnosed in several ways: - "natural" way ('nobin'), - QUANTITATIVE: automatic positioning on section "1" provided in "segments" file, - QUALITATIVE: ASCII positions read on "initial_positions". 2. "binary" initial positions ('bin') initial positions are read on file "initial.bin". 3. "subset" of "binary" initial positions ('subbin') initial positions are read on file "initial.bin" a list of indices (file "subset") defines the subset to use. NOTE: indices in subset MUST BE monotonous "initial.bin" can be for instance the initial positions (see "init.sav") or final positions (see "final.sav") of a former quantitative experiment. Correct input is either 'nobin' or 'bin' or 'subbin'.
`nmax`	Maximum number of particles.
`tunit`	Convenient unit of time (in seconds), usually one day (86400.).
`ntfic`	Sampling time (in number of "tunit") for the available transport field.
`key_approximatesigma`	Linear interpolation of the density.

3.2 Quantitative mode

If the "mode" *index* in the *ARIANE item* is set to 'quantitative' the *QUANTITATIVE item* is read.

```
&QUANTITATIVE
 key_eco              =[.TRUE.|.FALSE.],
 key_reducmem         =[.TRUE.|.FALSE.],
 key_unitm3           =[.TRUE.|.FALSE.],
 key_nointerpolstats  =[.TRUE.|.FALSE.],
 max_transport        =[real_value | 0.],
/
```

QUANTITATIVE indexes	
`key_eco`	Remove some annexe computations which cost more than 50% of the total time. It is highly recommended to set this *index* to `.TRUE.` to reduce CPU time.
`key_reducmem`	Reduce memory in reading only the selected region. The reduction of memory depends of the selected region.
`key_unitm3`	Transport are printed with unit m^3 than Sverdrup.
`key_nointerpolstats`	No statistic interpolations.
`max_transport`	To define a maximum transport value, in m^3/s, that should not be exceeded by the transport automatically associated to each initial particle the lower the value, the larger the number of initial particles (as well as the CPU time needed) and the larger the accuracy of the results usual values include: - 1.e9 (to get only 1 particle within 1 model gridcell) - 1.e4 (i.e. 1e-2 Sv, usual choice for "standard" experiments)

3.3 Qualitative mode

If the "mode" *index* in the *ARIANE item* is set to 'qualitative' the *QUALITATIVE item* is read.

```
   &QUALITATIVE
     delta_t   = [real_value    | 0.],
     frequency = [integer_value | -1],
     nb_output = [integer_value | -1],
     mask      = [.TRUE.        |.FALSE.],
   /
```

QUALITATIVE indexes	
`delta_t`	To define a convenient unit of time (in seconds) usual values include: - 3600. (for 1 hour) - 86400. (for 1 day)

QUALITATIVE indexes	
frequency	To specify the frequency of output (*traj.ql* file) for the positions of all selected particles, in relation with the unit of time (*delta_t*): - 24 (for daily output, when the unit of time is 3600.) - 720 (for monthly output, when the unit of time is 3600.) - 1 (for daily output, when the unit of time is 86400.) - 30 (for monthly output, when the unit of time is 86400.)
nb_output	To specify the maximum number of outputs (#output). All trajectories will be stopped when *traj.ql* contains such a number of positions for each selected particle usual values include: - 360 (for a 1-year experiment, with a daily output) - 120 (for a 10-year experiment, with a monthly output) - 1000 (for a 1000-year experiment, with a annual output)
mask	To suppress the land points (however often useful for graphical post-processing) in the *traj.ql* output file.

3.4 OPA

3.4.1parameters

```
   &OPAPARAMS
     imt              =[integer_value | -1],
     jmt              =[integer_value | -1],
     kmt              =[integer_value | -1],
     lmt              =[integer_value | -1],
     key_periodic     =[.TRUE.|.FALSE.],
     key_jfold        =[.TRUE.|.FALSE.],
     key_computew     =[.TRUE.|.FALSE.],
     key_partialsteps =[.TRUE.|.FALSE.],
     key_sigma        =[.TRUE.|.FALSE.],
     zsigma           =[real_value | 0.],
   /
```

OPAPARAMS indexes	
imt	Number of indices in "i" (longitude).
jmt	Number of indices in "j" (latitude).
kmt	Number of indices in "k" (depth).

OPAPARAMS indexes	
`lmt`	Number of time steps.
`key_computew`	Compute the vertical transport from the horizontal current components.
`key_partialsteps`	Take into account the partial steps.
`key_jfold`	Take into account the periodicty in latitude of the OPA-ORCA grids.
`key_periodic`	Take into account the periodicity in longitude.
`key_sigma`	Compute density from temperature and salinity.
`zsigma`	A constant to compute sigma.

3.4.2Dynamic and tracer components

The *item* structures following are explained in the netcdf file name strategy chapter.

3.4.2.1 Zonal current and its EIV

```
&ZONALCRT
  c_dir_zo       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_zo    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_zo        = [begin_integer_value            |  -1   ],
  indn_zo        = [end_integer_value              |  -1   ],
  maxsize_zo     = [number_of_digits_integer_value |  -1   ],
  c_suffix_zo    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_zo      = ['netcdf_variable_name'         | 'NONE'],
  nc_var_eivu    = ['iev_netcdf_variable_name'     | 'NONE'],
  nc_att_mask_zo = [ mask_or_missing_value         | 'NONE'],
/
```

3.4.2.2 Meridional current and its EIV

```
&MERIDCRT
  c_dir_me       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_me    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_me        = [begin_integer_value            |  -1   ],
  indn_me        = [end_integer_value              |  -1   ],
  maxsize_me     = [number_of_digits_integer_value |  -1   ],
  c_suffix_me    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_me      = ['netcdf_variable_name'         | 'NONE'],
  nc_var_eivv    = ['iev_netcdf_variable_name'     | 'NONE'],
  nc_att_mask_me = [ mask_or_missing_value         | 'NONE'],
/
```

3.4.2.3 Vertical current (optional)

```
&VERTICRT
  c_dir_ve       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_ve    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_ve        = [begin_integer_value            |  -1   ],
  indn_ve        = [end_integer_value              |  -1   ],
  maxsize_ve     = [number_of_digits_integer_value |  -1   ],
  c_suffix_ve    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_ve      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_ve = [ mask_or_missing_value         | 'NONE'],
/
```

3.4.2.4 Temperature (optional)

```
&TEMPERAT
  c_dir_te       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_te    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_te        = [begin_integer_value            |  -1   ],
  indn_te        = [end_integer_value              |  -1   ],
  maxsize_te     = [number_of_digits_integer_value |  -1   ],
  c_suffix_te    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_te      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_te = [ mask_or_missing_value         | 'NONE'],
/
```

3.4.2.5 Salinity (optional)

```
&SALINITY
  c_dir_sa       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_sa    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_sa        = [begin_integer_value            |  -1   ],
  indn_sa        = [end_integer_value              |  -1   ],
  maxsize_sa     = [number_of_digits_integer_value |  -1   ],
  c_suffix_sa    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_sa      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_sa = [ mask_or_missing_value         | 'NONE'],
/
```

3.4.2.6 Density (optional)

```
&DENSITY
  c_dir_de       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_de    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_de        = [begin_integer_value            |  -1   ],
  indn_de        = [end_integer_value              |  -1   ],
  maxsize_de     = [number_of_digits_integer_value |  -1   ],
  c_suffix_de    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_de      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_de = [ mask_or_missing_value         | 'NONE'],
/
```

3.4.3Meshmask

```
&MESH
  dir_mesh     = ['dir/where/my/grid/is/stored' | 'NONE'],
  fn_mesh      = ['netcdf_file_name'            | 'NONE'],
  nc_var_xx_tt = ['netcdf_variable_name'        | 'NONE'],
  nc_var_xx_uu = ['netcdf_variable_name'        | 'NONE'],
  nc_var_yy_tt = ['netcdf_variable_name'        | 'NONE'],
  nc_var_yy_vv = ['netcdf_variable_name'        | 'NONE'],
  nc_var_zz_ww = ['netcdf_variable_name'        | 'NONE'],
  nc_var_e2u   = ['netcdf_variable_name'        | 'NONE'],
  nc_var_e1v   = ['netcdf_variable_name'        | 'NONE'],
  nc_var_e1t   = ['netcdf_variable_name'        | 'NONE'],
  nc_var_e2t   = ['netcdf_variable_name'        | 'NONE'],
  nc_var_e3t   = ['netcdf_variable_name'        | 'NONE'],
  nc_var_tmask = ['netcdf_variable_name'        | 'NONE'],
  nc_mask_val  = [real_value | 0.],
/
```

MESH indexes	
dir_mesh	Directory.
fn_mesh	Netcdf file name.
nc_var_xx_tt	The netcdf variable name of the longitudes on the T grid.
nc_var_xx_uu	The netcdf variable name of the longitudes on the U grid.
nc_var_yy_tt	The netcdf variable name of the latitudes on the T grid.
nc_var_yy_vv	The netcdf variable name of the latitudes on the U grid.
nc_var_zz_ww	The netcdf variable name of the vertical level (depth) on the W grid.
nc_var_e2u	The netcdf variable name of the scale factor E2U.
nc_var_e1v	The netcdf variable name of the scale factor E1V
nc_var_e1t	The netcdf variable name of the scale factor E1T
nc_var_e2t	The netcdf variable name of the scale factor E2T
nc_var_e3t	The netcdf variable name of the scale factor E3T
nc_var_tmask	The netcdf variable name of the mask on T grid.
nc_mask_val	The real value of the land.

3.5 ROMS

3.5.1parameters

```
   &ROMSPARAMS
     xi_rho   = [integer_value | -1],
     eta_rho  = [integer_value | -1],
     s_w      = [integer_value | -1],
     time     = [integer_value | -1],
   /
```

Namelist: ROMSPARAMS indexes	
xi_rho	Number of Rho-points in Xi-direction. (longitude)
eta_rho	Number of Rho-points in Eta-direction. (latitude)
s_w	Number of W-points in S-direction. (depth)
time	Number of time step.

3.5.2Dynamic and tracer components

The *item* structures following are explained in the netcdf file name strategy chapter.

3.5.2.1 Zonal current

```
&ZONALCRT
  c_dir_zo       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_zo    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_zo        = [begin_integer_value            |  -1   ],
  indn_zo        = [end_integer_value              |  -1   ],
  maxsize_zo     = [number_of_digits_integer_value |  -1   ],
  c_suffix_zo    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_zo      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_zo = [ mask_or_missing_value         | 'NONE'],
/
```

3.5.2.2 Meridional current

```
&MERIDCRT
  c_dir_me       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_me    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_me        = [begin_integer_value            |  -1   ],
  indn_me        = [end_integer_value              |  -1   ],
  maxsize_me     = [number_of_digits_integer_value |  -1   ],
  c_suffix_me    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_me      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_me = [ mask_or_missing_value         | 'NONE'],
/
```

3.5.2.3 Temperature (optional)

```
&TEMPERAT
  c_dir_te       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_te    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_te        = [begin_integer_value            |  -1   ],
  indn_te        = [end_integer_value              |  -1   ],
  maxsize_te     = [number_of_digits_integer_value |  -1   ],
  c_suffix_te    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_te      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_te = [ mask_or_missing_value         | 'NONE'],
/
```

3.5.2.4 Salinity (optional)

```
&SALINITY
  c_dir_sa       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_sa    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_sa        = [begin_integer_value            |  -1   ],
  indn_sa        = [end_integer_value              |  -1   ],
  maxsize_sa     = [number_of_digits_integer_value |  -1   ],
  c_suffix_sa    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_sa      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_sa = [ mask_or_missing_value         | 'NONE'],
/
```

3.5.2.5 Zeta

```
&DENSITY
  c_dir_de       = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_de    = ['netcdf_file_name_prefix'      | 'NONE'],
  ind0_de        = [begin_integer_value            |  -1   ],
  indn_de        = [end_integer_value              |  -1   ],
  maxsize_de     = [number_of_digits_integer_value |  -1   ],
  c_suffix_de    = ['netcdf_file_name_suffix'      | 'NONE'],
  nc_var_de      = ['netcdf_variable_name'         | 'NONE'],
  nc_att_mask_de = [ mask_or_missing_value         | 'NONE'],
/
```

3.5.3Grids

3.5.3.1 Global attributes (GLOBALATT)

```
&GLOBALATT
  dir_glbatt = ['dir/where/my/grid/is/stored' | 'NONE'],
  fn_glbatt  = ['netcdf_file_name'            | 'NONE'],
  nc_glbatt_hc   = ['netcdf_variable_name'    | 'NONE'],
  nc_glbatt_sc_w = ['netcdf_variable_name'    | 'NONE'],
  nc_glbatt_Cs_w = ['netcdf_variable_name'    | 'NONE'],
/
```

GLOBALATT indexes	
dir_glbatt	Directory.
fn_glbatt	Netcdf file name.
nc_glbatt_hc	The netcdf global attribute for hc.
nc_glbatt_sc_w	The netcdf global attribute for sc_w.
nc_glbatt_Cs_w	The netcdf global attribute for Cs_w.

3.5.3.2 ROMS grid (GRDROMS)

```
&GRDROMS
  dir_grd_roms = ['dir/where/my/grid/is/stored'  | 'NONE'],
  fn_grd_roms  = ['netcdf_file_name'             | 'NONE'],
  nc_var_lon_rho_roms  = ['netcdf_variable_name' | 'NONE'],
  nc_var_lon_u_roms    = ['netcdf_variable_name' | 'NONE'],
  nc_var_lat_rho_roms  = ['netcdf_variable_name' | 'NONE'],
  nc_var_lat_v_roms    = ['netcdf_variable_name' | 'NONE'],
  nc_var_pm_roms       = ['netcdf_variable_name' | 'NONE'],
  nc_var_pn_roms       = ['netcdf_variable_name' | 'NONE'],
  nc_var_h_roms        = ['netcdf_variable_name' | 'NONE'],
  nc_var_mask_rho_roms = ['netcdf_variable_name' | 'NONE'],
/
```

GRDROMS indexes	
dir_grd_roms	Directory.
fn_grd_roms	Netcdf file name.
nc_var_lon_rho_roms	The netcdf variable name of the rho longitudes.
nc_var_lon_u_roms	The netcdf variable name of the u longitudes.
nc_var_lat_rho_roms	The netcdf variable name of the rho latitudes.
nc_var_lat_v_roms	The netcdf variable name of the v latitudes.
nc_var_pm_roms	The netcdf variable name of curvilinear coordinate metric in 'xi'.
nc_var_pn_roms	The netcdf variable name of curvilinear coordinate metric in 'eta'.
nc_var_h_roms	The netcdf variable name of final bathymetry at rho points.
nc_var_mask_rho_roms	The netcdf variable name of mask on rho points.

4 Examples

4.1 OPA – Qualitative

```
&ARIANE
  key_roms       = .FALSE. ,
  key_alltracers = .TRUE.,
  mode           = 'qualitative',
  forback        = 'forward',
  bin            = 'nobin',
  nmax           = 300000,
  tunit          = 86400.,
```

```
  ntfic          = 180,
  key_approximatesigma=.FALSE.,
/
&QUALITATIVE
  delta_t        = 86400.,
  frequency      = 30,
  nb_output      = 55,
  mask           = .TRUE.,
/
&OPAPARAM
  imt      = 36,
  jmt      = 30,
  kmt      = 31,
  lmt      = 2,
  key_periodic     = .FALSE.,
  key_jfold        = .FALSE.,
  key_computew     = .FALSE.,
  key_partialsteps = .FALSE.,
  key_sigma        = .FALSE.,
  zsigma           =   2000.,
/
&ZONALCRT
  c_dir_zo     = '../../data',
  c_prefix_zo  = 'reduc_4Dfields.nc',
  ind0_zo      = -1,
  indn_zo      = -1,
  maxsize_zo   = -1,
  c_suffix_zo  = 'NONE',
  nc_var_zo    = 'U',
  nc_var_eivu  = 'NONE',
  nc_att_mask_zo = 'NONE',
/
&MERIDCRT
  c_dir_me     = '../../data',
  c_prefix_me  = 'reduc_4Dfields.nc',
  ind0_me      = -1,
  indn_me      = -1,
  maxsize_me   = -1,
  c_suffix_me  = 'NONE',
  nc_var_me    = 'V',
  nc_var_eivv  = 'NONE',
  nc_att_mask_me = 'NONE',
/
&VERTICRT
  c_dir_ve     = '../../data',
  c_prefix_ve  = 'reduc_4Dfields.nc',
  ind0_ve      = -1,
  indn_ve      = -1,
  maxsize_ve   = -1,
  c_suffix_ve  = 'NONE',
  nc_var_ve    = 'W',
  nc_var_eivw  = 'NONE',
  nc_att_mask_ve = 'NONE',
/
&TEMPERAT
  c_dir_te     = '../../data',
  c_prefix_te  = 'reduc_4Dfields.nc',
  ind0_te      = -1,
  indn_te      = -1,
  maxsize_te   = -1,
  c_suffix_te  = 'NONE',
  nc_var_te    = 'T',
  nc_att_mask_te = 'NONE',
/
&SALINITY
  c_dir_sa     = '../../data',
  c_prefix_sa  = 'reduc_4Dfields.nc',
```

```
  ind0_sa      = -1,
  indn_sa      = -1,
  maxsize_sa   = -1,
  c_suffix_sa  = 'NONE',
  nc_var_sa    = 'S',
  nc_att_mask_sa = 'NONE',
/
&DENSITY
  c_dir_de     = '../../data',
  c_prefix_de  = 'reduc_4Dfields.nc',
  ind0_de      = -1,
  indn_de      = -1,
  maxsize_de   = -1,
  c_suffix_de  = 'NONE',
  nc_var_de    = 'R',
  nc_att_mask_de = 'NONE',
/
&MESH
  dir_mesh     = '../../data',
  fn_mesh      = 'reduc_meshmask.nc',
  nc_var_xx_tt = 'xt',
  nc_var_xx_uu = 'xu',
  nc_var_yy_tt = 'yt',
  nc_var_yy_vv = 'yv',
  nc_var_zz_ww = 'zw',
  nc_var_e2u   = 'e2u',
  nc_var_e1v   = 'e1v',
  nc_var_e1t   = 'e1t',
  nc_var_e2t   = 'e2t',
  nc_var_e3t   = 'e3t',
  nc_var_tmask = 'mt3d',
  nc_mask_val  = 0.,
/
```

4.2 OPA – Quantitative

```
&ARIANE
  key_roms       = .FALSE. ,
  key_alltracers = .TRUE.,
  mode           = 'quantitative',
  forback        = 'forward',
  bin            = 'nobin',
  nmax           = 300000,
  tunit          = 86400.,
  ntfic          = 180,
  key_approximatesigma=.FALSE.,
/
&QUANTITATIVE
  key_eco        = .FALSE.,
  key_reducmem   = .TRUE.,
  key_unitm3     = .FALSE.,
  key_nointerpolstats = .FALSE.,
  max_transport  = 1.e9,
/
&OPAPARAM
  imt      = 36,
  jmt      = 30,
  kmt      = 31,
  lmt      = 2,
  key_periodic     = .FALSE.,
  key_jfold        = .FALSE.,
  key_computew     = .FALSE.,
  key_partialsteps = .FALSE.,
  key_sigma        = .FALSE.,
  zsigma           =   2000.,
/
&ZONALCRT
```

```
  c_dir_zo     = '../../data',
  c_prefix_zo  = 'reduc_4Dfields.nc',
  ind0_zo      = -1,
  indn_zo      = -1,
  maxsize_zo   = -1,
  c_suffix_zo  = 'NONE',
  nc_var_zo    = 'U',
  nc_var_eivu  = 'NONE',
  nc_att_mask_zo = 'NONE',
/
&MERIDCRT
  c_dir_me     = '../../data',
  c_prefix_me  = 'reduc_4Dfields.nc',
  ind0_me      = -1,
  indn_me      = -1,
  maxsize_me   = -1,
  c_suffix_me  = 'NONE',
  nc_var_me    = 'V',
  nc_var_eivv  = 'NONE',
  nc_att_mask_me = 'NONE',
/
&VERTICRT
  c_dir_ve     = '../../data',
  c_prefix_ve  = 'reduc_4Dfields.nc',
  ind0_ve      = -1,
  indn_ve      = -1,
  maxsize_ve   = -1,
  c_suffix_ve  = 'NONE',
  nc_var_ve    = 'W',
  nc_var_eivw  = 'NONE',
  nc_att_mask_ve = 'NONE',
/
&TEMPERAT
  c_dir_te     = '../../data',
  c_prefix_te  = 'reduc_4Dfields.nc',
  ind0_te      = -1,
  indn_te      = -1,
  maxsize_te   = -1,
  c_suffix_te  = 'NONE',
  nc_var_te    = 'T',
  nc_att_mask_te = 'NONE',
/
&SALINITY
  c_dir_sa     = '../../data',
  c_prefix_sa  = 'reduc_4Dfields.nc',
  ind0_sa      = -1,
  indn_sa      = -1,
  maxsize_sa   = -1,
  c_suffix_sa  = 'NONE',
  nc_var_sa    = 'S',
  nc_att_mask_sa = 'NONE',
/
&DENSITY
  c_dir_de     = '../../data',
  c_prefix_de  = 'reduc_4Dfields.nc',
  ind0_de      = -1,
  indn_de      = -1,
  maxsize_de   = -1,
  c_suffix_de  = 'NONE',
  nc_var_de    = 'R',
  nc_att_mask_de = 'NONE',
/
&MESH
  dir_mesh     = '../../data',
  fn_mesh      = 'reduc_meshmask.nc',
  nc_var_xx_tt = 'xt',
  nc_var_xx_uu = 'xu',
```

```
  nc_var_yy_tt = 'yt',
  nc_var_yy_vv = 'yv',
  nc_var_zz_ww = 'zw',
  nc_var_e2u   = 'e2u',
  nc_var_e1v   = 'e1v',
  nc_var_e1t   = 'e1t',
  nc_var_e2t   = 'e2t',
  nc_var_e3t   = 'e3t',
  nc_var_tmask = 'mt3d',
  nc_mask_val  = 0.,
/
```

4.3 ROMS – Qualitative

```
&ARIANE
  key_roms       = .TRUE. ,
  key_alltracers = .TRUE.,
  mode           = 'quantitative',
  forback        = 'forward',
  bin            = 'nobin',
  nmax           = 300000,
  tunit          = 86400.,
  ntfic          = 180,
  key_approximatesigma=.FALSE.,
/
&QUALITATIVE
  delta_t        = 86400.,
  frequency      = 30,
  nb_output      = 55,
  mask           = .TRUE.,
/
&ROMSPARAM
  xi_rho   =170,
  eta_rho  =138,
  s_w      =33,
  time     =6,
/
&ZONALCRT
  c_dir_zo     = '..',
  c_prefix_zo  = 'roms_avg_Y11M12.nc',
  ind0_zo      = -1,
  indn_zo      = -1,
  maxsize_zo   = -1,
  c_suffix_zo  = 'NONE',
  nc_var_zo    = 'u',
  nc_att_mask_zo = 'NONE',
/
&MERIDCRT
  c_dir_me     = '..',
  c_prefix_me  = 'roms_avg_Y11M12.nc',
  ind0_me      = -1,
  indn_me      = -1,
  maxsize_me   = -1,
  c_suffix_me  = 'NONE',
  nc_var_me    = 'v',
  nc_att_mask_me = 'NONE',
/
&TEMPERAT
  c_dir_te     = '..',
  c_prefix_te  = 'roms_avg_Y11M12.nc',
  ind0_te      = -1,
  indn_te      = -1,
  maxsize_te   = -1,
  c_suffix_te  = 'NONE',
  nc_var_te    = 'temp',
  nc_att_mask_te = 'NONE',
/
```

```
&SALINITY
  c_dir_sa     = '..',
  c_prefix_sa  = 'roms_avg_Y11M12.nc',
  ind0_sa      = -1,
  indn_sa      = -1,
  maxsize_sa   = -1,
  c_suffix_sa  = 'NONE',
  nc_var_sa    = 'salt',
  nc_att_mask_sa = 'NONE',
/
&ZETA
  c_dir_ze     = '..',
  c_prefix_ze  = 'roms_avg_Y11M12.nc',
  ind0_ze      = -1,
  indn_ze      = -1,
  maxsize_ze   = -1,
  c_suffix_ze  = 'NONE',
  nc_var_ze    = 'zeta',
  nc_att_mask_ze = 'NONE',
/
&GLOBALATT
  dir_glbatt           = '..',
  fn_glbatt            = 'roms_avg_Y11M12.nc',
  nc_glbatt_hc         = 'hc',
  nc_glbatt_sc_w       = 'sc_w',
  nc_glbatt_Cs_w       = 'Cs_w',
/
&GRDROMS
  dir_grd_roms         = '..',
  fn_grd_roms          = 'roms_grd.nc',
  nc_var_lon_rho_roms  = 'lon_rho',
  nc_var_lon_u_roms    = 'lon_u',
  nc_var_lat_rho_roms  = 'lat_rho',
  nc_var_lat_v_roms    = 'lat_v',
  nc_var_pm_roms       = 'pm',
  nc_var_pn_roms       = 'pn',
  nc_var_h_roms        = 'h',
  nc_var_mask_rho_roms = 'mask_rho',
/
```

4.4 ROMS – Quantitative

```
&ARIANE
  key_roms       = .TRUE. ,
  key_alltracers = .TRUE.,
  mode           = 'quantitative',
  forback        = 'forward',
  bin            = 'nobin',
  nmax           = 300000,
  tunit          = 86400.,
  ntfic          = 180,
  key_approximatesigma=.FALSE.,
/
&QUANTITATIVE
  key_eco        = .FALSE.,
  key_reducmem   = .TRUE.,
  key_unitm3     = .FALSE.,
  key_nointerpolstats = .FALSE.,
  max_transport  = 1.e9,
/
&ROMSPARAM
  xi_rho   =170,
  eta_rho  =138,
  s_w      =33,
  time     =6,
/
&ZONALCRT
```

```
  c_dir_zo     = '..',
  c_prefix_zo  = 'roms_avg_Y11M12.nc',
  ind0_zo      = -1,
  indn_zo      = -1,
  maxsize_zo   = -1,
  c_suffix_zo  = 'NONE',
  nc_var_zo    = 'u',
  nc_att_mask_zo = 'NONE',
/
&MERIDCRT
  c_dir_me     = '..',
  c_prefix_me  = 'roms_avg_Y11M12.nc',
  ind0_me      = -1,
  indn_me      = -1,
  maxsize_me   = -1,
  c_suffix_me  = 'NONE',
  nc_var_me    = 'v',
  nc_att_mask_me = 'NONE',
/
&TEMPERAT
  c_dir_te     = '..',
  c_prefix_te  = 'roms_avg_Y11M12.nc',
  ind0_te      = -1,
  indn_te      = -1,
  maxsize_te   = -1,
  c_suffix_te  = 'NONE',
  nc_var_te    = 'temp',
  nc_att_mask_te = 'NONE',
/
&SALINITY
  c_dir_sa     = '..',
  c_prefix_sa  = 'roms_avg_Y11M12.nc',
  ind0_sa      = -1,
  indn_sa      = -1,
  maxsize_sa   = -1,
  c_suffix_sa  = 'NONE',
  nc_var_sa    = 'salt',
  nc_att_mask_sa = 'NONE',
/
&ZETA
  c_dir_ze     = '..',
  c_prefix_ze  = 'roms_avg_Y11M12.nc',
  ind0_ze      = -1,
  indn_ze      = -1,
  maxsize_ze   = -1,
  c_suffix_ze  = 'NONE',
  nc_var_ze    = 'zeta',
  nc_att_mask_ze = 'NONE',
/
&GLOBALATT
  dir_glbatt           = '..',
  fn_glbatt            = 'roms_avg_Y11M12.nc',
  nc_glbatt_hc         = 'hc',
  nc_glbatt_sc_w       = 'sc_w',
  nc_glbatt_Cs_w       = 'Cs_w',
/
&GRDROMS
  dir_grd_roms         = '..',
  fn_grd_roms          = 'roms_grd.nc',
  nc_var_lon_rho_roms  = 'lon_rho',
  nc_var_lon_u_roms    = 'lon_u',
  nc_var_lat_rho_roms  = 'lat_rho',
  nc_var_lat_v_roms    = 'lat_v',
  nc_var_pm_roms       = 'pm',
  nc_var_pn_roms       = 'pn',
  nc_var_h_roms        = 'h',
  nc_var_mask_rho_roms = 'mask_rho',
```

/

5 References

- Arakawa, A., 1972: Design of the UCLA general circulation model. Numerical simulation of weather and climate. Dept. of Meteorology, University of California, Rep. 7, 1-34.