How to write an Ariane namelist file?

Ariane 2.x.x

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Bruno.Blanke@univ-brest.fr – Nicolas.Grima@univ-brest.fr

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This document is available on the official Ariane web pages at the address:

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

1 Introduction

A *namelist* file is an ASCII file (readable and writeable by a human) that consists of a collection of items, where each item has a name, indexes and associated data values. Its format is known by a Fortran compiler and gives a solution to parametrize easily an application without the need to recompile it every time.

In our case, the *namelist* file is used as an input file to the ARIANE application in order to switch on or off some specific options, set parametrizations 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 strategy is detailed.

2 Ariane's *namelist* file(s)

A namelist file is built as follows:

```
&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 types can be real, integer, character, logical, etc.

In Ariane, all indexes have a default value that is coded in the source code. This, it is not essential to specify an index if its value is the same as the default value. Default values are specified in a bold case in all the examples described hereafter.

The place of the items can be changed. However, it is not possible to remove an item whose index values has not been set.

2.1 OPA-NEMO and ROMS items

Because the OPA-NEMO[1] and ROMS[2] models do not generate the same type of output files, due in particular to conceptual differences in vertical level discretization, their namelist items are different. They are detailed in table 1.

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

Table 1: OPA and ROMS items

[1]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 LOCEAN (Laboratoire d'Océanographie et du Climat: Expérimentation et Approches. Numériques), formerly LODYC (Laboratoire d'Océanographie DYnamique et de Climatologie).

[2]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 on the *index* value (between brackets in the table) set in ***ARIANE***, ***OPAPARAM*** or ***ROMSPARAM*** items.

2.2 The NetCDF file name strategy

2.2.1 Data

The Ariane application reads velocity and tracer data generated by an OGCM from *NetCDF* files. Because data storage varies from one simulation to another one and/or from one OGCM to another one, Ariane supports:

- Velocity and tracer data in one file or in separate files (for example: OPA separates fields according to their reference grid 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).
- Varying number of time steps between successive output files (for example: daily output data stored in monthly NetCDF files).

Therefore, it is possible to read directly from an OGCM output[3], stored with a *NetCDF* format, without duplicating data in a different format or in a specific file.
To do this, we assume that the NetCDF file names are structured as follows:

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

Where *prefix* and *suffix* are strings of characters and *number* is an integer.
Number must be coded with a constant digit number and its value must increase one by one, in agreement with time 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:

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

If your NetCDF files do not follow one of these good forms you should and could (easily) create symbolic links to have them respect it.

(examples are given at the end of this document)

The *NetCDF* file names are coded by *indexes* in the *namelist* file. An item is generally structured as follows:

```
&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 velocity component or tracer short name coded on 2 characters (for example: "zo" for zonal current, "me" for meridional current, etc).

2.2.2 Grid or mesh

We assume that grid and 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.
In the OPA-NEMO case, you can merge some variables from different grid files using the *nco* command *ncks*:

```
cp mesh_hgr.nc mesh_hgr.nc_orig
ncks -A -v e3t_ps mesh_zgr.nc mesh_hgr.nc
ncks -A -v gdepw mesh_zgr.nc mesh_hgr.nc
ncks -A -v tmask mask.nc mesh_hgr.nc
```

3 Ariane namelist assistant (ANA)

To help you to fill correctly an Ariane namelist, an assistant is available at this URL:
http://stockage.univ-brest.fr/~grima/Ariane/namelist/namelist.html

4 Ariane namelist items detailed

All items and indexes introduced in the previous version (1.3.0) or Ariane are still available. Old namelist files should remain compatible with this new version.
Items and indexes coming with this new version of Ariane are highlighted.

4.1 A common item: ARIANE

```
&ARIANE
  key_roms           =[.TRUE.|.FALSE.],
 (key_symphonie     =[.TRUE.|.FALSE.], in development)
  key_alltracers     =[.TRUE.|.FALSE.],
  key_sequential     =[.TRUE.|.FALSE.],
  key_ascii_ouputs   =[.TRUE.|.FALSE.],
  mode               =['qualitative' | 'quantitative' | 'NONE']
  forback            =['forward' | 'backward' | 'NONE']
  bin                =['nobin' | 'bin' | 'subbin' | 'NONE']
  init_final         =['init' | 'final' | 'NONE']
  key_read_age       =[.TRUE.,.FALSE.]
  nmax               =[ integer_value | -1 ],
  tunit              =[ real_value | 0. ],
  ntfic              =[ integer_value | -1 ],
  tcyc               =[ real_value | computed ],
  (key_approximatesigma =[.TRUE.|.FALSE.],) → Obsolete ←
  key_computesigma   =[.TRUE.|.FALSE.],
  zsigma             =[ real_value | 0. ],
/
```

ARIANE indexes	
key_roms	By default Ariane was written to compute Lagrangian analyses from OPA-NEMO outputs. If this index is activated (.TRUE.), Ariane computes Lagrangian diagnostics from ROMS outputs..
key_alltracers	Temperature, salinity and density are taken into account in the Lagrangian diagnostics.

ARIANE indexes	
key_sequential	By default, Ariane stores in memory all the input data (incore). In this case particles are integrated one by one during all the period of study. Due to limitation of available memory or/and large volume of data (with a high spatial and temporal resolution), it is now possible for Ariane to read sequentially one time step of the input data and to integrate all particles during this period, before reading the next time step. This mode works in qualitative and quantitative mode. If `key_sequential` is `.TRUE.`, you have to add the new item `SEQUENTIAL`.
key_ascii_ouputs	If .TRUE., Ariane stores some of its outputs in an ASCII format. NetCDF outputs are always available whatever the value of this parameter.
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 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'.
bin	Correct input is either '**nobin**' or '**bin**' or '**subbin**'. 1. Initial positions can be diagnosed in several ways: - "natural" way ('nobin'), - QUANTITATIVE: automatic positioning on section "1" provided in file "sections.txt", - QUALITATIVE: ASCII positions read on file "initial_positions.txt". 2. "binary" initial positions ('bin') initial positions are read on file "ariane_initial.nc". 3. "subset" of "binary" initial positions ('subbin'): initial positions are read on file "ariane_initial.nc" and a list of indices ("subset.txt" file) defines the subset of indices to use. Notes: - indices in subset.txt file HAVE TO BE in ascending order, - "ariane_initial.nc" can be a "ariane_positions_quantitative.nc" file from a former quantitative experiment or a "ariane_trajectories_qualitative.nc" file from a former qualitative experiment.

ARIANE indexes	
init_final	It is used if bin is either 'bin' or 'subbin'. In these cases a ariane_initial.nc binary file will be read, a copy of the result of a former Lagrangian experiment. You must specify whether you want to use the 'initial' or 'final' positions of this former experiment to start your new Ariane experiment.
key_read_age	[CAUTION: very poorly tested and documented!] Option to follow an Ariane experiment piece by piece. The age is stored in the final position file of a first Ariane experiment and read by the next experiment (if bin option is set to 'bin' or 'subbin'). Don't USE this option in backward mode!
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 (output data from OPA or ROMS).
tcyc	Reference time value in seconds used to print particle ages in the `stats.txt` output file. By default the value of `tcyc` is computed as follows: `tcyc = tunit * ntfic * lmt` which implies that particle ages are expressed as a fraction (or multiple) of Ariane calendar length.
~~**key_approximatesigma**~~	OBSOLETE : Use now key_computesigma and zsigma.
key_computesigma	Compute density from temperature and salinity.
zsigma	Constant reference depth for sigma (density) calculations.

4.2 Sequential

If the "key_sequential" *index* in the *ARIANE item* is set to '.TRUE.' the *SEQUENTIAL item* is read.

```
&SEQUENTIAL
 (key_interp_temporal = in development)
 maxcycles          =[integer_value | 1],
/
```

SEQUENTIAL index	
maxcycles	Maximum number of cycles. A cycle corresponds to reading of the total input data period (lmt). This parameter is used only if the data are periodic in time and if trajectories longer than this period are needed. If not (like in realistic oceanic simulation) maxcycles has to be 1.

4.3 Quantitative mode

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

```
&QUANTITATIVE
 key_2dquant          =[.TRUE.|.FALSE.],
 key_eco              =[.TRUE.|.FALSE.],
 key_reducmem         =[.TRUE.|.FALSE.],
 key_unitm3           =[.TRUE.|.FALSE.],
 key_nointerpolstats  =[.TRUE.|.FALSE.],
 max_transport        =[real_value | 0.],
 lmin                 =[ integer_value, 1],
 lmax                 =[ integer_value, lmt],
/
```

QUANTITATIVE indexes	
key_2dquant	Quantitative experiment without account of vertical displacements. The particles can only move along the horizontal (2D calculations).
key_eco	Remove some ancillary computations that cost more than 50% of the total time. It is highly recommended to set this *index* to ***.TRUE.*** in order to reduce CPU time.
key_reducmem	Reduce memory use by reading model fields only over the selected region. The reduction of memory depends of the size of the region.
key_unitm3	Transports are printed with unit m^3/s rather than sverdrups.
key_nointerpolstats	No interpolations of statistics.
max_transport	To define a maximum transport value, in m3/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 better the accuracy of the results. Usual values include: - 1.e9 (to get only 1 particle within 1 model grid cell) - 1.e4 (i.e. 1e-2 Sv, usual choice for "standard" experiments)
lmin	First time step to generate particles (see tutorial).
lmax	Last time step to generate particles (see tutorial).

4.4 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],
  key_region = [.TRUE.         |.FALSE.],
  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)
frequency	To specify the output frequency of the positions of the calculated trajectories, 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) for each trajectory. 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)
key_region	To reduce CPU time and memory, it is now possible to specify a subregion of study (part of the whole domain) when running a qualitative experiment (in a similar way as it is done semi-automatically by Ariane in a quantitative experiment). A **region_limits** file with the indices of the region limits in “i”, “j” and “k” (longitude, latitude, depth) has to be present in the directory where the Ariane experiment is run (mkseg tool in quantitative mode generates this type of file).
mask	Obsolete.

4.5 OPA-NEMO

4.5.1 parameters

```
&OPAPARAM
  imt              =[integer_value | -1],
  jmt              =[integer_value | -1],
  kmt              =[integer_value | -1],
  lmt              =[integer_value | -1],
  key_periodic     =[.TRUE.|.FALSE.],
  key_jfold        =[.TRUE.|.FALSE.],
  pivot            =[F, T],
  key_computew     =[.TRUE.|.FALSE.],
  key_partialsteps =[.TRUE.|.FALSE.],
  (key_sigma        = obsolete,)
  (zsigma           = obsolete,)
/
```

OPAPARAM indexes	
imt	Number of indices in "i" (longitude).
jmt	Number of indices in "j" (latitude).
kmt	Number of indices in "k" (depth).
lmt	Number of time steps to be read by Ariane (not to exceed what is truly available on file !).
key_computew	Compute the vertical transport from the vertical integration of the 2D convergence of the lateral transport.
key_partialsteps	Take into account partial steps.
key_jfold	Take into account folding in latitude of the OPA-ORCA grids.
pivot	Folding in latitude in the OPA-ORCA configuration depends on grid resolution. To apply this folding, OPA-ORCA uses a pivot point. For ORCA 4, 2 and 025, the pivot point is "T", for ORCA 05 the pivot point is "F". Therefore this index supports only a "T" or "F" value.
key_periodic	Take into account periodicity in longitude.
key_sigma	Obsolete. (see ARIANE item)
zsigma	Obsolete. (see ARIANE item)

4.5.2 Dynamic and tracer components

The structure of the following *item* are explained in the NetCDF file name strategy chapter.

4.5.2.1 Zonal current and related Eddy Induced Velocity (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'],
/
```

4.5.2.2 Meridional current and related Eddy Induced Velocity (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'],
/
```

4.5.2.3 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'],
/
```

4.5.2.4 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'],
/
```

4.5.2.5 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'],
/
```

4.5.2.6 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'],
/
```

4.5.3 Meshmask

```
&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 of T gridpoints.
nc_var_xx_uu	The NetCDF variable name of the longitudes of U gridpoints.
nc_var_yy_tt	The NetCDF variable name of the latitudes of T gridpoints.
nc_var_yy_vv	The NetCDF variable name of the latitudes of V gridpoints.
nc_var_zz_ww	The NetCDF variable name of the vertical level (depth) of W grid points.
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 3D mask on T grid.
nc_mask_val	The real value of land grid points

4.6 ROMS

4.6.1 parameters

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

Namelist: ROMSPARAM 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 steps.

4.6.2 Dynamic and tracer components

The structure of the following *items* are explained in the NetCDF file name strategy chapter.

4.6.2.1 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'],
/
```

4.6.2.2 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'],
/
```

4.6.2.3 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'],
/
```

4.6.2.4 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'],
/
```

4.6.2.5 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'],
/
```

ZETA

```
&ZETA
  c_dir_ze        = ['dir/where/my/data/are/stored' | 'NONE'],
  c_prefix_ze     = ['NetCDF_file_name_prefix'      | 'NONE'],
  ind0_ze         = [begin_integer_value            |  -1   ],
  indn_ze         = [end_integer_value              |  -1   ],
  maxsize_ze      = [number_of_digits_integer_value |  -1   ],
  c_suffix_ze     = ['NetCDF_file_name_suffix'      | 'NONE'],
  nc_var_ze       = ['NetCDF_variable_name'         | 'NONE'],
  nc_att_mask_ze = [ mask_or_missing_value          | 'NONE'],
/
```

4.6.3 ROMS Grids

4.6.3.1 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.

4.6.3.2 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 NetCDFvariable 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.

5 Examples

5.1 OPA – Qualitative

```
&ARIANE
  key_alltracers = .TRUE.,
  mode           = 'qualitative',
  forback        = 'forward',
  bin            = 'nobin',
  nmax           = 300000,
  tunit          = 86400.,
  ntfic          = 180,
  key_computesigma = .FALSE.,
/
&QUALITATIVE
  delta_t        = 86400.,
  frequency      = 30,
  nb_output      = 55,
/
&OPAPARAM
  imt      = 36,
  jmt      = 30,
  kmt      = 31,
  lmt      = 2,
  key_periodic     = .FALSE.,
  key_jfold        = .FALSE.,
  key_computew     = .FALSE.,
  key_partialsteps = .FALSE.,
/
&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 = 'glamt',
  nc_var_xx_uu = 'glamu',
  nc_var_yy_tt = 'gphit',
  nc_var_yy_vv = 'gphiv',
  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 = 'tmask',
  nc_mask_val  = 0.,
/
```

5.2 OPA – Quantitative

```
&ARIANE
  key_alltracers = .TRUE.,
  mode           = 'quantitative',
  forback        = 'forward',
  bin            = 'nobin',
  nmax           = 300000,
  tunit          = 86400.,
  ntfic          = 180,
  key_computesigma = .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.,
/
&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 = 'glamt',
  nc_var_xx_uu = 'glamu',
  nc_var_yy_tt = 'gphit',
  nc_var_yy_vv = 'gphiv',
  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 = 'tmask',
  nc_mask_val  = 0.,
/
```

5.3 ROMS – Qualitative

```
&ARIANE
  key_roms       = .TRUE. ,
  key_alltracers = .TRUE.,
  mode           = 'quantitative',
  forback        = 'forward',
  bin            = 'nobin',
  nmax           = 300000,
  tunit          = 86400.,
  ntfic          = 180,
  key_computesigma=.TRUE.,
  zsigma         = 2000.,
/
&QUALITATIVE
  delta_t        = 86400.,
  frequency      = 30,
  nb_output      = 55,
/
&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',
/
```

5.4 ROMS – Quantitative

```
&ARIANE
  key_roms        = .TRUE. ,
  key_alltracers = .TRUE.,
  mode            = 'quantitative',
  forback         = 'forward',
  bin             = 'nobin',
  nmax            = 300000,
  tunit           = 86400.,
  ntfic           = 180,
  key_computesigma=.TRUE.,
  zsigma          = 2000.,
/
&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',
/
```

6 Simple scripts to modify the input file names

6.1 OPA-NEMO names

```
#!/bin/ksh

SRC_NAME=ORCA025-G70

typeset -Z3 nb

for grid in gridT gridU gridV gridW
do
  echo ""
  ((nb = 1))

  for filename in *${grid}.nc
  do

    echo "${nb} - ${SRC_NAME}_${nb}_${grid}.nc -> ${filename}"
    ln -s ${filename}  ${SRC_NAME}_${nb}_${grid}.nc
    ((nb=nb+1))
  done
done
```

6.2 ROMS names

```
#!/bin/ksh

SRC_NAME=Iroise15KM_avg_M

typeset -Z3 nb

echo ""
((nb = 1))
((nbo = 1))

for count in ${SRC_NAME}*.nc
do
    filename=${SRC_NAME}${nbo}.nc
    echo "${nb} - ${SRC_NAME}_${nb}.nc -> ${filename}"
    ln -s ${filename}  ${SRC_NAME}_${nb}.nc
    ((nb=nb+1))
    ((nbo=nbo+1))
done
```

7 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.