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Supplement of

GO5.0: the joint NERC–Met Office NEMO global ocean model for use in coupled and forced applications

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Namelist for GO5.0 NEMO configuration

```
!!>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
!! NEMO/OPA  :  1 - run manager      (namrun)
!! namelists    2 - Domain           (namzgr, namzgr_sco, namdom)
!!              3 - Surface boundary (namsbc, namsbc_ana, namsbc_flx,
namsbc_clio, namsbc_core
!!                                    namsbc_cpl, namqsr, namsbc_rnf,
namsbc_ssr, namsbc_alb)
!!              4 - lateral boundary (namlbc, namcla, namobc, namagrif, nambdy,
nambdy_tide)
!!              5 - bottom  boundary (nambfr, nambbc, nambbl)
!!              6 - Tracer           (nameos, namtra_adv, namtra_ldf,
namtra_dmp)
!!              7 - dynamics         (namdyn_adv, namdyn_vor, namdyn_hpg,
namdyn_spg, namdyn_ldf)
!!              8 - Verical physics  (namzdf, namzdf_ric, namzdf_tke,
namzdf_kpp, namzdf_ddm, namzdf_tmx)
!!              9 - diagnostics      (namtrd, namgap, namspr, namflo, namptr)
!!              9 - miscellaneous    (namsol, nammpp, nammpp_dyndist, namctl)
!!>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
!  CAUTION: some scripts does not support CAPITALs for logical use
.true./.false., not .TRUE./.FALSE.
!!======================================================================
!!                     ***  Run management namelists  ***
!!======================================================================
!!   namrun            parameters of the run
!!======================================================================
!-----------------------------------------------------------------------
&namrun        !   parameters of the run

!-----------------------------------------------------------------------
nn_no       =       0     !  job number
cn_exp      ="xhimoo"     !
nn_it000    =700801     !
nn_itend    =706560     !
nn_date0    =19760101     !
nn_leapy    =0     !
nn_istate   =       1     !  output the initial state (1) or not (0)
nn_stock    =    5760     !
nn_write    =     320     !  frequency of write in the output file   (modulo
referenced to nit000)
!----
ln_dimgnnn  = .false.     !  DIMG file format: 1 file for all processors (F) or
by processor (T)
ln_mskland  = .false.     !  mask land points in NetCDF outputs (costly: + ~15%)
ln_clobber  = .false.     !  clobber (overwrite) an existing file
nn_chunksz  =       0     !  chunksize (bytes) for NetCDF file (working only
with iom_nf90 routines)
ln_rstart   =.true.     !
 nn_rstctl
= 2      !
     ! = 1 use ndate0 in namelist (not the value in the restart file)
     ! = 2 calendar parameters read in the restart file
cn_ocerst_in  = "restart"     !  suffix of ocean restart name (input)
```

```
cn_ocerst_out = "restart"     !  suffix of ocean restart name (output)
/

!!======================================================================
!!                     ***  Domain namelists  ***
!!======================================================================
!!   namzgr       vertical coordinate
!!   namzgr_sco   s-coordinate or hybrid z-s-coordinate
!!   namdom       space and time domain (bathymetry, mesh, timestep)
!!======================================================================
!-----------------------------------------------------------------------
&namzgr        !   vertical coordinate

!-----------------------------------------------------------------------
ln_zco      = .false.     !  z-coordinate - full    steps   (T/F)
("key_zco" may also be defined)
ln_zps      = .true.      !  z-coordinate - partial steps   (T/F)
ln_sco      = .false.     !  s- or hybrid z-s-coordinate    (T/F)
/

!-----------------------------------------------------------------------
&namzgr_sco    !   s-coordinate or hybrid z-s-coordinate

!-----------------------------------------------------------------------
rn_sbot_min =  300.     !  minimum depth of s-bottom surface (>0) (m)
rn_sbot_max = 5250.     !  maximum depth of s-bottom surface (= ocean depth)
(>0) (m)
rn_theta    =    6.0     !  surface control parameter (0<=theta<=20)
rn_thetb    =    0.75     !  bottom control parameter  (0<=thetb<= 1)
rn_rmax     =    0.15     !  maximum cut-off r-value allowed (0<r_max<1)
ln_s_sigma  = .false.     !  hybrid s-sigma coordinates
rn_bb       =    0.8     !  stretching with s-sigma
rn_hc       =  150.0     !  critical depth with s-sigma
/

!-----------------------------------------------------------------------
&namdom        !   space and time domain (bathymetry, mesh, timestep)

!-----------------------------------------------------------------------
nn_bathy    =    1     !  compute (=0) or read(=1) the bathymetry file
nn_closea   =    0     !  closed seas and lakes are removed (=0) or kept (=1)
from the ORCA domain
nn_msh      =    0     !  create (=1) a mesh file (coordinates, scale factors,
masks) or not (=0)
rn_hmin     =   -8.     !  min depth of the ocean (>0) or min number of ocean
level (<0)
rn_e3zps_min=   25.     !  the thickness of the partial step is set larger than
the minimum
rn_e3zps_rat=    0.2     !  of e3zps_min and e3zps_rat * e3t   (N.B.
0<e3zps_rat<1)
                          !

rn_rdt      =  1350.     !  time step for the dynamics (and tracer if nacc=0)
==> 5760
```

```
nn_baro     =    16     !  number of barotropic time step (for the split
explicit algorithm) ("key_dynspg_ts")
rn_atfp     =    0.1     !  asselin time filter parameter
nn_acc      =    0     !  acceleration of convergence : =1      used, rdt <
rdttra(k)
     !                          =0, not used, rdt = rdttra
rn_rdtmin   =  1440.     !  minimum time step on tracers (used if nacc=1)
rn_rdtmax   =  1440.     !  maximum time step on tracers (used if nacc=1)
rn_rdth     =  800.     !  depth variation of tracer time step  (used if nacc=1)
/

!-----------------------------------------------------------------------
&namtsd    !   data : Temperature  & Salinity

!-----------------------------------------------------------------------
!          ! file name ! frequency (hours)    ! variable ! time interp. ! clim
!'yearly' or ! weights  ! rotation !
!          !           !  (if <0  months)     !   name   !  (logical)   ! (T/F)
! 'monthly'  ! filename ! pairing  !
sn_tem  = 'data_1m_potential_temperature_nomask', -1,'votemper',  .true.  ,
.true., 'yearly'   , ' '      , ' '     !
sn_sal  = 'data_1m_salinity_nomask'             , -1,'vosaline',  .true.  ,
.true., 'yearly'   , ''       , ' '     !
   !

cn_dir        = './'     !  root directory for the location of the runoff files
ln_tsd_init   = .true.     !  Initialisation of ocean T & S with T &S input data
(T) or not (F)
ln_tsd_tradmp = .true.     !  damping of ocean T & S toward T &S input data (T)
or not (F)
/

!!======================================================================
!!             ***  Surface Boundary Condition namelists  ***
!!======================================================================
!!   namsbc        surface boundary condition
!!   namsbc_ana    analytical         formulation
!!   namsbc_flx    flux               formulation
!!   namsbc_clio   CLIO bulk formulea formulation
!!   namsbc_core   CORE bulk formulea formulation
!!   namsbc_cpl    CouPLed            formulation
("key_coupled")
!!   namtra_qsr    penetrative solar radiation
!!   namsbc_rnf    river runoffs
!!   namsbc_ssr    sea surface restoring term (for T and/or S)
!!   namsbc_alb    albedo parameters
!!======================================================================
!-----------------------------------------------------------------------
&namsbc        !   Surface Boundary Condition (surface module)

!-----------------------------------------------------------------------
nn_fsbc     = 1     !  frequency of surface boundary condition computation
     !               (= the frequency of sea-ice model call)
ln_ana      = .false.     !  analytical formulation (T => fill namsbc_ana )
ln_flx      = .false.     !  flux formulation       (T => fill namsbc_flx )
```

```
ln_blk_clio = .false.     !  CLIO bulk formulation  (T => fill namsbc_clio)
ln_blk_core = .true.     !  CORE bulk formulation  (T => fill namsbc_core)
ln_blk_mfs  = .false.     !  MFS bulk formulation                    (T =>
fill namsbc_mfs )
ln_cpl      = .false.     !  Coupled formulation    (T => fill namsbc_cpl )
ln_apr_dyn  = .false.     !  Patm gradient added in ocean & ice Eqs.   (T =>
fill namsbc_apr )
nn_ice      = 4     !  =0 no ice boundary condition   ,
     !  =1 use observed ice-cover      ,
     !  =2 ice-model used                          ("key_lim3" or "key_lim2)
ln_dm2dc    = .false.     !  daily mean to diurnal cycle short wave (qsr)
ln_rnf      = .true.     !  runoffs (T => fill namsbc_rnf)
ln_ssr      = .true.     !  Sea Surface Restoring on T and/or S (T => fill
namsbc_ssr)
nn_fwb      = 0     !  FreshWater Budget: =0 unchecked
     !                     =1 global mean of e-p-r set to zero at each time step
     !                     =2 annual global mean of e-p-r set to zero
     !                     =3 global emp set to zero and spread out over erp
area
ln_cdgw = .false.     !  Neutral drag coefficient read from wave model (T =>
fill namsbc_wave)
/

!-----------------------------------------------------------------------
&namsbc_ana    !   analytical surface boundary condition

!-----------------------------------------------------------------------
nn_tau000   =   0     !  gently increase the stress over the first ntau_rst
time-steps
rn_utau0    =   0.5     !  uniform value for the i-stress
rn_vtau0    =   0.e0     !  uniform value for the j-stress
rn_qns0     =   0.e0     !  uniform value for the total heat flux
rn_qsr0     =   0.e0     !  uniform value for the solar radiation
rn_emp0     =   0.e0     !  uniform value for the freswater budget (E-P)
/

!-----------------------------------------------------------------------
&namsbc_flx    !   surface boundary condition : flux formulation

!-----------------------------------------------------------------------
!              !   file name  ! frequency (hours) !  variable  ! time interpol.
!  clim   ! 'yearly'/ ! weights  ! rotation !
!              !              !  (if <0  months)  !    name    !    (logical)
!  (T/F)  ! 'monthly' ! filename ! pairing  !
sn_utau     = 'utau'        ,        24         ,    'utau'  ,     .false.    ,
.false. , 'yearly'  , ''       , ''     !
sn_vtau     = 'vtau'        ,        24         ,    'vtau'  ,     .false.    ,
.false. , 'yearly'  , ''       , ''     !
sn_qtot     = 'qtot'        ,        24         ,    'qtot'  ,     .false.    ,
.false. , 'yearly'  , ''       , ''     !
sn_qsr      = 'qsr'         ,        24         ,    'qsr'   ,     .false.    ,
.false. , 'yearly'  , ''       , ''     !
sn_emp      = 'emp'         ,        24         ,    'emp'   ,     .false.    ,
.false. , 'yearly'  , ''       , ''     !
!
```

```
cn_dir      = './'     !  root directory for the location of the flux files
/

!-----------------------------------------------------------------------
&namsbc_clio   !   namsbc_clio  CLIO bulk formulea

!-----------------------------------------------------------------------
!              !   file name  ! frequency (hours) !  variable  ! time interpol.
!  clim   ! 'yearly'/ ! weights  ! rotation !
!              !              !  (if <0  months)  !    name    !    (logical)
!  (T/F)  ! 'monthly' ! filename ! pairing  !
sn_utau     = 'taux_1m'    ,       -1          , 'sozotaux' ,    .true.      ,
.true.  , 'yearly'  , ''       , ''     !
sn_vtau     = 'tauy_1m'    ,       -1          , 'sometauy' ,    .true.      ,
.true.  , 'yearly'  , ''       , ''     !
sn_wndm     = 'flx'        ,       -1          , 'socliowi' ,    .true.      ,
.true.  , 'yearly'  , ''       , ''     !
sn_tair     = 'flx'        ,       -1          , 'socliot2' ,    .true.      ,
.true.  , 'yearly'  , ''       , ''     !
sn_humi     = 'flx'        ,       -1          , 'socliohu' ,    .true.      ,
.true.  , 'yearly'  , ''       , ''     !
sn_ccov     = 'flx'        ,       -1          , 'socliocl' ,    .false.     ,
.true.  , 'yearly'  , ''       , ''     !
sn_prec     = 'flx'        ,       -1          , 'socliopl' ,    .false.     ,
.true.  , 'yearly'  , ''       , ''     !
!
cn_dir      = './'     !  root directory for the location of the bulk files are
/

!-----------------------------------------------------------------------
&namsbc_core   !   namsbc_core  CORE bulk formulea

!-----------------------------------------------------------------------
!              !   file name  ! frequency (hours) ! variable   ! time interpol.
!  clim   ! 'yearly'/ ! weights              ! rotation !
!              !              !  (if <0  months)  !   name     !    (logical)
!  (T/F)  ! 'monthly' ! filename             ! pairing  !
sn_wndi     = 'u10_core'   ,        6          , 'U_10_MOD' ,    .true.      ,
.false. , 'yearly'  ,'weights_grid03_bicubic_orca025.nc' , 'Ume'     !
sn_wndj     = 'v10_core'   ,        6          , 'V_10_MOD' ,    .true.      ,
.false. , 'yearly'  ,'weights_grid03_bicubic_orca025.nc' , 'Vme'     !
sn_qsr      = 'qsw_core'   ,       24          , 'SWDN_MOD' ,    .false.     ,
.false. , 'yearly'  ,'weights_grid03_bilinear_orca025.nc', ''     !
sn_qlw      = 'qlw_core'   ,       24          , 'LWDN_MOD' ,    .false.     ,
.false. , 'yearly'  ,'weights_grid03_bilinear_orca025.nc', ''     !
sn_tair     = 't10_core'    ,       6          , 'T_10_MOD' ,    .true.      ,
.false. , 'yearly'  ,'weights_grid03_bilinear_orca025.nc', ''     !
sn_humi     = 'q10_core'    ,       6          , 'Q_10_MOD' ,    .true.      ,
.false. , 'yearly'  ,'weights_grid03_bilinear_orca025.nc', ''     !
sn_prec     = 'precip_core',       -1          , 'TPRECIP'  ,    .true.      ,
.false. , 'yearly'  ,'weights_grid03_bilinear_orca025.nc', ''     !
sn_snow     = 'snow_core'  ,       -1          , 'SNOW'     ,    .true.      ,
.false. , 'yearly'  ,'weights_grid03_bilinear_orca025.nc', ''     !
sn_tdif     = 'taudif_core',       24          , 'taudif'   ,    .true.      ,
.false. , 'yearly'  ,'weights_grid03_bilinear_orca025.nc', ''     !
```

```
!
cn_dir      = './'     !  root directory for the location of the bulk files
ln_2m       = .false.     !  air temperature and humidity referenced at 2m (T)
instead 10m (F)
ln_taudif   = .false.     !  HF tau contribution: use "mean of stress module -
module of the mean stress" data ?
rn_pfac     = 1.     !  multiplicative factor for precipitation (total & snow)
/

!-----------------------------------------------------------------------
&namsbc_mfs   !   namsbc_mfs  MFS bulk formulae

!-----------------------------------------------------------------------
!              !  file name  ! frequency (hours) ! variable  ! time interp. !
clim  ! 'yearly'/ ! weights  ! rotation !
!              !             !  (if <0  months)  !   name    !   (logical)  !
(T/F) ! 'monthly' ! filename ! pairing  !
sn_wndi     =   'ecmwf'   ,        6          , 'u10'     ,    .true.    ,
.false. , 'daily'  ,'bicubic.nc' , ''     !
sn_wndj     =   'ecmwf'   ,        6          , 'v10'     ,    .true.    ,
.false. , 'daily'  ,'bicubic.nc' , ''     !
sn_clc      =   'ecmwf'   ,        6          , 'clc'     ,    .true.    ,
.false. , 'daily'  ,'bilinear.nc', ''     !
sn_msl      =   'ecmwf'   ,        6          , 'msl'     ,    .true.    ,
.false. , 'daily'  ,'bicubic.nc' , ''     !
sn_tair     =   'ecmwf'   ,        6          , 't2'      ,    .true.    ,
.false. , 'daily'  ,'bicubic.nc' , ''     !
sn_rhm      =   'ecmwf'   ,        6          , 'rh'      ,    .true.    ,
.false. , 'daily'  ,'bilinear.nc', ''     !
sn_prec     =   'ecmwf'   ,        6          , 'precip'  ,    .true.    ,
.true.  , 'daily'  ,'bicubic.nc' , ''     !
cn_dir      = './ECMWF/'     !  root directory for the location of the bulk
files
/

!-----------------------------------------------------------------------
&namsbc_cpl    !   coupled ocean/atmosphere model
("key_coupled")

!-----------------------------------------------------------------------
!                    !     description       !  multiple  !    vector   !
vector          ! vector !
!                    !                       ! categories !  reference  !
orientation       ! grids  !
! send
sn_snd_temp   =       'weighted oce and ice' ,    'no'    ,     ''      ,
''          ,   ''     !
sn_snd_alb    =       'weighted ice'         ,    'no'    ,     ''      ,
''          ,   ''     !
sn_snd_thick  =       'none'                 ,    'no'   ,     ''      ,
''          ,   ''     !
sn_snd_crt    =       'none'                 ,    'no'    , 'spherical' ,
'eastward-northward' ,  'T'     !
sn_snd_co2    =       'coupled'              ,    'no'    ,     ''      ,
''          ,   ''     !
```

```
! receive
sn_rcv_w10m   =       'none'                  ,    'no'    ,     ''      ,
''          ,   ''     !
sn_rcv_taumod =       'coupled'               ,    'no'    ,     ''      ,
''          ,   ''     !
sn_rcv_tau    =       'oce only'              ,    'no'    , 'cartesian' ,
'eastward-northward',  'U,V'     !
sn_rcv_dqnsdt =       'coupled'               ,    'no'    ,     ''      ,
''          ,   ''     !
sn_rcv_qsr    =       'oce and ice'           ,    'no'    ,     ''      ,
''          ,   ''     !
sn_rcv_qns    =       'oce and ice'           ,    'no'    ,     ''      ,
''          ,   ''     !
sn_rcv_emp    =       'conservative'          ,    'no'    ,     ''      ,
''          ,   ''     !
sn_rcv_rnf    =       'coupled'               ,    'no'    ,     ''      ,
''          ,   ''     !
sn_rcv_cal    =       'coupled'               ,    'no'    ,     ''      ,
''          ,   ''     !
sn_rcv_co2    =       'coupled'               ,    'no'    ,     ''      ,
''          ,   ''     !
/

------------------------------------------------------------------------

&namtra_qsr    !   penetrative solar radiation

!------------------------------------------------------------------------
!             !   file name  ! frequency (hours) ! variable   ! time interpol.
!  clim   ! 'yearly'/ ! weights  ! rotation !
!             !              !  (if <0  months)  !   name     !    (logical)
!  (T/F)  ! 'monthly' ! filename ! pairing  !
sn_chl      = 'chlorophyll',        -1         , 'CHLA'     ,    .true.      ,
.true.  , 'yearly'  , ''       , ''     !
cn_dir      = './'     !  root directory for the location of the runoff files
ln_traqsr   = .true.     !  Light penetration (T) or not (F)
ln_qsr_rgb  = .true.     !  RGB (Red-Green-Blue) light penetration
ln_qsr_2bd  = .false.     !  2 bands              light penetration
ln_qsr_bio  = .false.     !  bio-model light penetration
nn_chldta   =      0     !  RGB : Chl data (=1) or cst value (=0)
rn_abs      =   0.58     !  RGB & 2 bands: fraction of light (rn_si1)
rn_si0      =   0.35     !  RGB & 2 bands: shortess depth of extinction
rn_si1      =   23.0     !  2 bands: longest depth of extinction
/

!------------------------------------------------------------------------
&namsbc_rnf    !   runoffs namelist surface boundary condition

!------------------------------------------------------------------------
!             !   file name  ! frequency (hours) ! variable   ! time interpol.
!  clim   ! 'yearly'/ ! weights  ! rotation !
!             !              !  (if <0  months)  !   name     !    (logical)
!  (T/F)  ! 'monthly' ! filename ! pairing  !
sn_rnf      = 'runoff_1m_nomask' ,  -1         , 'sorunoff' ,    .true.      ,
.true.  , 'yearly'  , ''       , ''     !
```

```
sn_cnf      = 'runoff_1m_nomask' ,   0         , 'socoefr'  ,    .false.     ,
.true.  , 'yearly'  , ''       , ''     !
sn_s_rnf    = 'runoffs'             ,        24         , 'rosaline',   .true.
, .true. , 'yearly'  , ''       , ''     !
sn_t_rnf    = 'runoffs'             ,        24         , 'rotemper',   .true.
, .true. , 'yearly'  , ''       , ''     !
sn_dep_rnf  = 'runoffs'             ,         0         , 'rodepth' ,   .false.
, .true. , 'yearly'  , ''       , ''     !
cn_dir       = './'     !  root directory for the location of the runoff files
ln_rnf_emp   =   .false.     !  runoffs included into precipitation field (T) or
into a file (F)
ln_rnf_mouth =   .true.     !  specific treatment at rivers mouths
rn_hrnf      =   10.e0     !  depth over which enhanced vertical mixing is used
rn_avt_rnf   =   2.e-3     !  value of the additional vertical mixing coef.
[m2/s]
rn_rfact     =   1.e0     !  multiplicative factor for runoff
ln_rnf_depth = .false.     !  read in depth information for runoff
ln_rnf_tem   = .false.     !  read in temperature information for runoff
ln_rnf_sal   = .false.     !  read in salinity information for runoff
/

!-----------------------------------------------------------------------
&namsbc_apr    !   Atmospheric pressure used as ocean forcing or in bulk

!-----------------------------------------------------------------------
!              ! file name ! frequency (hours) ! variable ! time interpol. !
clim   ! 'yearly'/ ! weights  ! rotation !
!              !           !  (if <0  months)  !   name   !    (logical)   !
(T/F)  ! 'monthly' ! filename ! pairing  !
sn_apr      = 'patm'    ,         -1        ,'somslpre',    .true.      , .true.
, 'yearly'  ,  ''       ,   ''     !
cn_dir      = './'     !  root directory for the location of the bulk files
ln_ref_apr  = .false.     !  ref. pressure: global mean Patm (T) or a constant
(F)
/

!-----------------------------------------------------------------------
&namsbc_ssr    !   surface boundary condition : sea surface restoring

!-----------------------------------------------------------------------
!              !   file name  ! frequency (hours) ! variable   ! time interpol.
!  clim   ! 'yearly'/ ! weights  ! rotation !
!              !              !  (if <0  months)  !   name     !    (logical)
!  (T/F)  ! 'monthly' ! filename ! pairing  !
sn_sst      =   'sst_1m.nc'         ,    -1    , 'sst'      ,  .false.   ,
.false.,  'yearly'   ,   ' '    ,   ' '     !
sn_sss      =   'sss_1m.nc'         ,    -1    , 'vosaline' ,  .true.    ,
.true. ,  'yearly'   ,   ' '    ,   ' '     !
cn_dir      = './'     !  root directory for the location of the runoff files
nn_sstr     =     0     !  add a retroaction term in the surface heat       flux
(=1) or not (=0)
nn_sssr     =     2     !  add a damping     term in the surface freshwater flux
(=2)
     !  or to SSS only (=1) or no damping term (=0)
```

```
rn_dqdt     =   -40.     !  magnitude of the retroaction on temperature
[W/m2/K]
rn_deds     =   -33.333333     !  magnitude of the damping on salinity
[mm/day/psu]
ln_sssr_bnd =   .true.     !  flag to bound erp term (associated with nn_sssr=2)
rn_sssr_bnd =   4.e0     !  ABS(Max/Min) value of the damping erp term [mm/day]
/

!-----------------------------------------------------------------------
&namsbc_alb    !   albedo parameters

!-----------------------------------------------------------------------
rn_cloud    =    0.06     !  cloud correction to snow and ice albedo
rn_albice   =    0.5     !  albedo of melting ice in the arctic and antarctic
rn_alphd    =    0.80     !  coefficients for linear interpolation used to
rn_alphc    =    0.65     !  compute albedo between two extremes values
rn_alphdi   =    0.72     !  (Payne, 1972)
/

!!======================================================================
!!               ***  Lateral boundary condition  ***
!!======================================================================
!!   namlbc        lateral momentum boundary condition
!!   namcla        cross land advection
!!   namobc        open boundaries parameters
("key_obc")
!!   namagrif      agrif nested grid ( read by child model only )
("key_agrif")
!!   nambdy        Unstructured open boundaries
("key_bdy")
!!   namtide       Tidal forcing at open boundaries
("key_bdy_tides")
!!======================================================================
!-----------------------------------------------------------------------
&namlbc        !   lateral momentum boundary condition

!-----------------------------------------------------------------------
rn_shlat    =    0.     !  shlat = 0
                           !  free slip  !   partial slip  !   no slip   !
strong slip

ln_vorlat   = .false.     !  consistency of vorticity boundary condition with
analytical eqs.
/

!-----------------------------------------------------------------------
&namcla        !   cross land advection

!-----------------------------------------------------------------------
nn_cla      =    0     !  advection between 2 ocean pts separates by land
/

!-----------------------------------------------------------------------
&namobc        !   open boundaries parameters
("key_obc")
```

```
!-----------------------------------------------------------------------
ln_obc_clim= .true.     !  climatological obc data files (T) or not (F)
ln_vol_cst = .false.     !  impose the total volume conservation (T) or not (F)
ln_obc_fla = .false.     !  Flather open boundary condition
nn_obcdta  =    0     !  = 0 the obc data are equal to the initial state
     !  = 1 the obc data are read in 'obc.dta' files
cn_obcdta  = 'annual'     !  set to annual if obc datafile hold 1 year of data
                          !  set to monthly if obc datafile hold 1 month of
data

rn_dpein   =    1.     !  damping time scale for inflow at east  open boundary
rn_dpwin   =    1.     !     -           -         -       west    -      -
rn_dpnin   =    1.     !     -           -         -       north   -      -
rn_dpsin   =    1.     !     -           -         -       south   -      -
rn_dpeob   = 1500.     !  time relaxation (days) for the east  open boundary
rn_dpwob   =   15.     !     -           -         -     west    -      -
rn_dpnob   = 1500.     !     -           -         -     north   -      -
rn_dpsob   =   15.     !     -           -         -     south   -      -
rn_volemp  =  1.     !  = 0 the total volume change with the surface flux (E-P-
R)
     !  = 1 the total volume remains constant
/

!-----------------------------------------------------------------------
&namagrif      !  AGRIF zoom
("key_agrif")

!-----------------------------------------------------------------------
nn_cln_update = 3     !  baroclinic update frequency
ln_spc_dyn    = .true.     !  use 0 as special value for dynamics
rn_sponge_tra = 2880.     !  coefficient for tracer   sponge layer [m2/s]
rn_sponge_dyn = 2880.     !  coefficient for dynamics sponge layer [m2/s]
/

!-----------------------------------------------------------------------
&nam_tide      !   tide parameters (#ifdef key_tide)

!-----------------------------------------------------------------------
ln_tide_pot   = .true.     !  use tidal potential forcing
nb_harmo      =    11     !  number of constituents used
clname(1)     =   'M2'     !  name of constituent
clname(2)     =   'S2'     !
clname(3)     =   'N2'     !
clname(4)     =   'K1'     !
clname(5)     =   'O1'     !
clname(6)     =   'Q1'     !
clname(7)     =   'M4'     !
clname(8)     =   'K2'     !
clname(9)     =   'P1'     !
clname(10)    =   'Mf'     !
clname(11)    =   'Mm'     !
/

!-----------------------------------------------------------------------
```

```
&nambdy        !  unstructured open boundaries
("key_bdy")

!-----------------------------------------------------------------------
nb_bdy = 1     !  number of open boundary sets
ln_coords_file = .true.     !  =T : read bdy coordinates from file
cn_coords_file = 'coordinates.bdy.nc'     !  bdy coordinates files
ln_mask_file = .false.     !  =T : read mask from file
cn_mask_file = ''     !  name of mask file (if ln_mask_file=.TRUE.)
nn_dyn2d      =  2     !  boundary conditions for barotropic fields
nn_dyn2d_dta  =  3     !  = 0, bdy data are equal to the initial state
     !  = 1, bdy data are read in 'bdydata   .nc' files
     !  = 2, use tidal harmonic forcing data from files
     !  = 3, use external data AND tidal harmonic forcing
nn_dyn3d      =  0     !  boundary conditions for baroclinic velocities
nn_dyn3d_dta  =  0     !  = 0, bdy data are equal to the initial state
     !  = 1, bdy data are read in 'bdydata   .nc' files
nn_tra        =  1     !  boundary conditions for T and S
nn_tra_dta    =  1     !  = 0, bdy data are equal to the initial state
     !  = 1, bdy data are read in 'bdydata   .nc' files
nn_rimwidth  = 10     !  width of the relaxation zone
ln_vol     = .false.     !  total volume correction (see nn_volctl parameter)
nn_volctl  = 1     !  = 0, the total water flux across open boundaries is zero
/

!-----------------------------------------------------------------------
&nambdy_dta      !  open boundaries - external data           ("key_bdy")

!-----------------------------------------------------------------------
!              !   file name    ! frequency (hours) !  variable  ! time
interpol. !  clim   ! 'yearly'/ ! weights  ! rotation !
!              !                !  (if <0  months)  !    name    !    (logical)
!  (T/F)  ! 'monthly' ! filename ! pairing  !
bn_ssh =     'amm12_bdyT_u2d' ,         24        , 'sossheig' ,     .true.
, .false. ,  'daily'  ,    ''    ,   ''     !
bn_u2d =     'amm12_bdyU_u2d' ,         24        , 'vobtcrtx' ,     .true.
, .false. ,  'daily'  ,    ''    ,   ''     !
bn_v2d =     'amm12_bdyV_u2d' ,         24        , 'vobtcrty' ,     .true.
, .false. ,  'daily'  ,    ''    ,   ''     !
bn_u3d  =    'amm12_bdyU_u3d' ,         24        , 'vozocrtx' ,     .true.
, .false. ,  'daily'  ,    ''    ,   ''     !
bn_v3d  =    'amm12_bdyV_u3d' ,         24        , 'vomecrty' ,     .true.
, .false. ,  'daily'  ,    ''    ,   ''     !
bn_tem  =    'amm12_bdyT_tra' ,         24        , 'votemper' ,     .true.
, .false. ,  'daily'  ,    ''    ,   ''     !
bn_sal  =    'amm12_bdyT_tra' ,         24        , 'vosaline' ,     .true.
, .false. ,  'daily'  ,    ''    ,   ''     !
cn_dir  =    'bdydta/'     !
ln_full_vel = .false.     !
/

!-----------------------------------------------------------------------
&nambdy_tide     ! tidal forcing at open boundaries

!-----------------------------------------------------------------------
```

```
filtide      = 'bdydta/amm12_bdytide_'     !  file name root of tidal forcing
files
tide_cpt(1)   ='Q1'      !  names of tidal components used
tide_cpt(2)   ='O1'      !  names of tidal components used
tide_cpt(3)   ='P1'      !  names of tidal components used
tide_cpt(4)   ='S1'      !  names of tidal components used
tide_cpt(5)   ='K1'      !  names of tidal components used
tide_cpt(6)   ='2N2'      !  names of tidal components used
tide_cpt(7)   ='MU2'      !  names of tidal components used
tide_cpt(8)   ='N2'      !  names of tidal components used
tide_cpt(9)   ='NU2'      !  names of tidal components used
tide_cpt(10)   ='M2'      !  names of tidal components used
tide_cpt(11)   ='L2'      !  names of tidal components used
tide_cpt(12)   ='T2'      !  names of tidal components used
tide_cpt(13)   ='S2'      !  names of tidal components used
tide_cpt(14)   ='K2'      !  names of tidal components used
tide_cpt(15)   ='M4'      !  names of tidal components used
tide_speed(1)   = 13.398661     !  phase speeds of tidal components (deg/hour)
tide_speed(2)   = 13.943036     !  phase speeds of tidal components (deg/hour)
tide_speed(3)   = 14.958932     !  phase speeds of tidal components (deg/hour)
tide_speed(4)   = 15.000001     !  phase speeds of tidal components (deg/hour)
tide_speed(5)   = 15.041069     !  phase speeds of tidal components (deg/hour)
tide_speed(6)   = 27.895355     !  phase speeds of tidal components (deg/hour)
tide_speed(7)   = 27.968210     !  phase speeds of tidal components (deg/hour)
tide_speed(8)   = 28.439730     !  phase speeds of tidal components (deg/hour)
tide_speed(9)   = 28.512585     !  phase speeds of tidal components (deg/hour)
tide_speed(10)   = 28.984106     !  phase speeds of tidal components (deg/hour)
tide_speed(11)   = 29.528479     !  phase speeds of tidal components (deg/hour)
tide_speed(12)   = 29.958935     !  phase speeds of tidal components (deg/hour)
tide_speed(13)   = 30.000002     !  phase speeds of tidal components (deg/hour)
tide_speed(14)   = 30.082138     !  phase speeds of tidal components (deg/hour)
tide_speed(15)   = 57.968212     !  phase speeds of tidal components (deg/hour)
ln_tide_date = .true.     !  adjust tidal harmonics for start date of run
/

!!======================================================================
!!                 ***  Bottom boundary condition  ***
!!======================================================================
!!   nambfr        bottom friction
!!   nambbc        bottom temperature boundary condition
("key_trabbc")
!!   nambbl        bottom boundary layer scheme
("key_trabbl_dif","key_trabbl_adv")
!!======================================================================
!-----------------------------------------------------------------------
&nambfr        !   bottom friction

!-----------------------------------------------------------------------
nn_bfr      =    2     !  type of bottom friction :   = 0 : no   slip,  = 2 :
nonlinear friction
     !                                = 3 : free slip,  = 1 :    linear friction
rn_bfri1    =    4.e-4     !  bottom drag coefficient (linear case)
rn_bfri2    =    1.e-3     !  bottom drag coefficient (non linear case)
rn_bfeb2    =    2.5e-3     !  bottom turbulent kinetic energy background
(m^2/s^2)
```

```
ln_bfr2d    = .true.     !  horizontal variation of the bottom friction coef
(read a 2D file )
ln_bfrimp   = .false.     !
rn_bfrien      =  50.     !  multiplying factor of bfr
/

!-----------------------------------------------------------------------
&nambbc        !   bottom temperature boundary condition

!-----------------------------------------------------------------------
ln_trabbc   = .true.     !  Apply a geothermal heating at the ocean bottom
nn_geoflx   =    2     !  geothermal heat flux: = 0 no flux
     !     = 1 constant flux
     !     = 2 variable flux (read in geothermal_heating.nc in mW/m2)
rn_geoflx_cst = 0.e-3     !  Constant value of geothermal heat flux [W/m2]
/

!-----------------------------------------------------------------------
&nambbl        !   bottom boundary layer scheme

!-----------------------------------------------------------------------
nn_bbl_ldf  =  1     !  diffusive bbl (=1)   or not (=0)
nn_bbl_adv  =  1     !  advective bbl (=1/2) or not (=0)
rn_ahtbbl   =  1000.     !  lateral mixing coefficient in the bbl  [m2/s]
rn_gambbl   =  10.     !  advective bbl coefficient                 [s]
/

!!======================================================================
!!                      Tracer (T & S ) namelists
!!======================================================================
!!   nameos        equation of state
!!   namtra_adv    advection scheme
!!   namtra_ldf    lateral diffusion scheme
!!   namtra_dmp    T & S newtonian damping
("key_tradmp")
!!======================================================================
!-----------------------------------------------------------------------
&nameos        !   ocean physical parameters

!-----------------------------------------------------------------------
nn_eos      =    0     !  type of equation of state and Brunt-Vaisala frequency
     !     = 0, UNESCO (formulation of Jackett and McDougall (1994) and of
McDougall (1987) )
     !     = 1, linear: rho(T)   = rau0 * ( 1.028 - ralpha * T )
     !     = 2, linear: rho(T,S) = rau0 * ( rbeta * S - ralpha * T )
rn_alpha    =    2.e-4     !  thermal expension coefficient (neos= 1 or 2)
rn_beta     =    0.001     !  saline  expension coefficient (neos= 2)
/

!-----------------------------------------------------------------------
&namtra_adv    !   advection scheme for tracer

!-----------------------------------------------------------------------
ln_traadv_cen2   =  .false.     !  2nd order centered scheme
ln_traadv_tvd    =  .true.     !  TVD scheme
```

```
ln_traadv_muscl  =  .false.     !  MUSCL scheme
ln_traadv_muscl2 =  .false.     !  MUSCL2 scheme + cen2 at boundaries
ln_traadv_ubs    =  .false.     !  UBS scheme
ln_traadv_qck    =  .false.     !  QUICKEST scheme
/

!-------------------------------------------------------------------------------
---
&namtra_ldf    !   lateral diffusion scheme for tracers

!-------------------------------------------------------------------------------
---
   !                       !  Operator type:

ln_traldf_lap    =  .true.     !  laplacian operator
ln_traldf_bilap  =  .false.     !  bilaplacian operator
   !                       !  Direction of action:

ln_traldf_level  =  .false.     !  iso-level
ln_traldf_hor    =  .false.     !  horizontal (geopotential)   (needs
"key_ldfslp" when ln_sco=T)
ln_traldf_iso    =  .true.     !  iso-neutral                 (needs
"key_ldfslp")
   !                       !  Griffies parameters             (all need
"key_ldfslp")

ln_traldf_grif   =  .false.     !  use griffies triads
ln_traldf_gdia   =  .false.     !  output griffies eddy velocities
ln_triad_iso     =  .false.     !  pure lateral mixing in ML
ln_botmix_grif   =  .false.     !  lateral mixing on bottom
   !                       !  Coefficients

   ! Eddy-induced (GM) advection always used with Griffies; otherwise needs
"key_traldf_eiv"

     ! Value rn_aeiv_0 is ignored unless = 0 with Held-Larichev spatially
varying aeiv
   !                                  (key_traldf_c2d & key_traldf_eiv &
key_orca_r2, _r1 or _r05)

rn_aeiv_0        =     0.     !  eddy induced velocity coefficient [m2/s]
rn_aht_0         =   300.     !  horizontal eddy diffusivity for tracers [m2/s]
rn_ahtb_0        =     0.     !  background eddy diffusivity for ldf_iso [m2/s]
     !                                        (normally=0; not used with
Griffies)
/

!-------------------------------------------------------------------------
&namtra_dmp    !   tracer: T & S newtonian damping
('key_tradmp')

!-------------------------------------------------------------------------
ln_tradmp   =  .false.     !
nn_hdmp     =   -1     !  horizontal shape =-1, damping in Med and Red Seas only
     !                  =XX, damping poleward of XX degrees (XX>0)
```

```
                          !                       + F(distance-to-coast) + Red
and Med Seas

nn_zdmp     =    0     !  vertical   shape =0    damping throughout the water
column
     !                  =1 no damping in the mixing layer (kz  criteria)
     !                  =2 no damping in the mixed  layer (rho crieria)
rn_surf     =   50.     !  surface time scale of damping   [days]
rn_bot      =  360.     !  bottom  time scale of damping   [days]
rn_dep      =  800.     !  depth of transition between rn_surf and rn_bot
[meters]
nn_file     =    0     !  create a damping.coeff NetCDF file (=1) or not (=0)
/

!!======================================================================
!!                     ***  Dynamics namelists  ***
!!======================================================================
!!   namdyn_adv    formulation of the momentum advection
!!   namdyn_vor    advection scheme
!!   namdyn_hpg    hydrostatic pressure gradient
!!   namdyn_spg    surface pressure gradient                          (CPP key
only)
!!   namdyn_ldf    lateral diffusion scheme
!!======================================================================
!-----------------------------------------------------------------------
&namdyn_adv    !   formulation of the momentum advection

!-----------------------------------------------------------------------
ln_dynadv_vec = .true.     !  vector form (T) or flux form (F)
ln_dynadv_cen2= .false.     !  flux form - 2nd order centered scheme
ln_dynadv_ubs = .false.     !  flux form - 3rd order UBS      scheme
/

!-----------------------------------------------------------------------
&namdyn_vor    !   option of physics/algorithm (not control by CPP keys)

!-----------------------------------------------------------------------
ln_dynvor_ene = .false.     !  enstrophy conserving scheme
ln_dynvor_ens = .false.     !  energy conserving scheme
ln_dynvor_mix = .false.     !  mixed scheme
ln_dynvor_een = .true.     !  energy & enstrophy scheme
/

!-----------------------------------------------------------------------
&namdyn_hpg    !   Hydrostatic pressure gradient option

!-----------------------------------------------------------------------
ln_hpg_zco  = .false.     !  z-coordinate - full steps
ln_hpg_zps  = .true.     !  z-coordinate - partial steps (interpolation)
ln_hpg_sco  = .false.     !  s-coordinate (standard jacobian formulation)
ln_hpg_djc  = .false.     !  s-coordinate (Density Jacobian with Cubic
polynomial)
ln_hpg_prj  = .false.     !  s-coordinate (Pressure Jacobian scheme)
ln_dynhpg_imp = .false.     !  time stepping: semi-implicit time scheme  (T)
                               !           centered      time scheme  (F)
```

```
/

!-----------------------------------------------------------------------
!namdyn_spg    !   surface pressure gradient   (CPP key only)
!-----------------------------------------------------------------------
!                           !  explicit free surface
("key_dynspg_exp")
!                           !  filtered free surface
("key_dynspg_flt")
!                           !  split-explicit free surface
("key_dynspg_ts")
!-----------------------------------------------------------------------
&namdyn_ldf    !   lateral diffusion on momentum

!-----------------------------------------------------------------------
                            !  Type of the operator :

ln_dynldf_lap    =  .false.     !     laplacian operator
ln_dynldf_bilap  =  .true.     !     bilaplacian operator
                            !  Direction of action  :

ln_dynldf_level  =  .false.     !  iso-level
ln_dynldf_hor    =  .true.     !  horizontal (geopotential)           (require
"key_ldfslp" in s-coord.)
ln_dynldf_iso    =  .false.     !  iso-neutral                          (require
"key_ldfslp")
   !                        !  Coefficient

rn_ahm_0_lap     = 40000.     !  horizontal laplacian eddy viscosity   [m2/s]
rn_ahmb_0   =     0.     !  background eddy viscosity for ldf_iso [m2/s]
rn_ahm_0_blp     = -1.5e11     !  horizontal bilaplacian eddy viscosity [m4/s]
/

!!======================================================================
!!             Tracers & Dynamics vertical physics namelists
!!======================================================================
!!       namzdf        vertical physics
!!       namzdf_ric    richardson number dependent vertical mixing
("key_zdfric"      )
!!       namzdf_tke    TKE dependent vertical mixing
("key_zdftke"      )
!!       namzdf_kpp    KPP dependent vertical mixing
("key_zdfkpp"      )
!!       namzdf_ddm    double diffusive mixing parameterization
("key_zdfddm"      )
!!       namzdf_tmx    tidal mixing parameterization
("key_zdftmx"      )
!!======================================================================
!-----------------------------------------------------------------------
&namzdf        !   vertical physics

!-----------------------------------------------------------------------
rn_avm0     =   1.2e-4     !  vertical eddy viscosity   [m2/s]
(background Kz if not "key_zdfcst")
```

```
rn_avt0     =   1.2e-5     !  vertical eddy diffusivity [m2/s]
(background Kz if not "key_zdfcst")
nn_avb      =    0     !  profile for background avt & avm (=1) or not (=0)
nn_havtb    =    1     !  horizontal shape for avtb (=1) or not (=0)
ln_zdfevd   = .true.     !  enhanced vertical diffusion (evd) (T) or not (F)
nn_evdm     =    1     !  evd apply on tracer (=0) or on tracer and momentum
(=1)
rn_avevd    =   10.     !  evd mixing coefficient [m2/s]
ln_zdfnpc   = .false.     !  Non-Penetrative algorithm (T) or not (F)
nn_npc      =    1     !  frequency of application of npc
nn_npcp     =  365     !  npc control print frequency
ln_zdfexp   = .false.     !  time-stepping: split-explicit (T) or implicit (F)
time stepping
nn_zdfexp   =    3     !  number of sub-timestep for ln_zdfexp=T
/

!-----------------------------------------------------------------------
&namzdf_ric    !   richardson number dependent vertical diffusion
("key_zdfric" )

!-----------------------------------------------------------------------
rn_avmri    = 100.e-4     !  maximum value of the vertical viscosity
rn_alp      =   5.     !  coefficient of the parameterization
nn_ric      =   2     !  coefficient of the parameterization
/

!-----------------------------------------------------------------------
&namzdf_tke    !   turbulent eddy kinetic dependent vertical diffusion
("key_zdftke")

!-----------------------------------------------------------------------
rn_ediff    =   0.1     !  coef. for vertical eddy coef.
(avt=rn_ediff*mxl*sqrt(e) )
rn_ediss    =   0.7     !  coef. of the Kolmogoroff dissipation
rn_ebb      =  67.83     !  coef. of the surface input of tke (=67.83 suggested
when ln_mxl0=T)
rn_emin     =   1.e-6     !  minimum value of tke [m2/s2]
rn_emin0    =   1.e-4     !  surface minimum value of tke [m2/s2]
nn_mxl      =   3     !  mixing length: = 0 bounded by the distance to surface
and bottom
     !                 = 1 bounded by the local vertical scale factor
     !                 = 2 first vertical derivative of mixing length bounded by
1
     !                 = 3 as =2 with distinct disspipative an mixing length
scale
nn_pdl      =   1     !  Prandtl number function of richarson number (=1,
avt=pdl(Ri)*avm) or not (=0, avt=avm)
ln_mxl0     = .true.     !  surface mixing length scale = F(wind stress) (T) or
not (F)
rn_mxl0     =   0.04     !  surface  buoyancy lenght scale minimum value
ln_lc       = .true.     !  Langmuir cell parameterisation (Axell 2002)
rn_lc       =   0.15     !  coef. associated to Langmuir cells
nn_etau     =   1     !  penetration of tke below the mixed layer (ML) due to
internal & intertial waves
     !        = 0 no penetration
```

```
     !        = 1 add a tke source below the ML
     !        = 2 add a tke source just at the base of the ML
     !        = 3 as = 1 applied on HF part of the stress    ("key_coupled")
rn_efr      =   0.05     !  fraction of surface tke value which penetrates below
the ML (nn_etau=1 or 2)
nn_htau     =   0     !  type of exponential decrease of tke penetration below
the ML
     !        = 0  constant 10 m length scale
     !        = 1  0.5m at the equator to 30m poleward of 40 degrees
/

!-----------------------------------------------------------------------
&namzdf_kpp    !   K-Profile Parameterization dependent vertical mixing
("key_zdfkpp", and optionnally:

!-----------------------------------------------------------------------
"key_kppcustom" or "key_kpplktb")
ln_kpprimix = .true.     !  shear instability mixing
rn_difmiw   =  1.0e-04     !  constant internal wave viscosity [m2/s]
rn_difsiw   =  0.1e-04     !  constant internal wave diffusivity [m2/s]
rn_riinfty  =  0.8     !  local Richardson Number limit for shear instability
rn_difri    =  0.0050     !  maximum shear mixing at Rig = 0    [m2/s]
rn_bvsqcon  = -0.01e-07     !  Brunt-Vaisala squared for maximum convection
[1/s2]
rn_difcon   =  1.     !  maximum mixing in interior convection [m2/s]
nn_avb      =  0     !  horizontal averaged (=1) or not (=0) on avt and amv
nn_ave      =  1     !  constant (=0) or profile (=1) background on avt
/

!-----------------------------------------------------------------------
&namzdf_gls                !   GLS vertical diffusion
("key_zdfgls")

!-----------------------------------------------------------------------
rn_emin       = 1.e-6     !  minimum value of e   [m2/s2]
rn_epsmin     = 1.e-12     !  minimum value of eps [m2/s3]
ln_length_lim = .true.     !  limit on the dissipation rate under stable
stratification (Galperin et al., 1988)
rn_clim_galp  = 0.53     !  galperin limit
ln_crban      = .true.     !  Use Craig & Banner (1994) surface wave mixing
parametrisation
ln_sigpsi     = .true.     !  Activate or not Burchard 2001 mods on psi schmidt
number in the wb case
rn_crban      = 100.     !  Craig and Banner 1994 constant for wb tke flux
rn_charn      = 70000.     !  Charnock constant for wb induced roughness length
nn_tkebc_surf =   1     !  surface tke condition (0/1/2=Dir/Neum/Dir Mellor-
Blumberg)
nn_tkebc_bot  =   1     !  bottom tke condition (0/1=Dir/Neum)
nn_psibc_surf =   1     !  surface psi condition (0/1/2=Dir/Neum/Dir Mellor-
Blumberg)
nn_psibc_bot  =   1     !  bottom psi condition (0/1=Dir/Neum)
nn_stab_func  =   2     !  stability function (0=Galp, 1= KC94, 2=CanutoA,
3=CanutoB)
nn_clos       =   1     !  predefined closure type (0=MY82, 1=k-eps, 2=k-w,
3=Gen)
```

```
/

!-----------------------------------------------------------------------
&namzdf_ddm    !   double diffusive mixing parameterization
("key_zdfddm")

!-----------------------------------------------------------------------
rn_avts     = 1.e-4     !  maximum avs (vertical mixing on salinity)
rn_hsbfr    = 1.6     !  heat/salt buoyancy flux ratio
/

!-----------------------------------------------------------------------
&namzdf_tmx    !   tidal mixing parameterization
("key_zdftmx")

!-----------------------------------------------------------------------
rn_htmx     = 500.     !  vertical decay scale for turbulence (meters)
rn_n2min    = 1.e-8     !  threshold of the Brunt-Vaisala frequency (s-1)
rn_tfe      = 0.333     !  tidal dissipation efficiency
rn_me       = 0.2     !  mixing efficiency
ln_tmx_itf  = .true.     !  ITF specific parameterisation
rn_tfe_itf  = 1.     !  ITF tidal dissipation efficiency
/

!!======================================================================
!!                  ***  Miscelaneous namelists  ***
!!======================================================================
!!   nammpp            Massively Parallel Processing
("key_mpp_mpi)
!!   nammpp_dyndist    Massively Parallel domain decomposition
("key_agrif" && "key_mpp_dyndist")
!!   namctl            Control prints & Benchmark
!!   namsol            elliptic solver / island / free surface
!!======================================================================
!-----------------------------------------------------------------------
&namsol        !   elliptic solver / island / free surface

!-----------------------------------------------------------------------
nn_solv     =      1     !  elliptic solver: =1 preconditioned conjugate
gradient (pcg)
     !                   =2 successive-over-relaxation (sor)
nn_sol_arp  =      0     !  absolute/relative (0/1) precision convergence test
rn_eps      =  1.e-6     !  absolute precision of the solver
nn_nmin     =    300     !  minimum of iterations for the SOR solver
nn_nmax     =   2000     !  maximum of iterations for the SOR solver
nn_nmod     =     10     !  frequency of test for the SOR solver
rn_resmax   =  1.e-20     !  absolute precision for the SOR solver
rn_sor      =  1.973     !  optimal coefficient for SOR solver (to be adjusted
with the domain)
/

!-----------------------------------------------------------------------
&nammpp        !   Massively Parallel Processing
("key_mpp_mpi)
```

```
!-----------------------------------------------------------------------
cn_mpi_send =  'I'     !  mpi send/recieve type   ='S', 'B', or 'I' for standard
send,
                          !  buffer blocking send or immediate non-blocking
sends, resp.

nn_buffer   =   0     !  size in bytes of exported buffer ('B' case), 0 no
exportation
ln_nnogather=  .true.     !  activate code to avoid mpi_allgather use at the
northfold
jpni         = 16     ! jpni   number of processors following i (set
automatically if < 1)
jpnj         = 30     ! jpnj   number of processors following j (set
automatically if < 1)
jpnij        = 480     ! jpnij  number of local domains (set automatically if <
1)
/

!-----------------------------------------------------------------------
&namctl        !   Control prints & Benchmark

!-----------------------------------------------------------------------
ln_ctl      = .false.     !  trends control print (expensive
nn_print    =    0     !  level of print (0 no extra print)
nn_ictls    =    1     !  start i indice of control sum (use to compare mono
versus
nn_ictle    =    1     !  end   i indice of control sum        multi processor
runs
nn_jctls    =    1     !  start j indice of control               over a
subdomain)
nn_jctle    =    1     !  end   j indice of control
nn_isplt    =    1     !  number of processors in i-direction
nn_jsplt    =    1     !  number of processors in j-direction
nn_bench    =    0     !  Bench mode (1/0): CAUTION use zero except for bench
                          !     (no physical validity of the results)

nn_timing   =    0     !  timing by routine activated (=1) creates timing.output
file, or not (=0)
/

!!======================================================================
!!                      ***  Diagnostics namelists  ***
!!======================================================================
!!   namtrd       dynamics and/or tracer trends
("key_trddyn","key_trdtra","key_trdmld")
!!   namgap       level mean model-data gap
("key_diagap")
!!   namflo       float parameters
("key_float")
!!   namptr       Poleward Transport Diagnostics
!!======================================================================
!
!-----------------------------------------------------------------------
&namnc4        !   netcdf4 chunking and compression settings
("key_netcdf4")
```

```
!-----------------------------------------------------------------------
nn_nchunks_i=   4     !  number of chunks in i-dimension
nn_nchunks_j=   4     !  number of chunks in j-dimension
nn_nchunks_k=   31     !  number of chunks in k-dimension
     !  setting nn_nchunks_k = jpk will give a chunk size of 1 in the vertical
which
                           !  is optimal for postprocessing which works
exclusively with horizontal slabs

ln_nc4zip   = .true.     !  (T) use netcdf4 chunking and compression
                           !  (F) ignore chunking information and produce
netcdf3-compatible files

/

!-----------------------------------------------------------------------
&namtrd        !   diagnostics on dynamics and/or tracer trends
("key_trddyn" and/or "key_trdtra")

!              !       or mixed-layer trends or barotropic vorticity
('key_trdmld' or  "key_trdvor")
!-----------------------------------------------------------------------
nn_trd      = 600     !  time step frequency dynamics and tracers trends
nn_ctls     =   0     !  control surface type in mixed-layer trends (0,1 or
n<jpk)
rn_ucf      =   1.     !  unit conversion factor (=1 -> /seconds ; =86400. ->
/day)
cn_trdrst_in      = "restart_mld"     ! suffix of ocean restart name (input)
cn_trdrst_out     = "restart_mld"     ! suffix of ocean restart name (output)
ln_trdmld_restart = .false.     !  restart for ML diagnostics
ln_trdmld_instant = .false.     !  flag to diagnose trends of instantantaneous
or mean ML T/S
/

!-----------------------------------------------------------------------
&namflo       !   float parameters
("key_float")

!-----------------------------------------------------------------------
ln_rstflo = .false.     !  float restart (T) or not (F)
nn_writefl=      75     !  frequency of writing in float output file
nn_stockfl=    5475     !  frequency of creation of the float restart file
ln_argo   = .false.     !  Argo type floats (stay at the surface each 10 days)
ln_flork4 = .false.     !  trajectories computed with a 4th order Runge-Kutta
(T)
                           !  or computed with Blanke' scheme (F)

/

!-----------------------------------------------------------------------
&namptr       !   Poleward Transport Diagnostic

!-----------------------------------------------------------------------
ln_diaptr  = .false.     !  Poleward heat and salt transport (T) or not (F)
```

```
ln_diaznl  = .false.     !  Add zonal means and meridional stream functions
ln_subbas  = .false.     !  Atlantic/Pacific/Indian basins computation (T) or
not
                           !  (orca configuration only, need input basins mask
file named "subbasins.nc"

ln_ptrcomp = .false.     !  Add decomposition : overturning
nn_fptr    =  1     !  Frequency of ptr computation [time step]
nn_fwri    =  300     !  Frequency of ptr outputs [time step]
/

!-----------------------------------------------------------------------
&namhsb       !  Heat and salt budgets

!-----------------------------------------------------------------------
ln_diahsb  = .false.     !  check the heat and salt budgets (T) or not (F)
/

!-----------------------------------------------------------------------
&nam_diaharm   !   Harmonic analysis of tidal constituents ('key_diaharm')

!-----------------------------------------------------------------------
nit000_han =696961     ! First time step used for harmonic analysis
nitend_han =700800     ! Last time step used for harmonic analysis
nstep_han  = 15     ! Time step frequency for harmonic analysis
tname(1)   = 'M2'     ! Name of tidal constituents
tname(2)   = 'K1'     !
/

!-----------------------------------------------------------------------
&namdct        ! transports through sections

!-----------------------------------------------------------------------
nn_dct      = 15     !  time step frequency for transports computing
nn_dctwri   = 15     !  time step frequency for transports writing
nn_secdebug = 112     !      0 : no section to debug
                           !     -1 : debug all section

                           !  0 < n : debug section number n

/

!!======================================================================
!!             ***  Observation & Assimilation namelists ***
!!======================================================================
!!   namobs       observation and model comparison
('key_diaobs')
!!   nam_asminc   assimilation increments
('key_asminc')
!!======================================================================
!
!-----------------------------------------------------------------------
&namobs       !  observation usage switch
('key_diaobs')
```

```
!-----------------------------------------------------------------------
ln_t3d     = .false.     ! Logical switch for T profile observations
ln_s3d     = .false.     ! Logical switch for S profile observations
ln_ena     = .false.     ! Logical switch for ENACT insitu data set
   !                       !     ln_cor                Logical switch for
Coriolis insitu data set

ln_profb   = .false.     ! Logical switch for feedback insitu data set
ln_sla     = .false.     ! Logical switch for SLA observations
ln_sladt   = .false.     ! Logical switch for AVISO SLA data
ln_slafb   = .false.     ! Logical switch for feedback SLA data
                         !     ln_ssh                Logical switch for SSH
observations

ln_sst     = .false.     ! Logical switch for SST observations
                         !     ln_reysst             Logical switch for
Reynolds observations

                         !     ln_ghrsst             Logical switch for
GHRSST observations

ln_sstfb   = .false.     ! Logical switch for feedback SST data
                         !     ln_sss                Logical switch for SSS
observations

                         !     ln_seaice             Logical switch for Sea
Ice observations

                         !     ln_vel3d              Logical switch for
velocity observations

                         !     ln_velavcur           Logical switch for
velocity daily av. cur.

                         !     ln_velhrcur           Logical switch for
velocity high freq. cur.

                         !     ln_velavadcp          Logical switch for
velocity daily av. ADCP

                         !     ln_velhradcp          Logical switch for
velocity high freq. ADCP

                         !     ln_velfb              Logical switch for
feedback velocity data

                         !     ln_grid_global        Global distribtion of
observations

                         !     ln_grid_search_lookup Logical switch for obs
grid search w/lookup table

                         !     grid_search_file      Grid search lookup file
header
```

```
                          !     enactfiles              ENACT input observation
file names

                          !     coriofiles              Coriolis input
observation file name

   !                      ! profbfiles: Profile feedback input observation file
name

profbfiles = 'profiles_01.nc'     !
                          !     ln_profb_enatim         Enact feedback input
time setting switch

                          !     slafilesact             Active SLA input
observation file name

                          !     slafilespas             Passive SLA input
observation file name

   !                      ! slafbfiles: Feedback SLA input observation file
name

slafbfiles = 'sla_01.nc'     !
                          !     sstfiles                GHRSST input
observation file name

   !                      ! sstfbfiles: Feedback SST input observation file
name

sstfbfiles = 'sst_01.nc' 'sst_02.nc' 'sst_03.nc' 'sst_04.nc' 'sst_05.nc'     !
                          !     seaicefiles             Sea Ice input
observation file name

                          !     velavcurfiles           Vel. cur. daily av.
input file name

                          !     velhvcurfiles           Vel. cur. high freq.
input file name

                          !     velavadcpfiles          Vel. ADCP daily av.
input file name

                          !     velhvadcpfiles          Vel. ADCP high freq.
input file name

                          !     velfbfiles              Vel. feedback input
observation file name

                          !     dobsini                 Initial date in window
YYYYMMDD.HHMMSS

                          !     dobsend                 Final date in window
YYYYMMDD.HHMMSS
```

```
                           !     n1dint                  Type of vertical
interpolation method

                           !     n2dint                  Type of horizontal
interpolation method

                           !     ln_nea                  Rejection of
observations near land switch

nmsshc     = 0     ! MSSH correction scheme
                           !     mdtcorr                 MDT  correction

                           !     mdtcutoff               MDT cutoff for computed
correction

ln_altbias = .false.     ! Logical switch for alt bias
ln_ignmis  = .true.     ! Logical switch for ignoring missing files
                           !     endailyavtypes   ENACT daily average types

ln_grid_global = .true.     !
ln_grid_search_lookup = .false.     !
/

!-----------------------------------------------------------------------
&nam_asminc   !   assimilation increments
('key_asminc')

!-----------------------------------------------------------------------
ln_bkgwri = .false.     !  Logical switch for writing out background state
ln_trjwri = .false.     !  Logical switch for writing out state trajectory
ln_trainc = .false.     !  Logical switch for applying tracer increments
ln_dyninc = .false.     !  Logical switch for applying velocity increments
ln_sshinc = .false.     !  Logical switch for applying SSH increments
ln_asmdin = .false.     !  Logical switch for Direct Initialization (DI)
ln_asmiau = .false.     !  Logical switch for Incremental Analysis Updating
(IAU)
nitbkg    = 0     !  Timestep of background in [0,nitend-nit000-1]
nitdin    = 0     !  Timestep of background for DI in [0,nitend-nit000-1]
nitiaustr = 1     !  Timestep of start of IAU interval in [0,nitend-nit000-1]
nitiaufin = 15     !  Timestep of end of IAU interval in [0,nitend-nit000-1]
niaufn    = 0     !  Type of IAU weighting function
nittrjfrq = 0     !  Frequency of trajectory output for 4D-VAR
ln_salfix = .false.     !  Logical switch for ensuring that the sa > salfixmin
salfixmin = -9999     !  Minimum salinity after applying the increments
/

!-----------------------------------------------------------------------
&namsbc_wave   ! External fields from wave model

!-----------------------------------------------------------------------
!              !  file name  ! frequency (hours) ! variable  ! time interp. !
clim  ! 'yearly'/ ! weights  ! rotation !
!              !             !  (if <0  months)  !   name    !   (logical)  !
(T/F) ! 'monthly' ! filename ! pairing  !
```

```
sn_cdg      =  'cdg_wave' ,        1          , 'drag_coeff' , .true.   ,
.false. , 'daily'  ,''         , ''     !
!
cn_dir_cdg  = './'     !  root directory for the location of drag coefficient
files
/

!-----------------------------------------------------------------------
&namdyn_nept  !   Neptune effect (simplified: lateral and vertical diffusions
removed)

!-----------------------------------------------------------------------
   ! Suggested lengthscale values are those of Eby & Holloway (1994) for a
coarse model

ln_neptsimp       = .false.     ! yes/no use simplified neptune
ln_smooth_neptvel = .false.     ! yes/no smooth zunep, zvnep
rn_tslse          =  1.2e4     ! value of lengthscale L at the equator
rn_tslsp          =  3.0e3     ! value of lengthscale L at the pole
   ! Specify whether to ramp down the Neptune velocity in shallow

   ! water, and if so the depth range controlling such ramping down

ln_neptramp       = .true.     ! ramp down Neptune velocity in shallow water
rn_htrmin         =  100.0     ! min. depth of transition range
rn_htrmax         =  200.0     ! max. depth of transition range
/
```

```
!=============================================================================
=
! CICE namelist
!=============================================================================
=

&setup_nml
    days_per_year  = 365
  ,  use_leap_years  = .false.
  , year_init      = 1976
  , istep0         = 0
  , dt             = 1350.0
  , npt            = 5760
  , ndyn_dt        = 1
  , runtype        = 'continue'
  , ice_ic         =
'/projects/nemo/users/sgalde/CICE025/iced_start_abwORCA025_jan365.vn3.bin'
  , restart        = .true.
  , restart_dir    = './'
  , restart_file   = 'xhimoi.restart'
  , pointer_file   = './ice.restart_file'
  , dumpfreq       = 'd'
  , dumpfreq_n     = 90
  , diagfreq       = 320
  , diag_type      = 'file'
  , diag_file      = 'ice_diag.d'
  , print_global   = .true.
  , print_points   = .true.
  , latpnt(1)      =  90.
  , lonpnt(1)      =   0.
  , latpnt(2)      = -65.
  , lonpnt(2)      = -45.
  , dbug           = .false.
  , histfreq       = 'd','x','x','x','x'
  , histfreq_n     =  5 , 1 , 1 , 1 , 1
  , hist_avg       = .true.
  , history_dir    = './'
  , history_file   = 'xhimoi.5d'
  , history_format = 'nc'
  , write_ic       = .false.
  , incond_dir     = './'
  , incond_file    = 'xhimoi_ic'
/

&grid_nml
    grid_format  = 'nc'
  , grid_type    = 'tripole'
  , grid_file    =
'/projects/hirescm/hadgem3/grids/seaice/ORCA025/CICE_grid_280809.nc'
  , kmt_file     =
'/projects/nemo/users/sgalde/CICE025/CICE_ORCA025_drakkar_kmt.nc'
  , kcatbound    = 1
/

&domain_nml
```

```
    nprocs            = 480
  , processor_shape   = 'square-pop'
  , distribution_type = 'cartesian'
  , distribution_wght = 'block'
  , ew_boundary_type  = 'cyclic'
  , ns_boundary_type  = 'tripoleT'
/

&tracer_nml
    tr_iage      = .false.
  , restart_age  = .false.
  , tr_lvl       = .false.
  , restart_lvl  = .false.
  , tr_pond_cesm = .false.
  , restart_pond_cesm = .false.
  , tr_pond_lvl  = .false.
  , restart_pond_lvl  = .false.
  , tr_aero      = .false.
  , restart_aero = .false.
/

&ice_nml
    kitd            = 1
  , kdyn            = 1
  , ndte            = 120
  , kstrength       = 1
  , krdg_partic     = 1
  , krdg_redist     = 1
  , mu_rdg          = 4.0
  , advection       = 'remap'
  , heat_capacity   = .false.
  , conduct         = 'MU71'
  , shortwave       = 'default'
  , albedo_type     = 'default'
  , albicev         = 0.78
  , albicei         = 0.36
  , albsnowv        = 0.98
  , albsnowi        = 0.70
  , ahmax           = 0.5
  , R_ice           = 0.
  , R_pnd           = 0.
  , R_snw           = 1.5
  , hs0             = 0.03
  , hs1             = 0.03
  , dpscale         = 1.e-3
  , frzpnd          = 'cesm'
  , snowinfil       = .false.
  , rfracmin        = 0.15
  , rfracmax        = 0.85
  , pndaspect       = 0.8
  , atmbndy         = 'default'
  , fyear_init      = 1997
  , ycycle          = 1
  , atm_data_format = 'nc'
  , atm_data_type   = 'default'
```

```
  , atm_data_dir    = 'unknown_atm_data_dir'
  , calc_strair     = .true.
  , calc_Tsfc       = .true.
  , precip_units    = 'mks'
  , Tfrzpt          = 'constant'
  , ustar_min       = 0.005
  , update_ocn_f    = .true.
  , oceanmixed_ice  = .false.
  , ocn_data_format = 'nc'
  , sss_data_type   = 'default'
  , sst_data_type   = 'default'
  , ocn_data_dir    = 'unknown_ocn_data_dir'
  , oceanmixed_file = 'unknown_oceanmixed_file'
  , restore_sst     = .false.
  , trestore        =  0
  , restore_ice     = .false.
/

&icefields_nml
    f_tmask        = .true.
  , f_tarea        = .true.
  , f_uarea        = .true.
  , f_dxt          = .false.
  , f_dyt          = .false.
  , f_dxu          = .false.
  , f_dyu          = .false.
  , f_HTN          = .false.
  , f_HTE          = .false.
  , f_ANGLE        = .true.
  , f_ANGLET       = .true.
  , f_NCAT         = .true.
  , f_VGRDi        = .false.
  , f_VGRDs        = .false.
  , f_bounds       = .true.
  , f_hi           = 'd'
  , f_hs           = 'd'
  , f_Tsfc         = 'd'
  , f_aice         = 'd'
  , f_uvel         = 'd'
  , f_vvel         = 'd'
  , f_fswdn        = 'd'
  , f_flwdn        = 'd'
  , f_snow         = 'x'
  , f_snow_ai      = 'd'
  , f_rain         = 'x'
  , f_rain_ai      = 'd'
  , f_sst          = 'd'
  , f_sss          = 'd'
  , f_uocn         = 'd'
  , f_vocn         = 'd'
  , f_frzmlt       = 'd'
  , f_fswfac       = 'x'
  , f_fswabs       = 'x'
  , f_fswabs_ai    = 'd'
  , f_albsni       = 'd'
```

```
, f_alvdr        = 'x'
, f_alidr        = 'x'
, f_albice       = 'x'
, f_albsno       = 'x'
, f_albpnd       = 'x'
, f_coszen       = 'x'
, f_flat         = 'x'
, f_flat_ai      = 'd'
, f_fsens        = 'x'
, f_fsens_ai     = 'd'
, f_flwup        = 'x'
, f_flwup_ai     = 'd'
, f_evap         = 'x'
, f_evap_ai      = 'd'
, f_Tair         = 'd'
, f_Tref         = 'x'
, f_Qref         = 'x'
, f_congel       = 'd'
, f_frazil       = 'd'
, f_snoice       = 'd'
, f_meltt        = 'd'
, f_melts        = 'd'
, f_meltb        = 'd'
, f_meltl        = 'd'
, f_fresh        = 'x'
, f_fresh_ai     = 'd'
, f_fsalt        = 'x'
, f_fsalt_ai     = 'd'
, f_fhocn        = 'x'
, f_fhocn_ai     = 'd'
, f_fswthru      = 'x'
, f_fswthru_ai   = 'd'
, f_fsurf_ai     = 'd'
, f_fcondtop_ai  = 'd'
, f_fmeltt_ai    = 'd'
, f_strairx      = 'd'
, f_strairy      = 'd'
, f_strtltx      = 'd'
, f_strtlty      = 'd'
, f_strcorx      = 'd'
, f_strcory      = 'd'
, f_strocnx      = 'd'
, f_strocny      = 'd'
, f_strintx      = 'd'
, f_strinty      = 'd'
, f_strength     = 'd'
, f_divu         = 'd'
, f_shear        = 'd'
, f_sig1         = 'd'
, f_sig2         = 'd'
, f_dvidtt       = 'd'
, f_dvidtd       = 'd'
, f_daidtt       = 'd'
, f_daidtd       = 'd'
, f_mlt_onset    = 'd'
```

```
  , f_frz_onset    = 'd'
  , f_dardg1dt     = 'd'
  , f_dardg2dt     = 'd'
  , f_dvirdgdt     = 'd'
  , f_opening      = 'd'
  , f_hisnap       = 'x'
  , f_aisnap       = 'x'
  , f_trsig        = 'd'
  , f_icepresent   = 'd'
  , f_iage         = 'x'
  , f_alvl         = 'x'
  , f_vlvl         = 'x'
  , f_ardg         = 'x'
  , f_vrdg         = 'x'
  , f_faero_atm    = 'x'
  , f_faero_ocn    = 'x'
  , f_aero         = 'x'
  , f_aicen        = 'd'
  , f_vicen        = 'd'
  , f_Tinz         = 'x'
  , f_Tsnz         = 'x'
  , f_fsurfn_ai    = 'd'
  , f_fcondtopn_ai = 'd'
  , f_fmelttn_ai   = 'd'
  , f_flatn_ai     = 'd'
  , f_apondn       = 'x'
  , f_apond        = 'x'
  , f_hpond        = 'x'
  , f_ipond        = 'x'
  , f_apond_ai     = 'x'
  , f_hpond_ai     = 'x'
  , f_ipond_ai     = 'x'
  , f_apeff        = 'x'
/
```