

Steps to Couple LMDZOR_v6 and ORCHIDEE-MICT
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On CURIE/IRENE

module unload nco/4.4.8

Download modipsl

```
svn co http://forge.ipsl.jussieu.fr/igcmg/svn/modipsl/trunk modipsl
```

```
cd /ccc/work/cont003/dsm/devaraju/CouplingORC_LMDZ/LMDZORmict/modipsl/util
```

```
vi mod.def
```

Replace 'trunk/ORCHIDEE' by 'branches/ORCHIDEE-MICT/tags/ORCHIDEE_MICT_8.7.1'

also change the revision number to '5308'

```
./model -h
```

Extract the model LMDZOR_v6

```
./model LMDZOR_v6
```

```
cd
```

```
/ccc/work/cont003/dsm/devaraju/CouplingORC_LMDZ/LMDZORmict/modipsl/modele  
s
```

```
rm -fr IOIPSL
```

```
svn co -r4850 svn://forge.ipsl.jussieu.fr/orchidee/branches/ORCHIDEE-MICT/IOIPSL  
IOIPSL
```

```
cd IOIPSL/src
```

```
../../../../util/ins_make
```

```
vi Makefile
```

```
#F_0 = -DCPP_PARA -O3 $(F_D) $(F_P) -I$(MODDIR) -module $(MODDIR) -fp-model precise
```

```
F_0 = -DCPP_PARA -03 -xAVX -align all -align array32byte $(F_D) $(F_P) -I$(MODDIR)
-module $(MODDIR) -fp-model precise
```

```
gmake
```

```
cd /ccc/work/cont003/dsm/devaraju/CouplingORC_LMDZ/LMDZORmict/modipsl/modeles/XIOS
```

```
XIOS revision 1550 works (any latest version should work)
```

```
./make_xios --prod --arch X64_CURIE --full --j 8
```

```
cd
```

```
/ccc/work/cont003/dsm/devaraju/CouplingORC_LMDZ/LMDZORmict/modipsl/modeles/ORCHIDEE
```

```
./makeorchidee_fcm -parallel mpi -arch X64_CURIE -driver -prod -full -j 8
```

Change the files at ../modeles/LMDZ

Index: arch/arch-X64_CURIE.path

```
=====
--- arch/arch-X64_CURIE.path      (revision 3085)
+++ arch/arch-X64_CURIE.path      (working copy)
@@ -2,8 +2,8 @@
  NETCDF_INCDIR=-I$NETCDF_INC_DIR
  IOIPSL_INCDIR=$LMDGCM/../../lib
  IOIPSL_LIBDIR=$LMDGCM/../../lib
-ORCH_INCDIR=$LMDGCM/../../lib
-ORCH_LIBDIR=$LMDGCM/../../lib
+ORCH_INCDIR=$LMDGCM/../../ORCHIDEE/lib
+ORCH_LIBDIR=$LMDGCM/../../ORCHIDEE/lib
  OASIS_INCDIR=$LMDGCM/../../oasis3-mct/BLD/build/lib/psmile.MPI1
  OASIS_LIBDIR=$LMDGCM/../../oasis3-mct/BLD/lib
  INCA_LIBDIR=$LMDGCM/../../INCA/config/lib
```

Index: makelmdz_fcm

```
=====
=====
--- makelmdz_fcm      (revision 3085)
+++ makelmdz_fcm      (working copy)
@@ -378,9 +378,9 @@
  CPP_KEY="$CPP_KEY ORCHIDEE_NOOPENMP"
  fi
  if [[ "$veget" == "orchidee2.0" ]]; then
-  orch_libs="sechiba parameters stomate parallel orglob orchidee"
+  orch_libs="sechiba parameters stomate sticslai parallel orglob orchidee"
  else
-  orch_libs="sechiba parameters stomate parallel orglob"
```

```
+   orch_libs="sechiba parameters stomate sticslai parallel orglob"
fi
LIB="${LIB} -L${ORCH_LIBDIR}"
for lib in ${orch_libs} ; do
```

[p529jorn@curie70 LMDZ]\$ svn diff make*

Index: makegcm

=====

====

```
--- makegcm (revision 2982)
+++ makegcm (working copy)
@@ -238,9 +238,9 @@
   set optim90=" -fast -fixed "
   set optimtru90=" -fast -free "
   if ( $io == "ioipsl" ) then
-   set opt_link="-lf77compat -L$MODIPSLDIR -lsechiba -lparameters -lstomate
-lioipsl -L$NCDFLIB -lnetcdf "
+   set opt_link="-lf77compat -L$MODIPSLDIR -lsechiba -lparameters -lstomate
-lsticslai -lioipsl -L$NCDFLIB -lnetcdf "
   else
-   set opt_link="-lf77compat -L$MODIPSLDIR -lsechiba -lparameters -lstomate
-L$NCDFLIB -lnetcdf "
+   set opt_link="-lf77compat -L$MODIPSLDIR -lsechiba -lparameters -lstomate
-lsticslai -L$NCDFLIB -lnetcdf "
   endif
   set mod_loc_dir=$localdir
   set mod_suffix=mod
@@ -597,10 +597,10 @@
if ( "$veget" == 'true' ) then
  set cppflags="$cppflags -DCPP_VEGE"
  # set link_veget=" -lsechiba -lparameters -lstomate "
- set link_veget=" -lsechiba -lparameters -lstomate -lorchidee"
+ set link_veget=" -lsechiba -lparameters -lstomate -lsticslai -lorchidee"
  if ( $XNEC || $X8BRODIE || $X6NEC ) then
  # set link_veget=" -lsxsechiba -lsxparameters -lsxstomate -lsxorglob -lsxparallel"
- set link_veget=" -lsxsechiba -lsxparameters -lsxstomate "
+ set link_veget=" -lsxsechiba -lsxparameters -lsxstomate -lsxsticslai"
  endif
endif
```

Index: makelmdz

=====

====

```
--- makelmdz (revision 2982)
+++ makelmdz (working copy)
@@ -432,9 +432,9 @@
    CPP_KEY="$CPP_KEY ORCHIDEE_NOOPENMP"
    fi
    if [[ "$veget" == "orchidee2.0" ]]; then
-   orch_libs="sechiba parameters stomate parallel orglob orchidee"
+   orch_libs="sechiba parameters stomate sticslai parallel orglob orchidee"
    else
-   orch_libs="sechiba parameters stomate parallel orglob"
+   orch_libs="sechiba parameters stomate sticslai parallel orglob"
    fi
    LIB="{LIB} -L${ORCH_LIBDIR}"
    for lib in ${orch_libs} ; do
```

Index: makelmdz_fcm

=====

====

```
--- makelmdz_fcm (revision 2982)
+++ makelmdz_fcm (working copy)
@@ -378,9 +378,9 @@
    CPP_KEY="$CPP_KEY ORCHIDEE_NOOPENMP"
    fi
    if [[ "$veget" == "orchidee2.0" ]]; then
-   orch_libs="sechiba parameters stomate parallel orglob orchidee"
+   orch_libs="sechiba parameters stomate sticslai parallel orglob orchidee"
    else
-   orch_libs="sechiba parameters stomate parallel orglob"
+   orch_libs="sechiba parameters stomate sticslai parallel orglob"
    fi
    LIB="{LIB} -L${ORCH_LIBDIR}"
    for lib in ${orch_libs} ; do
```

Remove the below line in the files stomate.f90 before compilation

```
CHARACTER(LEN=200)          :: temp_str
    !$OMP THREADPRIVATE(temp_str) <----- remove this
line
```

Make sure to apply the fix for wut_cm_daily and wus_cm_daily variables.

Revision: 5328
Author: albert.jornet
Date: 2018-07-06 14:41:32 +0200 (Fri, 06 Jul 2018)
Log Message:

Fix: only calculate wut_cm_daily and wus_cm_daily when CROP module is enabled
Fix: no OPENMP declaration required for temp_str. This raises an issue in coupled mode

Modified Paths:

branches/ORCHIDEE-MICT/ORCHIDEE/src_stomate/stomate.f90

Modified: branches/ORCHIDEE-MICT/ORCHIDEE/src_stomate/stomate.f90

```
=====
--- branches/ORCHIDEE-MICT/ORCHIDEE/src_stomate/stomate.f90      2018-07-06 09:25:58
UTC (rev 5327)
+++ branches/ORCHIDEE-MICT/ORCHIDEE/src_stomate/stomate.f90      2018-07-06 12:41:32
UTC (rev 5328)
@@ -1331,7 +1331,6 @@
!   REAL(r_std),DIMENSION(:,:,:),ALLOCATABLE      :: plantdate_real
!   REAL(r_std),DIMENSION(:,:),ALLOCATABLE        :: plantdate_now_real
  CHARACTER(LEN=200)                                :: temp_str
-   !$OMP THREADPRIVATE(temp_str)
  !!!   CHARACTER(LEN=30)                            :: var_name
        REAL(r_std), ALLOCATABLE, DIMENSION (:, :, :)      :: Nfert_dat !!temporary
nitrogen fertilization data
        CHARACTER(LEN=80)                                :: var_name !! for
restget_p
@@ -2754,11 +2753,13 @@
  ENDF

!!!!!! crops
-   ! calculate daily mean values for soil temperature for root zone
-   CALL stomate_accu(do_slow, stempdiag_cm, wut_cm_daily)
+   IF (ANY(ok_LAidev)) THEN
+   ! calculate daily mean values for soil temperature for root zone
+   CALL stomate_accu(do_slow, stempdiag_cm, wut_cm_daily)

-   ! calculate daily mean values for soil moisture for root zone
-   CALL stomate_accu(do_slow, shumdiag_cm, wus_cm_daily)
+   ! calculate daily mean values for soil moisture for root zone
+   CALL stomate_accu(do_slow, shumdiag_cm, wus_cm_daily)
+   ENDF
!!!!!! xuhui

@@ -6264,7 +6265,12 @@
  wet1day(:) = 6
  wet2day(:) = 6
!end gmjc
```

```

+! crop
+ wut_cm_daily = zero
+ wus_cm_daily = zero
+! crop

+
! 6 Initialize index histwrite related variables
CALL stomate_init_index(kjpij, kjpindex, index)

```

Index: src_parallel/xios_orchidee.f90

```

=====
--- src_parallel/xios_orchidee.f90      (revision 5309)
+++ src_parallel/xios_orchidee.f90      (working copy)
@@ -177,6 +177,7 @@
CHARACTER(LEN=20)           :: calendar_str      !! Name of
current calendar
CHARACTER(LEN=30)           :: start_str        !! Current
date as character string
CHARACTER(LEN=30)           :: startorig_str    !! Time
origin date as character string
+ CHARACTER(LEN=100), PARAMETER :: domain_id =
"domain_landpoints"       !! Time origin date as character string
!_
=====
=====

```

```

@@ -241,7 +242,7 @@
!! 3. Domain definition
!
! Global domain
- CALL xios_set_domain_attr("domain_landpoints", ni_glo=iim_g,
nj_glo=jjm_g)
+ CALL xios_set_domain_attr(TRIM(domain_id), ni_glo=iim_g,
nj_glo=jjm_g)

```

```

! Local MPI domain
IF ( GridType == "RegLonLat" ) THEN

```

Index: src_parameters/vertical_soil.f90

```

=====
--- src_parameters/vertical_soil.f90    (revision 5309)
+++ src_parameters/vertical_soil.f90    (working copy)
@@ -177,7 +177,7 @@
INTEGER(i_std)             :: nbcst           !!
Related to refine at bottom. Work in progress...
INTEGER(i_std)             :: igeo           !!
Related to refine at bottom. Work in progress...
REAL(r_std), DIMENSION(nblayermax+1) :: ztmp           !! Depth
at the node of each layer (m)
- REAL(r_std), DIMENSION(nblayermax+1) :: zint           !! Depth
at the interface of each layer (m)
+ REAL(r_std), DIMENSION(nblayermax)   :: zint           !! Depth
at the interface of each layer (m)
REAL(r_std), DIMENSION(nblayermax+1) :: dtmp           !!
Distance between the current node and the one above (m)
REAL(r_std), DIMENSION(nblayermax+1) :: drefine        !!
=====

```

Related to refine at bottom. Work in progress...
INTEGER(i_std), DIMENSION(1) :: imin !!
Related to refine at bottom. Work in progress...

Make sure to, at least, request 2 XIOS MPI processors.

modeles/IOIPSL/src/
[p529jorn@irene171 src]\$ svn diff
Index: flincom.f90

=====

====

```
--- flincom.f90 (revision 3944)
+++ flincom.f90 (working copy)
@@ -105,7 +105,7 @@
!-
! This is the data we keep on each file we open
!-
- INTEGER, PARAMETER :: nbfile_max = 200
+ INTEGER, PARAMETER :: nbfile_max = 400
  INTEGER, SAVE :: nbfiles = 0
  INTEGER, SAVE :: ncids(nbfile_max), ncnbd(nbfile_max), &
    ncfunli(nbfile_max), ncnba(nbfile_max)
```

Index: fliocom.f90

=====

====

```
--- fliocom.f90 (revision 3944)
+++ fliocom.f90 (working copy)
@@ -48,7 +48,7 @@
!! flio_r8 : REAL*8 external type
!!-----
  INTEGER,PARAMETER,PUBLIC :: &
- & flio_max_files=100, flio_max_dims=25, flio_max_var_dims=5
+ & flio_max_files=500, flio_max_dims=25, flio_max_var_dims=5
  INTEGER,PARAMETER,PUBLIC :: &
  & flio_i = -1, flio_r = -2, flio_c =nf90_char, &
  & flio_i1=nf90_int1, flio_i2=nf90_int2, flio_i4=nf90_int4, &
```

Fix: missing OpenMP due to merge.
Fix: use getin_p instead of getin to ensure a correct parallelization
Clean: add getin_p basic description

Modified Paths:

branches/ORCHIDEE-MICT/ORCHIDEE/src_parallel/mod_orchidee_omp_data.F90

Modified: branches/ORCHIDEE-MICT/ORCHIDEE/src_parallel/mod_orchidee_omp_data.F90

=====

--- branches/ORCHIDEE-MICT/ORCHIDEE/src_parallel/mod_orchidee_omp_data.F90

2018-07-19 12:49:51 UTC (rev 5345)

+++ branches/ORCHIDEE-MICT/ORCHIDEE/src_parallel/mod_orchidee_omp_data.F90

2018-07-19 13:28:43 UTC (rev 5346)

@@ -49,6 +49,7 @@

IMPLICIT NONE

!\$OMP BARRIER

+\$OMP BARRIER

END SUBROUTINE barrier2_omp

Include these changes if necessary (similar to changes made for the DOFOCO):

Original

```

      zcond(i) = MAX(0.0, zqn(i)-zqs(i))/(1+zdqs(i))
      rhcl(i,k)=1.0
    ELSE
      zcond(i) = MAX(0.0, zqn(i)-zqs(i))*rneb(i,k)/(1+zdqs(i))

```

Modified:

```

      zcond(i) = MAX(0.0, zqn(i)-zqs(i))
      rhcl(i,k)=1.0
    ELSE
      zcond(i) = MAX(0.0, zqn(i)-zqs(i))*rneb(i,k)

```

Then compile

cd

/ccc/work/cont003/dsm/devaraju/CouplingORC_LMDZ/LMDZORmict/modipsl/config/LMDZOR_v6

gmake

Modify the file context_orchidee.xml to this:

From:

```
<grid id="grid_nsnow">  
  <domain domain_ref="domain_landpoints" >  
    <interpolate_domain order="1"/>  
  </domain>  
  <axis axis_ref="nsnow" />  
</grid>
```

to:

```
<grid id="grid_nsnow">  
  <domain domain_ref="domain_landpoints" />  
  <axis axis_ref="nsnow" />  
</grid>
```

Change run.def
STOMATE_HIST_DT=0
WRITE_STEP = 0

orchidee.def_CWRR
set THERMOSOIL_NBLEV=32
DEPTH_MAX = 38 # in trunk its 90

```
*****  
#OPTIONAL changes only  
change one_file to multiple_file in file_def_orchidee.xml
```

While waiting, you can deactivate sechiba_history_4dim.nc. Set directly in modeles/ORCHIDEE/src_xml/file_def_orchidee.xml :

```
<file id="sechiba3" name="sechiba_history_4dim" output_level="11" output_freq="1mo"  
enabled=".FALSE.">
```

```
*****
```

Also remember to comment out many 4 dimensional variables in both field_def_orchidee.xml and file_def_orchidee.xml files

For ORCHIDEE-MICT the default 15 PFT map does not work:-
\${R_IN}/SRF/PFTMAPS/CMIP6/ESA-LUH2v2/historical/15PFT.v1/PFTmap_2000.nc

Remove PFTmap and use

/ccc/work/cont003/dsmips1/devaraju/FORCEfiles/PFT/PFTmap_2000_13pft.nc

OR

\${R_IN}/SRF/PFTMAPS/CMIP6/ESA-LUH2/historical/v1.2/withoutNoBio/13PFTmap_2000_ESA_LUH2v2h_withoutNoBio_v1.2.nc

```
(${R_IN}/SRF/PFTMAPS/CMIP6/ESA-  
LUH2/historical/v1.2/withoutNoBio/13PFTmap_2000_ESA_LUH2v2h_withoutNoBio_v1.2.nc,  
PFTmap.nc), \
```