Correction – F. Getting Started Programming with SURFEX

The variables XTMEAN and XTGRAD have already been defined, declared and initialized in the type DIAG_t, in routines modd_diagn.F90 and mode_diag.F90 (see routines in src/SURFEX)

• *in modd_diagn.F90*

in TYPE Diag_t

```
REAL, POINTER, DIMENSION(:) ::   XTMEAN   ! mean air temperature        (K)
REAL, POINTER, DIMENSION(:) ::   XTGRAD   ! temperature gradient        (K)
```

in SUBROUTINE DIAG_INIT(D)

```
NULLIFY(D%XTMEAN)
NULLIFY(D%XTGRAD)
```

• *allocation/ initialization the pointers in mode_diag.F90*

in SUBROUTINE ALLOC_BUD, after XTS

```
ALLOCATE(DA%XTMEAN(KLU))
DA%XTMEAN = XUNDEF
ALLOCATE(DA%XTGRAD(KLU))
DA%XTGRAD = XUNDEF
```

F.2 : Programming / Modify the code under MYSRC directory

• add air temperature PTA as argument in average_diag_isban.F90

Add PTA in

```
SUBROUTINE AVERAGE_DIAG_ISBA_n(DGO,D, DC, ND, NDC, NP, KNPATCH, OSURF_BUDGETC, &
                OCANOPY, PHW, PHT ,PSFCO2, PTRAD, PTA)
```

Add in the declarations of arguments

```
REAL, DIMENSION(:), INTENT(IN)      :: PTA    ! Air temperature forcing (K)
```

• compute XTMEAN and XTGRAD in average_diag_isban.F90

Add, in part *2. surface temperature and 2 meters parameters*, after the do loop dedicated to XTS and XALBT

```
!Mean surface temperature
D%XTMEAN = (D%XTS + PTA) / 2
!Temperature gradient
D%XTGRAD = (D%XTS - PTA) / PHT
```

- add PTA as argument to average_diag_isban.F90 in coupling_isban.F90

Add PTA in

```
CALL AVERAGE_DIAG_ISBA_n(ID%O, ID%D, ID%DC, ID%ND, ID%NDC, NP, IO%NPATCH, &
               ID%O%LSURF_BUDGETC, IO%LCANOPY, PUREF, PZREF, PSFCO2, PTRAD, PTA)
```

- add TMEAN_ISBA and TGRAD_ISBA as new records in write_diag_seb_isban.F90

Add, with surface humidity QS_ISBA :

```
YRECFM='TMEAN_ISBA'
YCOMMENT='X_Y_'//YRECFM//' (K)'
CALL WRITE_SURF(DUO%CSELECT,HPROGRAM,YRECFM,ID%D%XTMEAN(:),IRESP,HCOMMENT=YCOMMENT)
!
YRECFM='TGRAD_ISBA'
YCOMMENT='X_Y_'//YRECFM//' (K)'
CALL WRITE_SURF(DUO%CSELECT,HPROGRAM,YRECFM,ID%D%XTGRAD(:),IRESP,HCOMMENT=YCOMMENT)
```

F.3 : Test your modifications

- Rerun the ISBA case. 2 new files should be produced : TMEAN_ISBA.TXT and TGRAD_ISBA.TXT

- Change your OPTIONS.nam To be written as output fields, you need to modify your OPTIONS.nam

- if TMEAN_ISBA and TGRAD_ISBA are written with surface humidity QS_ISBA, fields are written only if LSURF_VARS=TRUE (→ write_diag_seb_isban.F90). So, to be written, you need to indicate in OPTIONS.nam LSURF_VARS=TRUE (in NAM_DIAG_SURFn)

- And you need to add in the namelist &NAM_WRITE_DIAG_SURFn
```
     CSELECT(13) = 'TMEAN_ISBA'
     CSELECT(14) = 'TGRAD_ISBA'
```

- Plot the results