



Surfex SSC 02/04/15

Parallelisation PGD / PREP (MOSAYC)

What was done

- Optimization and then parallelisation of PGD and PREP with MPI + open-mp locally:
 - Use of the subroutine developed for the OFFINE run to distribute the grid points among the MPI tasks.
 - MPI commands for:
 - The reading of the physiographic files, the subgrid orography and the interpolation with the 3 nearest points in the PGD step.
 - The reading of the covers, the horizontal interpolation HORIBL, BILIN and ROTLATLON, the reading of the input file in the PREP step.

Test case A

CONF PROJ grid

- **A1** with 4000000 points, resolution 1km,
- **A2** with 1000000 points, resolution 2km
- centered on France,
- Options: ISBA-2L, CPHOTO=NON, CSNOW=D95, NHALO=2, SEAFLX, TEB, WATFLX, NHALO_PREP = 5.
- Physio: gtopo30, ecoclimap, FAO

We do :

- 1 PGD A2, 1 PREP A2 (GRIB GAUSS arpege in input => HORIBL interpol)
- then 1 PGD A1, et 1 PREP A1 (PGD A2 et PREP A2 in input, EXTERN CONF PROJ => BILIN interpol).

Results, test case A

Elapsed / RSS by MPI task	OLD	NEW	NEW MPI	NEW MPI + OPEN-MP
PGD A2 (6P, 4T)	4min57s / 24.5G	2min53s / 15.4G	1min26s / 2.9G	1min18s / 2.5G
PREP A2 (15P, 8T)	17min45s / 24.6G	12min18s / 25.1G	2min2s / 2.3G	1min8s / 2.4G
PREP A1 (15P, 8T)	Virtual memory too big	13min31s / 25.2G	2min37s / 2.3G	1min32s / 2.2G

Test case B

- LONLAT REG grid
 - B1 with 64800 points, resolution 1°, global
 - B2 with 259200 points, resolution 0.5°, global
 - Options: ISBA-DIF, 12 patches, CPHOTO=NIT, CSNOW=3-L à 12 couches, NHALO=70, NHALO_PREP=40.
 - Physio: gtopo30, ecoclimap, hwsd, topo_index, soc_sub, soc_top, perm_glo_10km

- We do:
 - 1 PGD B1, 1 PREP B1 (GRIB GAUSS arpege in input=> HORIBL interpol)
 - 1PGD B2, 1 PREP B2 (PGD B1 et PREP B1 in input, EXTERN LATLON, HORIBL interpol)

Results, test case B

Elapsed / RSS par tâche MPI	OLD	NEW	NEW MPI	NEW MPI + OPEN-MP
PGD B1 (15P,8T)	26min56s/5.6G	7min1s / 5.5g	51s / 0.6G	49s / 0.7G
PREP B1 (4P, 4T)	26s / 1.9g	8s / 2G	7s / 0.08G	8s / 0.3G
PGD B2 (15P, 8T)	38min / 21.9G	12min4s / 21.3G	1min58 / 2G	1min18 / 2G
PREP B2 (4P, 4T)	FA ext not possible	1min2s / 2.9G	36s / 1.1G	32s / 1.1G

Remains to be done

- To suppress the general open-mp from the run OFFLINE (isn't efficient and add great complexity)
- To adapt the tests base to test parallel PGD and PREP
- To test it
- To integrate in a SURFEX version later than V8