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EMEP model: Basic Exercises

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Model Setup:

Main dir: EMEP.Opensource

NEW FEATURE: 'config_emep.nml' -> contains switches and flags needed for the run and special case simulations.

Subdirectories: code, input, met
code contains model code
met directory contains meteorology data
input directory contains all other input data

modrun.sh: CPU request example on our supercomputer: HP BL460C Gen8,
(<http://www.notur.no/hardware/stallo/>)

```
#PBS -lnodes=1:ppn=8  
# wall time limit of run  
#PBS -lwalltime=00:30:00  
#PBS -lpmem=1000MB  
#PBS -A nn2890k
```

```
trendyear=2010      # emission year  
runlabel1=Base     # short label  
startdate="2010 01 01" # start date (metdata)  
enddate="2010 12 31" # end date (metdata)
```



Exercises.

- Exercise 1:

Base run. code, meteorology, input data.

- Run for the meteorological year 2010.
- Output is written into the home directory.
- Output files:

Base_fullrun.nc → Annual file in netCDF format

Base_month.nc → Monthly file in netCDF format

Base_day.nc → Daily file in netCDF format

Base_hour.nc → Hourly file in netCDF format

sites_2010.csv → Sites data in ascii

sondes_2010.csv → sondes data in ascii

RunLog.out - Log file with run settings info + massbalance check info at the end

Timing.out - CPU Time details.



Exercises continued.

Exercise 2:

Choosing a particular domain:

- `config_emep.nml: RUNDOMAIN`
- Same set of output files

Exercise 3:

Choosing time period

- `modrun.sh: Choose with 'startdate and enddate'`



Exercises Continued

Exercise 4:

Writing out 4D concentrations:

My_Derived_ml.f90

Parameter: "D3»

egs., to write out Daily CO concentration to all model level ->

```
typ_s5i("CO      ", "ppb", D3,"AIR_CONCS", SPEC, D)
```



Exercises Continued.

Exercise 5:

Add more species to all vertical levels in the hourly netCDF output file.

My_Outputs_ml.f90:

nhourly_out, nlevels_hourly, FREQ_HOURLY

egs., code to write out hourly concentration of NO₂ to all levels :

```
hr_out = (/ &  
    ,Asc2D("no2_3dppb" , "Out3D", NO2 &  
    ,ix1,ix2,iy1,iy2,nlevels_hourly,"ppbv",PPBINV  
    600.0*1.91) /)
```




Exercises Continued.

Exercise 6:

How to select species in the sites.csv

`My_Outputs_ml.f90`:

- `NSITES_MAX = 99` & ! Max. no surface sites allowed
- `FREQ_SITE = 1` & ! Interval (hrs) between outputs
- `NADV_SITE = NSPEC_ADV` & ! No. advected species (1 up to `NSPEC_ADV`)
- `NSHL_SITE = NSPEC_SHL` & ! No. short-lived species
- `NXTRA_SITE_MISC = 2` & ! No. Misc. met. params



Exercises Continued.

– and Sondes

- **My_Outputs_ml.f90:**

```
NSONDES_MAX = 99      & ! Max. no sondes allowed
NLEVELS_SONDE = 20   & ! No. k-levels (9 => 0--2500 m)
FREQ_SONDE = 1       & ! Interval (hrs) between outputs
NADV_SONDE = 2       & ! No. advected species
NSHL_SONDE = 3       & ! No. short-lived species
NXTRA_SONDE = 4      ! No. Misc. met. params
```

```
integer, public, parameter, dimension(NADV_SONDE) :: &
SONDE_ADV = (/ IXADV_O3, IXADV_NO2/)
```

```
integer, public, parameter, dimension(NSHL_SONDE) :: &
SONDE_SHL = (/ IXSHL_OH, IXSHL_OD, IXSHL_OP /)
```

```
character(len=10), public, parameter,
dimension(NXTRA_SONDE) :: &
```

```
SONDE_XTRA= (/ "NOy  ", "z_mid ", "p_mid ", "th   " /)
```




Exercises Continued.

Exercise 8:

Adding more sites to 'sites.csv' and
'sondes.csv' file

- Edit `sites.dat` and `sondes.dat` files in the
input directory

egs., `sites.dat` ->

name	lat	lon	lev
Ny_Alesund	78.93	11.88	20
Hyytiala	61.85	24.28	20



Exercises Continued.

Exercise 9: Nesting

Different MODES:

`config_emep.nml` →

`MODE = 0 (do nothing)`

1->write, 2->read, 3->read and write, 10->write at end of run, 11->read at start, 12->read at start and write at end

Using different Boundary conditions

`'ExtrenalBICs_ml.f90'` →

`USE_EXTERNAL_BIC = .true.,`

`EXTERNAL_BIC_NAME = "YourBC.nc"`

`Nest_ml.f90` →

`NHOURSAVE=3`



Exercises Continued.

Source Receptor Calculations:

- femis.dat ->

Name	7	sox	nox	co	voc	nh3	pm25	pmco
28	0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

- For reducing 20% emissions of SOX from France

Name	7	sox	nox	co	voc	nh3	pm25	pmco
8	0	1.0	.80	1.0	1.0	1.0	1.0	1.0



Notes

After each run, Output will be written out to the \$HOME Directory.

If you do not want your files to be overwritten, edit 'runlabel1' in modrun.sh file

You can compare a 'Base run' with the data on EMEP Opensource Web site.

If something goes wrong, contact me, I'll forward the tricky questions to Peter or David ;)