*Regional Cooperation for*
*Limited Area Modelling in Central Europe*

LACE
nwp central europe

# ALARO in MUSC

Martina Tudor

ZAMG DHMZ Czech Hydrometeorological Institute OMSZ IMGW METEO ROMANIA SHMÚ ARSO METEO Slovenia

# MUSC resources

Single column model version
Working week
https://hirlam.org/trac/wiki/Meetings/Physics/MUSCWW21

Resources that work on ecgate:
https://hirlam.org/trac/wiki/HarmonieSystemDocumentation/MUSC
HIRLAM MUSC (pre)cy46h1 (works also on ecgate)
https://hirlam.org/trac/wiki/HarmonieSystemDocumentation/MUSC_CY46

Works on a PC/laptop if done with access to the lustre system in MF:
Environment for MUSC Simulations https://github.com/romainroehrig/EMS
Preparing Atlas for SCM simulations
https://github.com/romainroehrig/SCM-atlas

# MUSC

- It was built to run it on a PC/laptop
- quickly test an idea in 1D on a test case and plot and compare

But one has to be able to compile the model on that laptop!

Starting from HARMONIE repository on ecgate:
Starting from HARMONIE container on a laptop:
Starting from CY46t1_op1 with MUSC modifs on belenos:
- **modifying the namelist to use ALARO physics works**

It also works on the laptop of Eric!
But only for the one case where all the required input fields are present! ALARO is running with ISBA that requires some input surface fields that are not required for the packages using SURFEX.

# MUSC testbed and working week

The goal was to establish a common MUSC system that would allow to run all three CSCs using the same executable and the same input files.
 - ALARO needs additional input for most examples (it can be added manually and should have no impact on AROME type results)

Tools available:
 - porting on a laptop (but ...)
 - to create input from 3D model runs
 - running
 - plot and compare experiments

# MUSC testbed and working week

### Experiments and results reported

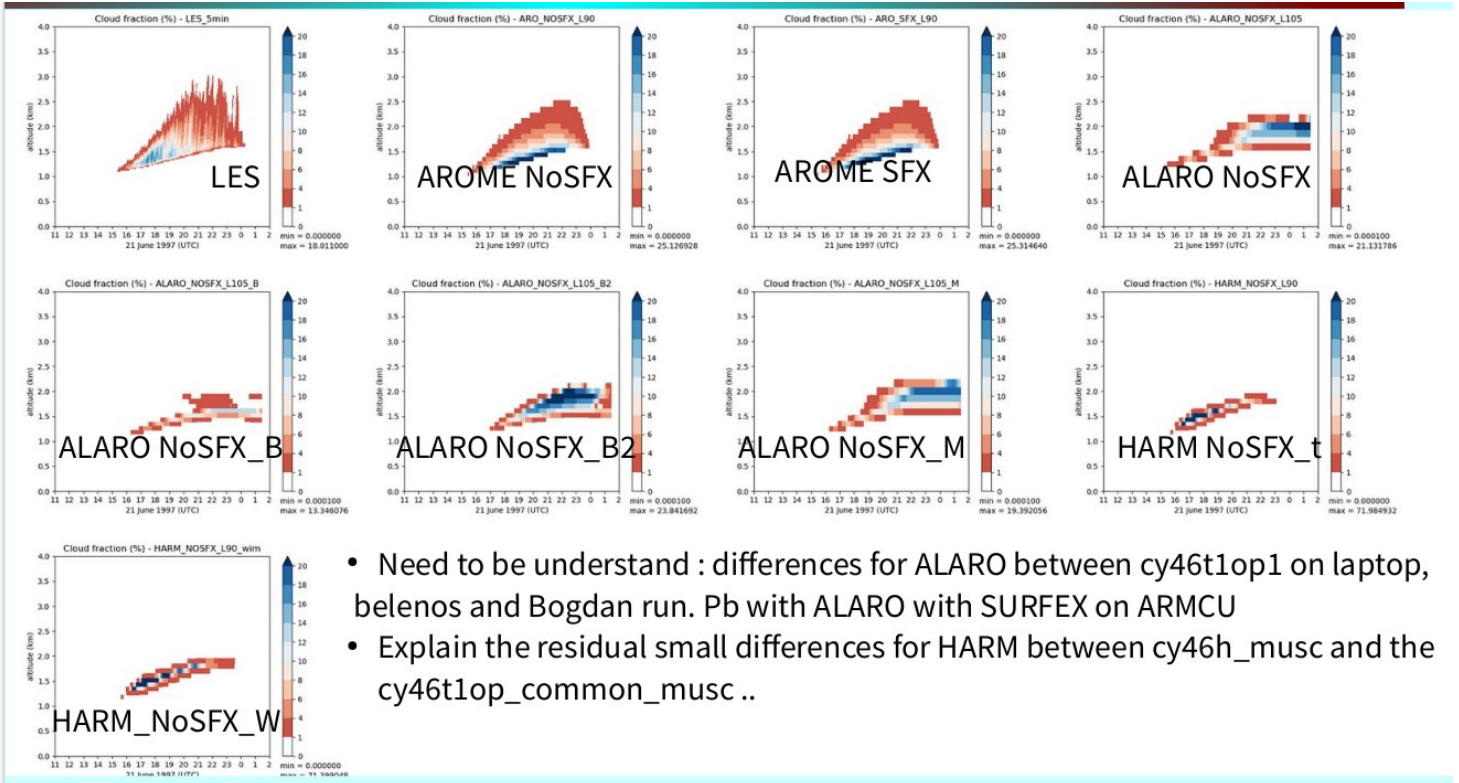
#### Code description

| Name | Description |
|---|---|
| 46h1 | Harmonie code as maintained in pre-CY46h1 branch `git@github.com:Hirlam/Harmonie.git -b pre-CY46h1` |
| 46h1++ | 46h1 with "++" changes provided by Eric available in `git@github.com:ewhelan/Harmonie.git -b bugfix/get_MF_MUSC_running` |
| 46t1 | The T code, a.k.a. the export version, CY46T1_bf.06 |
| 46t1op1_musc | MF operational code with code modifications for MUSC see below for the local.tgz (Eric) |

Please add missing, edit, correct the table items, links welcome for additional info

| Experiment | Set up by | Setup in framework | Resulting | Notes | Link to namelist | Link to input |
|---|---|---|---|---|---|---|
| ARMCU | Eric | 46t1op1_musc laptop/belenos ⇨local.tgz | lfa and ATLAS output | AROME L90 50s ARPEGE input file can also be used | ⇨nam_scum_46t1_AROME_NOSFX | ⇨initfile_L90_AROME_sea ⇨initfile_L90_AROME_land |
| ARMCU | Eric | 46t1op1_musc laptop/belenos ⇨local.tgz | lfa and ATLAS output | ARPEGE L105 240s/ ALARO L105 180s same imput file for ARPEGE and ALARO, AROME input file can also be used and vice-versa | ⇨nam_scum_46t1_ALARO ⇨namarp_46t1op1_ARPEGE_NOSFX | ⇨initfile_L105_ARPEGE |
| ARMCU | Wim | 46h1 Linux fedora34 workstation | Output fa, lfa | Runs with Eoin's/Emily's setup and namelist atm with Harmonie physics settings | ⇨namelist_atm, ⇨namelist_sfx | ⇨MUSCIN_ARMCU_atm.fa, ⇨MUSCIN_ARMCU_pgd.fa, ⇨MUSCIN_ARMCU_sfx.fa |
| ARMCU | Eoin | 46h1 using 46t1 code | | | | |
| ARMCU | Yann | 46t1 xxx | ATLAS output | ecRad experiments | ⇨namarp with ecRad | |
| ARMCU | Teresa | 46h1 (pre-CY46h1 from hirlam git) nebula | Output fa, lfa | without Eric's surface changes | ⇨naml_arut_e001_sl2, ⇨namelist_atm_ref | ⇨MUSCIN_ARMCUL79_atm.fa, ⇨MUSCIN_ARMCUL79_sfx.fa, ⇨MUSCIN_ARMCUL79_pgd.fa |
| ARMCU | Bogdan | | Output fa, lfa | | | |
| ARMCU | Martina | 46t1op1 belenos | Output fa, lfa | AROME&ALARO | ⇨nam_ALARO_NOSFX ⇨nam_AROME_NOSFX.wrks | ⇨init_file |
| ARMCU | Daniel | 46h1/dmartin ecgb, cirrus(AEMET) | Output fa, lfa | | ⇨namelist_atm_ARMCUcirrus | Same as Wim's |
| REF for test | Emily | 46h1 ecgb | Output fa, lfa | | | |
| REF for test | Martina | 46h1 ecgb | Output fa, lfa | ALARO setup | | |
| REF for test | Martina | 46h1 container on a pc | Output fa, lfa | several | | |
| REF for test | Laura,Emily | 46h1/dmartin ecgb, debian11 | Output fa, lfa | for aerosol | | |
| REF for test | Piotr | 46h1 xxx, (ubuntu18 container) | Output fa, lfa | | | |
| REF for test | Ana | 46h1 ecgb,(ubuntu18) | Output fa, lfa | | | |
| REF for test | Guðrún Nína | 46h1 ecgb | Output fa, lfa | Harmonie-AROME setup | | |

# MUSC testbed and working week




- Need to be understand : differences for ALARO between cy46t1op1 on laptop, belenos and Bogdan run. Pb with ALARO with SURFEX on ARMCU
- Explain the residual small differences for HARM between cy46h_musc and the cy46t1op_common_musc ..

# MUSC without SURFEX

MUSC should give us insight on physics params without impact of dynamics, surface etc.
Surface fluxes should be prescribed to be the same for all three physics packages.
Therefore – Ana went to Toulouse to work on **validation without SURFEX for AROME and useful for MUSC**
Principle: use and put the old ISBA routines ACSOL , ACVEG ACDROV in one routine with all the surface characteristics such as sand, clay, soil depth etc … will be given by the namelist and not read in the initial file.
1- list of all the input and output  for  the 3 routines
2- which input are coming from the initial file : veg, lai etc …
3- modify the setup with a new logical LSPSURF (simple surface) to read in the namelist the surface and vegetation characteristics instead in the initial file.
4 – test in MUSC and in ARPEGE or ALADIN/ALARO ?
5 – add this new routine in apl_arome in case we have LMSE=F (no surfex) validation for AROME

# Issues Harmonie container

Works on a laptop
Plotting, comparing
Built using an ‘h’ cycle

# Issues EMS – missing libraries

It works only with access to MF lustre system

```
gfortran: error:
/cnrm/amacs/USERS/roehrig/share/EMS/pack/arp603_export.01.GFO
RTRAN610.cx/lib/libxrd.local.a: No such file or directory
gfortran: error:
/cnrm/amacs/USERS/roehrig/share/EMS/pack/arp603_export.01.GFO
RTRAN610.cx/lib/libxla.local.a: No such file or directory
gfortran: error:
/home/common/sync/gfortran/auxlibs-gcc-9.2.0/lib/libgribex.a: No
such file or directory
gfortran: error:
/home/common/sync/gfortran/auxlibs-gcc-9.2.0/lib/libmpidummy.a:
No such file or directory
```

# Issues EMS

```
tudor@tudor-Lenovo-V510-15IKB:~/Tools/EMS/v2.3/apptools$
./MUSC.py
Traceback (most recent call last):
  File "./MUSC.py", line 18, in <module>
    import ems
ModuleNotFoundError: No module named 'ems'
```

# Issues Atlas1D

```
Traceback (most recent call last):
  File "./run_atlas1d.py", line 20, in <module>
    import atlas1d
ModuleNotFoundError: No module named 'atlas1d'
```

# Solution

We need a ‘t’ cycle practical and PC/laptop portable version of the tool for a wider community (outside MF)

Build a Meteo France version based container for laptop/PC use
 - including EMS and Atlas1D

Any other ideas?