

# The CY43 MUSC environment

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# The CY43 MUSC environment

1 System Dummy + 1 Physics Expert  
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# Aim

Provide an easy-to-use single column modelling environment with a selection of idealized test cases

# Outline

- Background
- MUSC environment
- Plans

# Background



# Background

- Single column models represent a single model grid-point
- Allows all physical processes to be run in a vertical column
- Physical processes driven by large-scale forcings

# Background

- MUSC: Modèle Unifié, Simple Colonne
- Pros:
  - Quick(er) to compile and quick to run
  - Useful for evaluating developments
  - Easy to add additional variable to output files
  - Useful for testing changes to physical processes
- Cons:
  - Difficult to specify large-scale forcing
  - 3D effects not represented



# Background (HIRLAM)

- 2011 Workshop hosted by FMI
  - KNMI CY33T1 Testbed (namelists)
  - MUSC user guide (diagnostic list)
  - MUSC presentation (output & tools)
  - cy38 with selection of idealized tests
  - <https://hirlam.org/trac/wiki/MUSC> <http://netfam.fmi.fi/muscwd11/>
- HIRLAM developments
  - Run script + hard-coded namelists
  - Idealized test cases not maintained
  - KNMI still using “old infrastructure”





# MUSC environment

... what we have “achieved” so far

# MUSC: setup & compile

## NAME

`musc_setup.sh` - Set up a new MUSC experiment

## USAGE

`musc_setup.sh -r <harmonie-release> -c <configuration> [ -C ] [ -h ]`

## DESCRIPTION

Script to set up a new MUSC experiment.

## OPTIONS

-r harmonie-release

PATH to your Harmonie code directory

-c system-config

System configuration file. `config-sh/config.<system-config>` file must exist.

-C List available system-configurations.

-h Help! Print usage information

# MUSC: convert (Extract/FA/ASCII)

## NAME

musc\_convert.sh - Convert MUSC input data (ascii2fa, fa2ascii, extr3d)

## USAGE

```
musc_convert.sh -d <data-dir> -c <conv-type> -n <musc-name-id> [ -l  
<lat,lon> ] [ -t <time_hour> ]
```

## DESCRIPTION

Script for generating input for MUSC. For now, this script must be executed from the experiment directory. This script uses `gl_grib_api` to convert the data.

## OPTIONS

`-d musc-data-dir`

Specify PATH to MUSC data directory

`-c conv-type`

**extr3d** = extract MUSC input (FA format) from 3D HARMONIE files (An atmospheric file, a surface file and a physiography file are required as input).

**fa2ascii** = convert 1D MUSC FA input to ascii files to allow for editing (MUSC atm, sfx, pgd files needed as input)

**ascii2fa** = convert edited or unedited ascii files back to FA format

# MUSC: run!

## NAME

`musc_run.sh` - Run MUSC

## USAGE

`musc_run.sh -d <musc-data-dir> -t <test-name> -n <musc-name-id> [ -m ] [ -h ]`

## DESCRIPTION

MUSC experiments are contained within the MUSC test folder in `util/musc/test/<test-name>`. MUSC builds are contained in `build/<build-name>`.

## OPTIONS

`-d` `musc-data-dir`

Specify PATH to MUSC data directory (downloaded created from <https://hirlam.org/trac/raw-attachment/wiki/HarmonieSystemDocumentation/MUSC/muscCY43InputData.tar.gz>)

`-t` `test-name`

Test name. Directory `util/musc/test/<experiment-name>` must exist, contain input files and contain namelist files.

`-n` `musc-name-id`

MUSC experiment id string.



# MUSC: run!

- What's available now:
  - **MUSC\_REF**: The reference test. Run from column extracted from 3D files. LS forcings poorly defined. "Only useful for single-timestep diagnostics." 😊
  - **GABLS3**: Not working. Based on test provided for CY38 by Eric Bazile. Crashes on first timestep. 😞
  - **ARMCU**: Technically working. Need to look at output more closely. 😊

# MUSC: tools & plotting

- ddh toolbox (and lfa tools)
  - lfaminm: list LFA articles including min/max/mean/rms of the data
  - lfac: extract LFA article to STDOUT
- Many more DDH/LFA tools available but these two will do for now!
- <http://www.umn-cnrm.fr/gmapdoc/spip.php?article19>



# MUSC: tools & plotting

## NAME

`musc_plot1Dts.sh` - Plot MUSC lfa output

## USAGE

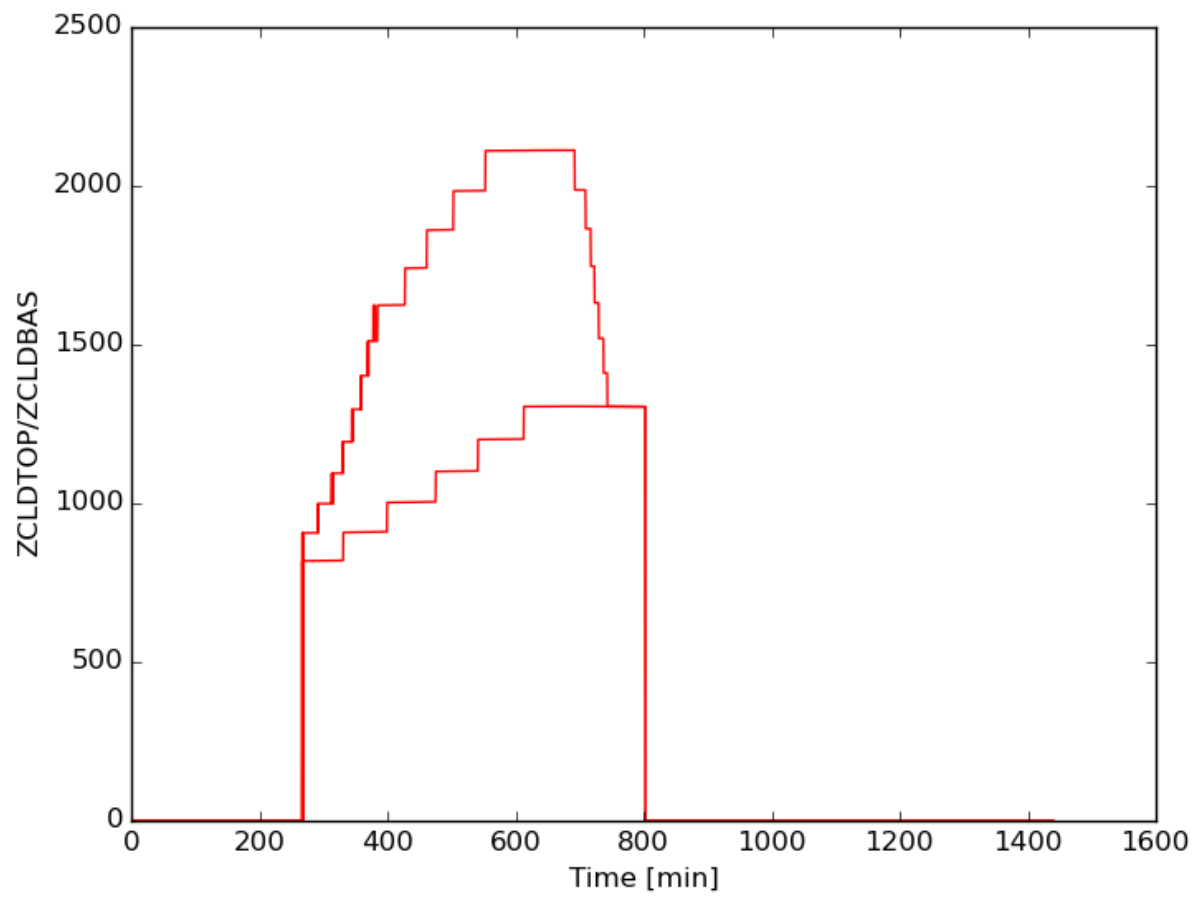
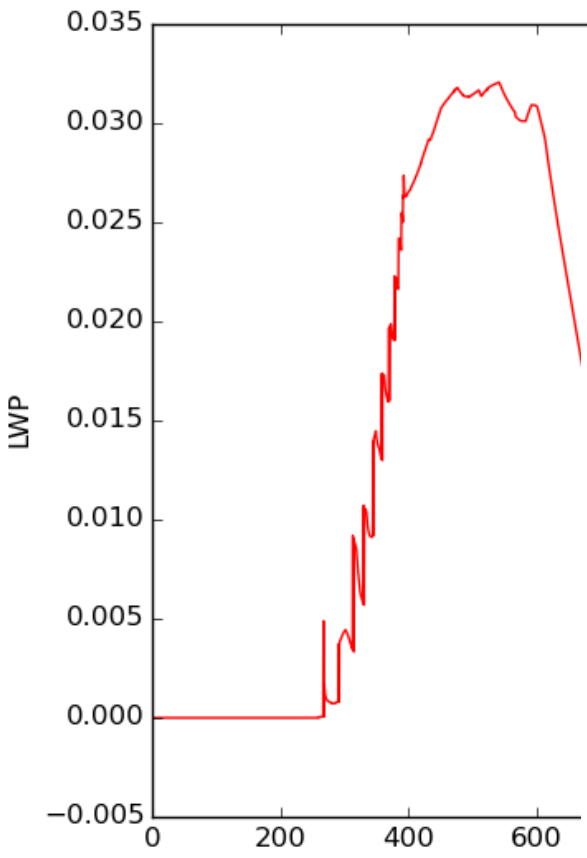
`musc_plot1Dts.sh -d <musc-data-dir> [ -h ]`

## DESCRIPTION

Script to produce MUSC time-series plots. Input: MUSC lfa data. Requires DDHTOOLBOX and Python.

## OPTIONS

- d musc-data-dir  
Specify PATH to MUSC OUTPUT data directory
- n lfa-name  
LFA parameter name (as listed by `lfaminm`)
- L  
List available (LFA) parameters
- h Help! Print usage information.



-L  
List available (LFA)  
-h Help! Print usage i



# Plans



# MUSC Plans: In the pipeline

- Improved diagnostics/plotting
- Script convergence (based on user feedback)
- Larger user base (I hope)
- Improved (wiki) documentation

# MUSC Plans: On our wish list

- A comprehensive set of idealized tests

# Aim

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