

## diag\_run – wrapper script for NorESM diagnostics

20.04.2018

### AUTHOR

Johan Liakka, NERSC (johan.liakka@nersc.no).

### LOCATION

At the moment `diag_run` is only available on NIRD:

`/projects/NS2345K/noresm_diagnostics/bin/diag_run`

### SYNTAX

```
diag_run [-m model] [-c case_name] [-s start_yr] [-e end_yr] [-i input_dir] [-c2 case_name2] [-s2 start_yr2] [-e2 end_yr2] [-i2 input_dir2] [-o output_dir] [-w web_dir] [-t type] [-p] [--no-atm]
```

### DESCRIPTION

`diag_run` is a wrapper script, which is used to run the diagnostics for each NorESM component (cam, clm, cice, micom, and hamocc). The diagnostic packages can be used to plot model results with respect to either observations (so-called model-obs diagnostics), or to another simulation (model1-model2 diagnostics). The diagnostics for the atmosphere (cam), land (clm) and sea-ice (cice) are based on the NCAR packages, but has undergone some major improvements, particularly in the climatology and time-series computations. The ocean (micom) and its biogeochemistry (hamocc) have been developed in-house by the author.

`diag_run` has two modes: (i) an “active-mode”, for which `diag_run` runs the diagnostic scripts; and (ii) a “passive-mode”, for which `diag_run` only configures the scripts. In the passive-mode the diagnostic scripts have to be run manually by the user. By default, `diag_run` is always in the active-mode, but switches into passive-mode if at least one of these two criteria are fulfilled:

1. The user invokes the option `-p` (see below), or
2. The user does not give enough information needed to run the diagnostics (next subsection).

### Active-mode

If you want to use `diag_run` to run the full (climatology and time-series) diagnostics, the minimum requirement is to specify the options `model`, `case_name`, `start_yr` and `end_yr` (`-m`, `-c`, `-s` and `-e`), e.g.:

Example 1:

```
diag_run -m cam -c N1850_f19_tn14_191017 -s 21 -e 50
```

This command runs atmospheric model-obs diagnostics of the case `N1850_f19_tn14_191017` using a climatology between model years 21 and 50. It is assumed that the `N1850_f19_tn14_191017` history files are located in `/projects/NS2345K/noresm/cases`. The resulting plots and html will be stored in `/projects/NS2345K/www/noresm_diagnostics/N1850_f19_tn14_191017/CAM_DIAG`, which links to the following URL:

[http://ns2345k.web.sigma2.no/noresm\\_diagnostics/N1850\\_f19\\_tn14\\_191017/CAM\\_DIAG/yrs21to50-obs.html](http://ns2345k.web.sigma2.no/noresm_diagnostics/N1850_f19_tn14_191017/CAM_DIAG/yrs21to50-obs.html).

The climatology and time-series files in `/projects/NS2345K/noresm_diagnostics/out/$USER/CAM_DIAG` (where `$USER` is your NIRD username).

If you want to run model1-model2 diagnostics, you also need to specify `case_name2`, `start_yr2` and `end_yr2` (`-c2`, `-s2`, `-e2`) in addition to those in Example 1, i.e.:

Example 2:

```
diag_run -m cam -c N1850_f19_tn14_191017 -s 21 -e 50 -c2 B1850MICOM_f09_tn14_01
-s2 21 -e2 50
```

would be the same as in Example 1 above, except for comparing N1850\_f19\_tn14\_191017 to B1850MICOM\_f09\_tn14\_01 instead of observations.

In Example 1 and Example 2 the options `-s` and `-e` (as well as `-s2`, `-e2`) refer to the start and end years of the climatology. The time-series are calculated from all the history files in the case directory (*input\_dir*). This is always the case unless the user invokes the option `-t time_series`. If this option is invoked, *start\_yr* and *end\_yr* refer to the beginning and end of the time series instead of the climatology, hence:

Example 3:

```
diag_run -m micom -c N1850_f19_tn14_191017 -t time_series -s 1 -e 20
```

would produce micom time-series plots between years 1 and 20. Note that omitting *start\_yr* and *end\_yr* when the option `-t time_series` is invoked computes the time-series over the entire experiment (all history files in the case directory, *input\_dir*):

Example 4:

```
diag_run -m cam -c N1850_f19_tn14_191017 -t time_series
```

`diag_run` uses some template scripts for each of the model components. When `diag_run` is executed, these scripts are changed according to the user-specified settings and renamed with a time stamp. For example, if you run the micom diagnostics, the run script template (`micom_diag_template.sh`) will be renamed with a time-stamp as `micom_diag_YYMMDD_HHMMSS`.

`diag_run` also creates a config and output file with the same time stamp (`config_YYMMDD_HHMMSS` and `out_YYMMDD_HHMMSS`, respectively). The config file stores information about changes in the diagnostics scripts invoked by the user, and the output file contains the standard output and error (i.e. what is shown in your terminal during runtime).

When the diagnostics a component is finished the run scripts are copied to:

```
output_dir/$USER/model_diag/config/case_name/run_scripts
```

and the config and output files to:

```
output_dir/$USER/model_diag/config/case_name/logs
```

Hence, for Example 1 above, the run scripts are saved in:

```
/projects/NS2345K/noresm_diagnostics/out/
```

```
$USER/CAM_DIAG/config/N1850_f19_tn14_191017/run_scripts
```

and the config and out files in:

```
/projects/NS2345K/noresm_diagnostics/out/
```

```
$USER/CAM_DIAG/config/N1850_f19_tn14_191017/logs
```

### Passive-mode

Another important property of `diag_run` is that it will only run the diagnostics if sufficient information has been provided by the user; otherwise it switches into passive-mode. `diag_run` will then configure the diagnostics scripts as much as possible (based on the information provided by the user), and also add information to the config file about which variables are still required to be modified by the user in order to run the diagnostic script. This option is particularly useful if you want to do some development work on the diagnostics scripts, or if you want to change any variables in the diagnostics scripts that are not included as an option in `diag_run`. Hence, if you run the following command:

### Example 3:

```
diag_run -m clm
```

the following will appear on the screen:

```
[johiak@tos-spw08 ~]$ /projects/NS2345K/noesm_diagnostics/diag_run -m clm
-----
Program:
/projects/NS2345K/noesm_diagnostics/bin/diag_run
Version: 4.3
-----
-CHANGING DIAGNOSTICS DIRECTORY to
/projects/NS2345K/noesm_diagnostics/out/johiak/CLM_DIAG in lnd_template.csh
-CHANGING ROOT DIRECTORY FOR CODE AND DATA to
/projects/NS2345K/noesm_diagnostics/packages/CLM_DIAG in lnd_template.csh
-CHANGING INPUT DIR 1 to /projects/NS2345K/noesm/cases in lnd_template.csh
-CHANGING publish_html_root to /projects/NS2345K/www/noesm_diagnostics in
lnd_template.csh
-SETTING UP TIME-SERIES DIAGNOSTICS FOR ENTIRE EXPERIMENT
CLM DIAGNOSTICS SUCCESSFULLY CONFIGURED in
/projects/NS2345K/noesm_diagnostics/out/johiak/CLM_DIAG
-----
lnd_template.csh IS NOT RUNNING: NOT ALL REQUIRED VARIABLES HAVE BEEN CONFIGURED
(see /projects/NS2345K/noesm_diagnostics/out/johiak/CLM_DIAG/config.log).
-----
-----
TOTAL diag_run RUNTIME: 0m2s
-CLM diagnostics: 0m2s
-----
DONE: fr. 20. april 15:37:42 +0200 2018
```

The (semi-configured) run script has then been copied to  
/projects/NS2345K/noesm\_diagnostics/out/johiak/CLM\_DIAG/lnd\_template.csh,  
and all information about the configuration is contained in  
/projects/NS2345K/noesm\_diagnostics/out/johiak/CLM\_DIAG/config.log

### Options

diag\_run options (flags) typically come in both short (single-letter) and long forms. A complete description of all options is given below in alphabetical order of the short option letter. When invoked without options, diag\_run prints a table containing all options along with some examples (see also below).

**-c** *case\_name* (-c1, --case, --case1)

Name of the test case experiment that you want to run diagnostics for. This option is required if you want to use diag\_run in active-mode.

**-c2** *case\_name2* (--case2)

Name of the control case experiment. This option is required if you want to run model1-model2 diagnostics in active-mode.

**-e** *end\_year* (-e1, --end\_yr, --end\_yr1)

If `-type=time_series`, this option refers to the end year of time-series for `case_name`. Otherwise, it refers to the end year of climatology. This option is optional if `-type=time_series`, but required for active-mode diagnostics if `-type=climo` or if `type` is not invoked.

`-e2 end_year (--end_yr2)`

If `-type=time_series`, this option refers to the end year of time-series for `case_name2`. Otherwise, it refers to the end year of climatology. This option is optional if `-type=time_series`, but required for active-mode model1-model2 diagnostics if `-type=climo` or if `type` is not invoked.

`-i input_dir (-i1, --input-dir, --input-dir1)`

Name of the root directory of the monthly history files for `case_name`. For example, if your micom history files are located in `/this/is/a/directory/case1/ocn/hist`, this option should be set to `input_dir=/this/is/a/directory`. Default is `input_dir=/projects/NS2345K/noresm/cases`

`-i2 input_dir2 (--input-dir2)`

Name of the root directory of the monthly history files for `case_name2`. Also here, default is `input_dir2=/projects/NS2345K/noresm/cases`

`-m model (--model)`

Name of the model you want to run the diagnostics for. Valid options are `cam`, `clm`, `cice`, `micom`, `hamocc` and `all`. This is the only option that is required for both the active and passive mode. If you invoke the “all” option, the `cam`, `clm`, `cice`, `micom` and `hamocc` diagnostics will be run subsequently. It is also possible to combine different models as you wish within this option: for example, if you only want to run `cam` and `clm` diagnostics, you can simply add the names of those models and separate them with a comma (`-m cam,clm`).

`--no-atm`

This option, which takes no argument, skips the usage of CAM history files in the CLM diagnostics. This option is necessary for offline CLM simulations.

`-o output_dir (--output_dir)`

Root directory where you want to store the output from the diagnostics (i.e. the climatology and time-series files). For example, if you set `output_dir=/just/another/directory`, the climatology and time-series files from the micom diagnostics will be stored in `/just/another/directory/MICOM_DIAG/`. Default is `output_dir=/projects/NS2345K/noresm_diagnostics/out/$USER`, where `$USER` is your user name on NIRD.

`-p, --passive-mode`

This option, which takes no argument, forces `diag_run` into passive-mode. This means, even if you have given sufficient information to run in active-mode, the diagnostic scripts will not be executed.

`-s start_year (-s1,--start_yr,--start_yr1)`

If `--type=time_series`, this option refers to the start year of time-series for `case_name`. Otherwise, it refers to the start year of climatology. This option is optional if `--type=time_series`, but required for active-mode diagnostics if `--type=climo` or if `type` is not invoked.

`-s2 start_year2 (--start_yr2)`

If `--type=time_series`, this option refers to the start year of time-series for `case_name2`. Otherwise, it refers to the start year of climatology. This option is optional if `--type=time_series`, but required for active-mode model1-model2 diagnostics if `--type=climo` or if `type` is not invoked.

`-t type (--type)`

Specifies if you only run climatology or time-series diagnostics: valid options are `--type=climo` and `--type=time_series`. Default is to run both.

`-w webdir (--web-dir)`

Specifies the directory where the html should be stored. This directory should preferably be linked to a web server so that one can look at the results with a web browser. Default is `--web-dir=/projects/NS2345K/www/noesm_diagnostics/`.

## Examples

Model-obs diagnostics of case=N1850\_f19\_tn11\_exp1 (climatology between yrs 21 and 50) for all model components:

```
diag_run -m all -c N1850_f19_tn11_exp1 -s 21 -e 50
```

Model-obs diagnostics in CAM, publish the html in /path/to/my/html:

```
diag_run -m cam -c N1850_f19_tn11_exp1 -s 21 -e 50 -w /path/to/my/html
```

Model-obs time-series diagnostics in MICOM for all years the model output directory

(/projects/NS2345K/noesm/cases/N1850\_f19\_tn11\_exp1/ocn/hist/):

```
diag_run -m micom -c N1850_f19_tn11_exp1 -t time_series
```

Configure (but do not run) model-obs diagnostics for CICE:

```
diag_run -m cice -c N1850_f19_tn11_exp1 -s 21 -e 50 -p
```

Model1-model2 diagnostics for CLM with user-specified history file directories:

```
diag_run -m clm -c N1850_f19_tn11_exp1 -s 21 -e 50 -i /input/directory1 -c2  
N1850_f19_tn11_exp2 -s2 21 -e2 50 -i2 /input/directory2
```

Model-obs climatology diagnostics (no time series) for MICOM:

```
diag_run -m micom -c N1850_f19_tn11_exp1 -s 21 -e 50 -t climo
```

Install CAM diagnostics in /my/dir with minimal configuration:

```
diag_run -m cam -o /my/dir
```

Model-obs diagnostics for MICOM and HAMOCC:

```
diag_run -m micom,hamocc -c N18500C_f19_tn11_exp1 -s 21 -e 50
```

Model-obs time-series diagnostics for an offline (uncoupled) CLM simulation:

```
diag_run -m clm -c N1850_f19_tn11_clmexp1 -s 71 -e 100 --no-atm
```

Model-obs time-series diagnostics in HAMOCC between yrs 31 and 100:

```
diag_run -m hamocc -c N18500C_f19_tn11_exp1 -s 31 -e 100 -t time_series
```