pdfUser guide for NCLscripts 2.0

General

PALM produces NetCDF output files of

- 3d
- 2d
- profiles
- timeseries
- spectra

These data can be plotted with the program NCL (http://www.ncl.ucar.edu/). NCL is a language designed specifically for scientific data analysis and visualization.
Four NCL scripts and one configuration file exist for PALM users in ***trunk/SCRIPTS/NCL*** to get a quick overview of the output data:

- ***cross_sections.ncl*** (draws contour, isoline or vector plots (of a 2-dimensional vector) from 2D or 3D data; instantaneous or time-averaged xy, xz, yz or 3D data can be used)

- ***profiles.ncl*** (draws profile line plots from profile or 3D data)

- ***spectra.ncl*** (draws NCL spectra plots from spectra data)

- ***timeseries.ncl*** (draws line plots from timeseries data)

- ***.ncl.config.default*** (default configuration file)

The shell script ***palmplot*** is designed for running the NCL scripts and can be found in ***trunk/SCRIPTS***. The usage is as follows:

palmplot plot_identifier

plot_identifier has to be ***xy***, ***xz***, ***yz***, ***pr***, ***sp*** or ***ts*** in dependence of the data that is to be plotted:

plot_identifier	***data***	***used ncl script***
xy	instantaneous or time-averaged xy or 3D data	cross_sections.ncl
xz	instantaneous or time-averaged xz or 3D data	cross_sections.ncl
yz	instantaneous or time-averaged yz or 3D data	cross_sections.ncl
pr	profile or 3D data	profiles.ncl
sp	spectra data	spectra.ncl
ts	timeseries data	timeseries.ncl

Several parameters can be steered to change the output plots. They can be either written in the prompt or modified within the configuration file ***.ncl.config.default***.
It is recommended to create a personal configuration file by copying the default configuration file ***.ncl.config.default*** to the PALM working directory ***~/palm/current_version*** and naming it ***.ncl.config***. The configuration file contains all steering parameters with a short description and can be modified to personal needs.
For controlling the parameters within the prompt, they need to be written as follows:

palmplot plot_identifier parameter=value parameter=string

Changing of parameters in the configuration file will be ignored if parameters are specified in the prompt. Most parameters are allocated with a suitable default value but some need to be changed before running any script. They are marked with a REQUIRED otherwise with OPTIONAL.
In case of a job chain without extended output files, the scripts will automatically read all necessary files after indicating the first and the last cyclic number.

A short introduction for using the shell script is given by typing ***palmplot -?***.
In the following some examples are given for plotting data of the PALM default run example_cbl.

Change to the directory where the data is stored:
cd palm/current_version/JOBS/example_cbl/OUTPUT

Enter the following commands:

Plotting xy-cross section data:
palmplot xy file_1=example_cbl_xy.nc var=,pt_xy,

Plotting profile data:
palmplot pr file_1=example_cbl_pr.nc format_out=eps file_out=pr_data var=,pt,wpt,

Plotting timeseries data:
palmplot ts file_1=example_cbl_ts.nc format_out=pdf file_out=ts_data no_rows=6

The following lists give an overview of all existing parameters. Further descriptions can be found in the configuration file ***.ncl.config.default***.

Parameter list for cross_sections.ncl:

file_1	REQUIRED	string	input file; “/path/name(.nc)”
start_f	OPTIONAL	integer	first cyclic number
end_f	OPTIONAL	integer	last cyclic number
xyc, xzc, yzc	OPTIONAL	integer	[=0] or [=1]; XY- or XZ- or YZ section
format_out	OPTIONAL	string	“x11”, “pdf”, “ps”, “eps”, “epsi”, “ncgm”
file_out	OPTIONAL	string	output file; “path/name”
no_columns	OPTIONAL	integer	number of plots in one row
no_rows	OPTIONAL	integer	number of plots in one column
sort	OPTIONAL	string	“layer” or “time”
var	OPTIONAL	string	by default all variables otherwise: e.g.: “,u,v,” for output of u and v
start_time_step	OPTIONAL	double	first time step in [hour]
end_time_step	OPTIONAL	double	last time step in [hour]
xs	OPTIONAL	double	first value of x range in [meter]
xe	OPTIONAL	double	last value of x range in [meter]
ys	OPTIONAL	double	first value of y range in [meter]
ye	OPTIONAL	double	last value of y range in [meter]
zs	OPTIONAL	integer	first index of z-range
ze	OPTIONAL	integer	last index of z-range
mode	OPTIONAL	string	“Fill” for contour plot , “Line” for isolines, “Both” for both
fill_mode	OPTIONAL	string	type of filling the contour plot: “AreaFill”, “RasterFill” or “CellFill”
shape	OPTIONAL	integer	aspect ratio is kept [=1] or not [=0]
font_size	OPTIONAL	float	font size of strings
font_size_legend	OPTIONAL	float	font size of legend strings
legend_label_stride	OPTIONAL	integer	reduction of number of labels in legend
axes_explicit	OPTIONAL	integer	explicit setting of axes is switched on [=1]
major_ticks_x	OPTIONAL if axis_explicit = 1	integer	number of major tick marks at x-axis
major_ticks_y	OPTIONAL if axis_explicit = 1	integer	number of major tick marks at y-axis
norm_x, norm_y, norm_z	OPTIONAL if axis_explicit = 1	float	normalising of axes

unit_x, unit_y, unit_z	OPTIONAL if axis_explicit = 1	string	units of axes
vector	OPTIONAL	integer	output of a vector plot [=1] or not [=0]
vec1	REQUIRED if vector=1	string	first component of vector (e.g.: “,u,”)
vec2	REQUIRED if vector=1	string	second component of vector(e.g.: “,v,”)
plotvec	OPTIONAL	string	variable where the vectorplot can overlay if desired (e.g.: “,u,”)
ref_mag	OPTIONAL	float	length of the vector

Parameter list for profiles.ncl:

file_1	REQUIRED	string	1st input file; “/path/name(.nc)”
start_f_1	OPTIONAL	integer	first cyclic number of 1st input file
end_f_1	OPTIONAL	integer	last cyclic number of 1st input file
format_out	OPTIONAL	string	“x11”, “pdf”, “ps”, “eps”, “epsi”, “ncgm”
file_out	OPTIONAL	string	output file; “path/name”
no_columns	OPTIONAL	integer	number of plots in one row
no_rows	OPTIONAL	integer	number of plots in one column
var	OPTIONAL	string	by default all variables otherwise: e.g.: “,u,v,” for output of u and v
no_files	OPTIONAL	integer	up to 6 different input files with identical variables and dimensions can be used
file_2	REQUIRED if no_files>1	string	2nd input file; “/path/name(.nc)”
start_f_2	OPTIONAL if no_files>1	integer	first cyclic number of 2nd input file
end_f_2	OPTIONAL if no_files>1	integer	last cyclic number of 2nd input file
file_3	REQUIRED if no_files>2	string	3rd input file; “/path/name(.nc)”
...			
name_legend_1	OPTIONAL if no_files>1	string	legend item 1 can be labeled
name_legend_2	OPTIONAL if no_files>1	string	legend item 2 can be labeled
name_legend_3	OPTIONAL if no_files>2	string	legend item 3 can be labeled
...			
start_time_step	OPTIONAL	double	first time step in [hour]
end_time_step	OPTIONAL	double	last time step in [hour]
time_stride	OPTIONAL	integer	temporal stride for the plots
start_x	OPTIONAL	integer	start value of x-axis for horizontal averaging if 3D-data is used; in [gridpoint]
end_x	OPTIONAL	integer	end value of x-axis for horizontal averaging if 3D-data is used; in [gridpoint]
start_y	OPTIONAL	integer	start value of y-axis for horizontal averaging if 3D-data is used; in [gridpoint]
end_y	OPTIONAL	integer	end value of y-axis for horizontal averaging if

			3D-data is used; in [gridpoint]
xs	OPTIONAL	float	first value of x axis
xe	OPTIONAL	float	last value of x axis
min_z	OPTIONAL	double	first value of z-axis in [meter]
max_z	OPTIONAL	double	last value of z-axis in [meter]
log_z	OPTIONAL	integer	[=1] if logarithmic scale for z otherwise [=0]
norm_z	OPTIONAL	float	value for normalising the z-axis
over	OPTIONAL	integer	[=1] for predefined overlaying of special variables otherwise [=0]
combine	OPTIONAL	integer	[=1] for combining of 2 or 3 variables otherwise [=0]
number_comb	REQUIRED if combine=1	integer	[=2] or [=3]
c_var	REQUIRED if combine=1	string	variables for combining, e.g.: “,u,v,w,”
black	OPTIONAL	integer	[=1] for black or [=0] for coloured lines
dash	OPTIONAL	integer	[=1] for dashed or [=0] for continuous lines
font_size	OPTIONAL	float	font size of strings
font_size_legend	OPTIONAL	float	font size of legend strings

Parameter list for spectra.ncl:

file_1	REQUIRED	string	input file; “/path/name(.nc)”
start_f	OPTIONAL	integer	first cyclic number
end_f	OPTIONAL	integer	last cyclic number
format_out	OPTIONAL	string	“x11”, “pdf”, “ps”, “eps”, “epsi”, “ncgm”
file_out	OPTIONAL	string	output file; “path/name”
no_columns	OPTIONAL	integer	number of plots in one row
no_rows	OPTIONAL	integer	number of plots in one column
var	OPTIONAL	string	by default all variables otherwise: e.g.: “,u,v,” for output of u and v
height_level	OPTIONAL	array integer	indicating which height levels from the input file shall be output; e.g: (/1,2,7/) for level 1,2 and 7; by default all levels
sort	OPTIONAL	string	“height” for all heights in one plot or “time” for all time steps in one plot
start_time_step	OPTIONAL	double	first time step in [hour]
end_time_step	OPTIONAL	double	last time step in [hour]
black	OPTIONAL	integer	[=1] for black or [=0] for coloured lines
dash	OPTIONAL	integer	[=1] for dashed or [=0] for continuous lines
log_x	OPTIONAL	integer	[=1] if logarithmic scale for x otherwise [=0]
log_y	OPTIONAL	integer	[=1] if logarithmic scale for y otherwise [=0]
norm_x	OPTIONAL	float	value for normalising the x-axis
norm_height	OPTIONAL	integer	normalising x-axis with height is switched on [=1]
norm_y	OPTIONAL	float	value for normalising the y-axis
unit_x, unit_y	OPTIONAL if axis_explicit = 1	string	units of axis
font_size	OPTIONAL	float	font size of strings
font_size_legend	OPTIONAL	float	font size of legend strings

Parameter list for timeseries.ncl:

file_1	REQUIRED	string	input file; “/path/name(.nc)”
start_f	OPTIONAL	integer	first cyclic number
end_f	OPTIONAL	integer	last cyclic number
format_out	OPTIONAL	string	“x11”, “pdf”, “ps”, “eps”, “epsi”, “ncgm”
file_out	OPTIONAL	string	output file; “path/name”
no_columns	OPTIONAL	integer	number of plots in one row
no_rows	OPTIONAL	integer	number of plots in one column
var	OPTIONAL	string	by default all variables otherwise: e.g.: “,u,v,” for output of u and v (one comma before and after each variable!)
start_time_step	OPTIONAL	double	first time step in [hour]
end_time_step	OPTIONAL	double	last time step in [hour]
over	OPTIONAL	integer	[=1] for predefined overlaying of the following sets of variables: (E,Es), (us,ws), (umax,vmax,wmax), (z_i_pt,z_i_wpt), (wpt,wpptp,wpptp0), (pt_0_,pt_zp_0_) otherwise [=0]
font_size	OPTIONAL	float	font size of strings
norm_t	OPTIONAL	float	normalising t-axis
unit_t	OPTIONAL	string	unit of t-axis

Program crash

If one of the program aborts and there is no comment, check the configuration file - the scripts should not abort with the default values. Be sure to use the right data type (e.g.: integer = **2**; float = **2.0**; double = **2.0d**; string = **“name”**).