NAME

ccplot − CloudSat and CALIPSO data plotting tool

SYNOPSIS

ccplot [**−a** *ratio*][**−c** *cmapfile*][**−d** *dpi*][**−m** *band*][**−o** *outfile*]
[**−p** *projection*[:*projoptions*]][**−r** *radius*][**−v**][**−x** *extent*][**−y** *extent*]
[**−z** *options*] *type file ...*
ccplot −i *file*
ccplot −h
ccplot −V

DESCRIPTION

ccplot is a tool that produces 2D plots of data stored in CloudSat, CALIPSO and MODIS HDF files.

The plot *type* can be one of:

cloudsat-reflec	CloudSat Reflectivity Factor
calipso532	CALIPSO L1B Total Attenuated Backscatter 532nm
calipso532p	CALIPSO L1B Perpendicular Attenuated Backscatter 532nm
calipso1064	CALIPSO L1B Attenuated Backscatter 1064nm
calipso-cratio	CALIPSO L1B Attenuated Color Ratio 1064nm/532nm
calipso-dratio	CALIPSO L1B Depolarization Ratio
calipso532-layer	CALIPSO L2 Integrated Attenuated Backscatter 532nm
calipso1064-layer	CALIPSO L2 Integrated Attenuated Backscatter 1064nm
calipso-cratio-layer	CALIPSO L2 Integrated Attenuated Total Color Ratio 1064nm/532nm
calipso-dratio-layer	CALIPSO L2 Integrated Volume Depolarization Ratio
calipso-temperature-layer	CALIPSO L2 Midlayer Temperature
orbit	map projection of CALIPSO and CloudSat trajectory, and Aqua MODIS radiance or reflectance swath depending on files supplied
orbit-clipped	MODIS-region-clipped map projection of CALIPSO and CloudSat trajectory, and Aqua MODIS radiance or reflectance swath depending on files supplied

The options are as follows:

−a *ratio* Aspect ratio of profile and layer products in km horizontal per km vertical. Defaults to 14.0.

−c *cmapfile*
Path to a cmap file defining a colormap *boundaries*, colorbar *ticks* and *colors*. This can be a filename relative to any path defined by the CCPLOT_CMAP_PATH environment variable. Such paths take precendence over the current working directory, unless *cmapfile* is an absolute path or begins with *./* or *../*. See the example cmap files that are distrubuted with **ccplot** for information about the format.

−d *dpi* DPI of *outfile* if a raster image is to be output.

−m *band* MODIS band specifier in the form r# for reflective bands and x# for radiation bands, where # is the band number.

−o *outfile*
Output file. Format is determined by extension Supported formats are SVG (.svg), PNG (.png), PDF (.pdf), EPS (.eps) and PS (.ps). Defaults to ccplot.png.

-p *projection*[:*projoptions*]

projection specifies the mapping projection for orbit plots. Supported projection types are:

aeqd	Azimuthal Equidistant
poly	Polyconic
gnom	Gnomonic
moll	Mollweide
tmerc	Transverse Mercator
nplaea	North-Polar Lambert Azimuthal
gall	Gall Stereographic Cylindrical
mill	Miller Cylindrical
merc	Mercator
stere	Stereographic
npstere	North-Polar Stereographic
vandg	van der Grinten
laea	Lambert Azimuthal Equal Area
mbtfpq	McBryde-Thomas Flat-Polar Quartic
sinu	Sinusoidal
spstere	South-Polar Stereographic
lcc	Lambert Conformal
npaeqd	North-Polar Azimuthal Equidistant
eqdc	Equidistant Conic
cyl	Cylindrical Equidistant
aea	Albers Equal Area
spaeqd	South-Polar Azimuthal Equidistant
ortho	Orthographic
cass	Cassini-Soldner
splaea	South-Polar Lambert Azimuthal
robin	Robinson

projection can be followed by a comma-separated list of option-value pairs *projoptions*. Supported projection options are:

boundinglat	Bounding latitude for polar projections.
lat_0	Central latitude.
lat_1	First standard parallel.
lat_2	Second standard parallel.
lat_ts	Latitude of true scale.
lon_1	Longitude of one of the two points on the projection centerline for oblique mercator.
lon_2	Longitude of one of the two points on the projection centerline for oblique mercator.

Longitude and latitude have to be valid positive decimal numbers followed by E or W, or S or N literal (respectively) to indicate direction.

Use -p help to get a list of available projections.

-r *radius*

Interpolation radius in pixels. In profile products radius specifies vertical extent which a data point is mapped onto. If such vertical regions of two data points overlap value is determined by averaging with a weight coefficient of 1 over distance squared. The same holds for swath products, but here radius specifies a square. If radius is too low with respect to **dpi** data will be sparsely distributed on the image. Default is 3 for swath swath and a sensible value calculated

from resolution for profile products.

-v Enable verbose mode.

-V Print version information and exit.

-x *extent*

Horizontal region to be plotted. *extent* can be specified in a number of formats depending on the plot type.

For profile and layer products *extent* can either be specified by rays or by a time interval. In the first case it takes the form *from..to* where *from* and *to* are the first and the last ray (resp.) to be plotted. In the latter case, *extent* can be an absolute time interval in the form *hour:min[:sec]..hour:min[:sec]*. or a relative time interval in the form *+|-[hour:]min:sec..+|-[hour:]min:sec*.

For swath products *extent* can be specified by scanlines (along-track) and samples (across-track), or by geographical coordinates. In the first case *extent* takes the form *from..to,from..to* where the first term is the first and the last scanline to be plotted, and the second term is the first and the last sample to be plotted. In the latter case *extent* takes the form *lon(E|W)..lon(E|W),lat(S|N)..lat(S|N)* where *lon*, *lat* are numbers (in degrees) and E, W, S, N are literals, (A|B) means either A or B.

-y *extent*

Vertical extent of CloudSat and CALIPSO profiles in meters in the form *from..to*.

-z *options*

Miscellaneous options that modifiy plot formatting. *options* is a list of comma separeted key=value pairs with no spaces in between. Supported general options are:

cbfontsize color bar font size (defaults to 8)
cbspacing spacing between the axes and color bar (defaults to 0.4)
drawelev (default to 1)
draw surface elevation line (CALIPSO)
elevlw (defaults to 0.5)
surface elevation line width
elevcolor (defaults to #FF0000)
surface elevation line color
fontsize font size (defaults to 10)
padding padding around the axes and color bar in inches (defaults to 1)
plotheight plot height in inches (defaults to 6)
title figure title (set automatically by default)

Supported options for orbit plots are:

coastlinescolor coastlines color (defaults to #46396D)
coastlineslw coastlines line width (defaults to 0.4)
countriescolor countries outlines color (defaults to #46396D)
countrieslw countries outlines line width (defaults to 0.2)
drawcoastlines draw coastlines (defaults to 1)
drawcountries draw countries outlines (defaults to 1)
drawlakes draw lakes (defaults to 1)
drawlsmask draw land-sea mask (defaults to 1)
drawmeridians draw meridians (defaults to 1)

drawminormeridians	draw meridians (defaults to 1)
drawminorparallels	draw minor parallels (defaults to 1)
drawparallels	draw parallels (defaults to 1)
landcolor	land color (defaults to #E9E4F7)
majormeridianscolor	major meridians color (defaults to #000000)
majormeridianslw	major meridians line width (defaults to 0.3)
majorparallelscolor	major parallels line color (defaults to #000000)
majorparallelslw	major parallels line width (defaults to 0.3)
mapres	map resolution: c (crude), l (low), i (intermediate), h (high), f (full); (defaults to i)
minormeridianscolor	minor meridians color (defaults to #000000)
minormeridianslw	minor meridians line width (defaults to 0.1)
minorparallelscolor	minor parallels color (defaults to #000000)
minorparallelslw	minor parallels line width (defaults to 0.1)
trajcolors	list of trajectory colors (defaults to #FF0000:#0000FF:#00FF00)
trajlws	list of trajectory line widths (defaults to 0.5)
trajnminortics	number of minor ticks between adjecent major ticks or -1 for automatic selection (defaults to -1)
trajticks	base for trajectory major ticks in seconds or -1 for automatic selection (defaults to -1)
watercolor	water color (defaults to #FFFFFF)

Options that accept a list of values are specified in the form key=value1:value2[:value...].

Use -z help to get a list of available options.

ENVIRONMENT

CCPLOT_CMAP_PATH

This is a colon-separated list of search paths for colormap files.

FILES

/usr/share/ccplot/cmap/*

Example cmap files.

EXAMPLES

Plot the first 1000 rays of CloudSat reflectivity profile from 2006224184641_01550_CS_2B-GEOPROF_GRANULE_P_R03_E01.hdf using cloudsat-reflec.cmap colormap, and save it as cloudsat-reflec.png:

```
$ ccplot -x 0..1000 -c cloudsat-reflectivity.cmap
-o cloudsat-reflec.png cloudsat-reflec
2006224184641_01550_CS_2B-GEOPROF_GRANULE_P_R03_E01.hdf
```

Plot the first minute of CALIPSO backscatter profile from 0 to 20km using calipso-backscatter.cmap colormap, and save it as calipso532.png:

```
$ ccplot -y 0..20000 -x +0:00..+1:00 -c calipso-backscatter.cmap
-o calipso532.png calipso532
CAL_LID_L1-Prov-V2-01.2006-07-06T19-50-51ZN.hdf
```

Plot map projection of CALIPSO trajectory superimposed on Aqua MODIS band 31 radiance using modis-temperature.cmap colormap, and save it as orbit-calipso.png:

```
$ ccplot -m x31 -c modis-temperature.cmap -p tmerc
-o orbit-calipso.png orbit-clipped
MYD021KM.A2006224.1945.005.2007140113559.hdf
CAL_LID_L1-Prov-V2-01.2006-07-06T19-50-51ZN.hdf
```

SEE ALSO

CloudSat Standard Data Products Handbook, April 25th, 2008.

CALIPSO Data Products Catalog Release 2.4, December 2007.

MODIS Level 1B Product User's Guide, December 1, 2005.

AUTHORS

ccplot was written by Peter Kuma.

CAVEATS

Plot size is limited to 32767 pixels.