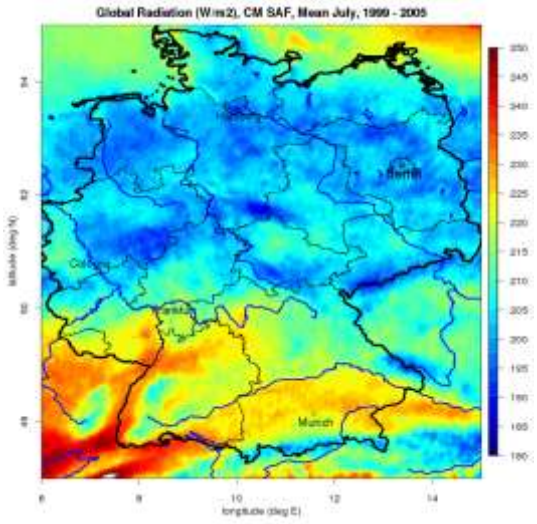
Software supported by CM SAF

Jörg Trentmann

Satellite Application Facility on

Climate Monitoring (CM SAF)

Deutscher Wetterdienst



Introduction

Are you a registered user of CM SAF?

Yes

No

Have you already ordered CM SAF data through the Web User Interface (WUI: www.cmsaf.eu/wui)?

Yes

No

Introduction

Which operating system are you using?

Windows

XP

7

2000

Vista

Linux/Unix

MAC OSX

Introduction

Did you visit the CM SAF Community Site?

Yes

No

Have you used the CM SAF Toolbox?

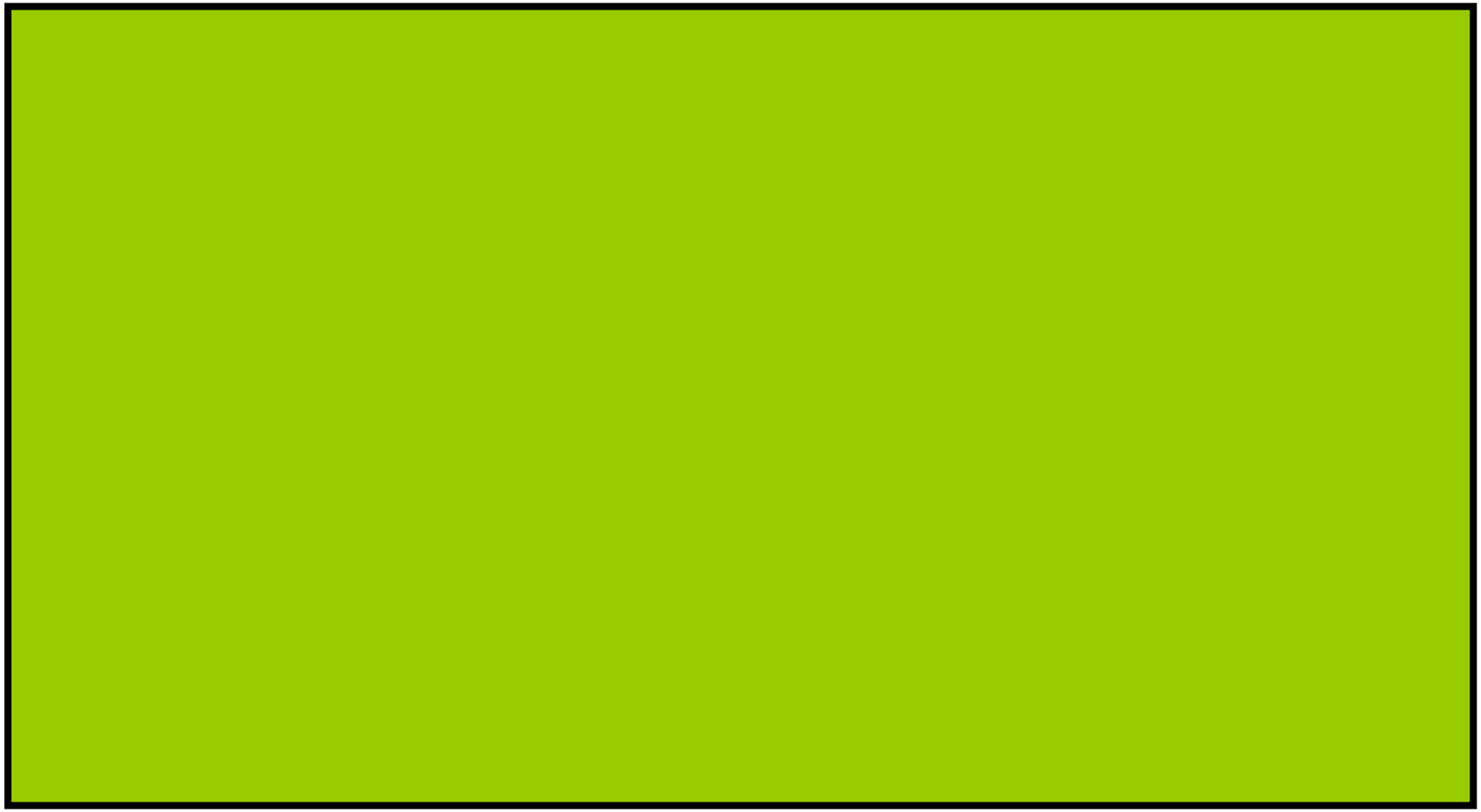
Yes

Very little

No

Introduction

Which software are you using when working with CM SAF data?



Ordering data

www.cmsaf.eu/wui

Data Formats

hdf

(http://www.hdfgroup.org/HDF5/)

+ supports additional data compression
+ commonly used in satellite data community
+ provides a standard

– not very common
– only limited software available to access the data
– complex to read data

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netcdf

(http://www.unidata.ucar.edu/software/netcdf

+ growing number of meteorological / climatological users
+ wider range of software available to access the data, incl. GIS
+ standard for climate data available

– no data compression, larger files

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It is recommended to order CM SAF data in netcdf-format via the Web User Interface (WUI)!

CM SAF data files

- All **CM SAF Data sets** are provided in netcdf-format, i.e, Meteosat, CLARA, ATOVS, HOAPS, CLAAS

  e.g., PREmm2008070100000001130034201GL.nc

- **Operational Products** from CM SAF can be ordered in netcdf-format for user specific regions and spatial resolutions :

  e.g., CFCmm20100701000320UD0023201UD.nc

- CM SAF data files provided through the Web User Interface always contain only one time step!

CM SAF data files

Example:

SISdm20040715000300070017901MA

….. contains

- the daily mean SIS product
- for 15 July 2004
- from version 300
- derived from Seviri/MSG1 data
- for the MSG full disk
- in 15x15km^2 sinusoidal projection

Software tools

The free, open-source climate data operators (*cdo*) and the statistical software tool *R* are the main tools supported to analyse CM SAF data. *Panoply* is a very useful viewer for netcdf-data files.

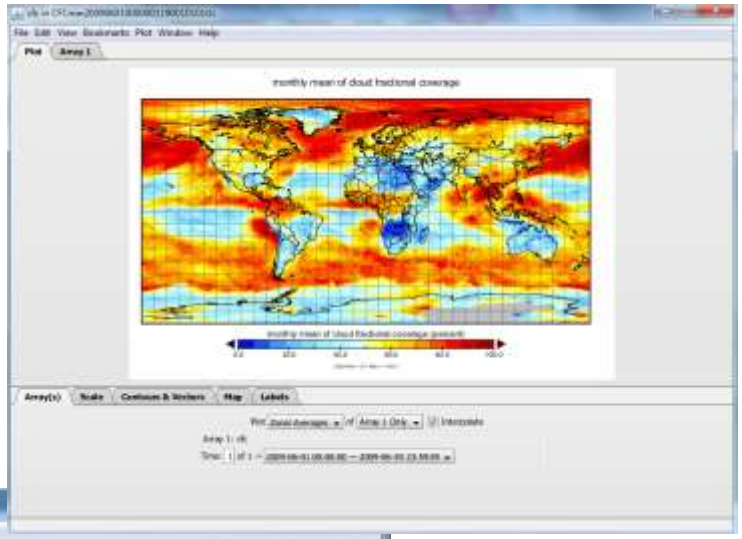
- ***Panoply:*** http://www.giss.nasa.gov/tools/panoply

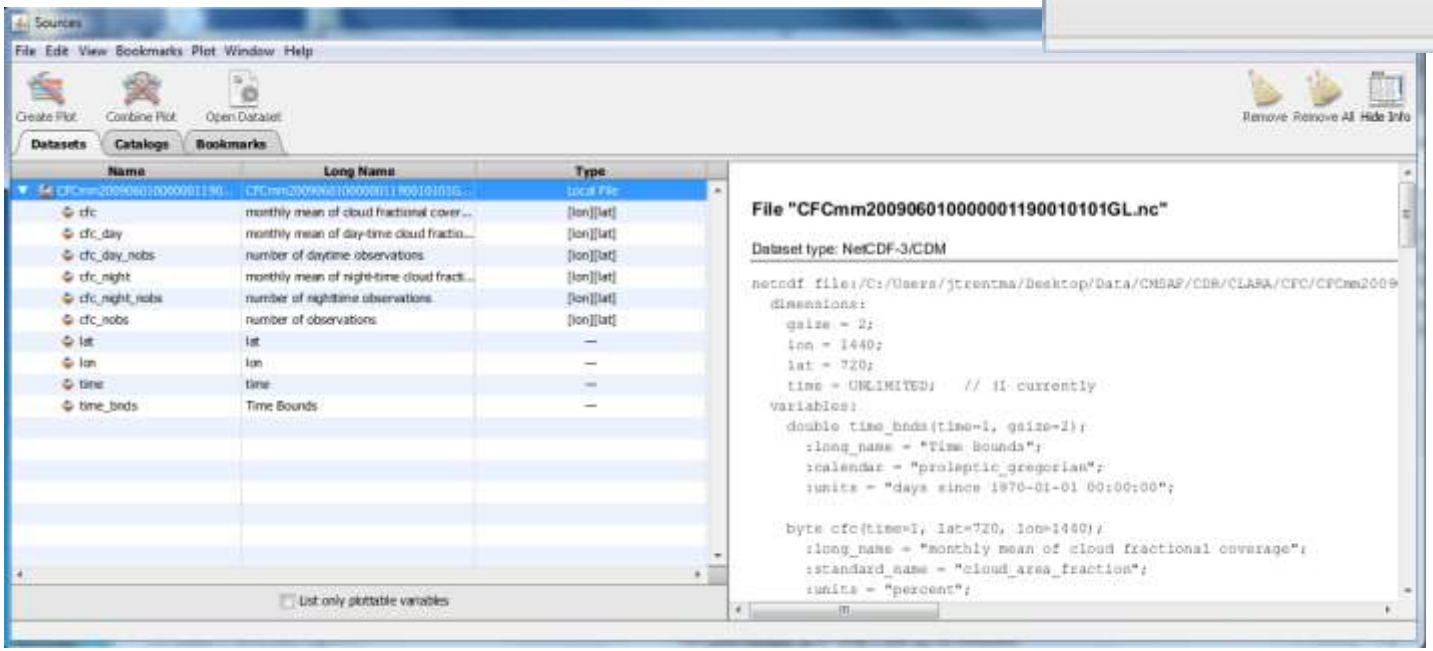
- ***cdo***: https://code.zmaw.de/projects/cdo

- ***R***: http://www.r-project.org

Panoply

- developed at NASA GISS: http://www.giss.nasa.gov/tools/panoply
- Based on Java, freely available
- Displays netcdf (hdf, grib) data





Climate Data Operators

- developed at Max Planck Institute for Meteorology, Hamburg
- freely available including extensive documentation: https://code.zmaw.de/projects/cdo
- works with multiple file formats, including grib, netcdf etc.
- collection of operators for processing climate (model) data e.g.
  - spatial interpolation
  - data selection
  - Subsampling
  - statistical and arithmetical functions
  - …
- is accessible from the 'command line' ('prompt')

tools: R

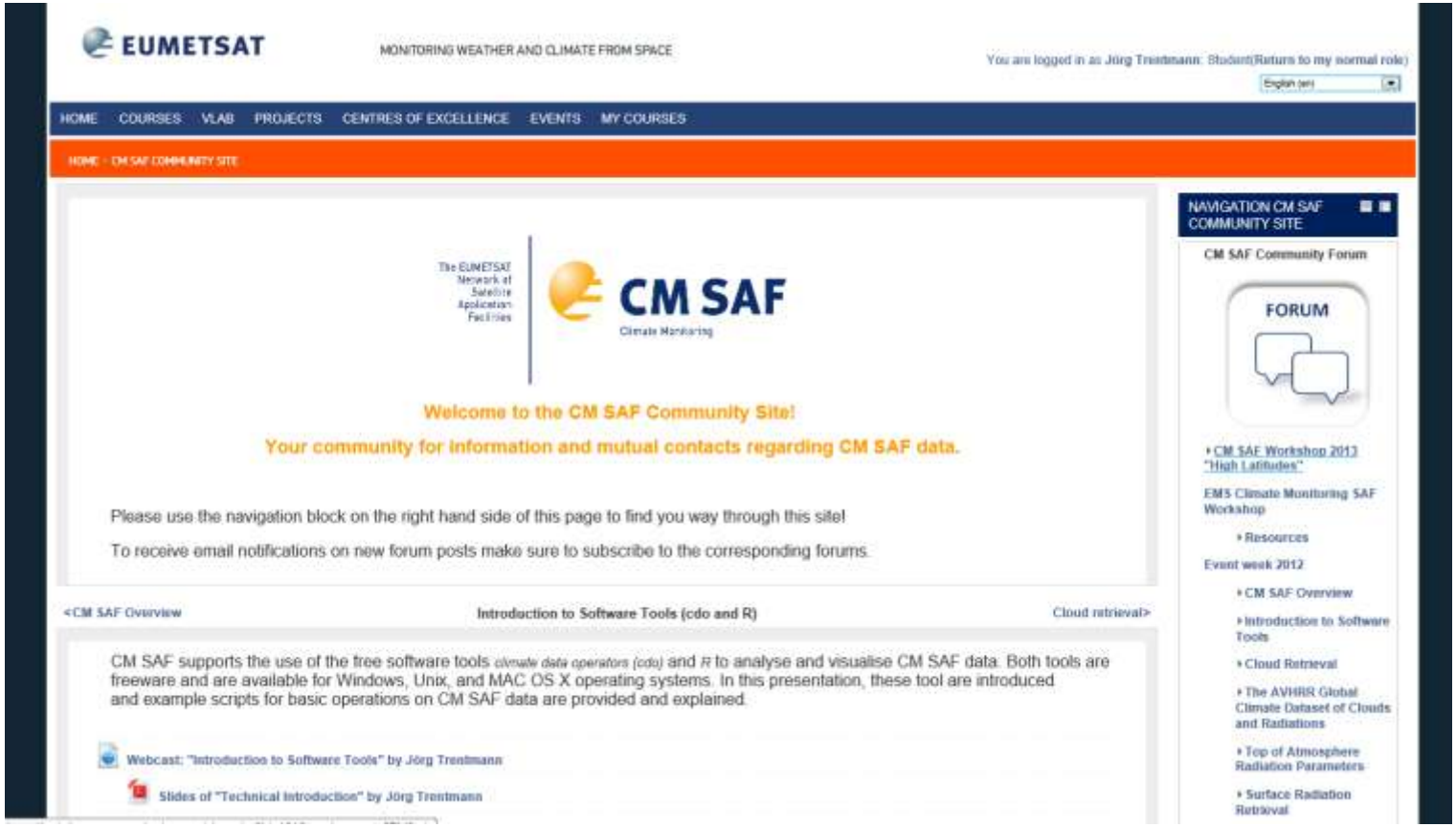
R

- programming language and software environment for statistical computing and graphics: http://www.r-project.org/
- includes an interface to netcdf
- has extensive statistical and graphical capabilities, mainly through additional packages
- supports the use of scripts
- extensive online-documentation available on the official webpage and on other webpages
- wide user community

tools: cdo + R

A collection of software scripts including example CM SAF data is provided on the CM SAF Community Page:

accessible via http://training.eumetsat.int

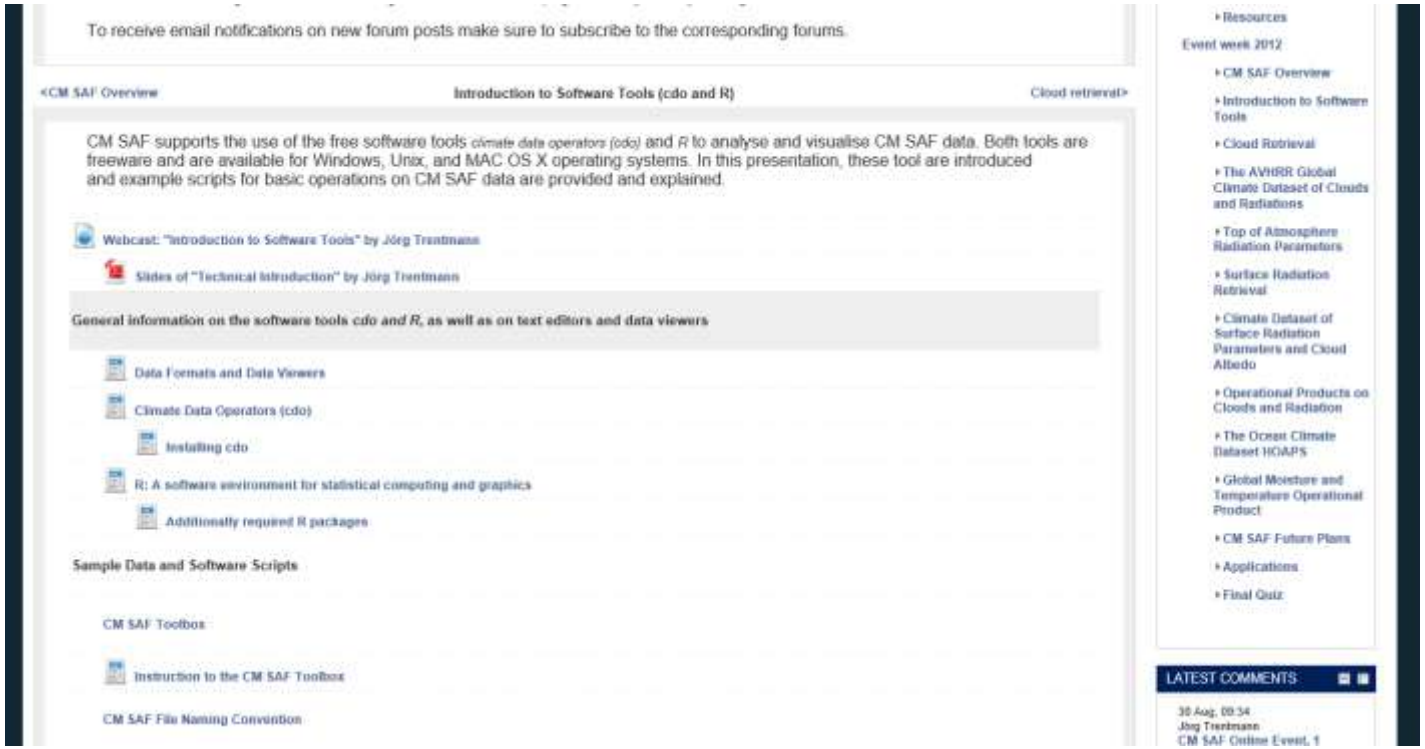


tools: cdo + R

- Scripts are based on Windows, rearranging them for Unix/Linux/Mac-operating systems should be straight forward.
- Before running these scripts, install *cdo* and *R* on your local computer system (see further instructions on the Course Page)!
- Suggestion: install *panoply* (visualize netcdf-files) and *Notepad*++ (text-editor).
- Have a look at the screencasts (provided on the Course page) that describe the use of the scripts!

tools: cdo + R

- Have a look at the screencasts (provided on the Community Site) that describe the use of the scripts!



Step-by-step

1. Order data in netcdf-format on a regular lon-lat grid from the CM SAF Web User Interface

www.cmsaf.eu/wui

Step-by-step

1. Order data in netcdf-format on a regular lon-lat grid from the CM SAF Web User Interface

Software scripts based on cdo:

1. Combine the individual time steps into one netcdf-file

2. Extract the time series for a single location
3. Calculate the temporal / spatial means
4. Calculate the multi-year monthly averages
5. Calculate the monthly anomalies

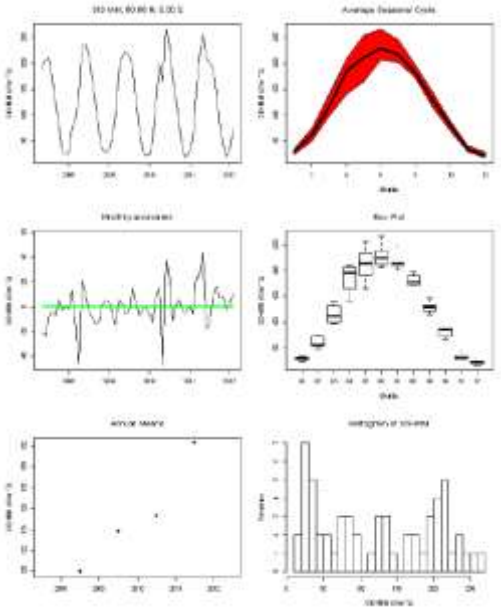
Visualize the data (netcdf)

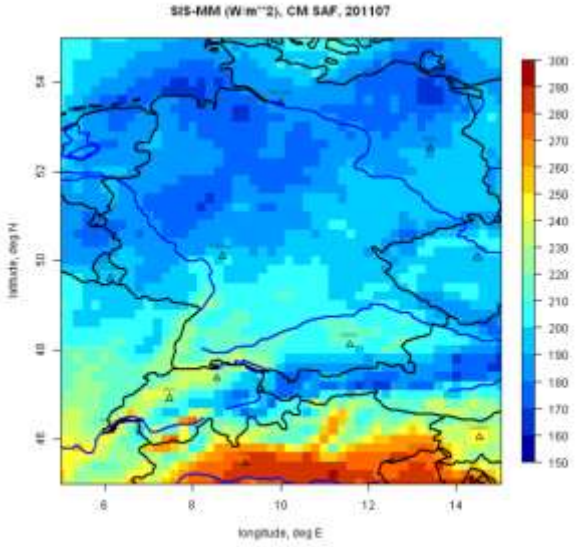
with panoply!

Step-by-step

Software scripts based on R:

1. Plot time series data
2. Analyse time series data,
   e.g., calculate average annual cycles, trends
3. Visualize the 2D Data,
   e.g., monthly means / temporal means / anomalies

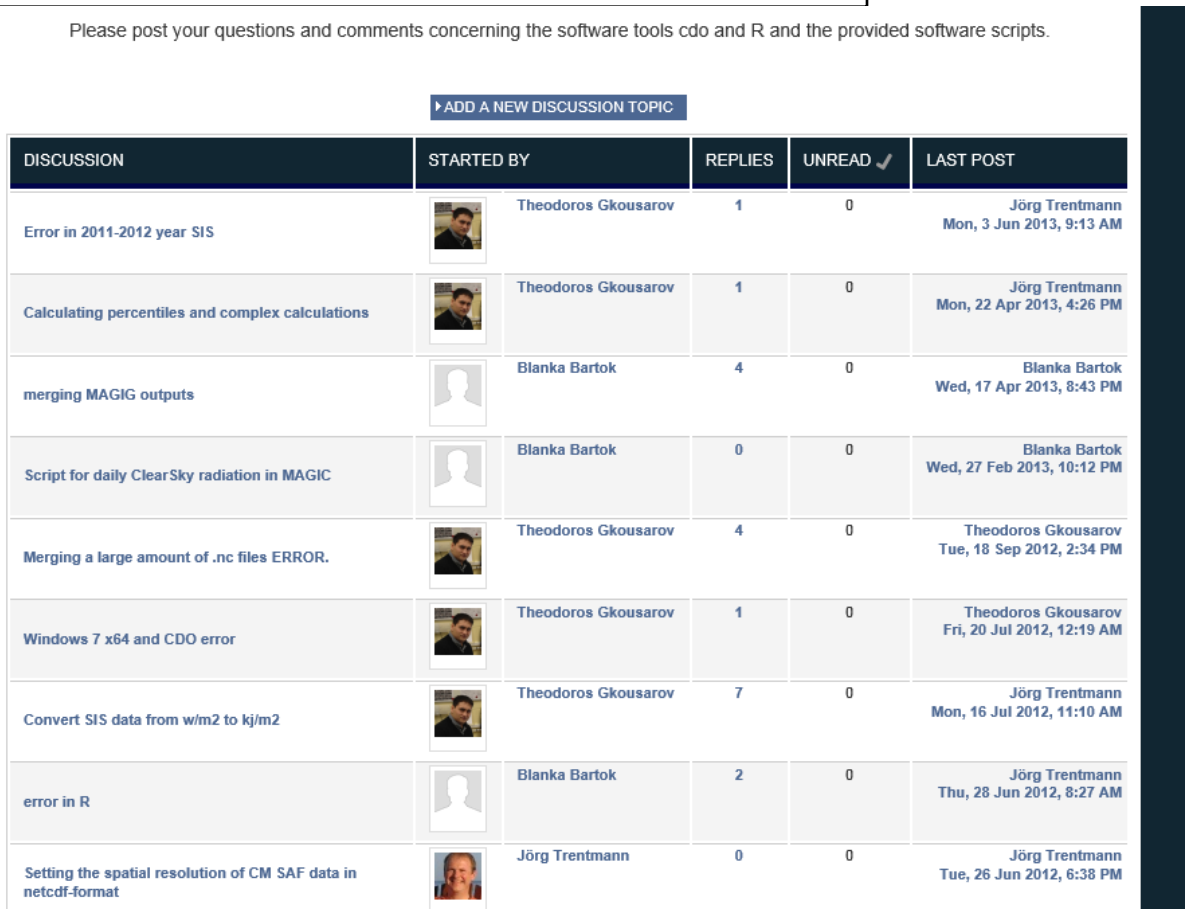




Step-by-step

Software support is provided through the

Software Forum on the CM SAF Community Site



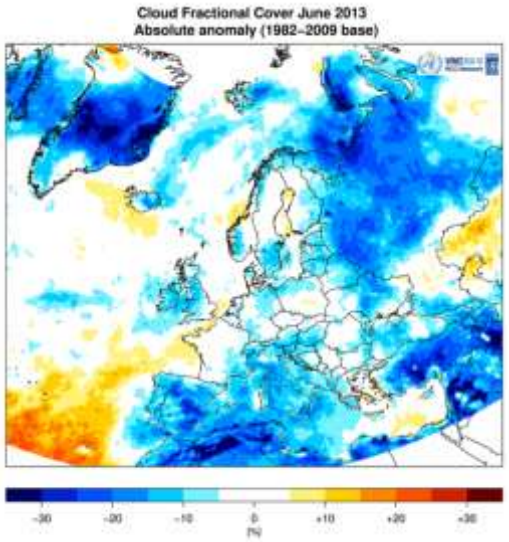
Please post your questions and comments concerning the software tools cdo and R and the provided software scripts.

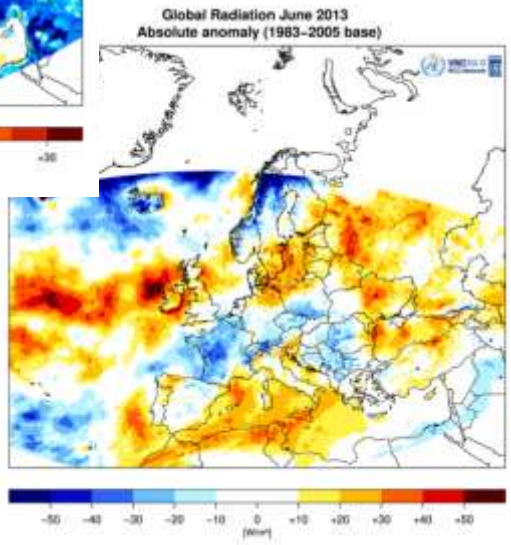
ADD A NEW DISCUSSION TOPIC

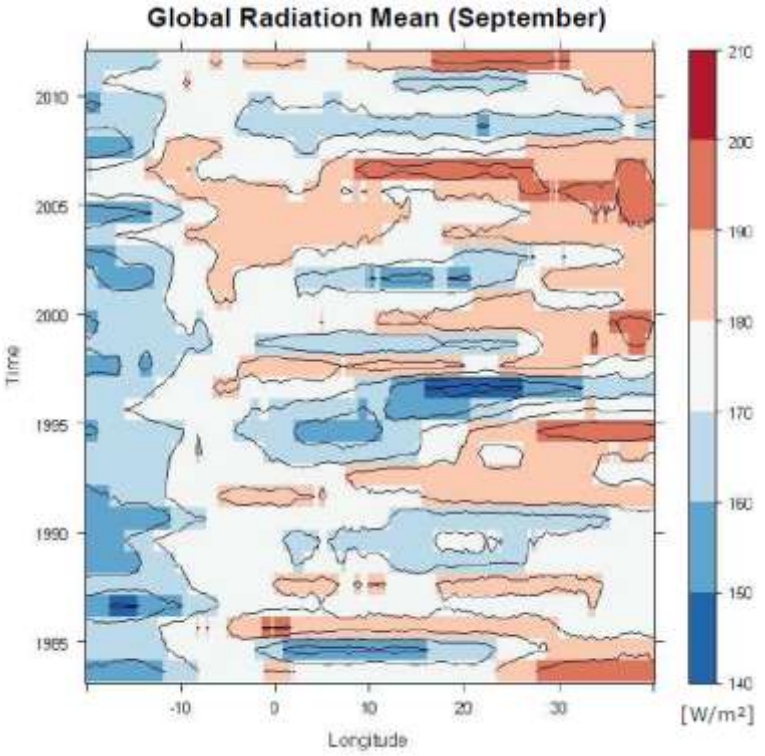
DISCUSSION	STARTED BY	REPLIES	UNREAD	LAST POST
Error in 2011-2012 year SIS	Theodoros Gkousarov	1	0	Jörg Trentmann Mon, 3 Jun 2013, 9:13 AM
Calculating percentiles and complex calculations	Theodoros Gkousarov	1	0	Jörg Trentmann Mon, 22 Apr 2013, 4:26 PM
merging MAGIG outputs	Blanka Bartok	4	0	Blanka Bartok Wed, 17 Apr 2013, 8:43 PM
Script for daily ClearSky radiation in MAGIC	Blanka Bartok	0	0	Blanka Bartok Wed, 27 Feb 2013, 10:12 PM
Merging a large amount of .nc files ERROR.	Theodoros Gkousarov	4	0	Theodoros Gkousarov Tue, 18 Sep 2012, 2:34 PM
Windows 7 x64 and CDO error	Theodoros Gkousarov	1	0	Theodoros Gkousarov Fri, 20 Jul 2012, 12:19 AM
Convert SIS data from w/m2 to kj/m2	Theodoros Gkousarov	7	0	Jörg Trentmann Mon, 16 Jul 2012, 11:10 AM
error in R	Blanka Bartok	2	0	Jörg Trentmann Thu, 28 Jun 2012, 8:27 AM
Setting the spatial resolution of CM SAF data in netcdf-format	Jörg Trentmann	0	0	Jörg Trentmann Tue, 26 Jun 2012, 6:38 PM

Additional examples

Regional Climate Center on Climate Monitoring (RCC-CM), http://www.dwd.de/rcc-cm







Andre Obregon, RCC, DWD

Additional examples

Solar Energy Applications (solaR), analysis and visualisation of gridded data (raster, rasterVis)

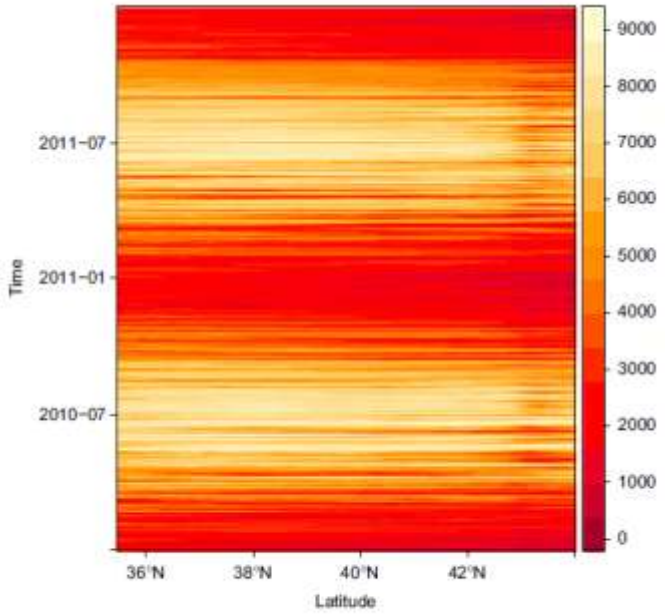


Fig. 1. Hovmöller plot with the time evolution of the daily horizontal irradiation (Wh/m^2) as published by CM SAF, averaged along 10°W to 5°E.

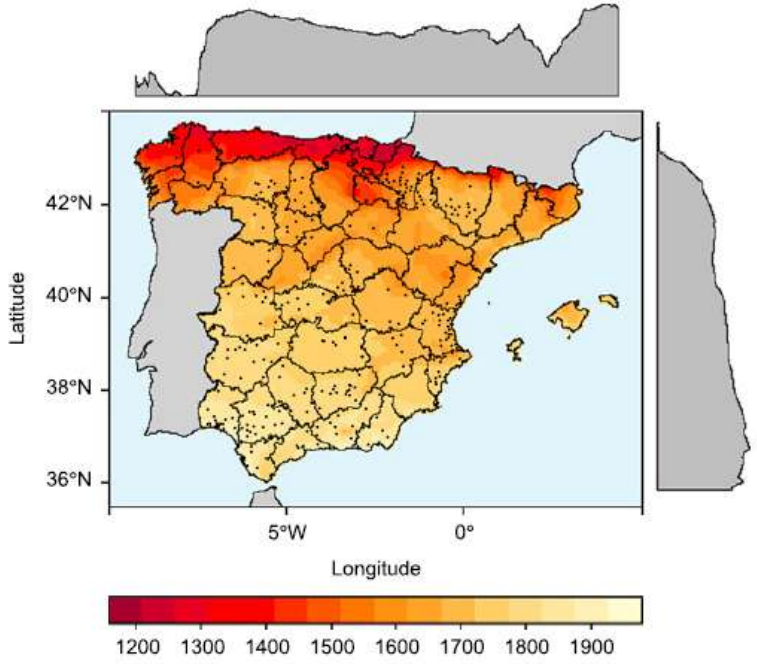


Fig. 2. Average of yearly horizontal irradiation (kWh/m^2) on the horizontal plane as published by CM SAF during 2010 and 2011.

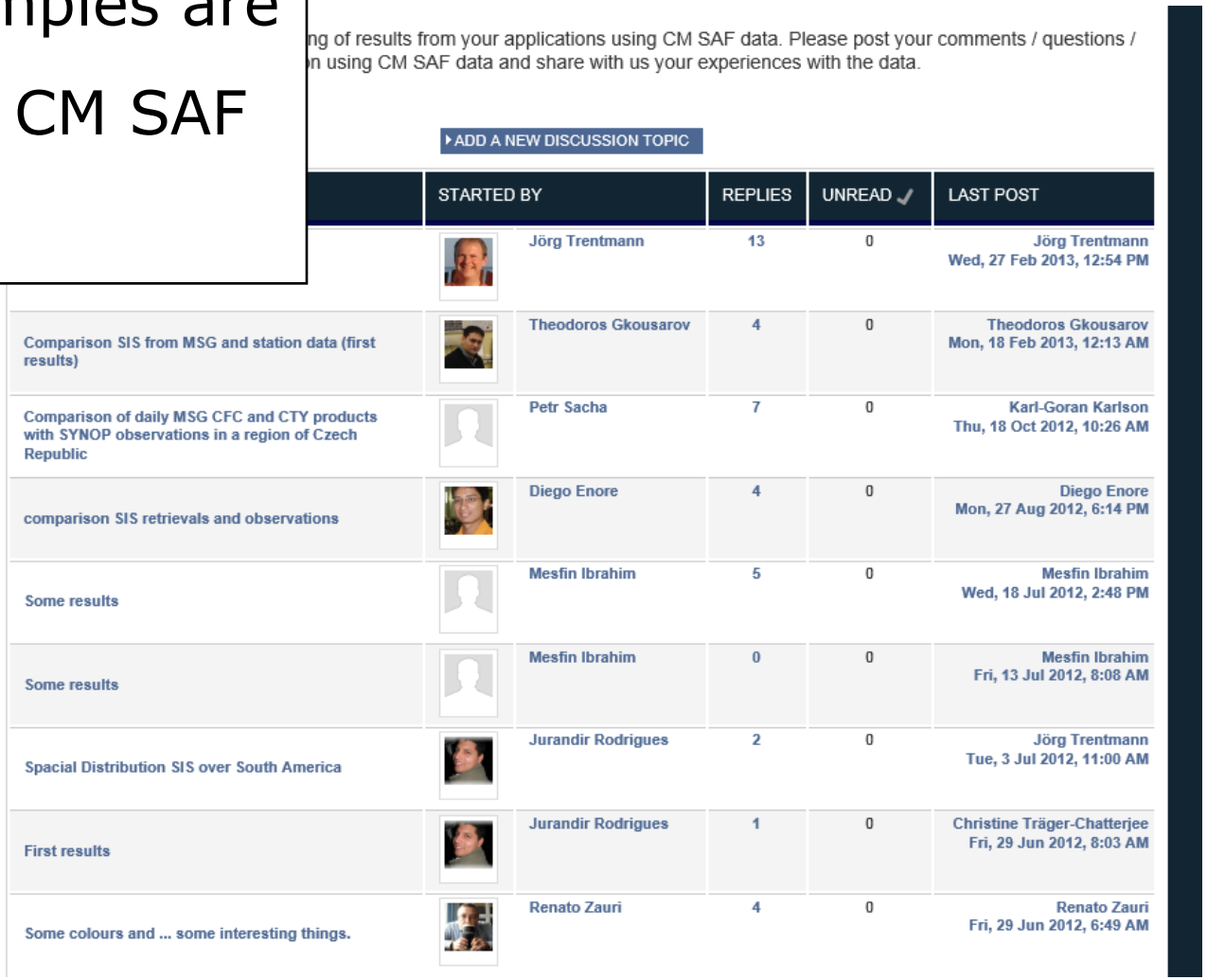
Comparative assessment of global irradiation from a satellite estimate model (CM SAF) and on-ground measurements (SIAR): A Spanish case study

F. Antonanzas-Torres [a,*], F. Cañizares [b], O. Perpiñán [c,d]

Renewable and Sustainable Energy Reviews 21 (2013) 248–261

Additional examples

Many more examples are available on the CM SAF Community Site



ng of results from your applications using CM SAF data. Please post your comments / questions /
n using CM SAF data and share with us your experiences with the data.

ADD A NEW DISCUSSION TOPIC

	STARTED BY	REPLIES	UNREAD	LAST POST
	Jörg Trentmann	13	0	Jörg Trentmann Wed, 27 Feb 2013, 12:54 PM
Comparison SIS from MSG and station data (first results)	Theodoros Gkousarov	4	0	Theodoros Gkousarov Mon, 18 Feb 2013, 12:13 AM
Comparison of daily MSG CFC and CTY products with SYNOP observations in a region of Czech Republic	Petr Sacha	7	0	Karl-Goran Karlson Thu, 18 Oct 2012, 10:26 AM
comparison SIS retrievals and observations	Diego Enore	4	0	Diego Enore Mon, 27 Aug 2012, 6:14 PM
Some results	Mesfin Ibrahim	5	0	Mesfin Ibrahim Wed, 18 Jul 2012, 2:48 PM
Some results	Mesfin Ibrahim	0	0	Mesfin Ibrahim Fri, 13 Jul 2012, 8:08 AM
Spacial Distribution SIS over South America	Jurandir Rodrigues	2	0	Jörg Trentmann Tue, 3 Jul 2012, 11:00 AM
First results	Jurandir Rodrigues	1	0	Christine Träger-Chatterjee Fri, 29 Jun 2012, 8:03 AM
Some colours and ... some interesting things.	Renato Zauri	4	0	Renato Zauri Fri, 29 Jun 2012, 6:49 AM

Final words….

- CM SAF offer not only high-quality climate data, but does also provide software incl. support to analyse CM SAF data based on free software packages

- cdo and R are very powerful tools for in-depth data analysis, incl. CM SAF data; other tools (Matlab, IDL, GIS) are also suitable to analyse CM SAF data

- The CM SAF Community Site provides a huge source of information on CM SAF and is intended to allow user interactions

- Feel free to share your questions / comments / results with us and other users of CM SAF data through the forums at the CM SAF Community Site

Any Questions / Comments?

Have fun playing with the data!

Looking forward to see your application!