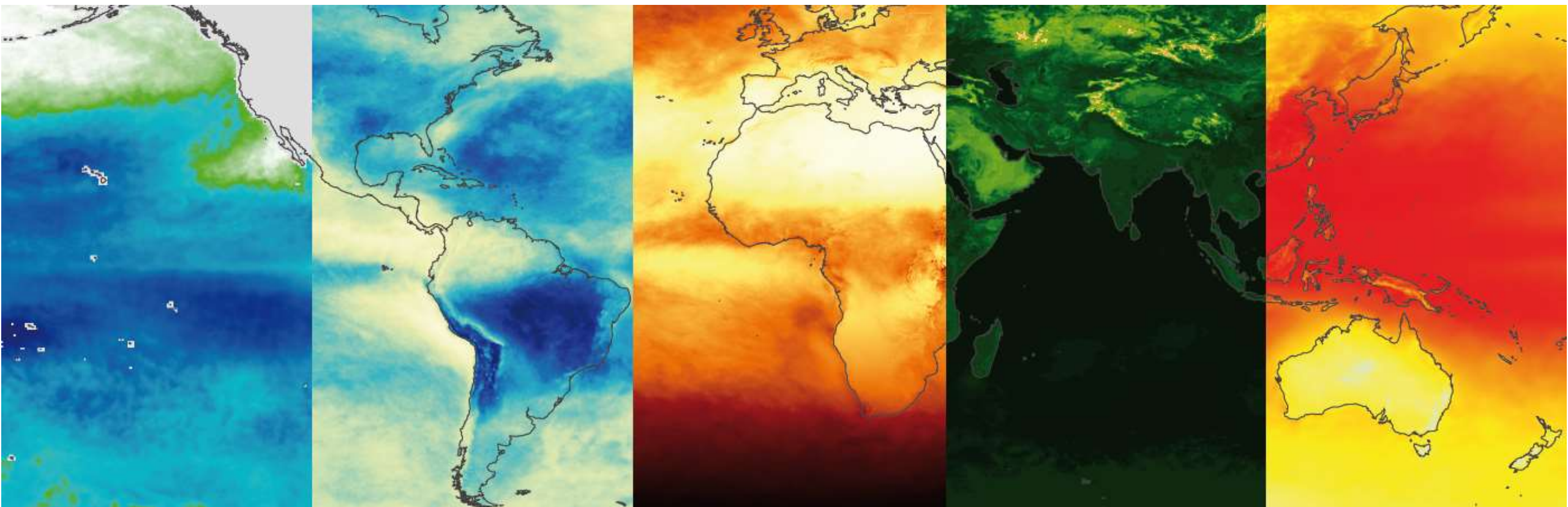


# Online Short Course: SARA – A Climate Data Record on Surface Solar Radiation

14 June 2023



# Data Access

## → Web User Interface ([wui.cmsaf.eu](http://wui.cmsaf.eu))

1. [Register once](#)
2. [Search data](#)
3. Change projection / spatial resolution / domain to reduce data size
4. Proceed to time range selection
5. Add to order cart
6. Login
7. Place an order
8. Wait for download email (“CM SAF product request has been finished”)

# Data Access



Mi 12.04.2023 09:59

CM SAF Contact <Contact.Cmsaf@dwd.de>

CM SAF product request: ORD49252, ORD49253

An

Dear Steffen Kothe,

Thank you for your product order. The following information about the requested product(s) is stored:

- 1 2004-01-01 2020-12-01 v004, CFC - Fractional cloud cover, SEVIRI on MSG, Monthly, Mean, METEOSAT full disk (includes Europe, Africa, Atlantic Ocean)
- 2 2021-01-01 2023-03-01 v004i1, CFC - Fractional cloud cover, SEVIRI on MSG, Monthly, Mean, METEOSAT full disk (includes Europe, Africa, Atlantic Ocean)

Total size of your order: 7.0 GB

(The total size above is based on the original products. Please be aware that the final order size may differ from this value in case of selected order post-processing, like format conversion or sub-domaining. It depends on the selected sub-domain size and/or target horizontal resolution. It's not possible to estimate the size of standing orders!)


Details of your order:

=====  
Order identification: ORD49252  
from: Wed Apr 12 07:59:23 UTC 2023

-----  
Position: 1  
Product type: CFC-Product  
Area: METEOSAT full disk (includes Europe, Africa, Atlantic Ocean)  
Temporal resolution: Monthly  
Statistics: Mean  
-----

# Data Access

Mi 12.04.2023 10:52  
CMSAF Contact <Contact.Cmsaf@dwd.de>  
CM SAF product request has been finished: ORD49253

An 

Dear Steffen Kothe,

The extraction of your ordered CM SAF product (CFC, SEVIRI on MSG, Monthly, Mean, Version 004, Latitude-longitude grid (0.05x0.05 degree), METEOSAT full disk (includes Europe, Africa, Atlantic Ocean), NetCDF4:LatLon,-11.0,44.0,5.0,34.0,0.05,0.05, 2021-01-01 - 2023-03-01) from our archive has been finished successfully.

Your order has a total size of 9.9 MB (10332160 Byte) and contains 27 individual data files.

The order data files are available on our data server for the next 14 days.

You can get access to the data server via https:

- host: cmsaf.dwd.de
- Username: routcm
- Password: 4gVdHUdpq8UhHclJIP
- Directory: data/ORD49253
- link: <https://cmsaf.dwd.de/data/ORD49253/>
- wget: `wget -r -np -nH --cut-dirs=1 --reject="index.html" --user=routcm --password=4gVdHUdpq8UhHclJIP https://cmsaf.dwd.de/data/ORD49253/`

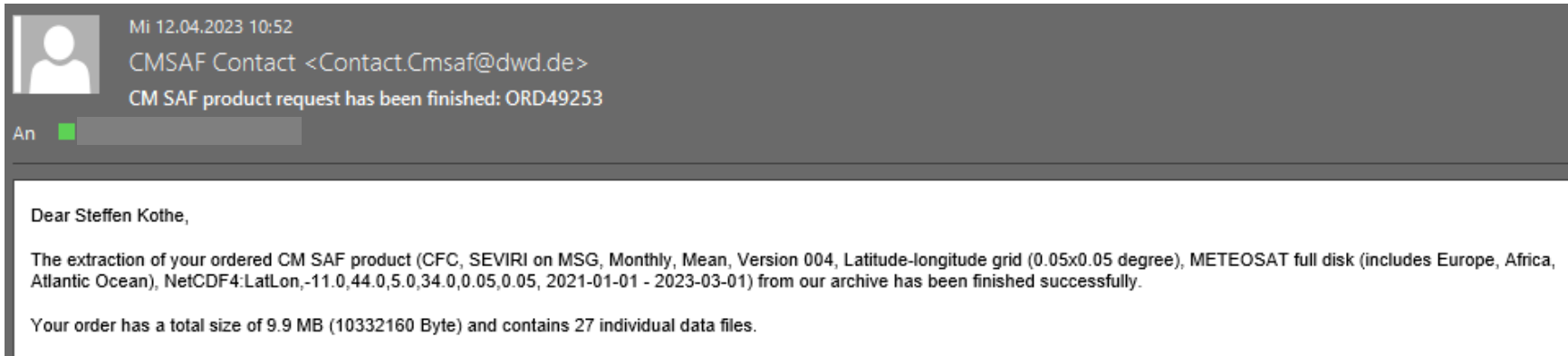
or via sftp:

- host: cmsaf.dwd.de
- Username: routcm
- Password: 4gVdHUdpq8UhHclJIP
- Port: 2424
- Directory: data/ORD49253
- login: `sftp -P 2424 routcm@cmsaf.dwd.de:data/ORD49253/`

The individual product data files are stored in a single tar-file on our data server:

- Filename: ORD49253.tar
- Filesize: 9.9 MB (10332160 Byte)

# Data Access



You can get access to the data server via https:

host: `cmsaf.dwd.de`

Username: `routcm`

Password: `4gVdHUdpq8UhhclJIP`

Directory: `data/ORD49253`

link: <https://cmsaf.dwd.de/data/ORD49253/>

wget: `wget -r -np -nH --cut-dirs=1 --reject="index.html" --user=routcm --password=4gVdHUdpq8UhhclJIP https://cmsaf.dwd.de/data/ORD49253/`

Directory: `data/ORD49253`  
login: `sftp -P 2424 routcm@cmsaf.dwd.de: data/ORD49253/`

The individual product data files are stored in a single tar-file on our data server:

Filename: `ORD49253.tar`  
Filesize: `9.9 MB (10332160 Byte)`



# Data Access

## → Web User Interface

- Easy selection and online ordering
- Possibility of regular data delivery
- Postprocessing
  - Spatial, temporal selection
- Data format (NetCDF)
- Download via https
- All data free of charge

## → User Help Desk



The screenshot shows the CM SAF Product Navigator web interface. At the top, there is a navigation bar with the EUMETSAT CM SAF logo, a menu (Home, Sitemap, Glossary, Imprint, Data Protection), and a welcome message with a sign-in link and an order cart icon showing 0 items. Below the navigation bar, the main content area is divided into several sections:

- NAVIGATION:** A vertical menu with links for Home, Products (expanded to show Product search), User, Order, and Service.
- DIRECTLY TO:** A list of quick links including Documentation, User Help Desk, CM SAF Service Messages, CM SAF FAQs, and CM SAF Accessibility Declaration.
- EXTERNAL LINKS:** A section with logos for EUMETSAT, DLR, SMHI, and other partner organizations.
- CM SAF - Product navigator:** A central text area explaining that products are available to anyone for free, but user registration is mandatory. It describes two types of products: Operational Products (ICDRs) and Climate Data Records (CDRs and FCDRs).
- SEARCH ACCORDING TO PRODUCT GROUPS/TYPES:** A section with two columns of product categories:
  - Operational Products:** Cloud products, Surface radiation products, Miscellaneous.
  - Climate Data Records:** Climate Data Records with DOI, Cloud products, Surface radiation products, Radiation fluxes at the top of atmosphere, Water vapour and temperature products, Miscellaneous.
 A "Show all products" link is provided at the bottom of this section.
- ADVANCED SEARCH:** A search form with dropdown menus for Product group, Product family, Product name, Area, Temporal resolution, Statistics, Spatial resolution, and Platform. It also includes a "Temporal coverage" section with "from" and "to" date pickers. At the bottom, it shows "Result: 1015" and buttons for "Reset" and "Show".
- PRODUCT EXAMPLES:** A vertical column on the right side showing three small satellite imagery thumbnails.

<https://wui.cmsaf.eu>



## What is the CM SAF R Toolbox?



## What is the CM SAF R Toolbox?

### R-based

cmsafops – Analysis

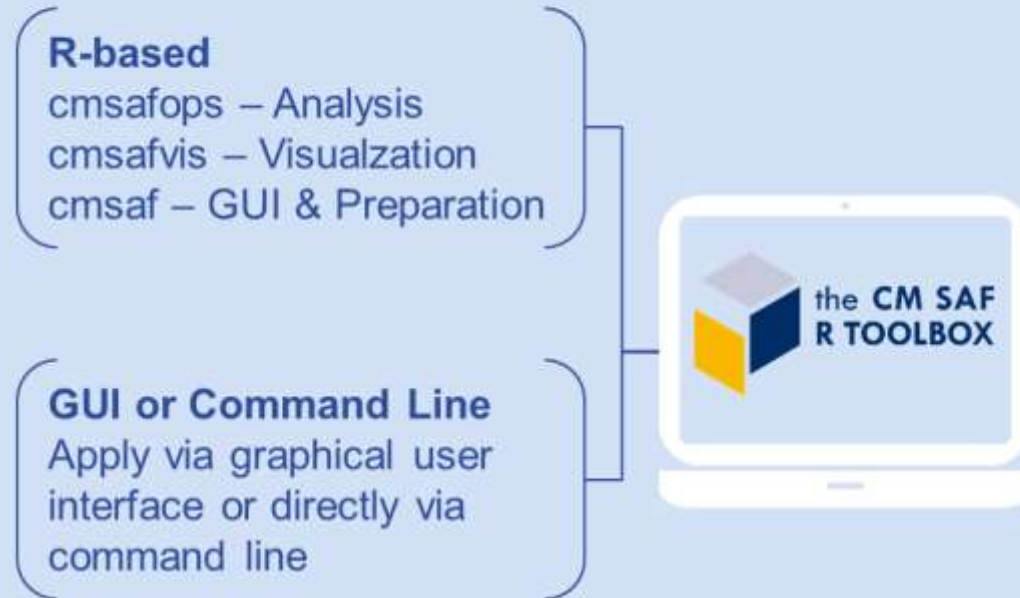
cmsafvis – Visualization

cmsaf – GUI & Preparation





## What is the CM SAF R Toolbox?



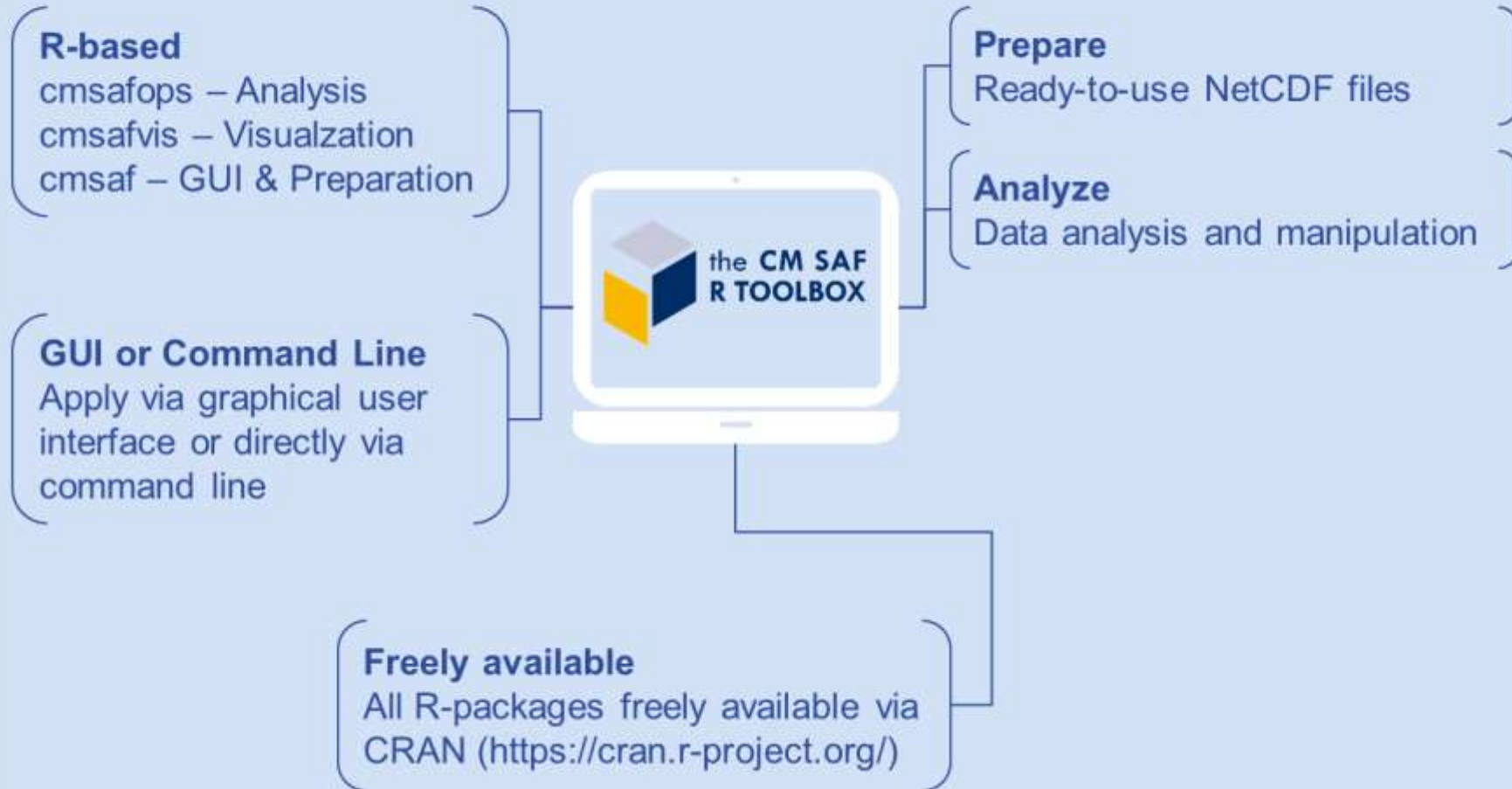
## What is the CM SAF R Toolbox?



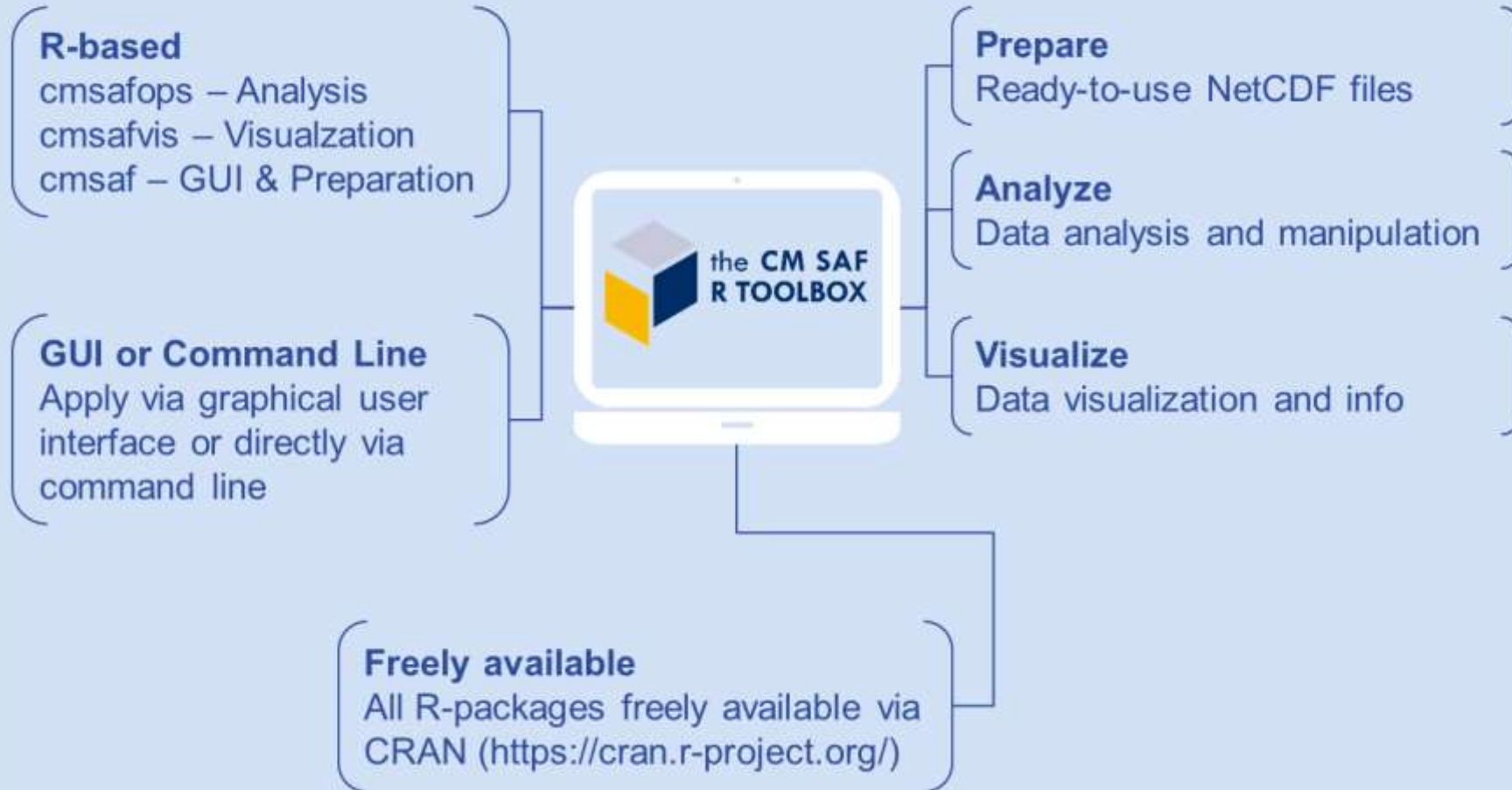
## What is the CM SAF R Toolbox?



## What is the CM SAF R Toolbox?



## What is the CM SAF R Toolbox?





# Tasks

1. Plot the long-term monthly mean of SARAH SIS for June for: a) Europe, b) a country of your choice.
2. Plot a time series of monthly mean SIS for Offenbach [lon 8.75 , lat 50.1] or a location of your choice.
3. Plot a map of the monthly anomaly of SARAH SDU for May 2023.

Download link for prepared data:

[https://public.cmsaf.dwd.de/data/stkothe/SARAH\\_SC/](https://public.cmsaf.dwd.de/data/stkothe/SARAH_SC/)

Please share your results with us:

<https://padlet.com/CMSAF/the-cm-saf-padlet-azeujpu4vc9cbfcy>

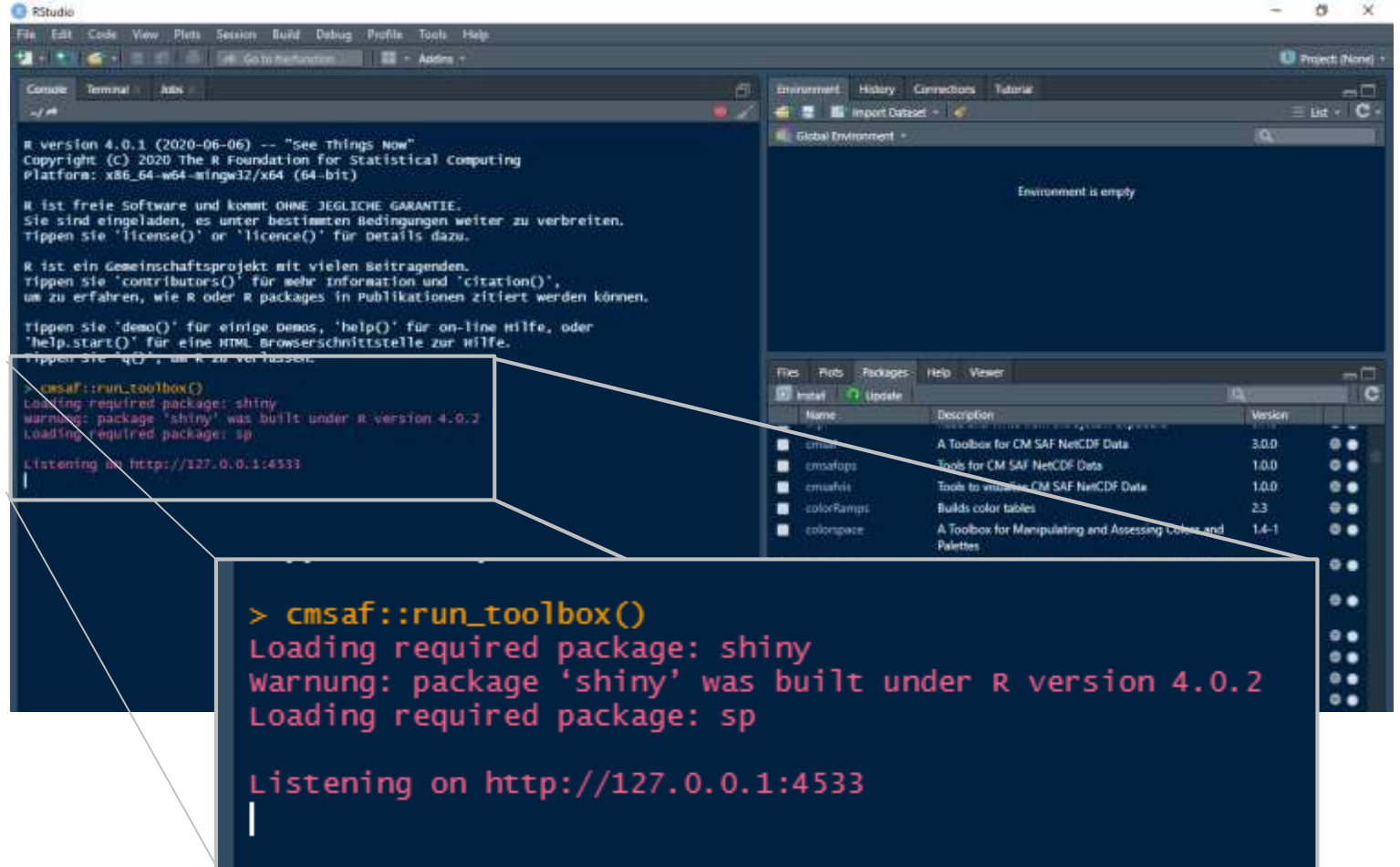


# Installation

1. Install R
  - <https://cran.r-project.org>
2. Install Rstudio
  - <https://www.rstudio.com/download>
3. Run RStudio and install cmsaf R-package
  - `install.packages('cmsaf')`

# Start the Toolbox

- Start Rstudio and type:  
  
→ `cmsaf::run_toolbox()`



```
R version 4.0.1 (2020-06-06) -- "See Things Now"
Copyright (C) 2020 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R ist freie Software und kommt OHNE JEGLICHE GARANTIE.
Sie sind eingeladen, es unter bestimmten Bedingungen weiter zu verbreiten.
Tippen sie 'license()' or 'licence()' für details dazu.

R ist ein Gemeinschaftsprojekt mit vielen Beitragenden.
Tippen sie 'contributors()' für mehr information und 'citation()',
um zu erfahren, wie R oder R packages in Publikationen zitiert werden können.

Tippen sie 'demo()' für einige demos, 'help()' für on-line Hilfe, oder
'help.start()' für eine HTML browserschnittstelle zur Hilfe.
Tippen sie 'q()' , um R zu verlassen.

> cmsaf::run_toolbox()
Loading required package: shiny
warning: package 'shiny' was built under R version 4.0.2
Loading required package: sp
Listening on http://127.0.0.1:4533
```

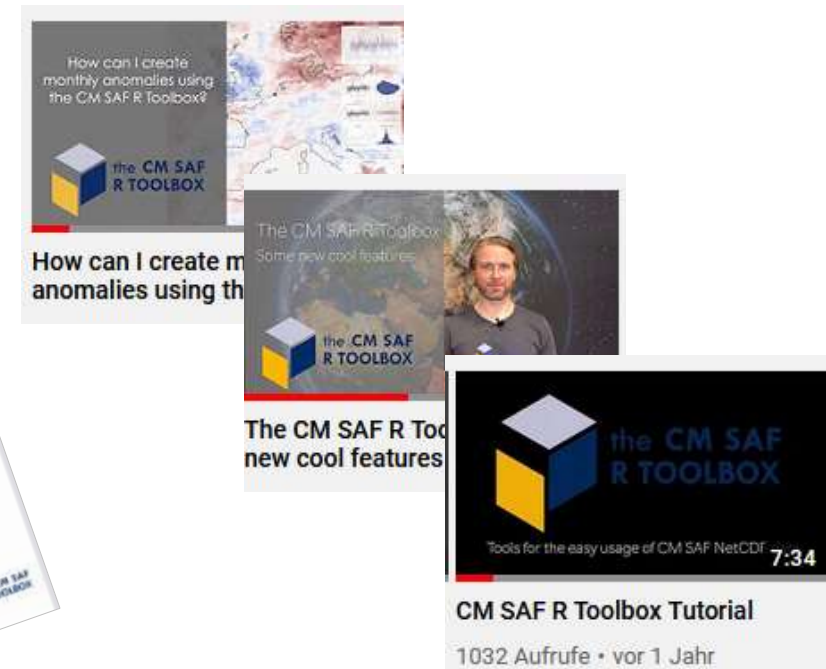
**> cmsaf::run\_toolbox()**  
Loading required package: shiny  
warning: package 'shiny' was built under R version 4.0.2  
Loading required package: sp  
  
Listening on http://127.0.0.1:4533

# Support

→ If you need help using the Toolbox have a look at our manuals, Youtube videos, the Toolbox paper, Q&A document, Cheat Sheets, flyer, etc.

→ [www.cmsaf.eu/R\\_toolbox](http://www.cmsaf.eu/R_toolbox)

→ [contact.cmsaf@dwd.de](mailto:contact.cmsaf@dwd.de)



# Support – Tutorials

➔ Status report and trend analysis with corresponding tutorial

➔ [www.cmsaf.eu/R\\_toolbox](http://www.cmsaf.eu/R_toolbox)



**Tutorial**

This tutorial refers to the monthly report in July 2021 in South Africa regarding the cloud coverage which was created using the CM SAF R-Toolbox. All steps on how to create the maps and plots with the R-Toolbox are documented in here. The order is based on the order of the report.

- To draw up this kind of report, you first need to download daily and monthly data for your chosen area. The exact data names are written down in the report under "Accessed data".
- All data is available on: <https://wsl.cmsaf.eu/>
- The extract for South Africa used in the application example;
  - Latitude: 20-40° S
  - Longitude: 0-40° E
- Plotted locations in South Africa:

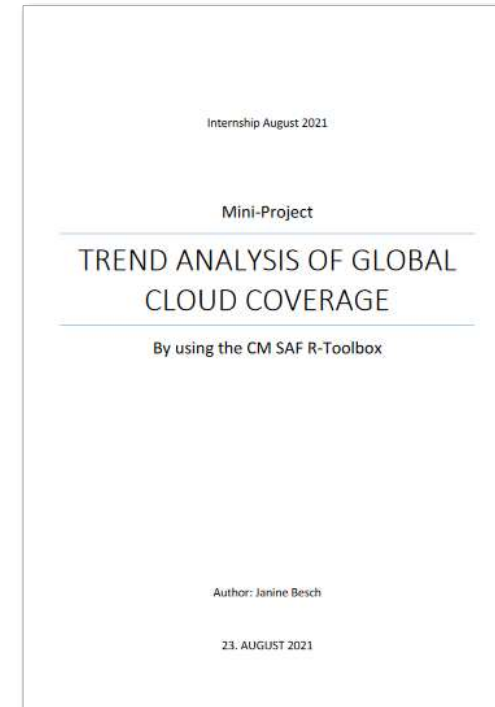
Location	Latitude	Longitude
Pretoria	25.731340	28.218370
Port Elizabeth	-33.958252	25.619022
Bloemfontein	-29.087217	26.154898
Cape Town (Kapstadt)	-33.918861	18.423300

**How to create a...**

✓ **...general map of cloud coverage in a selected country in a selected month?**

- Get monthly mean data (.tar-file) for your selected country and year
- Select the data range you want to analyze
- Choose "cfc" as the variable and reduce the spatial coverage if necessary
- Select "monthly statistics" as a group of operators as well as "monthly means"
- Choose your month of interest in the visualizer options and start brighten up your map!

➔ **Result:** „Average Cloud Fractional Cover (CFC) in July 2021 in South Africa“ (see fig. 1)



**Tutorial**

This tutorial refers to the trend analysis of global cloud coverage regarding the different cloud levels low, middle and high using the CM SAF R-Toolbox. All steps on how to create the maps and plots with the R-Toolbox are documented in here. The order is based on the order of the report.

- First of all, you need to download global monthly mean data of fractional cloud cover (cfc) for the time span 1991-2020. The exact data names are written down in the report
- All data is available on: <https://wsl.cmsaf.eu/>
- All necessary variables (low, middle, high, day, night cloud coverage) are included in the CFC-dataset
- Choose as much TCDR data as possible and ICDR for the remaining

**How to create a...**

✓ **...trend analysis of global cloud coverage of low, middle and high clouds and the corresponding significances?**

- Prepare:** Untar and unzip the global monthly mean data, which you already downloaded, by selecting the date range you want to analyze (1991-01-01-2020-12-01).  
 To be able to use the whole data range, you must combine the downloaded TCDR and ICDR data!  
 It might be helpful to know that TCDR and ICDR data can be combined by giving them same names in ascending order.  
 → If you need more help, please take a look at the tutorial on how to create a "Monthly report"



# Share your Results

<https://padlet.com/CMSAF/the-cm-saf-padlet-azeujpu4vc9cbfcy>