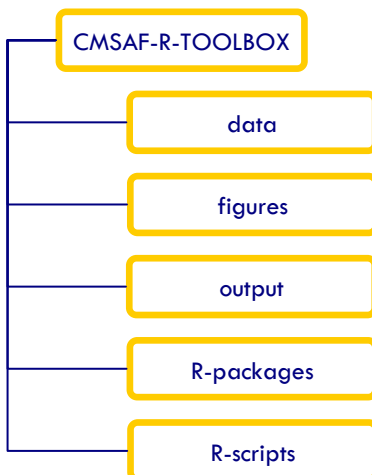

The CM SAF R TOOLBOX

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QUICK START

- Install R: www.r-project.org
- Install R-Studio (recommended for R beginners): www.rstudio.com/download
- Get CM SAF R TOOLBOX: www.cmsaf.eu/tools
- Start R or R-Studio and source the R-script *Install.Packages4Toolbox.R* once
- Start the R-script *CMSAF-R-TOOLBOX.R*
- Have fun

STRUCTURE



The CM SAF R TOOLBOX includes an optional folder structure with folders for data, output and figures. For most functions the filename(s) of the infile(s) will be checked. Thus, you can give the filename including the path or without path if you are working with the given folder structure or if the data are in your working directory. If the given infile is in 'CMSAF-R-TOOLBOX/data' or 'CMSAF-R-TOOLBOX/output', the outfile is written in 'CMSAF-R-TOOLBOX/output'. To use this option define the path to the CM SAF R TOOLBOX (ptt) once:

```
ptt = "path-to-toolbox"
e.g., ptt = "/cmsaf/stkothe/CMSAF-R-TOOLBOX"
```

- **data:** folder for data files (e.g., .tar-files)
- **figures:** folder, where figures will be saved
- **output:** folder, where NetCDF files will be saved
- **R-packages:** contains the cmsaf R-package
- **R-scripts:** contains prepared R-scripts for data preparation, analysis and plotting

R-SCRIPTS

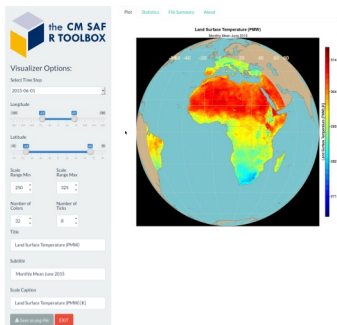
The CM SAF R TOOLBOX provides a set of R-scripts, which can be used to prepare, analyse and plot CM SAF NetCDF data. The R-scripts require **no** editing and can be started directly.

- ***Install.Packages4Toolbox.R:*** check and installation of all necessary R-packages
- ***CMSAF-R-TOOLBOX.R:*** control script for the three main steps of the CM SAF R TOOLBOX
- ***Prep.Data.R:*** data preparation (untar, unzip, select time and region, merge)
- ***Apply.Function.R:*** interface to apply functions of the cmsaf R-package
- ***CMSAF_Visualizer.R:*** tool for visualization of CM SAF data

The CM SAF R TOOLBOX

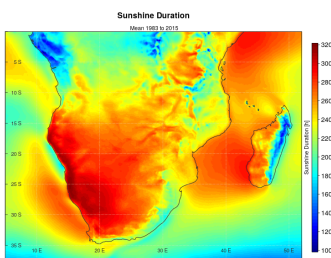
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EXAMPLE

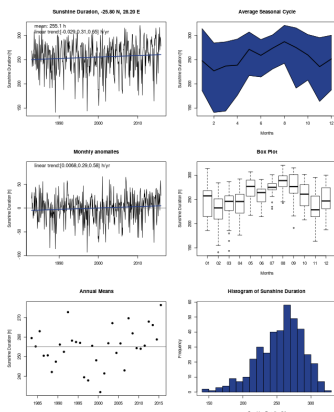


- Order CM SAF data via wui.cmsaf.eu and download them
- Open R-scripts/*CMSAF-R-TOOLBOX.R* in Rstudio and click on 'source'
- Browse to the downloaded .tar-file, click **Prepare**, click **GO**
- *Prep.Data.R* will be started
 - *Prep.Data.R* helps you to get from the downloaded .tar file to a ready-to-use NetCDF file
 - Single untarred files are stored in */data* and can optionally be deleted
 - *Prep.Data.R* gives one merged file including all time steps of the .tar file
 - The final NetCDF will be stored in */output*

- Choose the just generated .nc-file, click **Analyze**, click **GO**
- *Apply.Function.R* will be started
 - *Apply.Function.R* helps to apply functions of the *cmsaf* R-package
 - Choose a function by giving the corresponding number
 - For each chosen function you will get a output file, which is stored in */output*
 - The file name of the output file contains the function name and a random number
 - In the end you have the option to visualize the result with the CM SAF Visualizer
 - Stop the application by clicking **EXIT**



- Choose for instance an output file of *Apply.Function.R* (e.g., *SIS_Apply.Function_timean_123456.nc*), click **Visualize**, click **GO**
 - You will get a 2d map
 - Stop the application by clicking **EXIT**
- Choose for instance an output file of *Apply.Function.R* (e.g., *SIS_Apply.Function_selpoint_10_50_123456.nc*), click **Visualize**, click **GO**
 - You will get a 1d timeseries plot
 - Stop the application by clicking **EXIT**



'cmsaf' R-package

Apply.Function.R is an interface to functions of the 'cmsaf' R-Package. All functions can also be applied separately. The functions are documented in the package manual (<https://cran.r-project.org/web/packages/cmsaf/cmsaf.pdf>). The 'cmsaf' R-package includes more than 50 functions, which are easy to use.

User Help Desk

In case that a question or problem can not be solved by help of the Manual or the *cmsaf* R-package documentation, contact the CM SAF User Help Desk (contact.cmsaf@dwd.de).