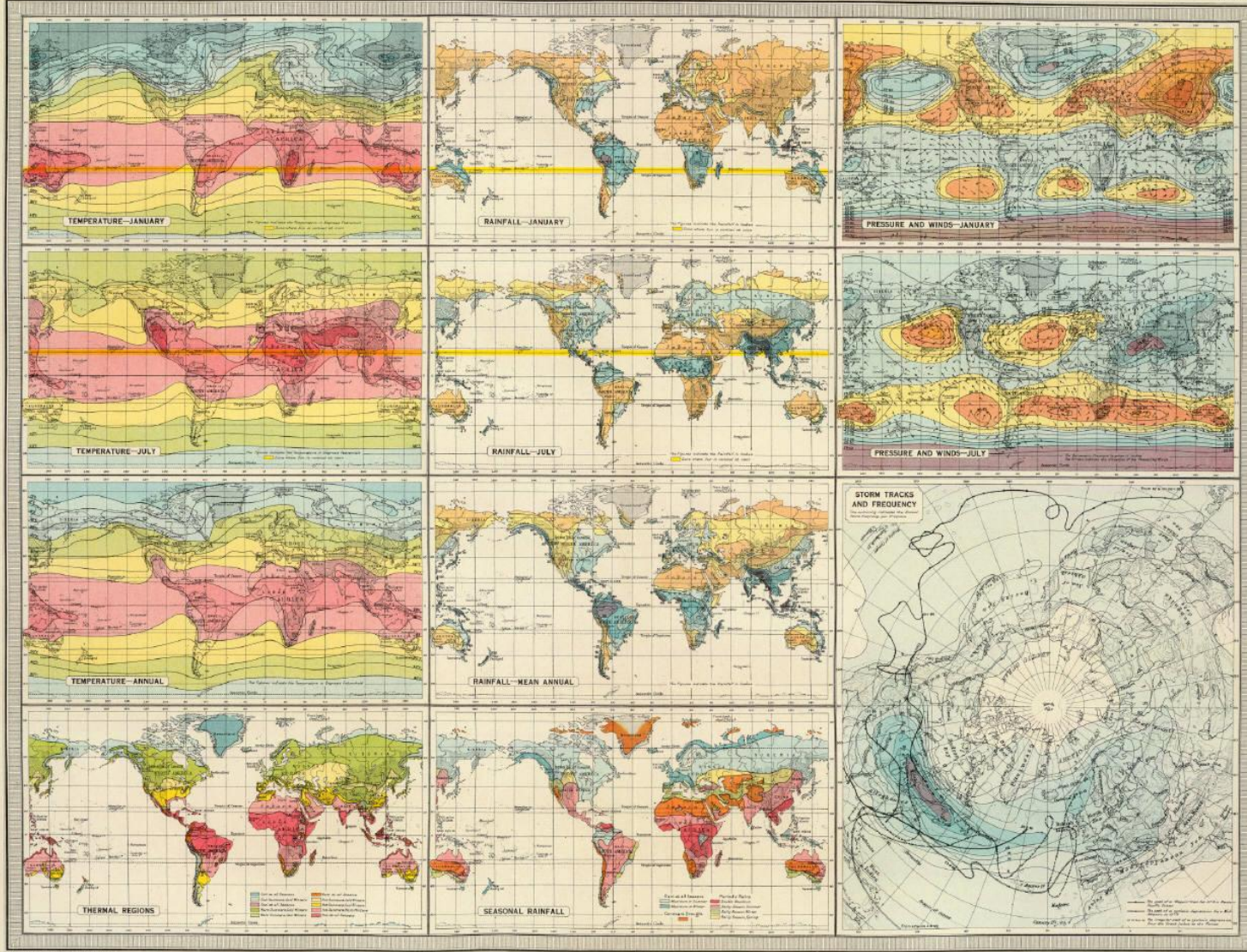


Satellite climatology atlas for Europe and Latvia



Zanita Avotniece

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THE EDINBURGH GEOGRAPHICAL INSTITUTE

Scale
The figures show 1000 ft. or more in a height of 1 inch (1:125,000)

JOHN BARTHOLOMEW & SON LTD.

Satellite climatology atlas for Europe and Latvia

For climatologists, young scientists and general public who

- need information on Europe's climatology
- are just *maybe* thinking about starting with satellite data
- need inspiration for the further work

Objectives

- To provide general information on the climatic characteristics of meteorological parameters over Europe and Latvia
- To provide information on satellite data suitable for climatological studies, their strengths and weaknesses
- To provide instructions for creating a satellite climatology atlas and beginning to work with satellite datasets in general

Data used

Parameter	Dataset	Variable	Period
Cloudiness	CLARA-A1	Monthly mean cloud fractional cover (CFC)	1982-2009
Cloud Phase	CLARA-A1	<ul style="list-style-type: none"> - Monthly mean fraction of liquid water clouds (CPH) - Monthly mean cloud ice water path (IWP) - Monthly mean cloud liquid water path (LWP) 	1982-2009
Cloud Top Parameters	CLARA-A1	Monthly mean cloud top parameters (CTO) <ul style="list-style-type: none"> - Cloud top height - Cloud top pressure - Cloud top temperature 	1982-2009
Cloud Optical Thickness	CLARA-A1	Monthly mean cloud optical thickness (COT) <ul style="list-style-type: none"> - All clouds - Ice clouds - Liquid clouds 	1982-2009
Solar Radiation	MVIRI dataset	<ul style="list-style-type: none"> - Monthly mean solar surface irradiance (SIS) - Monthly mean direct radiance at surface (SID) 	1990-2005
Daylight	Daylight dataset	Daylight intensity (DAL)	1990-2005
Surface Albedo	CLARA-A1	Surface albedo (SAL)	1982-2009

Data source: **CM SAF** – Satellite Application Facility on Climate Monitoring

<http://www.cmsaf.eu/>

To show the advantages of satellite data for climate studies

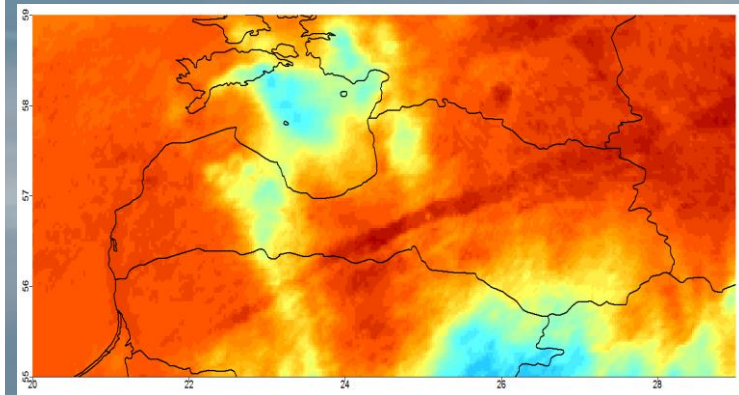
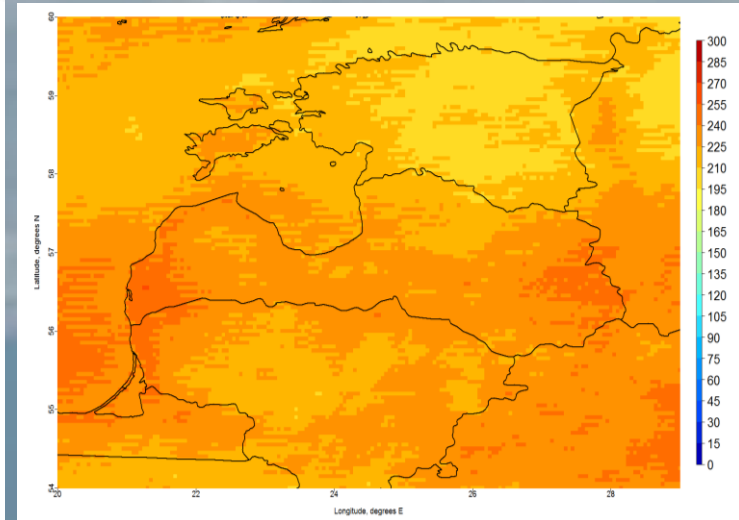
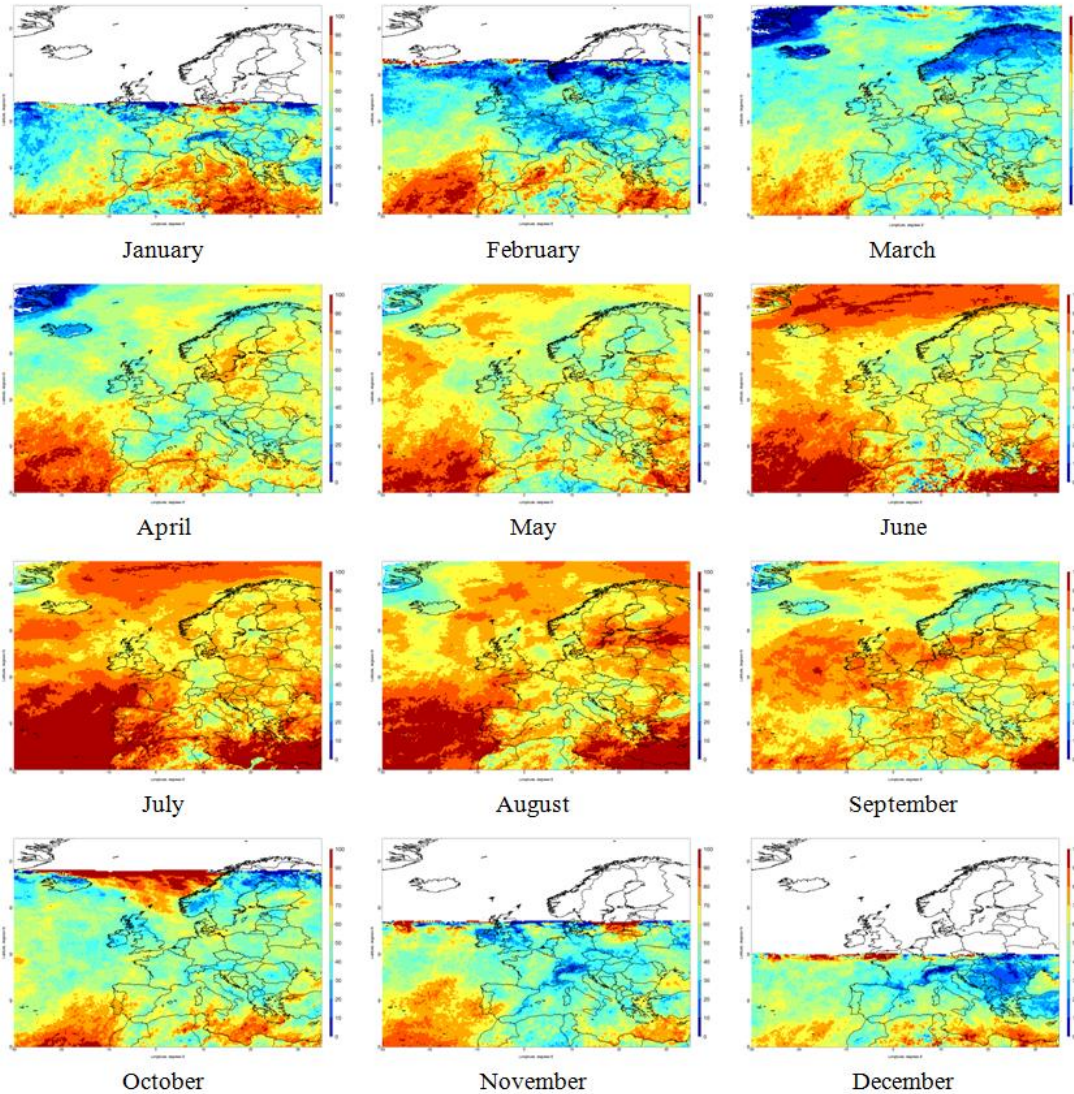
- Coverage, spatial and temporal resolution → GEO vs. LEO
- Information on parameters that can not be measured by the surface observation stations
- *Almost* 30-year period

To discuss the things to pay special attention to

- Not measuring the exact parameter – result depends on the retrieval method
- Retrieval methods, limitations for the use of data
- Known errors and imperfections in the datasets:
 - ✓ Missing scan-lines
 - ✓ Effect of snow cover
 - ✓ Effect of SZA thresholds
 - ✓ Unnatural features in the data (line over Latvia)

Use of 'reliable' information only:

- For COT, CPH, IWP, LWP, SAL only data from March till September were used
- For SIS, DAL the first years (up to 1990) of the datasets were not included
- The original MVIRI dataset for SIS was not used



Climate Datasets and High Impact Weather

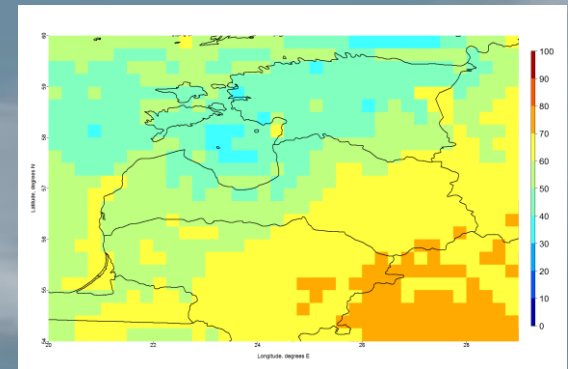
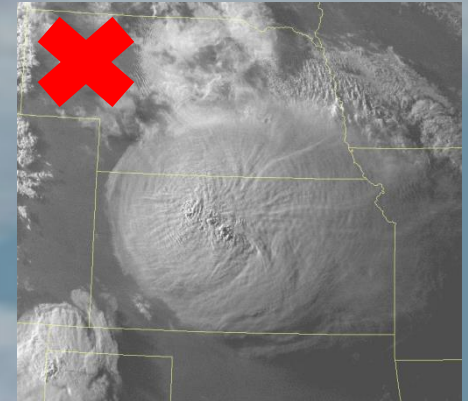
- Reprocessed homogenised data series
- Temporal and spatial resolution



- Lose some of the detail
- Can not see individual events as good

BUT

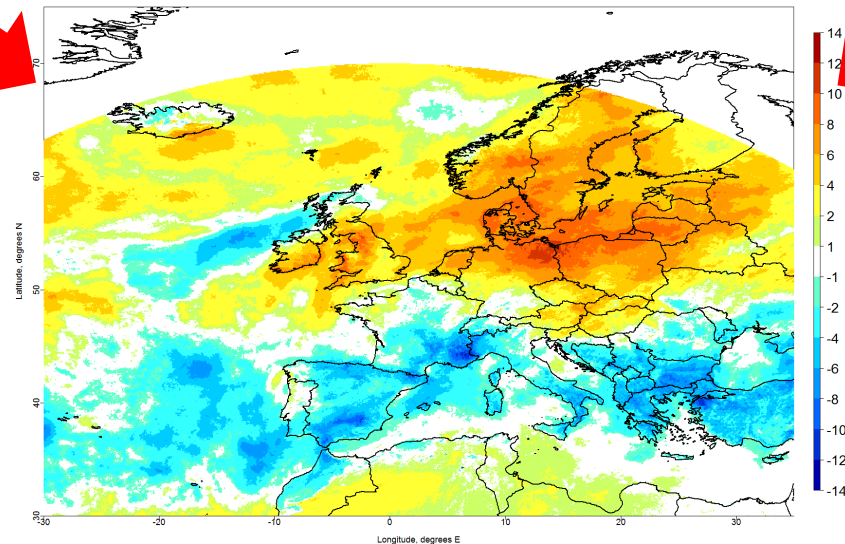
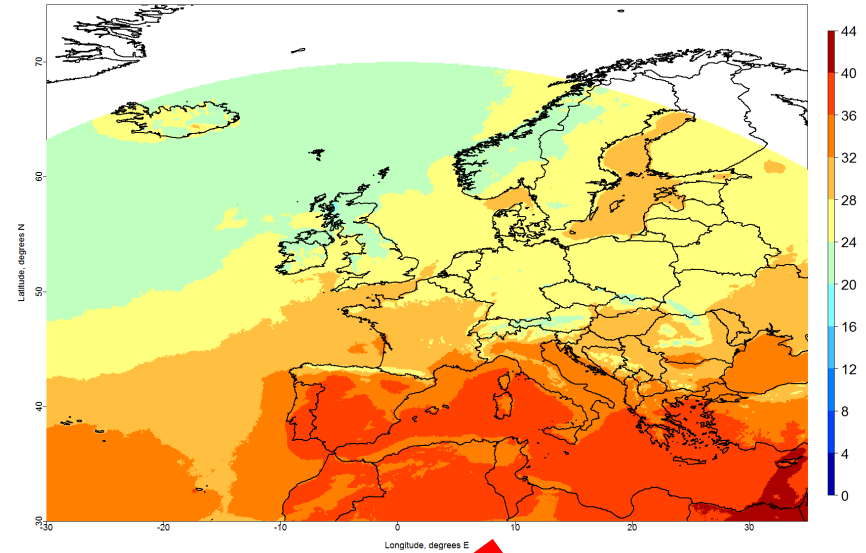
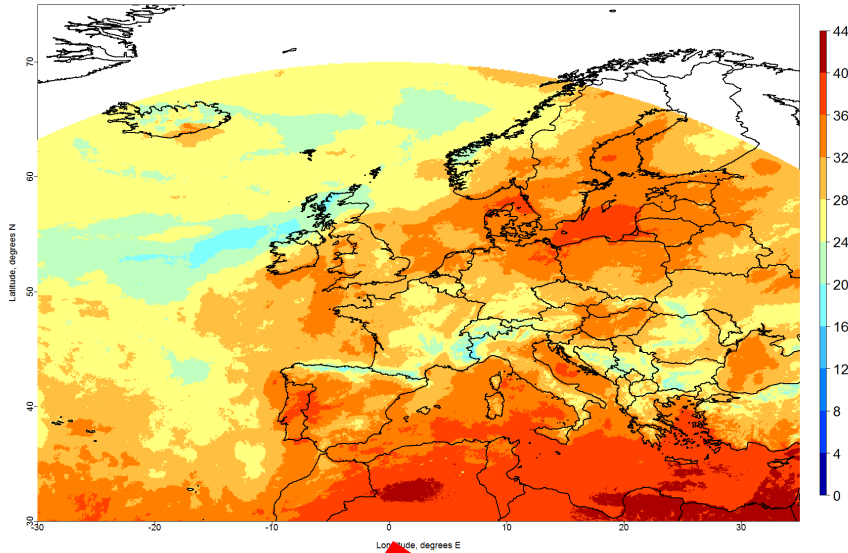
- Continuous events – droughts, heat waves, cold waves
- Can assess the climatology of High Impact Weather events



Anomalies – Daylight Intensity

June 1992

Multi-year mean for June



**Anomaly June
1992**

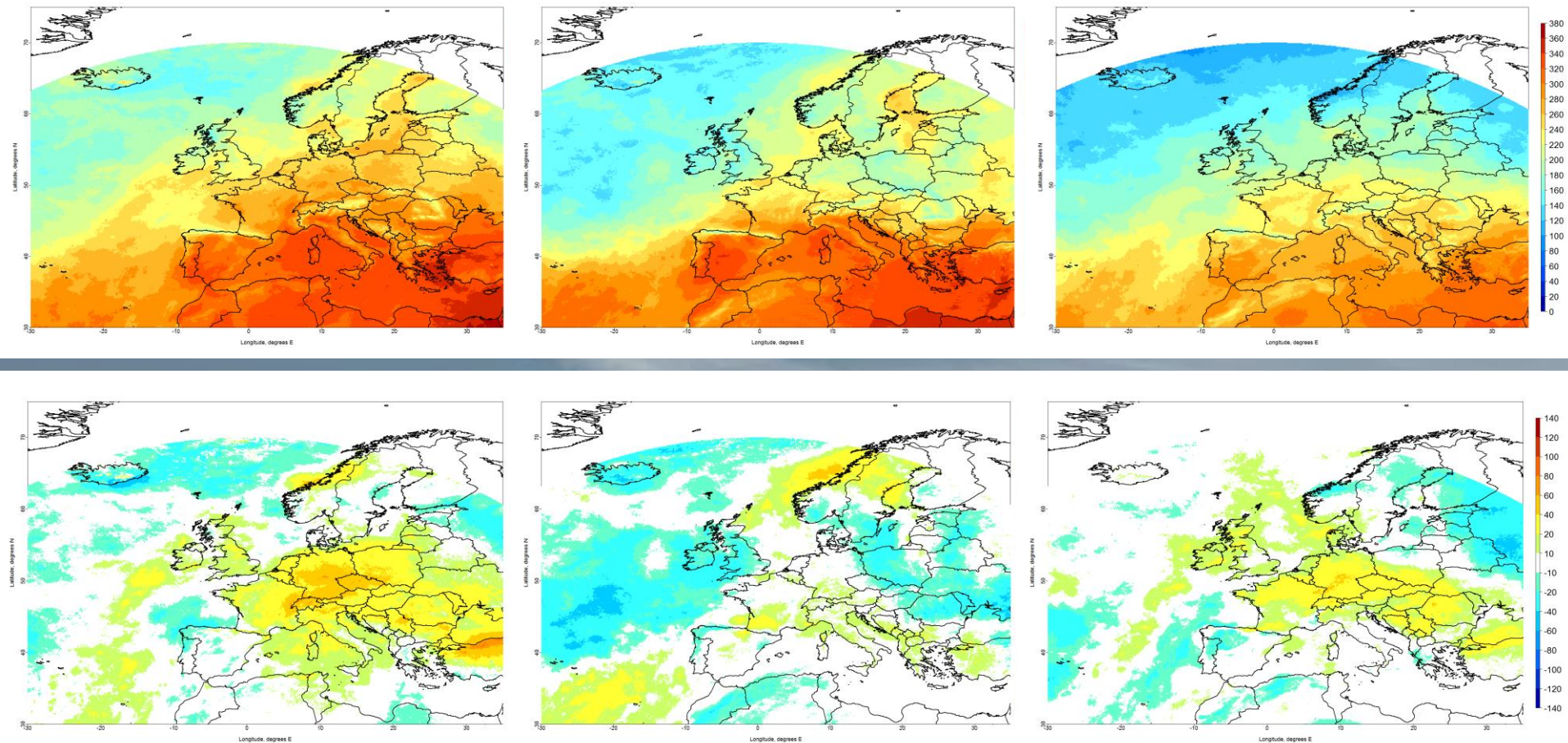
Analyse Extreme Events - Heat Wave 2003

Monthly Mean Solar Surface Irradiance and Anomalies

June

July

August



Available at...

- EUMETSAT Image Library
- http://www.eumetsat.int/website/home/Images/ImageLibrary/DAT_2266050.html

+ User Manual

- Short descriptions of the variables, including the choices made while working with each variable
- Description of the data sources, ordering, software tools and the use of scripts
- Example scripts, auxiliary data

Feedback, questions, ideas to atlas@lvgmc.lv

The Climate Atlas is a tool to help visualise climate datasets for Europe and Latvia.

Date & Time	1992-2009
Satellite	METSAT, Metop, NOAA

The H-SAR on Climate Monitoring (CM-SAR) provides satellite-based climate information on a variety of parameters, which can help people find out something more about atmosphere and climate.

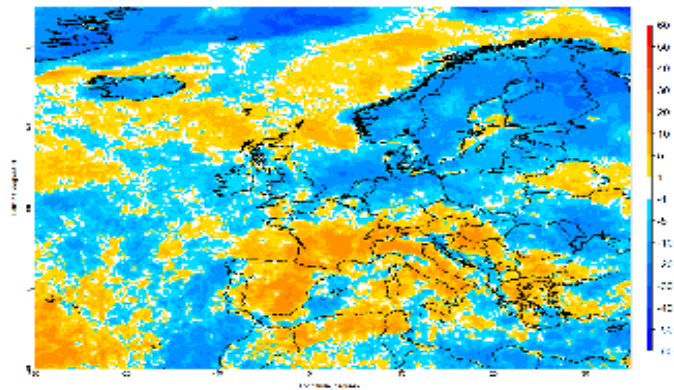
The climate atlas is a tool to help visualise climate datasets for Europe and Latvia. It is also a guide for working with satellite data in climatology.

More information and detailed analysis of the tool can be found in the In-Depth section.

IN DEPTH

by Zenta Avotniece (Latvian Environment, Geology and Meteorology Centre)

Monthly Anomaly of Cloud Fraction (%) in January 1992



PRODUCT: REGION:

TIME PERIOD: STATISTIC: YEAR:

MONTH:

The atlas is based on the climate datasets provided by the CM-SAR. It consists of maps providing climatological information of different meteorological parameters.

These include:

- general climatic characteristics of meteorological parameters over Europe and Latvia;
- information on satellite data suitable for climatological studies, particularly datasets provided by the CM-SAR;
- an example of the strengths and weaknesses of satellite data for climate applications;
- instructions for creating a satellite climatology atlas and beginning to work with satellite datasets in general.

This tool should be used for viewing example data from different CM-SAR climate datasets. The complete instructions provided here will enable users to create their own atlas with only minor additional support in processing or climatological theory.

In order to start creating your own atlas (or other product of your own choice), you should:

1. Decide what you want to achieve.
2. No, really decide what you want to achieve.
3. Decide which CM-SAR product is suitable for your application. In order to do this, you may want to consult the description files provided here and to visit the H-CM-SAR web page and the H-Web User Interface.
4. Order and download the data of interest by using the instructions for data ordering.
5. Install the software and get an idea of how it works; get acquainted with the scripts. Use the instruction files provided here for a basic overview and guidance.
6. Get acquainted with the work package (folder structure) and start working.
7. Pay attention to the results you get. Is there something suspicious or artificial in the data? You may need to decide if you are looking at something geophysical (real) or something from the data and data processing.

Additional sources to help you:

- H-Climate Atlas User Manual
- For additional information on the atlas please contact: Zenta Avotniece from the Latvian Environment, Geology and Meteorology Centre (zenta@lvgmc.lv).
- For any additional support on the use of CM-SAR data please contact the CM-SAR.
- H-CM-SAR Community Site will provide you with tutorial videos and useful scientific discussions of the current users of the atlas.
- H-CM-SAR Event work webcasts (H-Climate Monitoring SAR and H-CM-SAR Future (Plans) and Training Modules (H-Satellite Data in Climate Monitoring)) on the use of satellite data for climate monitoring.
- Online courses on computing and data analysis. You can find such courses on, for example, Coursera and Future School.

Work package used to create the atlas:

H-Toolbox containing the folder structure, example scripts and data (3.5 Gb). It contains the required folder structure, scripts and example NetCDF files for each product. Important – these are not the raw data as ordered and downloaded from the CM-SAR archive, but the result files acquired through manipulation of the raw data.

An aerial photograph of a vast, flat landscape, likely a salt flat or a dry lake bed, characterized by a deep blue color and a network of white, winding lines that suggest dry riverbeds or salt crystallization patterns. The text "Thank you for your attention!" is superimposed in the center in a white, serif font.

Thank you for your attention!