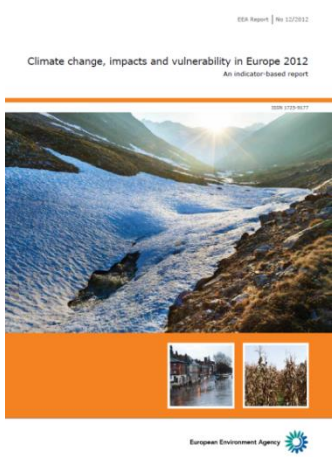
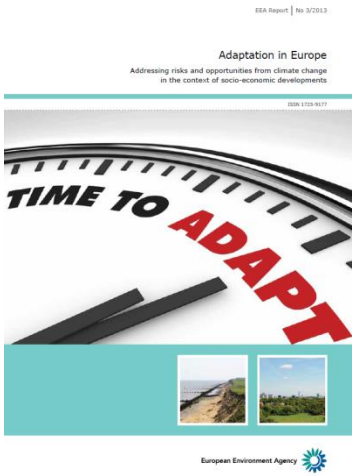
Examples of use of climate data for EEA indicators and Climate-ADAPT

Blaz Kurnik
Climate change impacts and adaptation (EEA)





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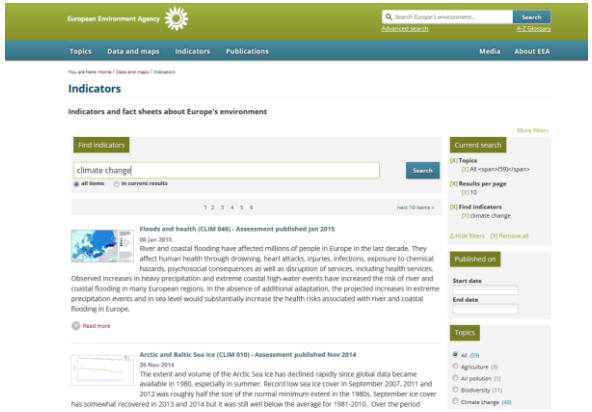
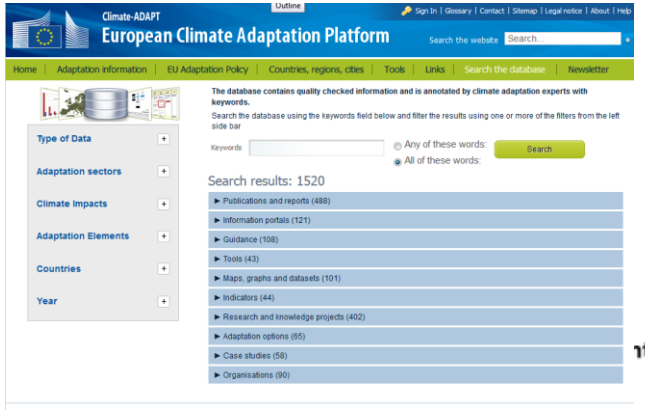
Main EEA products using climate data

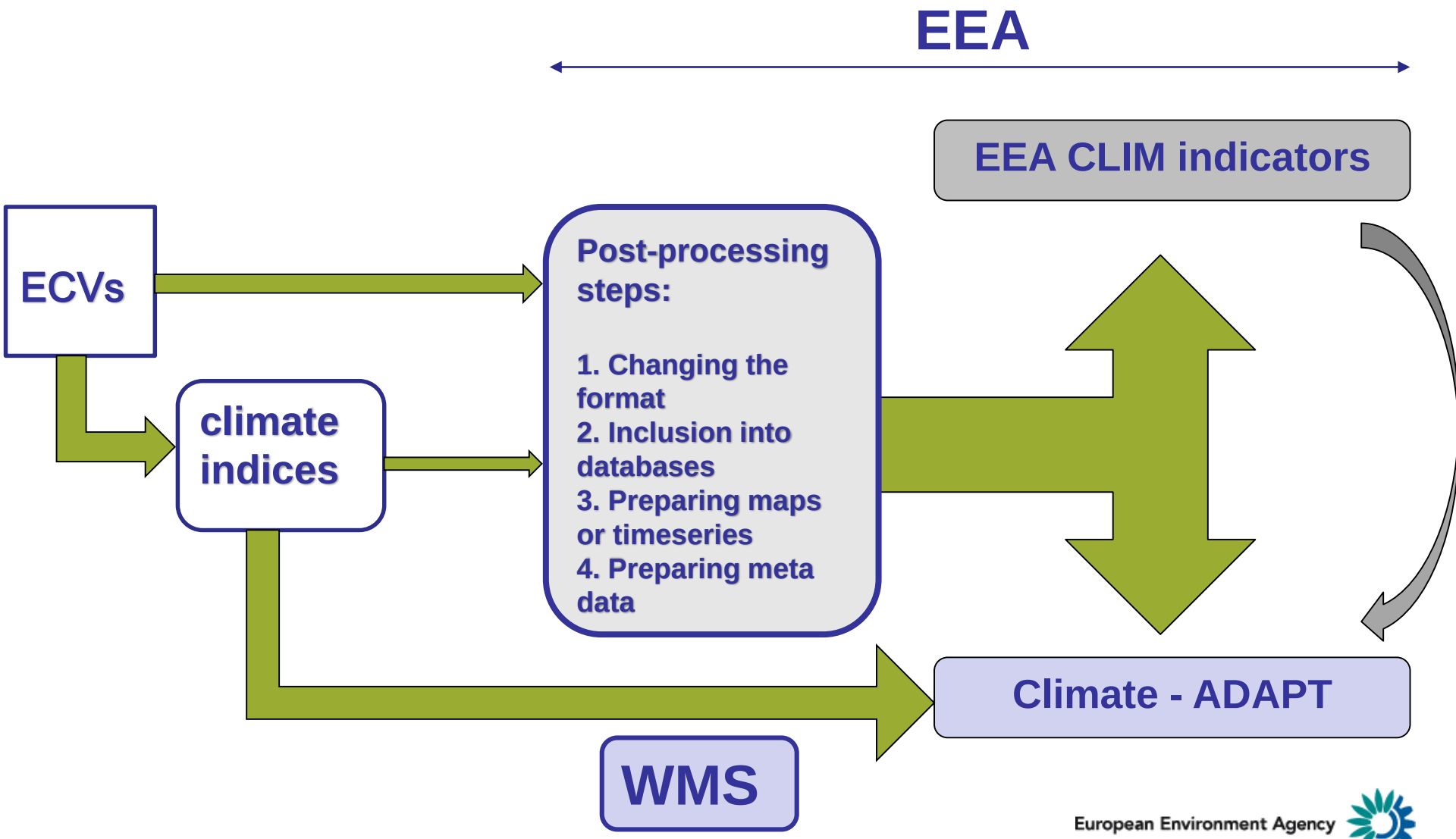
1. **Climate change impacts indicators (CLIM)** (updated every 1-3 years) and **EEA climate change assessments** (every 4 years)



2. **Climate-ADAPT** (updated "daily")



A typical data flow

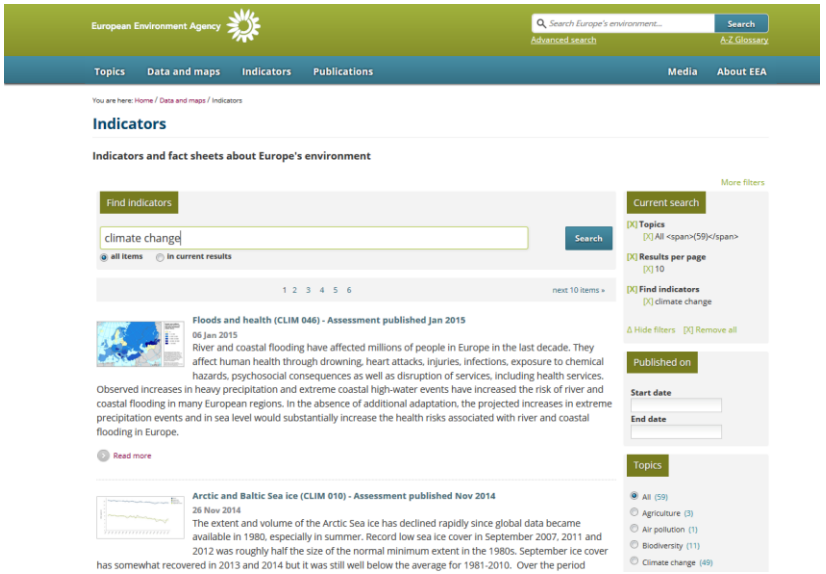


1. **Climate change impacts indicators**

EEA Climate change impact indicators

An EEA climate change impact indicator:

- is a measure that can be used to illustrate and communicate **complex** climate change phenomena in a **simple way**
- comprises **specificatio**n and **assessment(s**) including **key messages**
- uses quantitative data on **observed changes** and **projections**
- includes information on **uncertainties**
- has **policy** defined purposes
- uses well defined **criteria**
- is published on **EEA web pages (IMS)** and in **Climate-ADAPT**
- supports development of **adaptation policies**



www.eea.europa.eu/data-and-maps/indicators/

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Types and sources of data

Type:

- **Climate variables** (ECVs) (e.g. daily min, max, mean air temperature, total precipitation amount, …)
  23 indicators use directly at least one of the GCOS ECVs
- **Climate indices** (e.g. drought index, cold spell index, soil moisture index, …)
  7 indicators use different indices
- **in-situ** and/or **modelled** datasets (e.g. animal phenology data, distribution of species)

Sources:

- **Research projects** and programmes (EURO4M, ERA-CLIM2, UERRA,...)
- **Met** offices and **Climate** Services (ECMWF, UK MO, KNMI, …
- **Global** and **European** organisations (WHO, ECDC, CRED, JRC, …)
- **Scientific** literature, through scientific databases

Criteria:

- Thematic and policy **relevance**
- Scientific **soundness**
- Geographical **coverage**
- **Appropriate** geographical characterization
- **Long** time series
- **Reliable** data supply
- **Clear** methodology

Indicator name	*ECV or climate index*
Global and European Temperature	T2m
Temperature extremes	T2m
Mean precipitation	Pcp
Precipitation extremes	Pcp
Storms	FF&DD
Snow cover	Snow
Greenland ice sheet	IcS
Glaciers	Gla
Permafrost	Permafrost and seasonally frozen ground(stage III)
Arctic and Baltic sea ice	SIC
Ocean acidification	Ocean Acidity (stage III)
Ocean heat content	OHC
Sea surface temperature	SST
Phenology of marine species	SST
Distribution of marine species	SST
Global and European sea level rise	SL

Indicator name	*ECV or climate index*
Storm surges	SL, FF&DD
Soil organic carbon	LAI, FPR
Soil erosion	Pcp, LAI
Soil moisture	Soil moisture (stage III)
Growing season for agricultural crops	LAI, FPR
Agrophenology	LAI, FPR
Water-limited crop productivity	Crop moisture index (stage II), Soil moisture (stage III)
Irrigation water requirement	Crop moisture index (stage II), Soil moisture (stage III)
Forest fires	Fid
Extreme temperatures and health	Heat stress index (stage II)
Air pollution by ozone and health	O3A
Heating degree days	Residential Energy Demand Temperature index (stage II)

Structure

Key messages

Assessment (narrative on observed trends and projected climate change answering **policy question**)

Data:

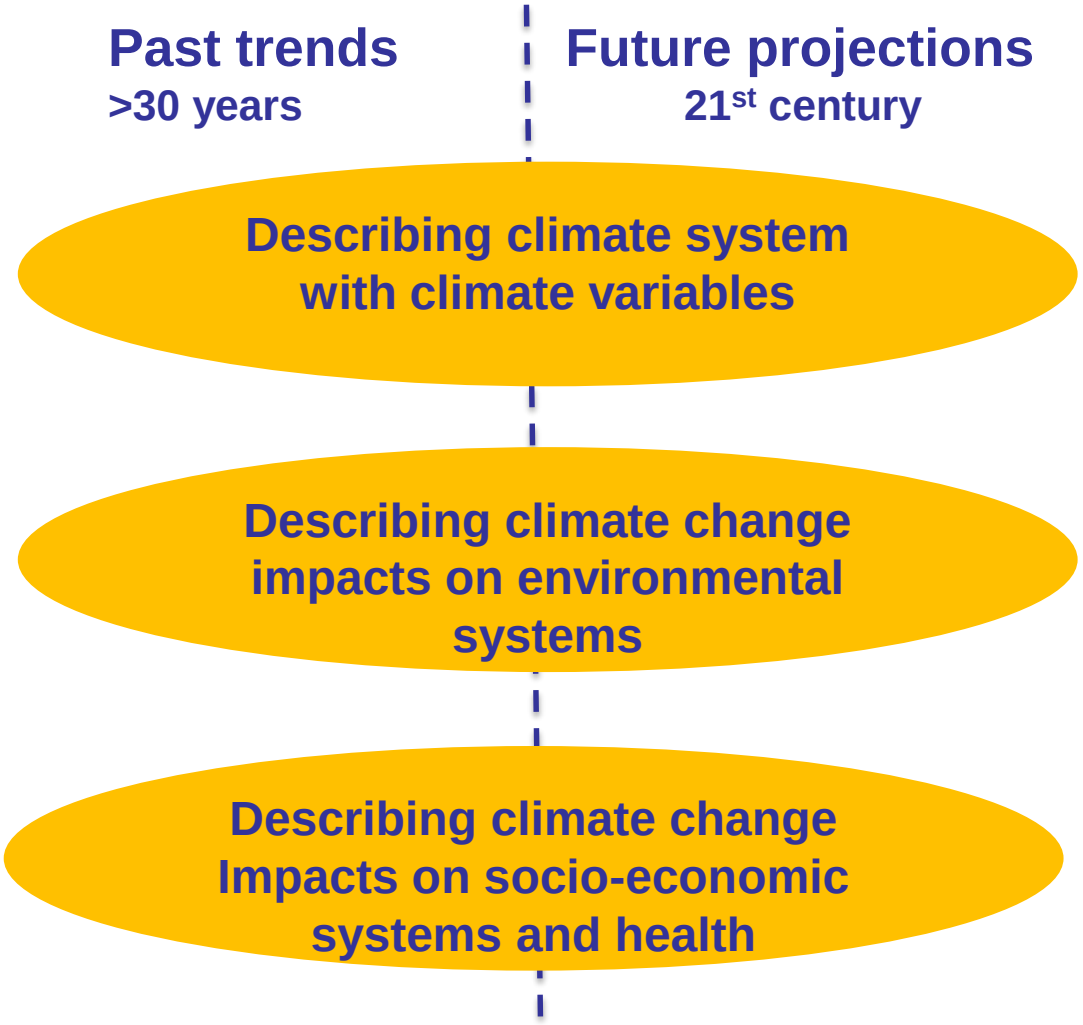
- Observations (in situ, remote sensing, reanalysis)
- Climate projections

Specification (description of data and methodology)

Meta data

- Units,
- Methodology,
- uncertainty,
- data providers,…

Describing climate change/impacts



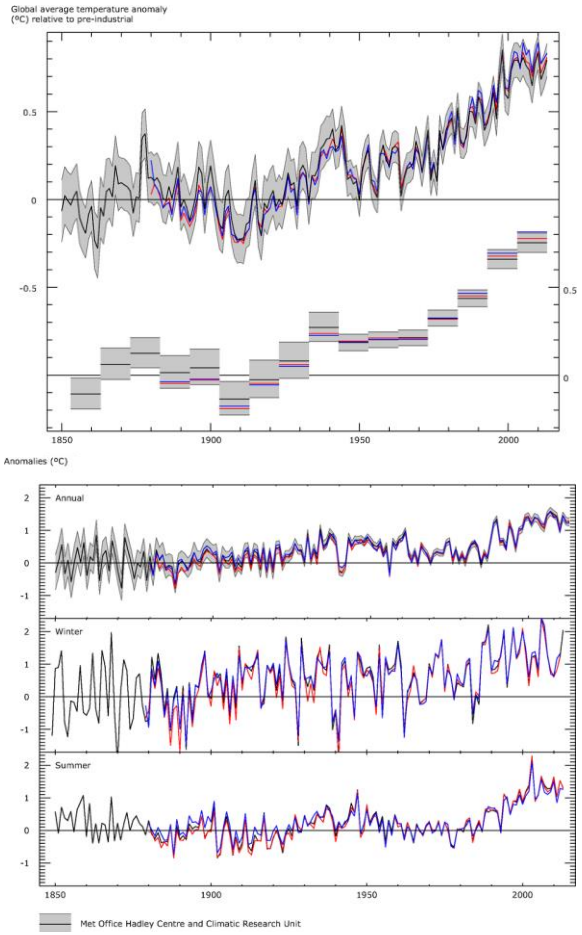
Set of 45 climate change impacts indicators

European temperature (trends)

Policy question: How much have global and European temperatures increased since pre-industrial period?

To answer the PQ we need:

- long time series of air surface temperature (~ 150 years)
- Data in a reasonable spatial resolution over the globe
- Data in high spatial resolution
- Seasonally aggregated data
- Presenting uncertainties



Met Office Hadley Centre and Climatic Research Unit

NOAA National Climatic Data Center

NASA Goddard Institute for Space Studies

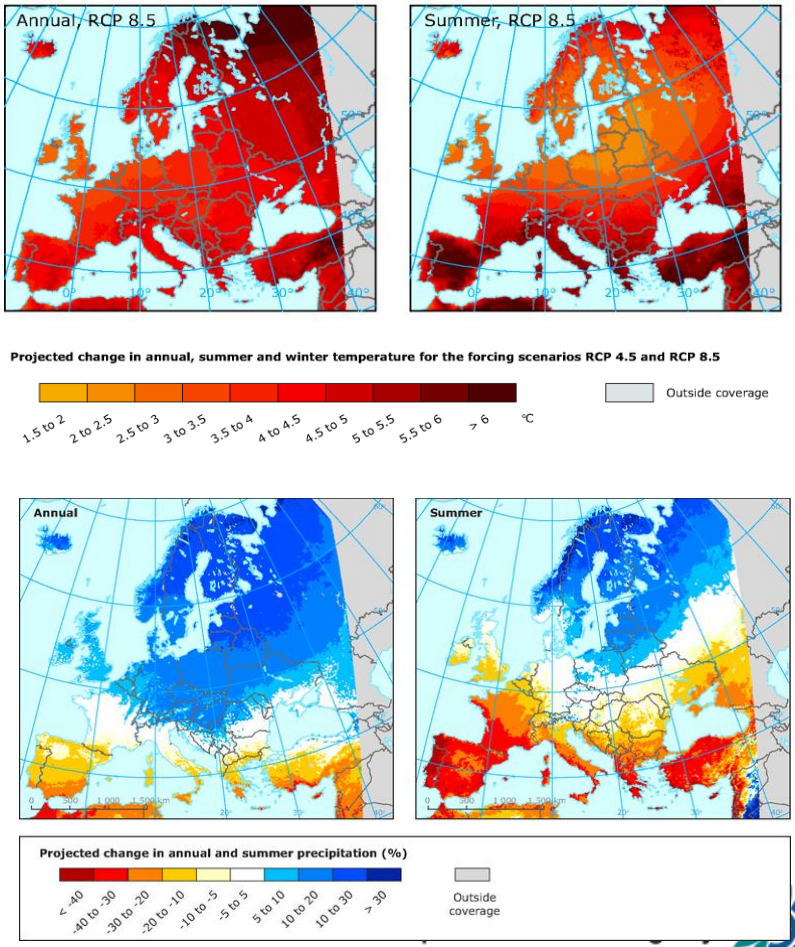
Link: http://www.eea.europa.eu/data-and-maps/indicators/global-and-european-temperature/global-and-european-temperature-assessment-8

Temperature and precipitation projections

Policy Question: What are the projected changes in temperature and precipitation in Europe?

To answer the PQ we need:

- Reliable multi-model projections by RCMs from EURO-CORDEX
- High spatial resolution datasets to assess regional differences
- RCMs driven by boundary conditions from different GCMs to assess ranges
- Different RCPs
- Projections for the whole 21st century
- Annual or seasonally aggregated data
- Bias corrected data in case of projections from impact models



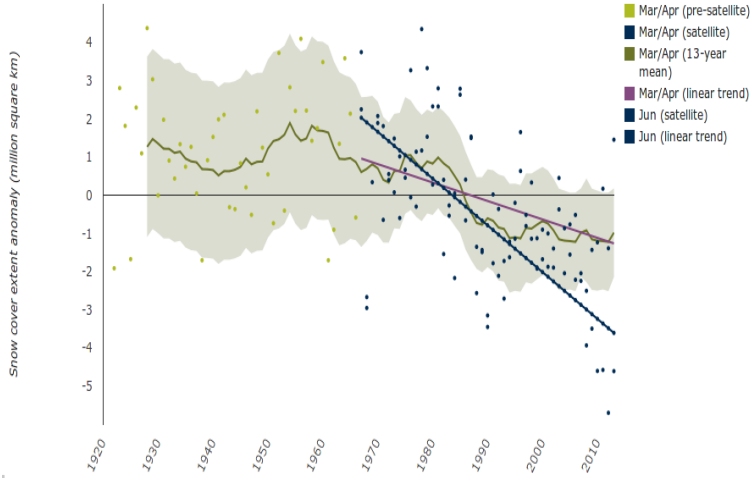
Link: http://www.eea.europa.eu/data-and-maps/indicators/european-precipitation-1/assessment-1

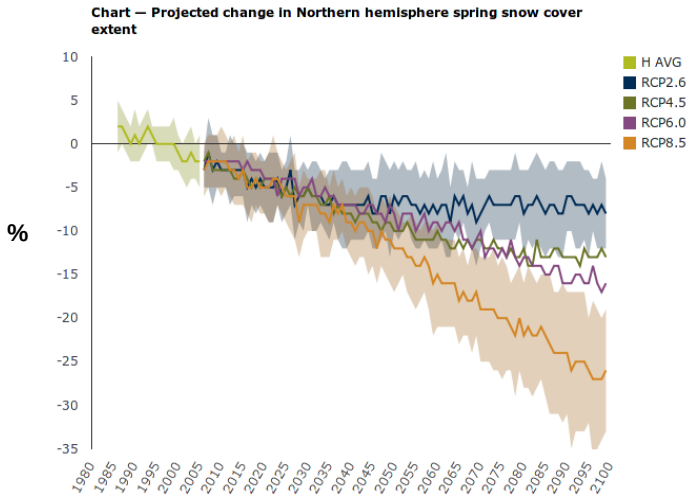
Snow cover

Policy Question: What are the trends and projections in snow cover extent and snow mass in Europe?

To answer the PQ we need:

- Different indices; snow cover extent and snow mass from different sources (GlobSnow project, Global Snow Lab, Laboratorie de Glaciologie et Géophysique de l'Environnement (LGGE))
- Observations are based on in-situ and satellite observations show
- Projections based on GCMs and different RCPs



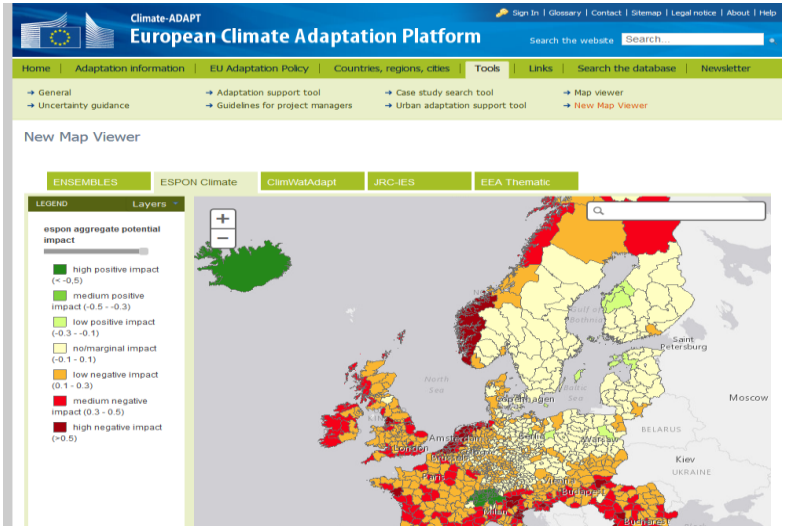


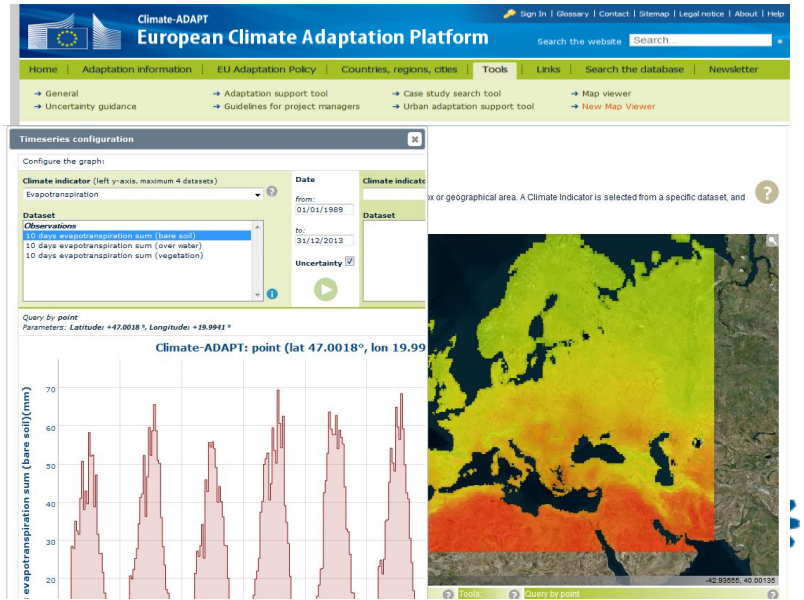
[Link: http://www.eea.europa.eu/data-and-maps/indicators/snow-cover-2/assessment](http://www.eea.europa.eu/data-and-maps/indicators/snow-cover-2/assessment)

2. Tools in Climate-ADAPT

Climate observations and projections in Climate-ADAPT

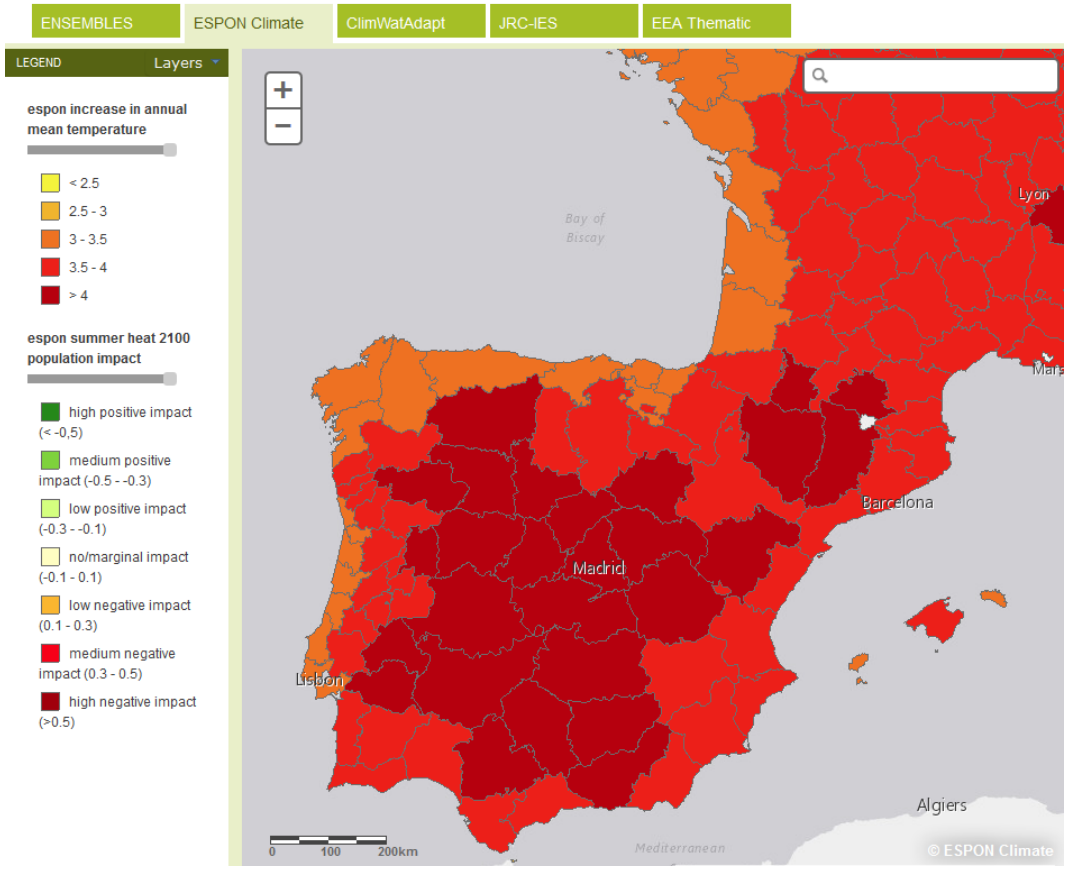
- Map viewer and time series tool
- Spatial information on different ECVs and indices including time series
- Raster and vector maps with climate indices
- Various types of data providers
- Data stored at the source
- Combining different datasets in one map





[Link: climate-adapt.eea.europa.eu/tools](climate-adapt.eea.europa.eu/tools)

Climate-ADAPT thematic mapviewer (v2)



- Five groups of data sources, connected to Climate-ADAPT with WMS
- Static maps, mainly on projections
- Possibilities to combine layers on impacts and vulnerabilities
- Basic structure (keep it simple)
- Information on the maps searchable in the Climate-ADAPT database

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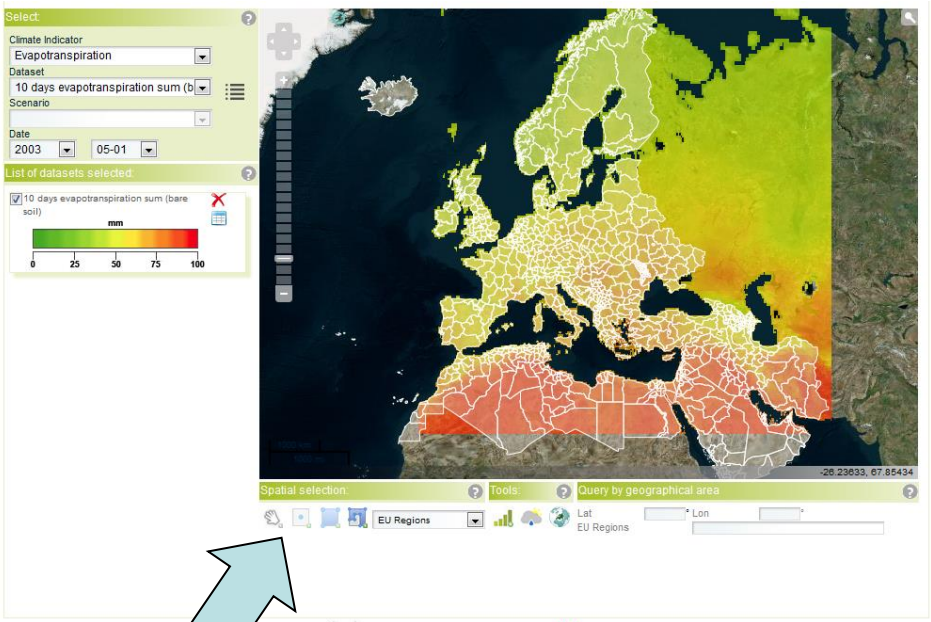
Climate-ADAPT timeseries tool

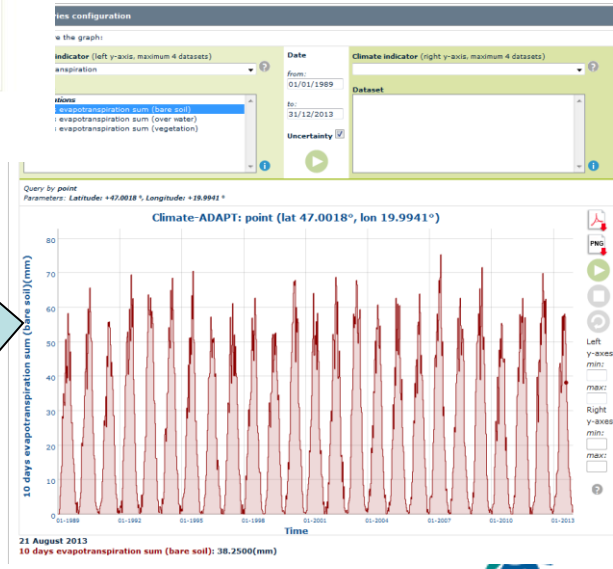
- An expert tool for presenting the timeseries of selected climate variables in Europe
- Developed by JRC
- 16 different sets ECVs or indices mainly based on observations
- Includes metadata portal
- Includes data from different sources using Web Features Service (WFS) and Web Map Service (WMS)

Climate-ADAPT timeseries tool

Selection of a ECV or an index for a selected timestamp



Options for spatial aggregation



Temporal presentation of selected ECV

Conclusions

- EEA CLIM indicators present both **past trends** and **future projections,**
- EEA CLIM indicators provide information on **uncertainty** of data, **quality** of input data, description of **methodology**,
- majority of EEA CLIM **indicators** could in future be based on the data and information provided by **C3S,**
- C3S could be **a key contributor** to EEA climate change impact assessments,
- Climate-ADAPT includes also tools for **spatial** and **temporal visualisations** of selected climate indices (using map viewer and time series tool),
- Climate-ADAPT tools like **mapviewer** and **time series tool** could in future include also outputs (like aggregated maps, timeseries of different indices, …) from C3S.

Thank you for your attention

http://www.eea.europa.eu/themes/climate
http://climate-adapt.eea.europa.eu

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Indicators and ECVs

Indicator name	ECV	comment
Global and European Temperature	T2m	
Mean precipitation	Pcp	
Storms	FF&DD	
Snow cover	Snow	
Greenland ice sheet	IcS	
Permafrost	Permafrost and seasonally frozen ground	
Arctic and Baltic sea ice	SIC	
Ocean acidification	Ocean Acidity	
Ocean heat content	OHC	
Sea surface temperature	SST	
Storm surges	SL, FF&DD	Combination of one or two ECVs
River flow	River discharge	As defined in GCOS
Plant and fungi phenology	link not identified	in situ data (phenological observations
Animal phenology	link not identified	in situ data (phenological observations
Soil moisture	Soil moisture	C3S stage III
Growing season for agricultural crops	LAI, FPR	Combination of different ECVs
Water limited crop productivity	Crop moisture stress index	Not ECV, but index
Floods and Health	Link not identified	Countries information

As proposed in C3S

- C3S stage II
- C3S stage III
- GCOS
- Not defined

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