Use of climate data and information for EEA climate change assessment

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(Air and climate change programme - EEA)

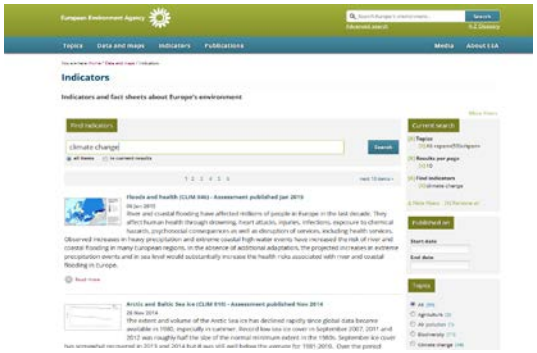
European Environment Agency

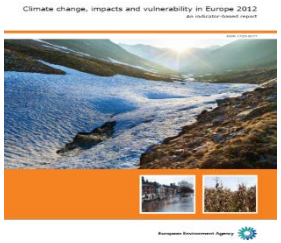
2016: EEA content priorities

- Circular economy
- Climate and Energy
- Sustainable Development Goals
- Refit Monitoring and Reporting
- Natural Capital
- Copernicus
  - land monitoring service and in-situ coordination
  - climate change service (important European user)
- SOER2020

Climate change, impacts, vulnerabilities, and adaptations

- Climate change impacts indicators
- Climate change impacts report
- Climate – ADAPT
- Report on Extreme weather and climate in Europe





Presenting Uncertainty

- **Uncertainty guidance** included in the Climate-ADAPT,
- Section on **uncertainty in observation and projections** in Climate change impacts report,
- **Uncertainty section** in climate impacts indicators ,
- **Uncertainty** in assessing trends and projections of **extreme climate.**

Climate indicators – Temperature

- An indicator on **Global and European temperature**
- Answering the policy question on **2 C target**
- Updated and improved **annually**
- Various global and European **datasets** used
- **Uncertainty** information presented in different ways

2015 the warmest year since pre-industrial…

… globally and in Europe

Media Centre

WMO: 2015 likely to be Warmest on Record, 2011-2015 Warmest Five Year Period

INDEPENDENT News Voices Culture Lifestyle Tech Sport Appeal

EURO4M

EUROPEAN REANALYSIS AND OBSERVATIONS FOR MONITORING
Tracking changes in European climate

2015: joint warmest year on record in Europe

(Redirected from 2015: second warmest year on record in Europe)

2015: second warmest year on record in Europe

Climate Indicator Bulletin

Climate Indicator Bulletins (CIBs) are user-driven climate information products which provide simple, effective and timely knowledge abstractions from the large amount of observation and reanalyses data available in UERRA. The bulletins focus on user groups in sectors such as disaster prevention, health, energy, water resources, ecosystems, forestry, agriculture, transport, tourism and biodiversity at European, national and local levels.

This bulletin presents an overview of the 2015 temperature evolution in Europe based on a large number of measurements.

Last update: 25 January 2016.

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Climate change: 2015 will

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Climate change

2015 smashes record for hottest year, final figures confirm

Experts warn that global warming is tipping climate into 'uncharted territory', as Met Office, Nasa and Noaa data all confirm record global temperatures for second year running

Damian Carrington

@dpcarrington

Wednesday 20 January 2016 15.30 GMT

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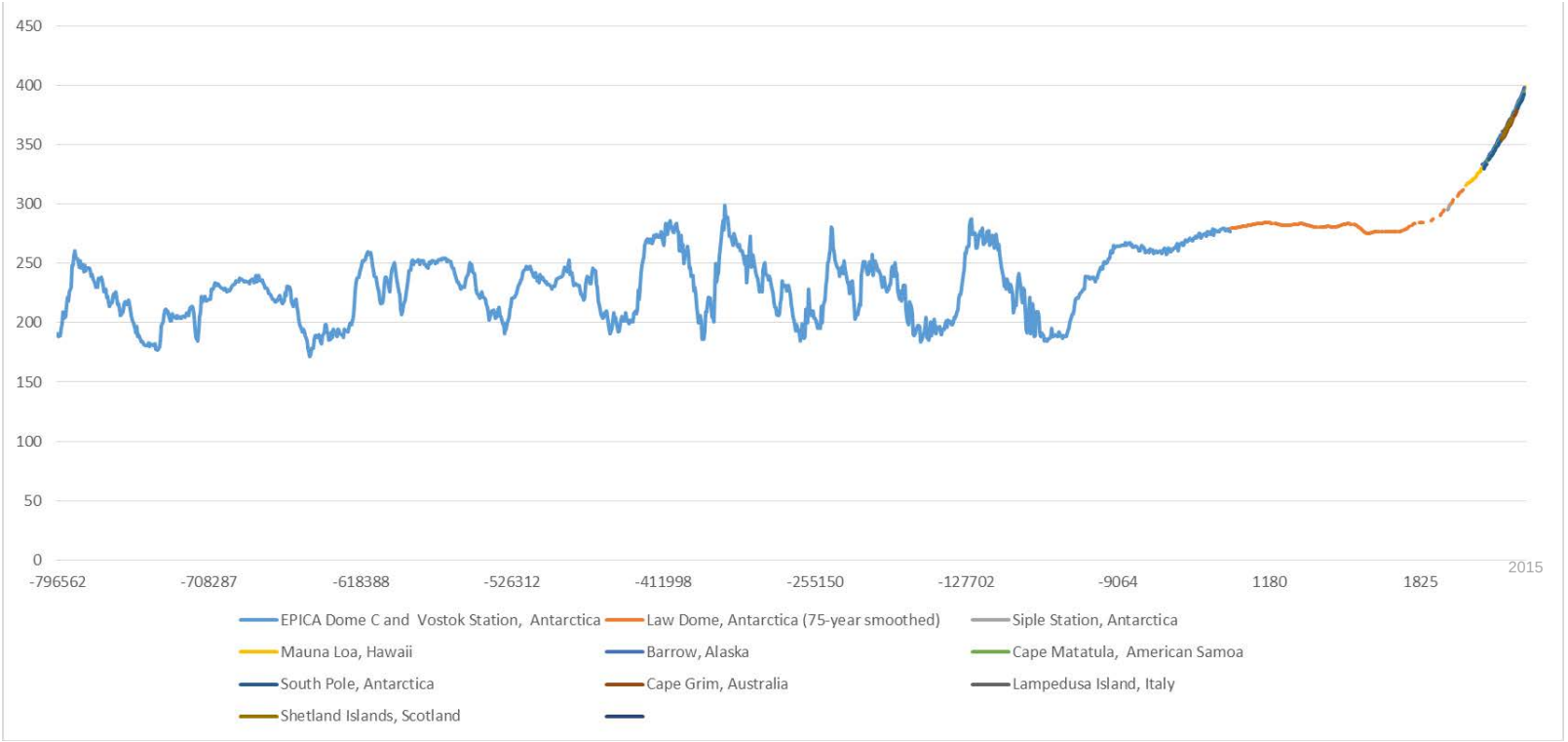
- 2015 the warmest year on record, according to **different** near-surface temperature observational analyses with anomalies close to 1^{o}C.

- the decade 2006-2015 was between **0.83 and 0.89 ^{o}C** warmer than the period 1850-1899 (**pre-industrial**)

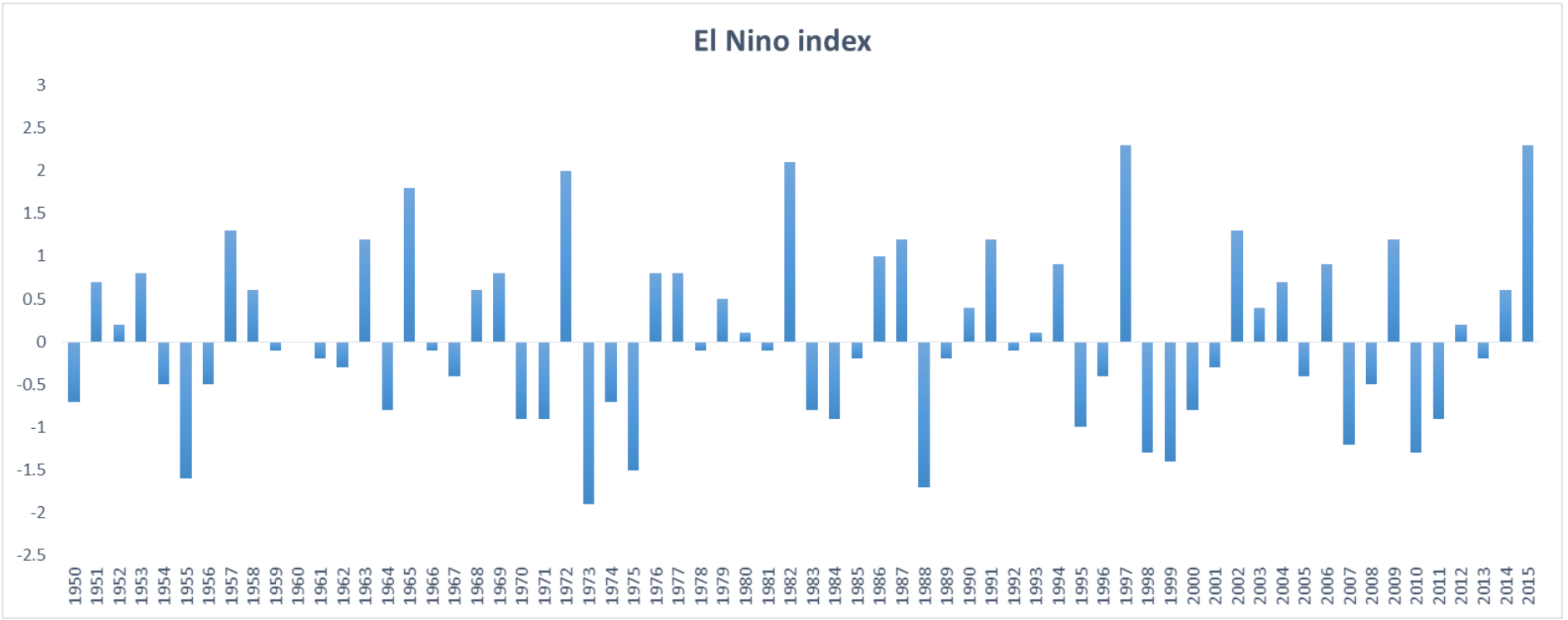
Reasons

- Anthropogenic influence – CO_2 concentration close to 400 ppm (highest in last 800 000 years)



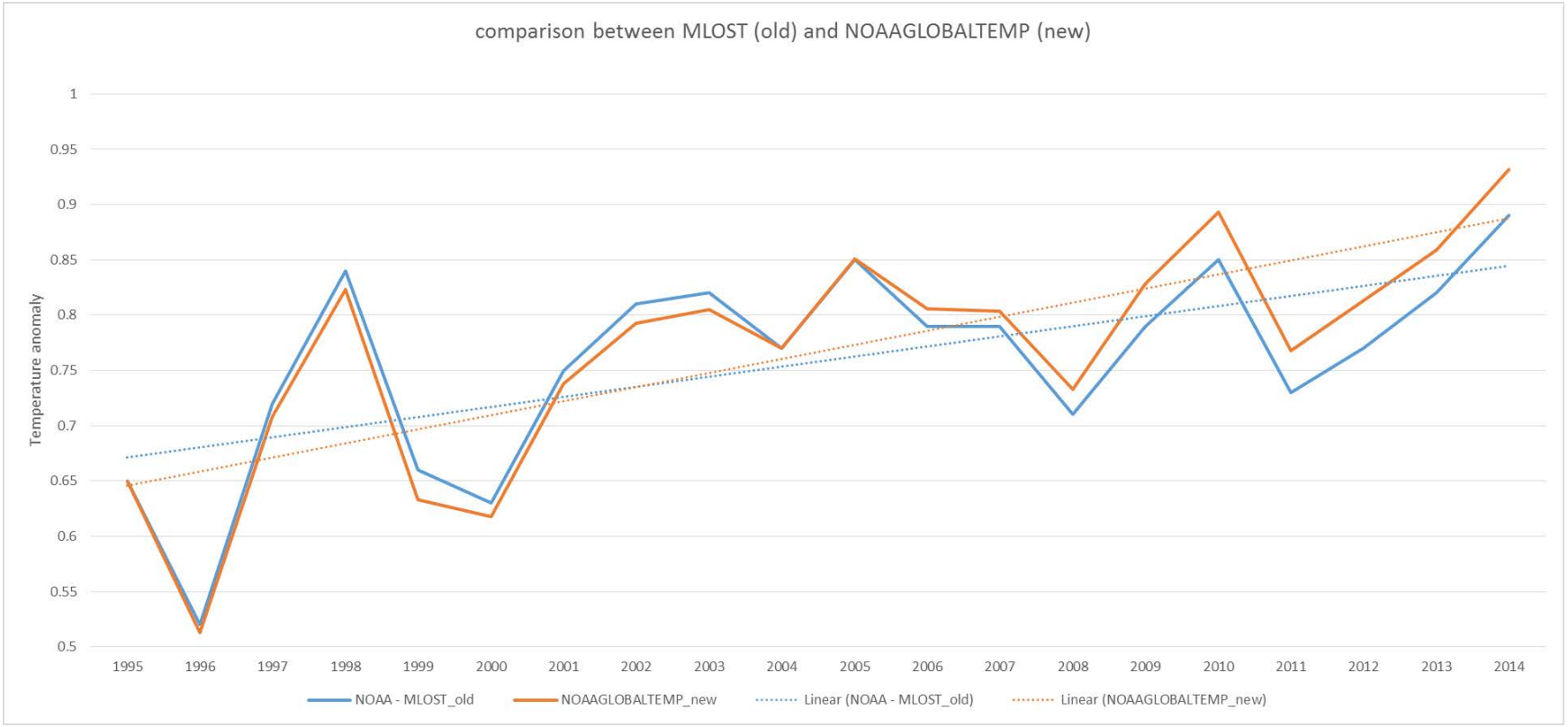
Reasons

- ENSO (strong positive phase after 1998)

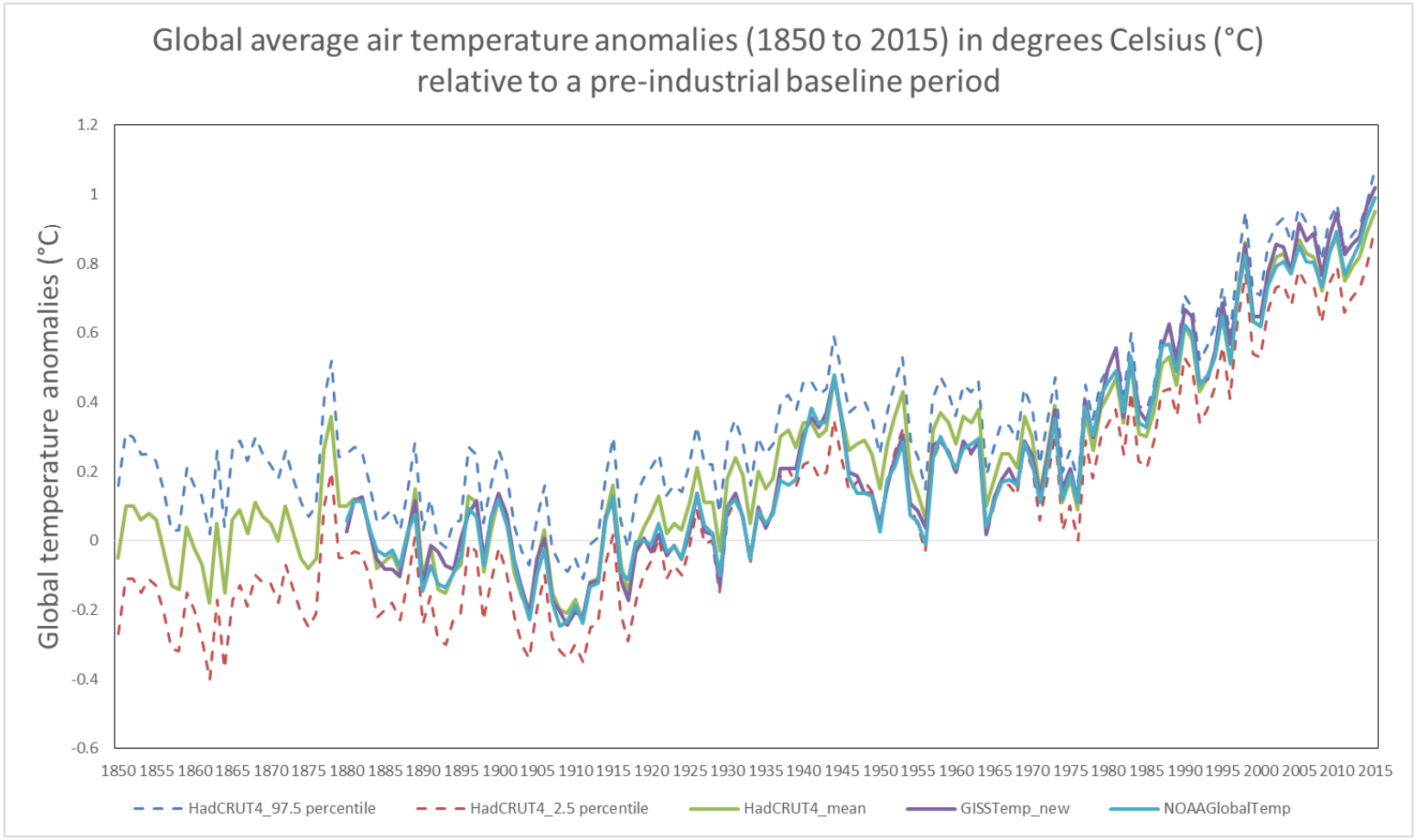


Timeseries of global temperature

New data with more stations available



Uncertainties in observations



EEA, UK – Met Office based on HadCRUT4 (Morice et al., 2012)*, NOAAGlobalTemp* (Karl et al, 2015) *and NASA-GISS* (Hansen et al., 2010)

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Uncertainties in past trends

- **Measurement errors** resulting from imperfect observational instruments (e.g. rain gauges, satellite sensors calibrations, station displacement, …)
- Errors in digitalising **old data** records
- **Aggregation errors** resulting from incomplete temporal and/or spatial data coverage (e.g. interpolation, filling missing data, homogenisations, …).
- In case of reanalysis **imperfect models** with limits in spatial resolution, descriptions of physical processes, boundary conditions, etc.
- In case of analysing trends: **selection of indices** and statistical trends analysis

Report on climate extremes

Assessing trends and projections in extreme events

Observations and projections of extreme events

Extreme temperature (Heat waves)

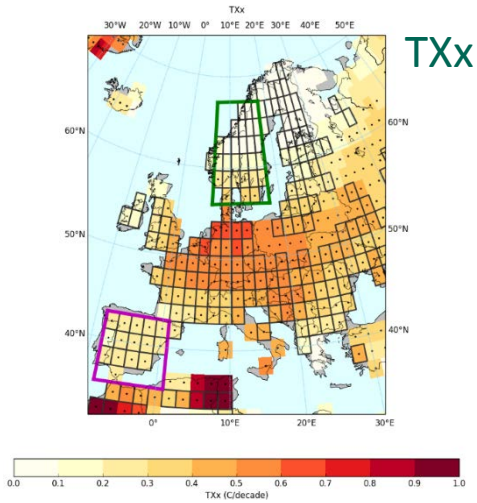
Droughts (meteorological, soil moisture and hydrological droughts)

Hail

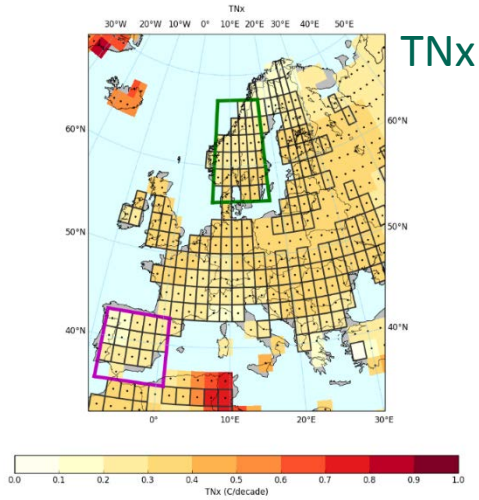
Heavy precipitation

Temperature extremes – use different thresholds

Trends in daily maximum and minimum temperature



TXx



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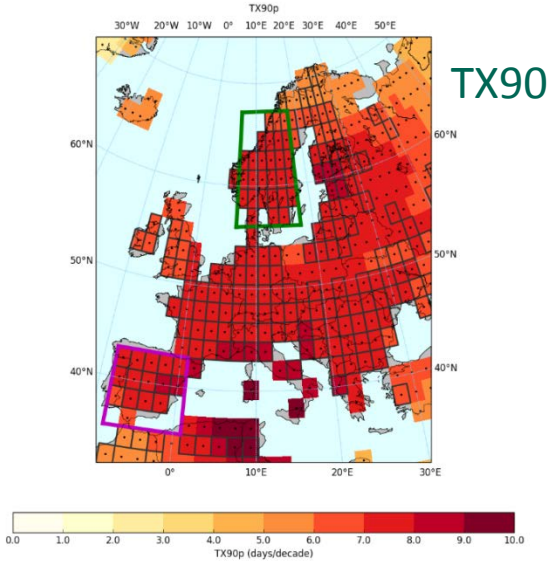
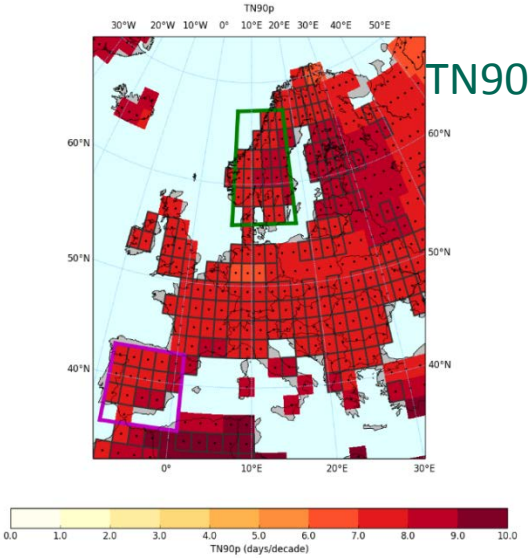
Absolute threshold



TX90p



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Relative threshold

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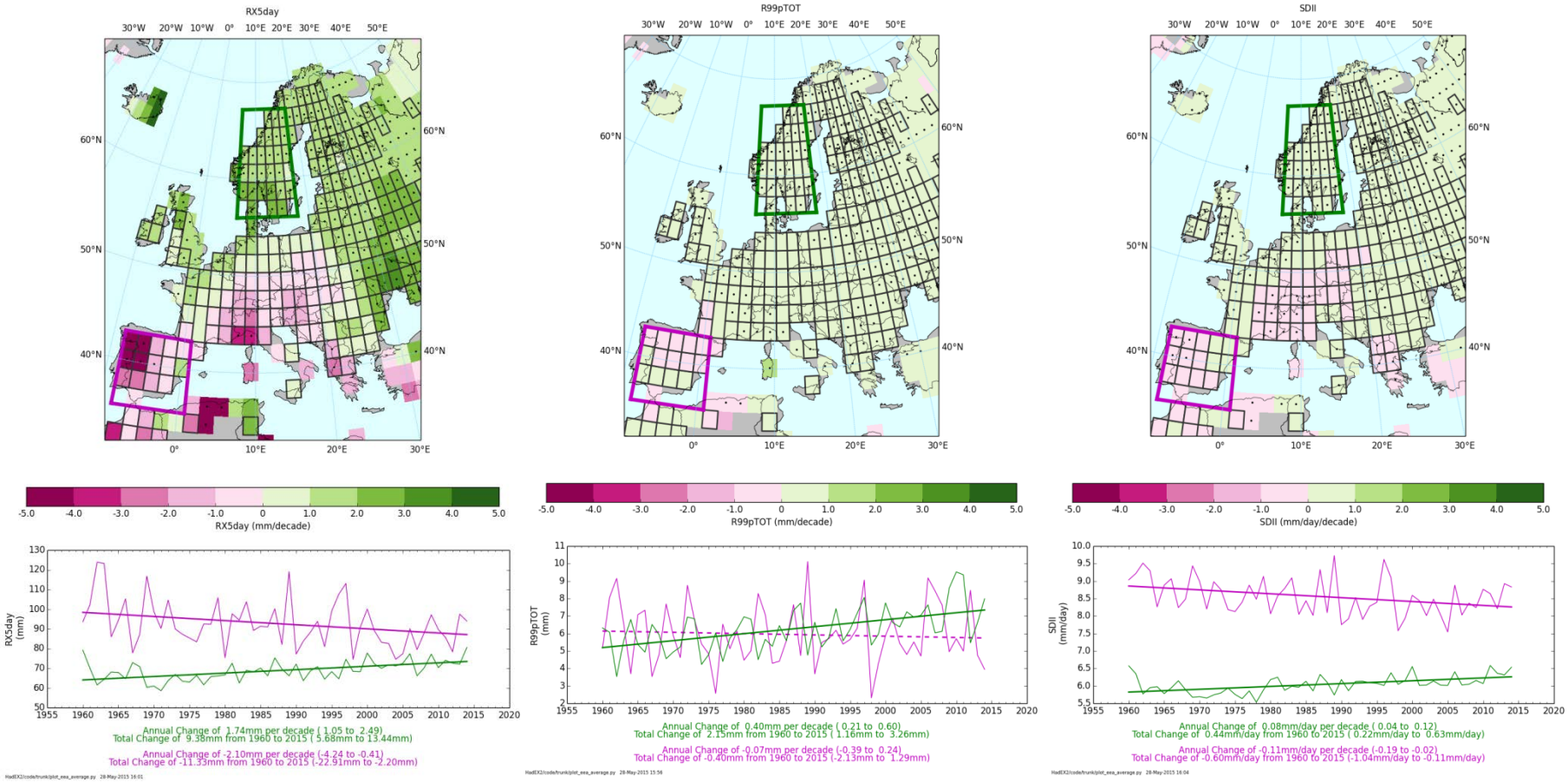
Precipitation extremes – use of different indices



EEA, 2015

European Environment Agency

Key messages from the report

- Since 2003 Europe has experienced several extreme summer heatwaves (2003, 2006, 2007, 2010, 2014 and 2015). ***Heat waves are projected to become the norm in the second half of the 21st century under a high forcing scenario (RCP8.5).***

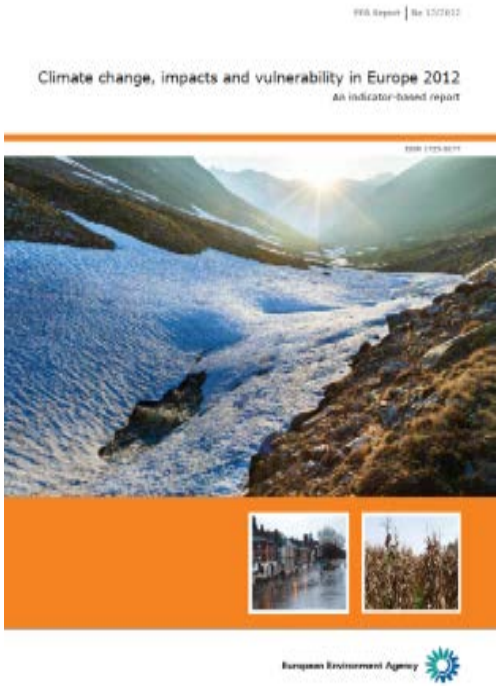
- The length of wet spells as well as the intensity of heavy precipitation events have decreased in southwestern Europe but increased in northern and northeastern Europe since 1960s. ***High resolution precipitation dataset not available.***

- Since 1951 increasing hail trends have been noted in southern France parts of Spain and Austria, and decreasing (but not significant) trends in parts of eastern Europe. ***Missing reliable data***

Climate Change impact report – under preparation

- Assessing impacts of past and future climate change

- Chapters on climate system, climate impacts on socio-economic sectors, ecosystems, and health



- Uncertainties addressed in separate section and under different indicators

Uncertainties in future climate impacts

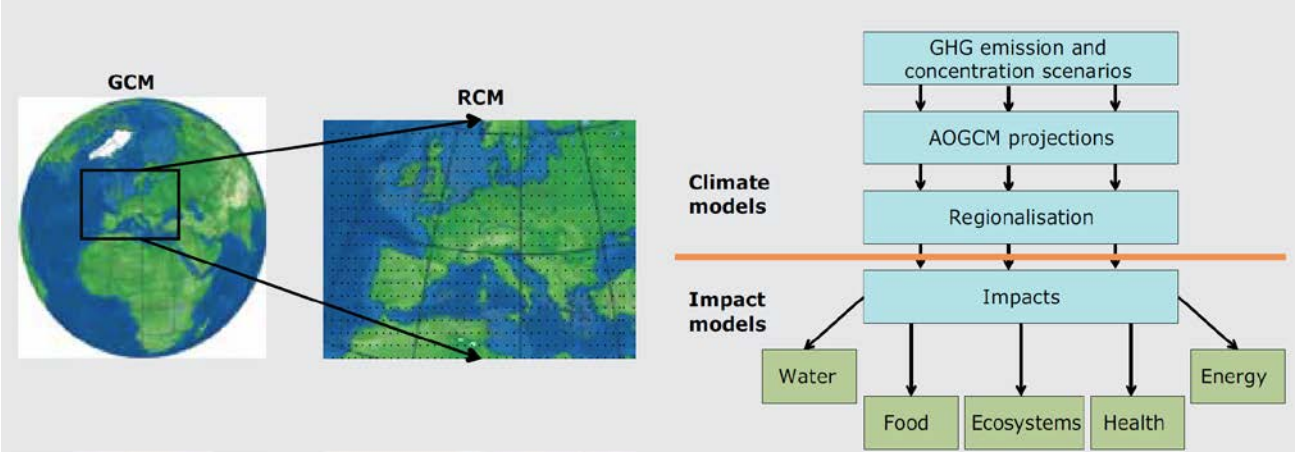
- ***Model limitations*** *(of climate and climate impact models)*
  - the limited resolution of models
  - an incomplete understanding of individual Earth system components
  - incomplete understanding of the environmental or social system under consideration

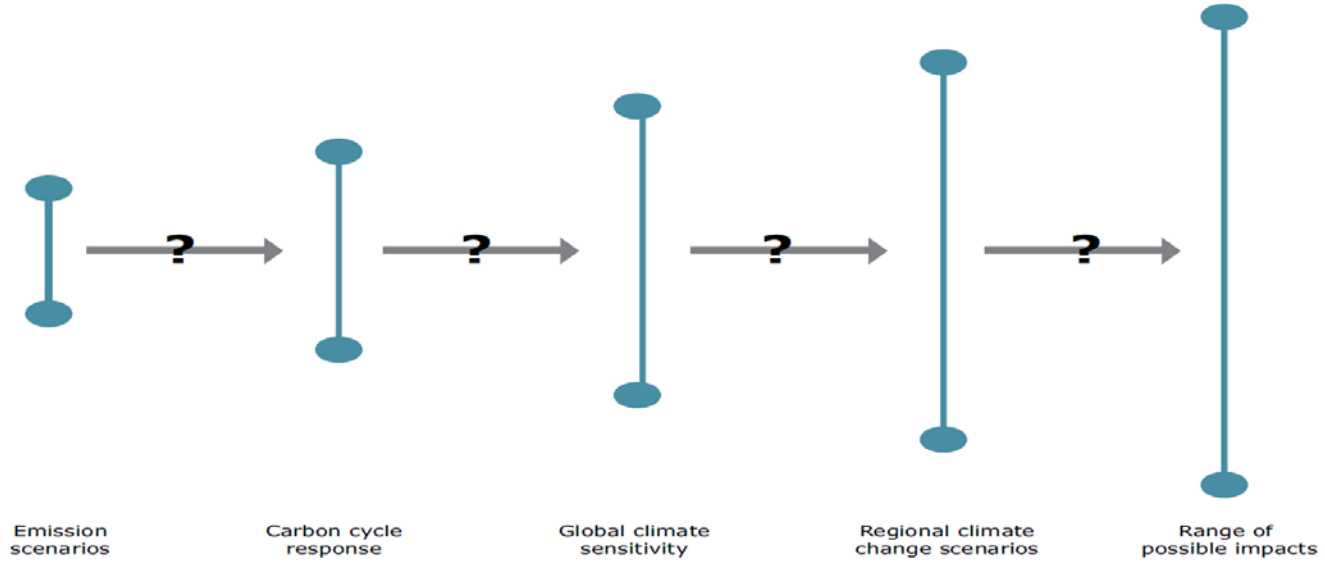
- ***Future emissions trajectories*** *(of greenhouse gases and aerosols)* determine the magnitude and rate of future climate change.

- ***Future development of non-climatic*** *(socio-economic, demographic, technological and environmental)*

- ***Future changes in societal preferences and political priorities*** determine the importance attached to a given climate impact (e.g. a local or regional loss of biodiversity).

Cascade of uncertainty





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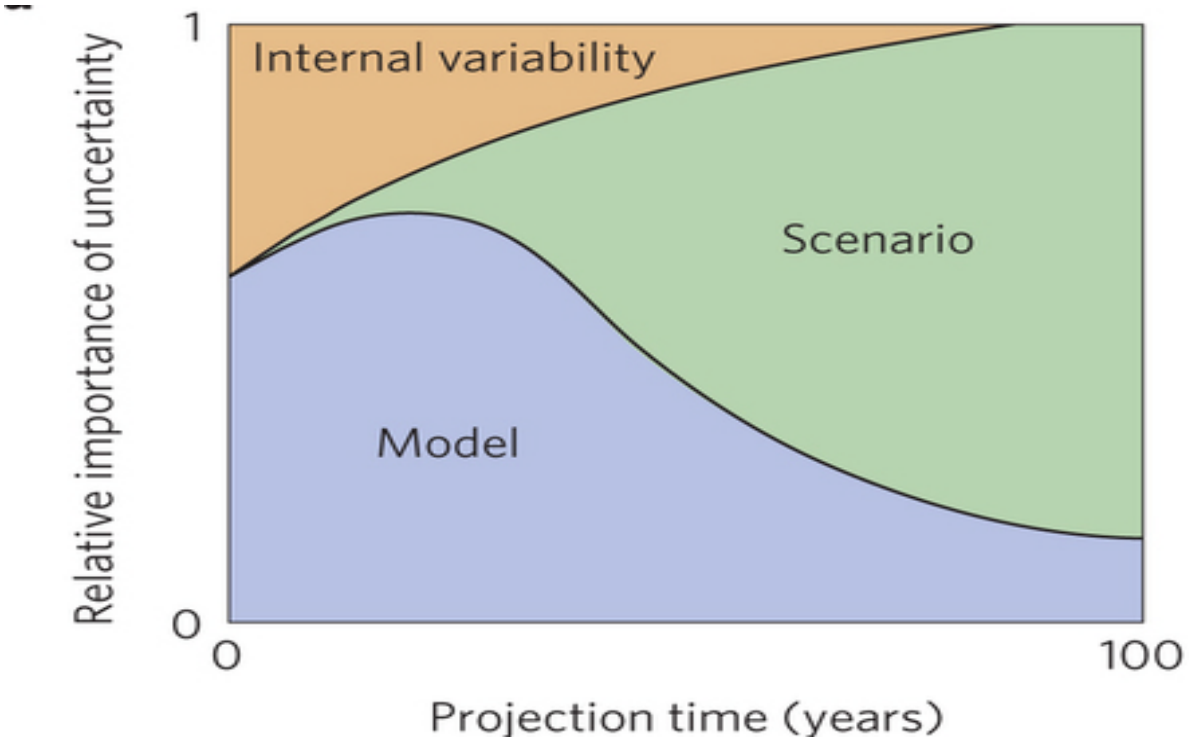
Ahmad et al., 2007

Uncertainties in projections

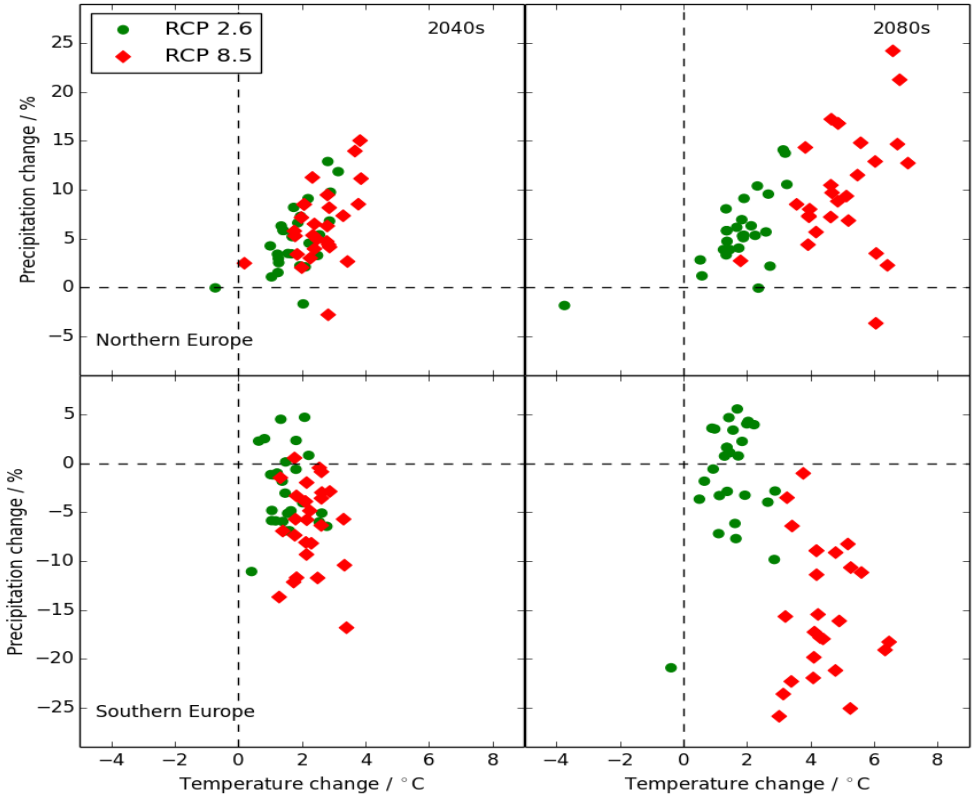
- **Relative contributions** of three sources of uncertainty in model-based climate projections of global decadal mean surface temperature



(Hawkins and Sutton, 2009)

Presenting models' results to policy makers

- Annual projected changes in temperature and precipitation for northern Europe and southern Europe and for two time periods



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Forthcoming EEA reports on climate change

- Climate change, impacts, and vulnerability report 2016 – indicator report (currently in under review with member states)

- Climate change adaptation and disaster risk reduction in Europe - Synergies for the knowledge base and policies – 2017 report (drafting has started)