

Knowledge base for adaptation

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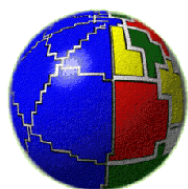
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Bologna, Italy

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ECRAN / TAIEX Workshop on national climate adaption policies and legislation - phase 1,

Tirana, Albania, 24-25 Nov. 2014



Istituto Nazionale di Geofisica e Vulcanologia



cmcc
Centro Euro-Mediterraneo
sui Cambiamenti Climatici

Outline

- Recent EEA reports
- Risk and uncertainty
- A preliminary Screening
- Data sources (obs. and models)
- New scenarios RCPs (IPCC AR5)

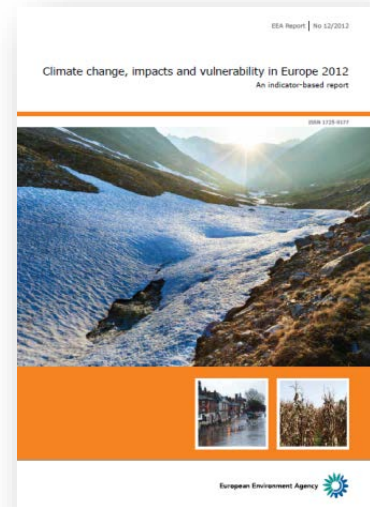
EEA activities on climate change impacts, vulnerability and adaptation



All available in English on EEA website.

Climate change, impacts and vulnerability in Europe (EEA indicator report, Nov 2012)

- Climate change (increases in temperature, changes in precipitation and decreases in ice and snow) is occurring **globally and in Europe**
- **A wide range of impacts on environmental systems and society** is occurring; further climate change impacts are projected for the future.
- Climate change impacts are projected to **differ strongly across Europe**.
- Climate change can **increase existing vulnerabilities and deepen socio-economic imbalances** in Europe.
- Projected future **impacts and damage costs** from climate change can be **reduced significantly by mitigation and adaptation actions**.



All indicators are on the EEA web site, many were updated after publication of IPCC AR5 reports in 2013/14

New updated EEA report due in 2016

Key past and projected impacts of climate change in Europe

Arctic

- Temperature rise much larger than global average
- Decrease in Arctic sea ice coverage
- Decrease in Greenland ice sheet
- Decrease in permafrost areas
- Increasing risk of biodiversity loss
- Intensified shipping and exploitation of oil and gas resources

Coastal zones and regional seas

- Sea-level rise
- Increase in sea surface temperatures
- Increase in ocean acidity
- Northward expansion of fish and plankton species
- Changes in phytoplankton communities
- Increasing risk for fish stocks

North-western Europe

- Increase in winter precipitation
- Increase in river flow
- Northward movement of species
- Decrease in energy demand for heating
- Increasing risk of river and coastal flooding

Mediterranean region

- Temperature rise larger than European average
- Decrease in annual precipitation
- Decrease in annual river flow
- Increasing risk of biodiversity loss
- Increasing risk of desertification
- Increasing water demand for agriculture
- Decrease in crop yields
- Increasing risk of forest fire
- Increase in mortality from heat waves
- Expansion of habitats for southern disease vectors
- Decrease in hydropower potential
- Decrease in summer tourism and potential increase in other seasons

Northern Europe

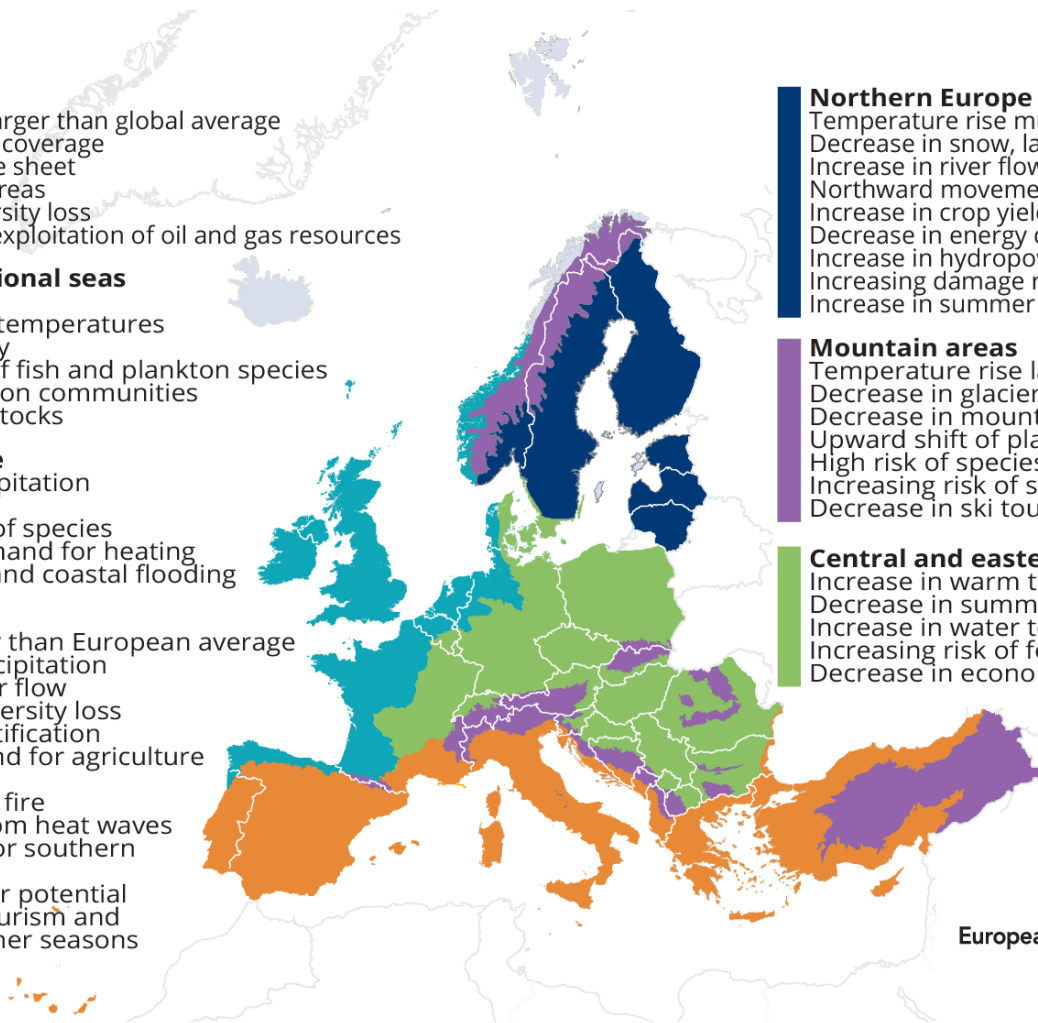
- Temperature rise much larger than global average
- Decrease in snow, lake and river ice cover
- Increase in river flows
- Northward movement of species
- Increase in crop yields
- Decrease in energy demand for heating
- Increase in hydropower potential
- Increasing damage risk from winter storms
- Increase in summer tourism

Mountain areas

- Temperature rise larger than European average
- Decrease in glacier extent and volume
- Decrease in mountain permafrost areas
- Upward shift of plant and animal species
- High risk of species extinction in Alpine regions
- Increasing risk of soil erosion
- Decrease in ski tourism

Central and eastern Europe

- Increase in warm temperature extremes
- Decrease in summer precipitation
- Increase in water temperature
- Increasing risk of forest fire
- Decrease in economic value of forests



European Environment Agency



European Environment Agency



Key past and projected impacts of climate change in Europe

Mediterranean region

Temperature rise larger than European average
Decrease in annual precipitation
Decrease in annual river flow
Increasing risk of biodiversity loss
Increasing risk of desertification
Increasing water demand for agriculture
Decrease in crop yields
Increasing risk of forest fire
Increase in mortality from heat waves
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Central and eastern Europe

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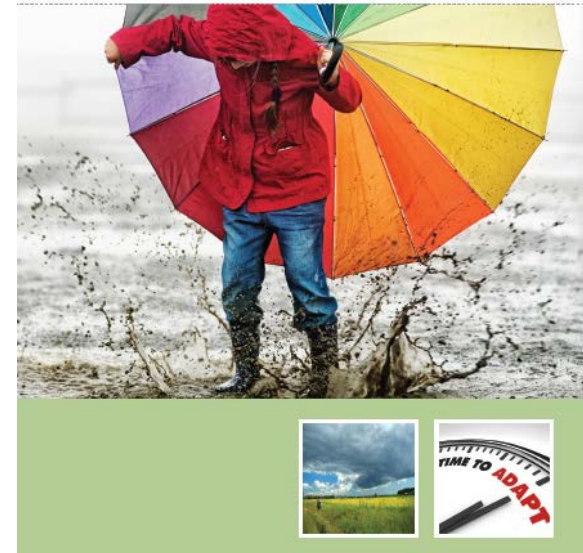
National adaptation policy processes in Europe (EEA report published 14 Oct 2014)

- **Self-assessment** of 44 questions; 30 EEA member countries responded
- Mid 2013-mid 2014; two consultation processes of countries
- Key findings clustered around **8 Key Topics**:
 - *Public and policy awareness of the need for adaptation*
 - *Knowledge generation and use*
 - *Planning adaptation*
 - *Coordination of adaptation*
 - *Stakeholders involvement*
 - *Implementation of adaptation*
 - *Transnational cooperation*
 - *Monitoring, reporting and evaluation*

EEA Report | No 4/2014

National adaptation policy processes
in European countries — 2014

ISSN 1977-8449



European Environment Agency 

Need for sound knowledge

- The importance of having '*better informed decision-making*' is highlighted in the **EU Climate Change Adaptation Strategy**, which includes this as one of its three main objectives (EC, 2013).
- Scientific knowledge, however, needs to be combined with practical and bureaucratic knowledge.
- Cooperation between **scientists**, **policy actors** and other **stakeholders** such as civil and business NGOs is fundamental.

Start with
a preliminary screening

Establish *Exposure Units*, *Receptors* and *Risk Assessment Endpoints* (climate thresholds)

- The exposure unit, receptors and assessment endpoints will all be determined by the nature of the decision problem.
- *The exposure unit* represents the system considered to be at risk, often defined in terms of *geographical extent, location and distribution of a variety population of receptors at risk*.
- These *receptors* are selected to represent important aspects of the exposure unit, particularly those of significance to the decision-making process.
- *Assessment endpoints* are chosen to help *establish the acceptability of the risk posed to the exposure unit(s)* by future circumstances and decisions, including those regarding climate change risk management .
- The choice of risk assessment endpoints therefore requires judgements concerning tolerable or intolerable levels of risk posed to receptors.

For a preliminary screening:

- Identify and **define a set of climate and non-climate variables or factors** for the exposure unit and for which the receptors may be sensitive;
- Collect and assess the available data set.
- Assess the available models and model data (climate, hydrologica, impacts)
- Use **climate scenarios** to help determine the climate change dependent risk to the receptors;
- Use **non-climate scenarios (population, socioeconomic scenarios)** to help determine the nature of the non-climate dependent risk.

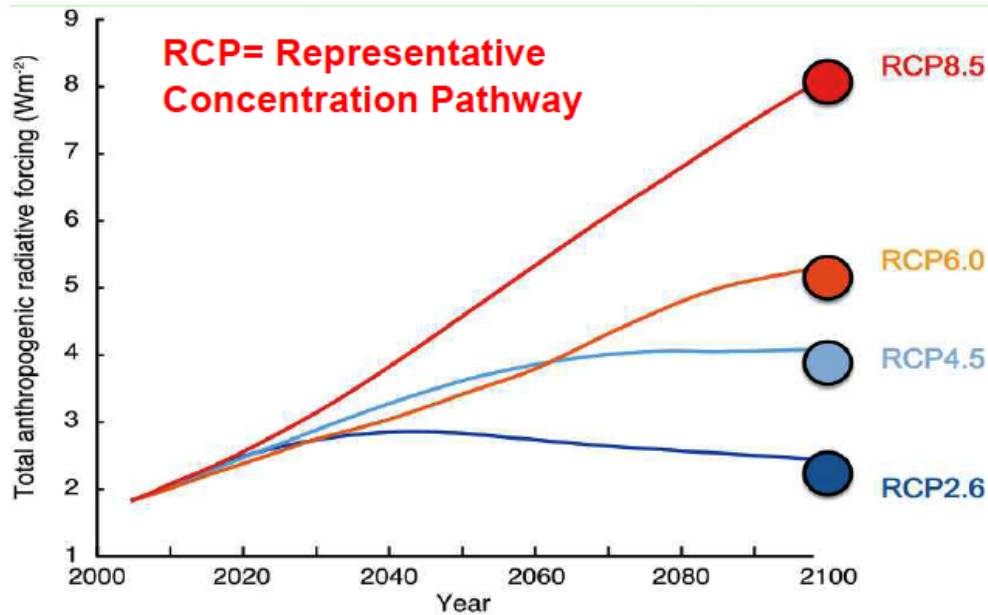
Climate models and climate scenarios

- Global climate models (GCM)
- Downscaling techniques:
 - *Dynamic downscaling: regional and local climate models*
 - *Statistic downscaling*

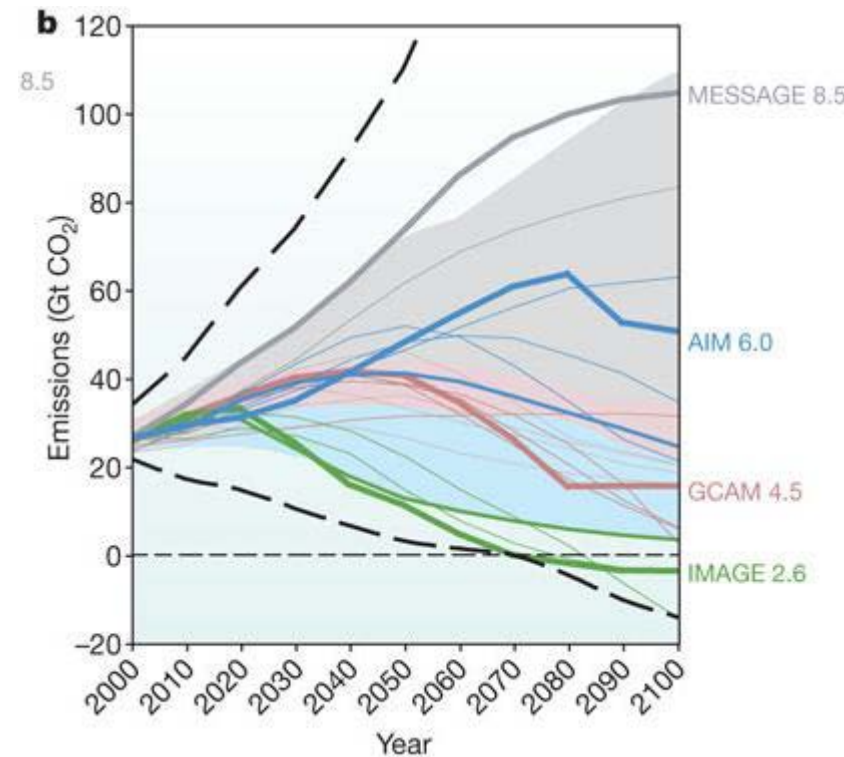
New scenarios “RCP”

Future Climate Projections

For future climate projections, climate models requires **Emission Scenarios**. Models in AR5 use *Representative Concentration Pathway (RCP)*



Radiative Forcing



Emissions

Scenarios for two time periods

- **“Near-term” scenarios** that cover the period to about 2035
- **“Long-term” scenarios** that cover the period to 2100 and, in a more stylized way, the period to 2300

Some sources and references of the main observational station datasets (temperature and precipitation)

- **Global Historical Climatology Network (GHCN-Monthly and GHCN-daily)**

Global daily data of temperature (max, min and mean) and precipitation from over 43000 stations (about 8500 of which are regularly updated with observations from within the last month) for a period starting also from the 19th century.

<http://www.ncdc.noaa.gov/data-access/quick-links#ghcn>

- **E-OBS gridded dataset**

E-OBS is a daily gridded observational dataset for precipitation, temperature and sea level pressure in Europe. The full dataset covers the period 1950-01-01 until 2013-12-31. Currently it is maintained and elaborated as part of the [UERRA](#) project (EU-FP7).

http://eca.knmi.nl/maxtemp_EOBS.php

- **MED-HYCOS (Mediterranean Hydrological Cycle Observing System)**

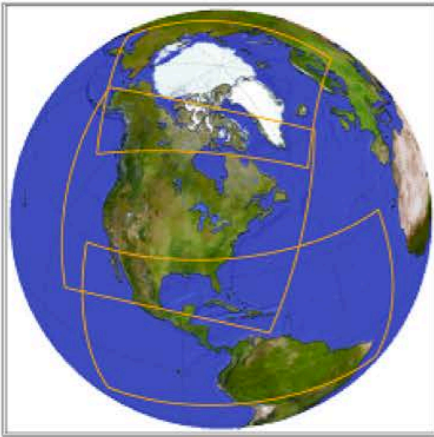
Network of hydrometeorological real time or near real time data collecting platforms (DCPs) on the main rivers of the Mediterranean catchments. (Albania, Bosnia, Croatia, Macedonia).

<http://medhycos.mpl.ird.fr/>

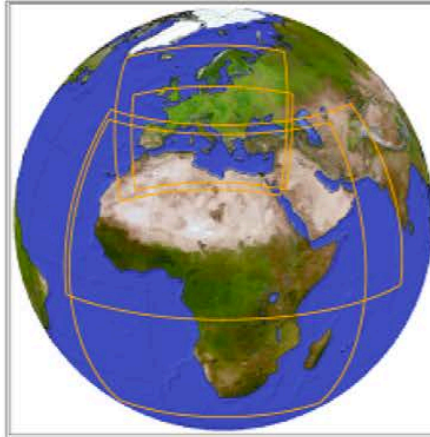
CORDEX

CORDEX is providing global coordination of Regional Climate Downscaling for improved regional climate change adaptation and impact assessment

CORDEX communities across the globe



- Arctic CORDEX
- North America CORDEX
- Central America CORDEX



- EURO-CORDEX
- MED-CORDEX
- CORDEX Africa
- MENA-CORDEX



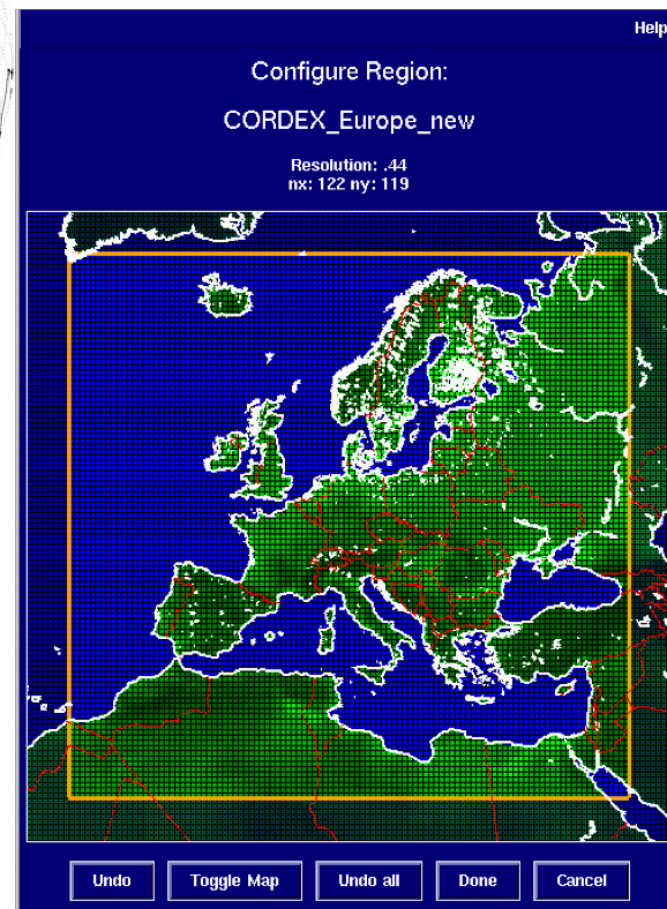
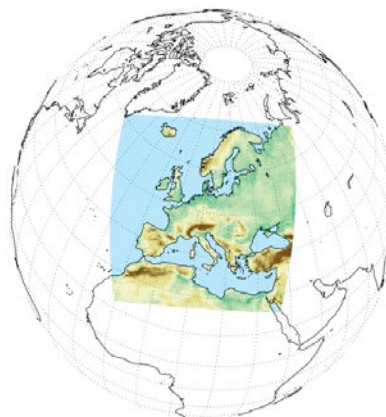
- Central Asia CORDEX
- South Asia CORDEX
- East Asia CORDEX
- Australasia CORDEX



- South America CORDEX
- CORDEX Antarctica

RCM Scenarios for Europe – EURO-CORDEX

- Area: Europe
- Emission scenarios:
RCP4.5, RCP8.5, RCP2.6
- Driving GCMs: *CMIP5*
- Grid spacing: **12.5 km, 50 km**
- Period: **1951 - 2100**
- Ensemble size: in total >70 simulations
(3 emission scenarios, 2 resolutions, several GCMs, several RCMs)
- Availability: 2013
- Further information:
 - Homepage: <http://www.euro-cordex.net/>
 - Contact: andreas.gobiet@uni-graz.at,
daniela.jacob@hzg.de



- ~25 very high (0.11°) resolution simulations based on the new rcp scenarios
- ~45 moderate (0.44°) resolution simulations based on the new rcp scenarios

http://wcrp-cordex.ipsl.jussieu.fr/



CORDEX is providing global coordination of Regional Climate Downscaling for improved regional climate change adaptation and impact assessment

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Coordinated Regional Climate Downscaling Experiment (CORDEX)



ANTARCTICA, SOUTH AMERICA

CORDEX News

- Trans-programme (HyMeX, Charmex, MerMex, SICMED, PaleoMex) Workshop on integrated regional climate modelling
- Signing of the IPOC Letter of Agreement
- 2nd meeting of the CORDEX Science Advisory Team (SAT)
- New Mailing List and Calendar for Prediction and Predictability in Polar Regions
- Permanent position as Executive Officer for the CliC International Project Office
- A new version of the IITM-RegCM4 RCP4.5 outputs for the period 2006-2060

CORDEX climate data archive

[Home](#)

**WCRP
CORDEX**

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CORDEX: A COordinated Regional climate Downscaling EXperiment

More reshuffling

Written by Ole Bøssing Christensen
Thursday, 12 June 2014 17:15

I have added specific links to several ESGF CORDEX archives, such that you can choose, if one of them is down or slow.




  

Updated documents

Written by Ole Bøssing Christensen
Thursday, 06 March 2014 12:49

Dear Colleagues,



After a long review process, the specification document has been updated. Hopefully the new version clears up most of the confusion and the ambiguities, which were present in several places in the old document. This is not supposed to be a new set of specifications, just a better description. So: If you discover differences, or new ambiguities, please let me know! The output table document has been revised several times in order to clear up things, but it is now hopefully frozen

Reshuffling of links

Written by Ole Bøssing Christensen
Monday, 17 February 2014 10:26

There are still many CORDEX data, which are not in ESGF. In order to not forget these archives, I have changed the "Download" button: You will now get to the CORDEX data archive overview (The "Other Archives"/"CORDEX archives" link). To get to the DMI ESGF, just choose the upper link there.

More data   

<http://cordex.dmi.dk/joomla/>

Precipitation projection (RCP8.5)

(2061-2100 respect to 1966-2005)

CMIP5 20 GCMs with hor. Res. 80-200 km – used in l'IPCC AR5

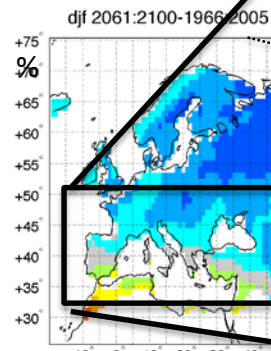
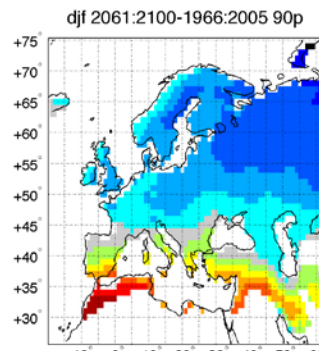
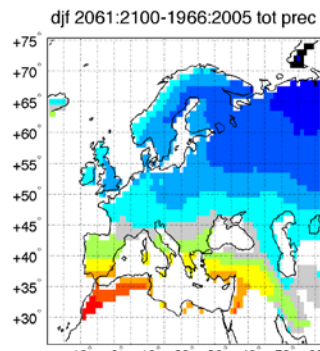
average, intense prec. events (90p), extreme prec. Events (99p)

Inverno

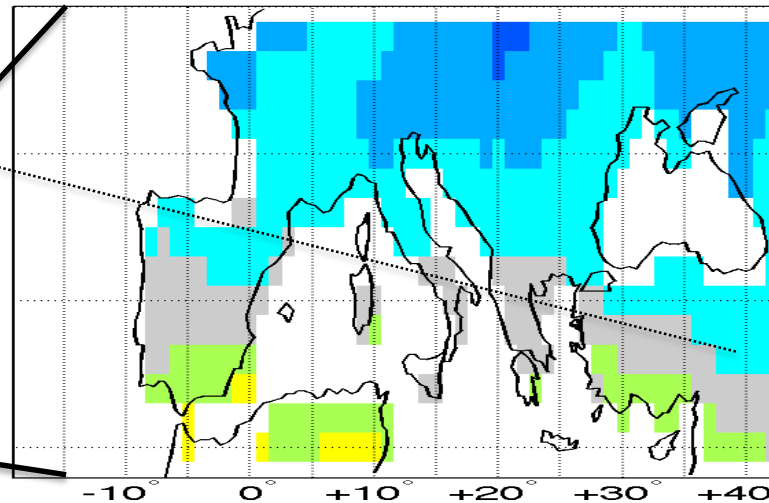
ave

90p

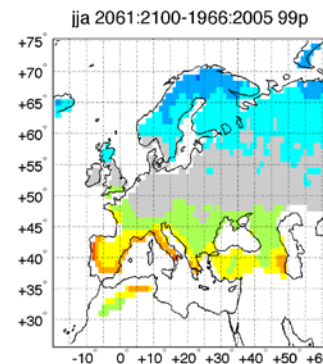
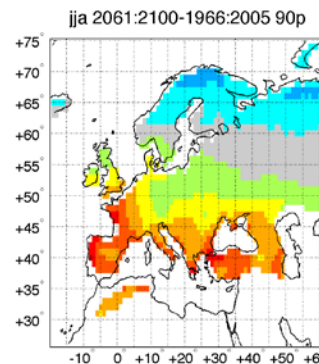
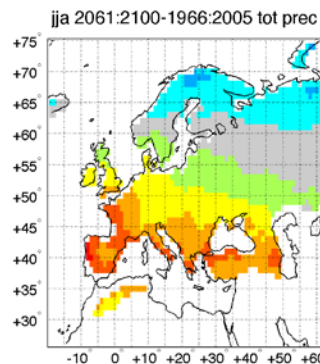
99p



djf 2061:2100-1966:2005 99p



Estate

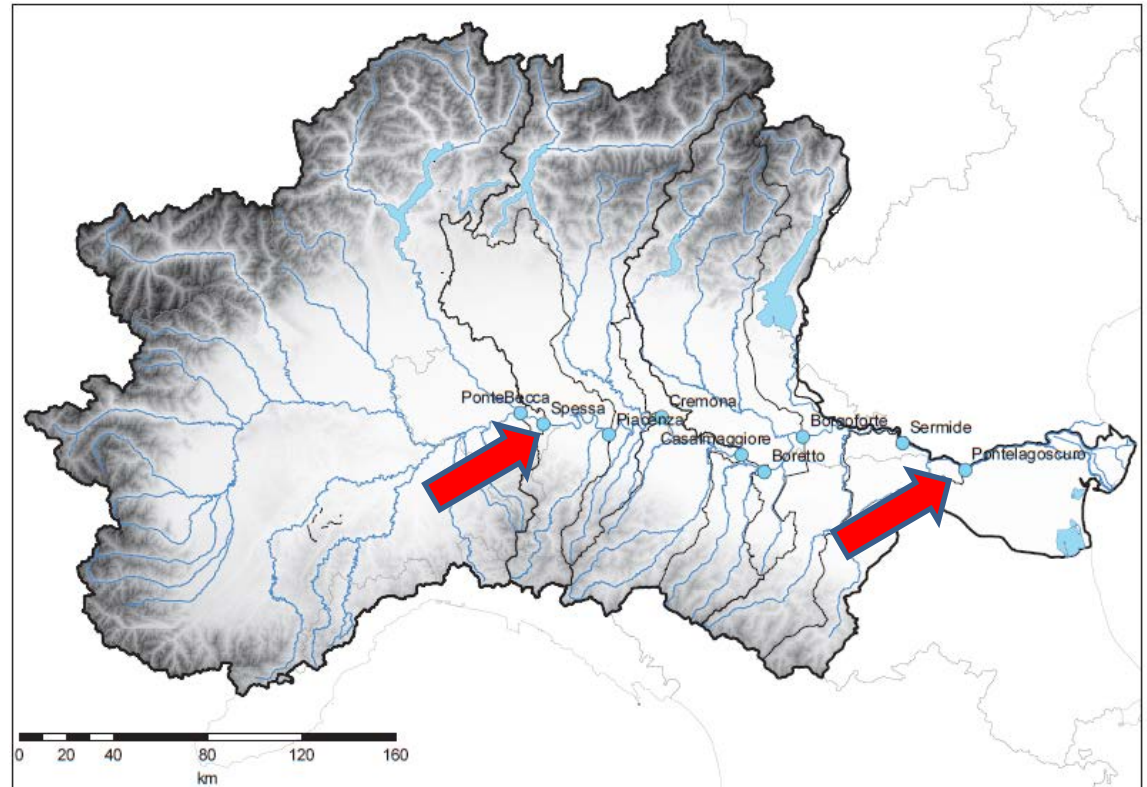
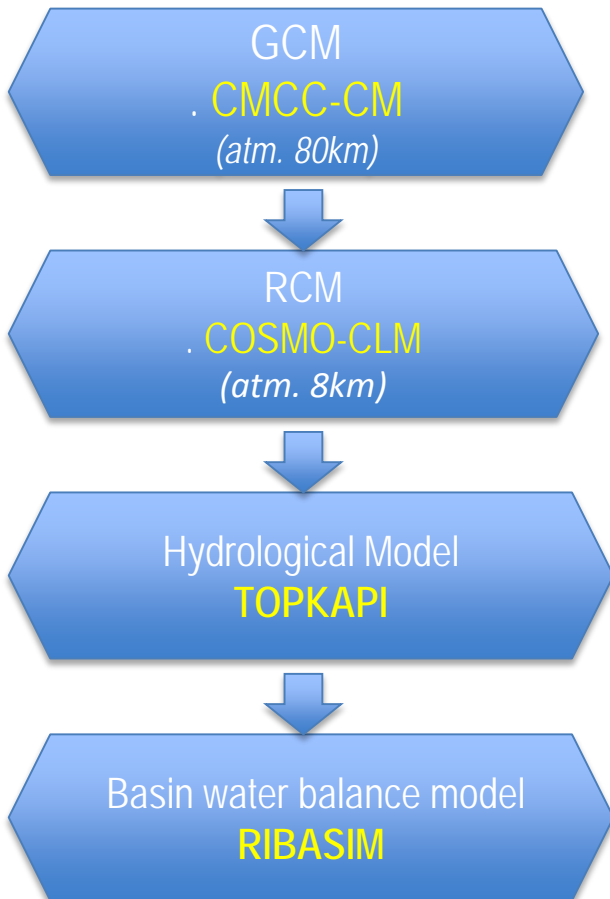


Source: Scoccimarro E., S. Gualdi, A. Bellucci, M. Zampieri, A. Navarra (2014):

Heavy precipitation events over Europe: future projections. *Regional Environmental Change*, doi:10.1007/s10113-014-0712-y

Projections of Po river flow (anomalies - %)

(CMCC and ARPA E.R.)

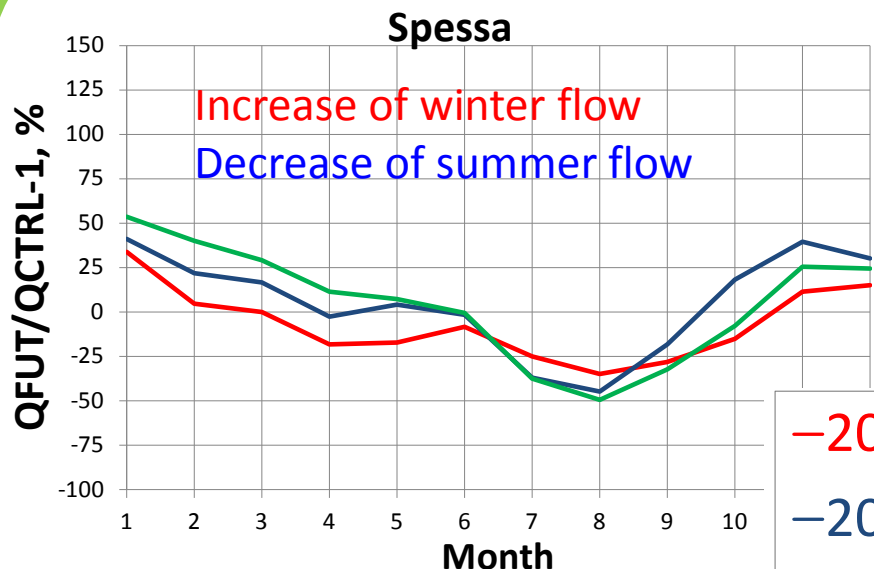


Source: Vezzoli et al., 2014 (submitted)

Projections of Po river flow (anomalies - %)

(CMCC and ARPA E.R.)

RCP 4.5



RCP 8.5

