

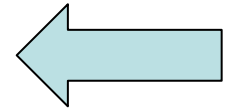
Climate Change in Europa (incl. Croatia)

Policy developments and Role of Future Research

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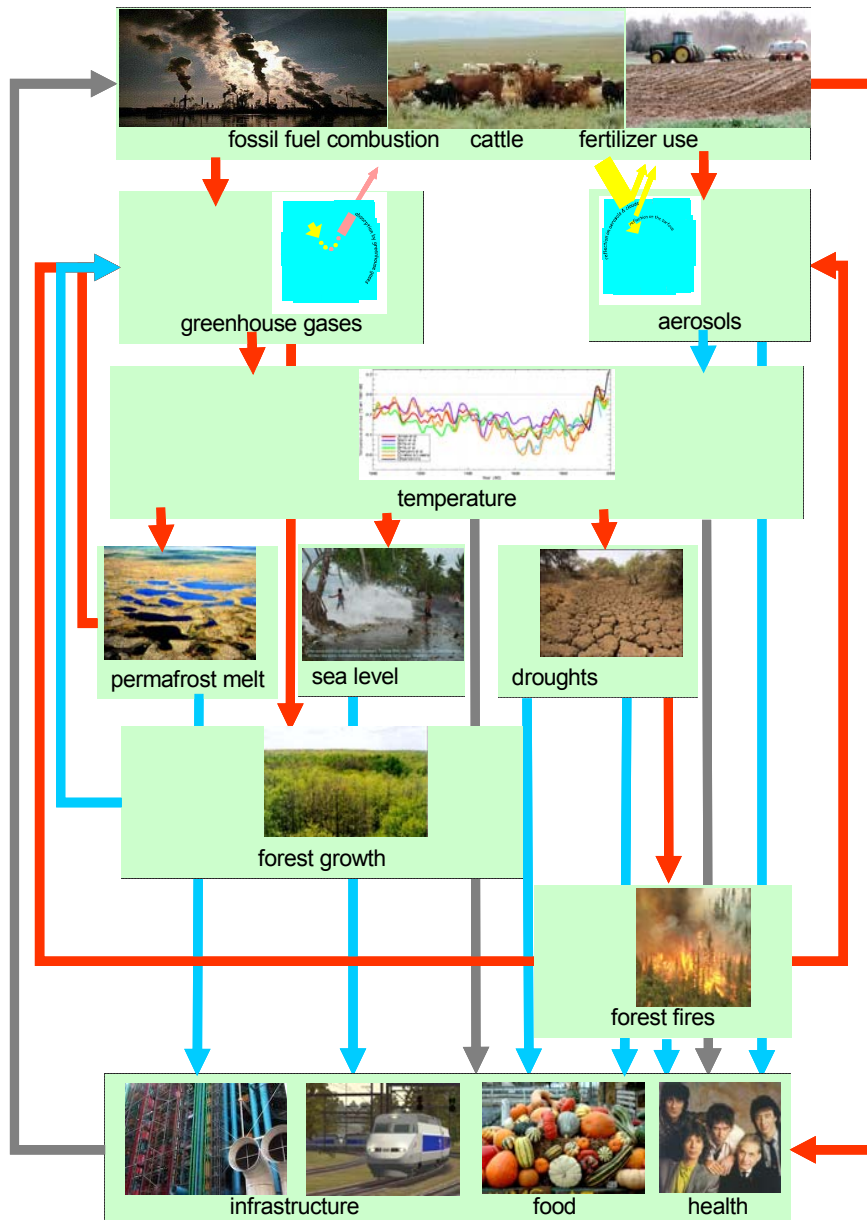
- 2007:
- Climate Change in Europe and Croatia
- Policy Response: Mitigation and Adaptation
- Mitigation in Croatia
- Adaptation in Croatia
- Future Research Needs

- 2007: the year the climate re. Climate Change changed
 - the warm winter of 2006-2007
 - the 4rth assessment report of the IPCC
 - Al Gore and Hollywood
 - the Nobel Prize for Peace
 - the JRC PESETA study
 - the EU Council Decision
 - the Bali Conference UNFCCC



cascade of climate change impacts

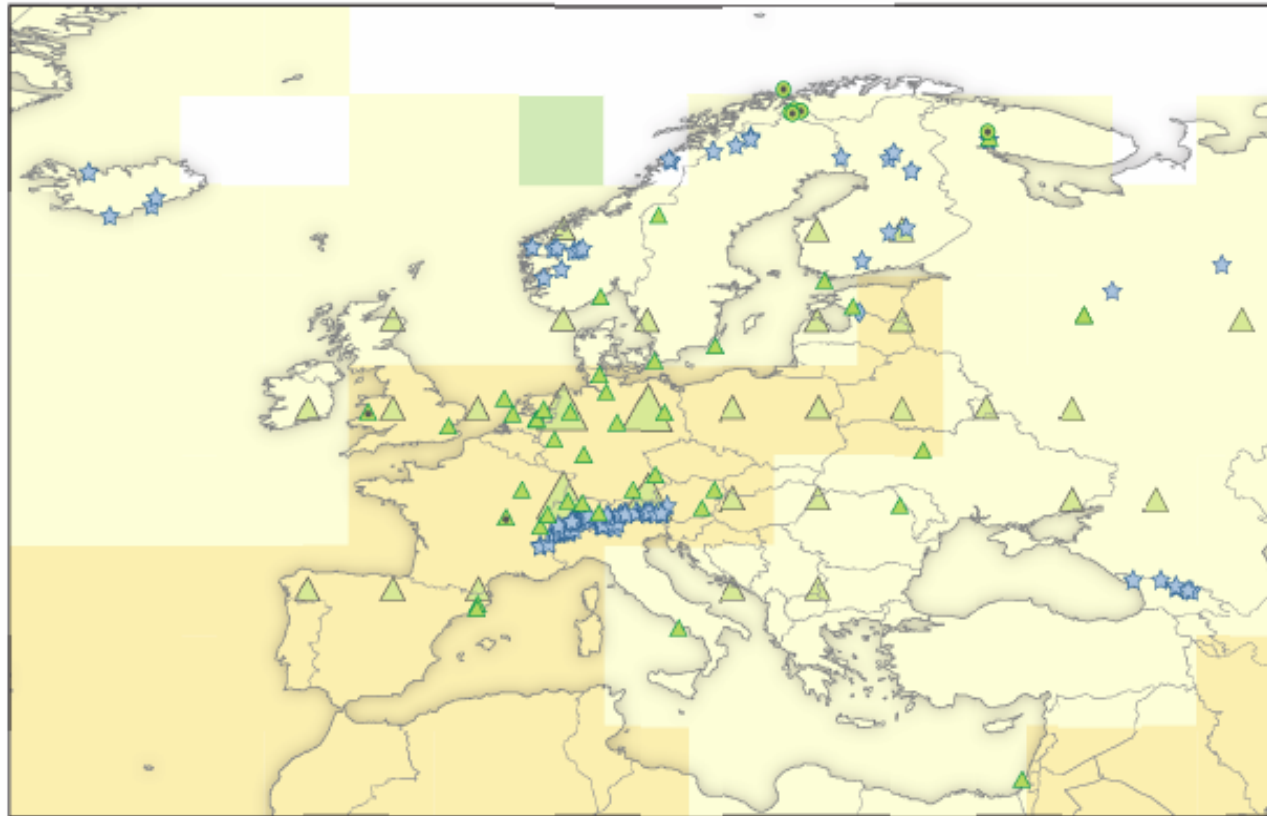
JRC information day, Croatia, Zagreb, 10 April 2008



from the upcoming
EEA-JRC-WHO Report on
Climate Change Impacts in Europe
2008

observed climate change

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Temperature change (°C) 1970 - 2004

OBSERVED DATA SERIES

BIOLOGICAL SYSTEMS

▲ TERRESTRIAL

● MARINE

○ FRESHWATER

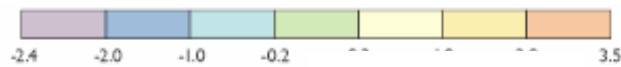
▲ AGRICULTURE

PHYSICAL SYSTEMS

★ CRYOSPHERE

● HYDROLOGY

◆ COASTAL PROCESSES



NUMBER of TERRESTRI

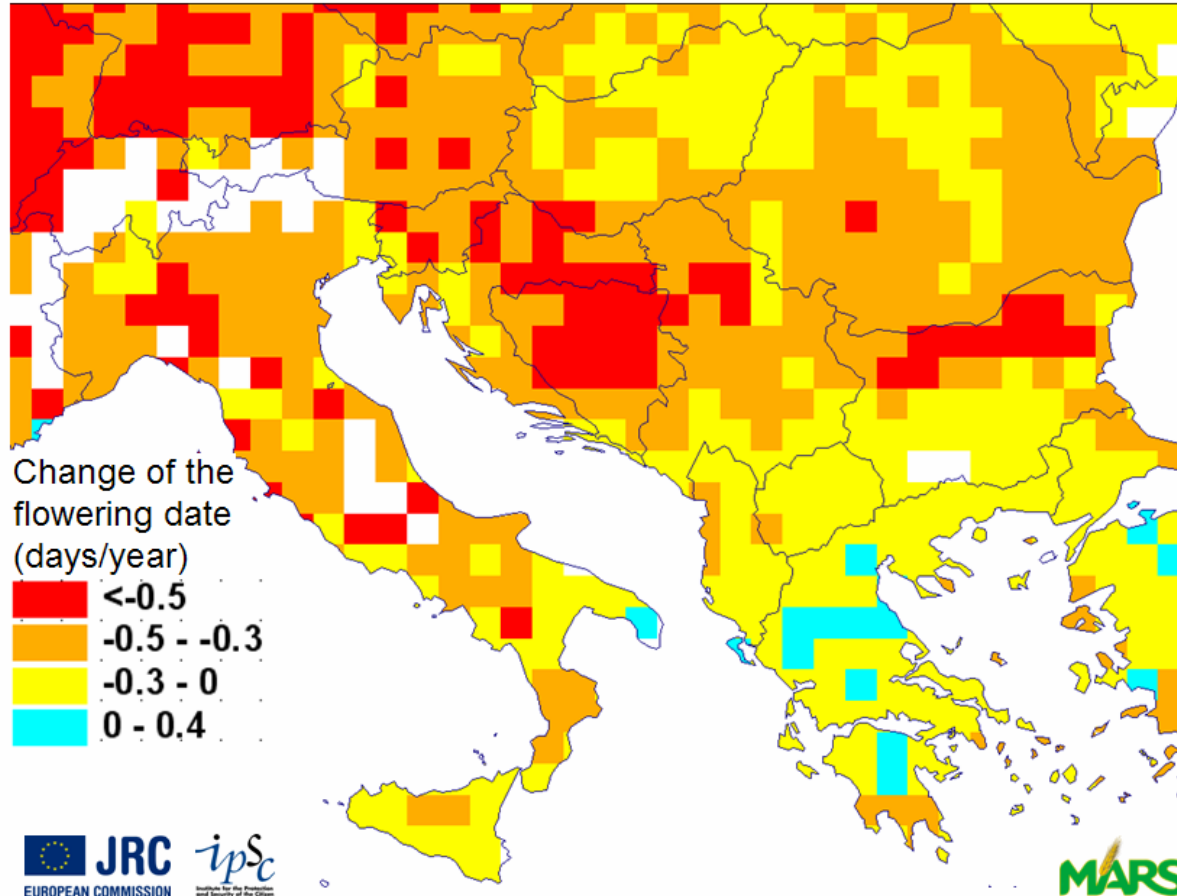
▲ 1-100

▲ 101-1000

▲ 1001-7500

Source:
 IPCC 4AR
 2007

Simulated yearly variation * of the flowering date for the winter wheat
(based on observed meteorological data from 1975-2007)



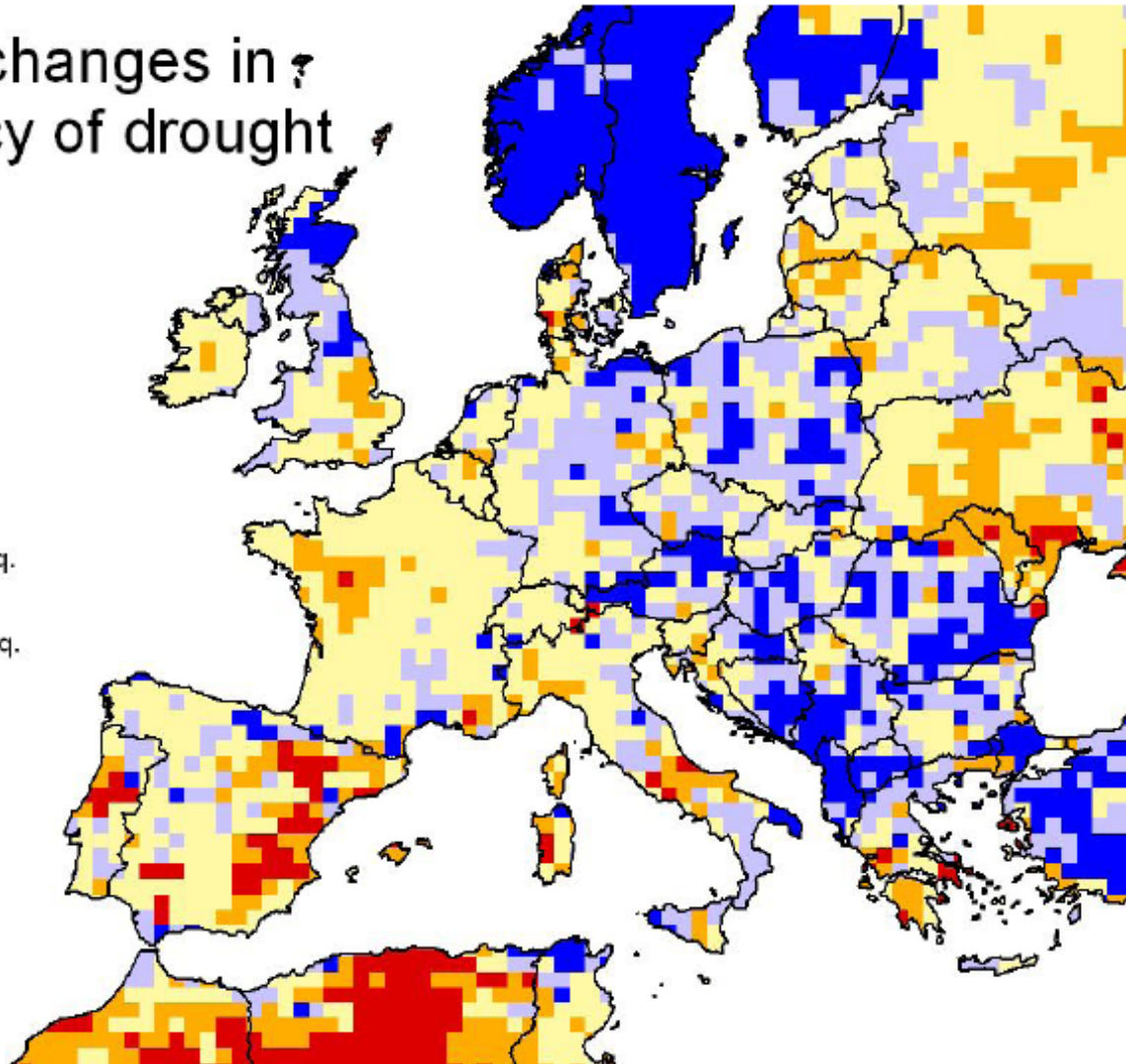
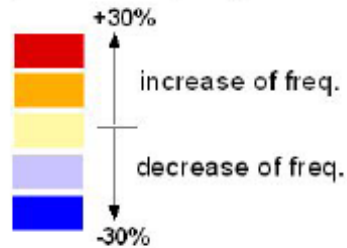
* Analysis is based on regression between the current year and the simulated day of beginning of anthesis.
Disclaimer: The geographic borders are purely a 2007 graphical representation and are only intended to be indicative.
These boundaries do not necessarily reflect the official EC position.

Source: JRC

Analysis of changes in the frequency of drought events

(Period: 1 April - 25 June)

1992-2006 vs.
previous 15-year period

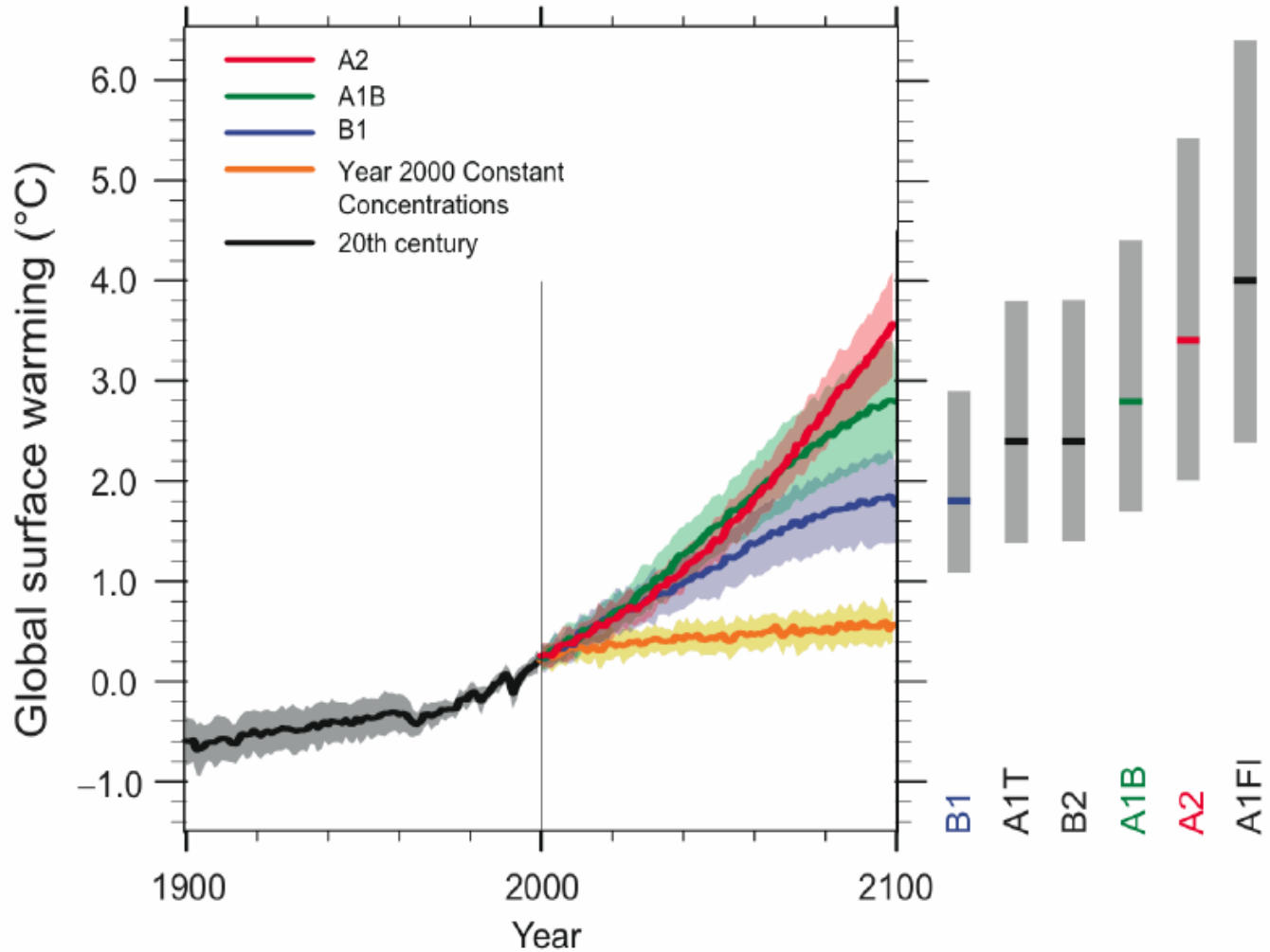


- Croatia is at the boarder of the Mediterranean and Central European climate regimes
→ variability, difficult to see trends
- Increase in annual mean temperature of around 1.5° C in past 35 years
- Impacts on ecosystems!
E.g. : earlier flowering of agricultural crops by about 30 days in past 30 years
- Increased occurrence of droughts and hot periods in Croatians coastal zone but potential decrease in the northern Croatia

future global climate change

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Multi-model Averages and Assessed Ranges for Surface Warming

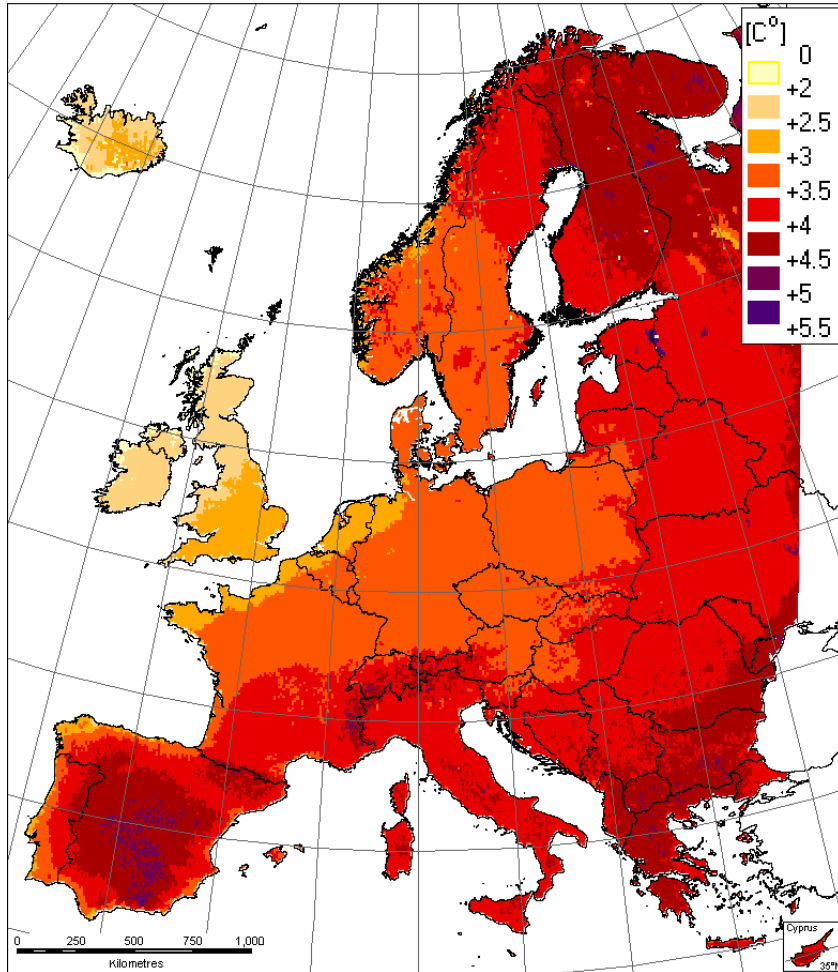


Source: IPCC 4AR

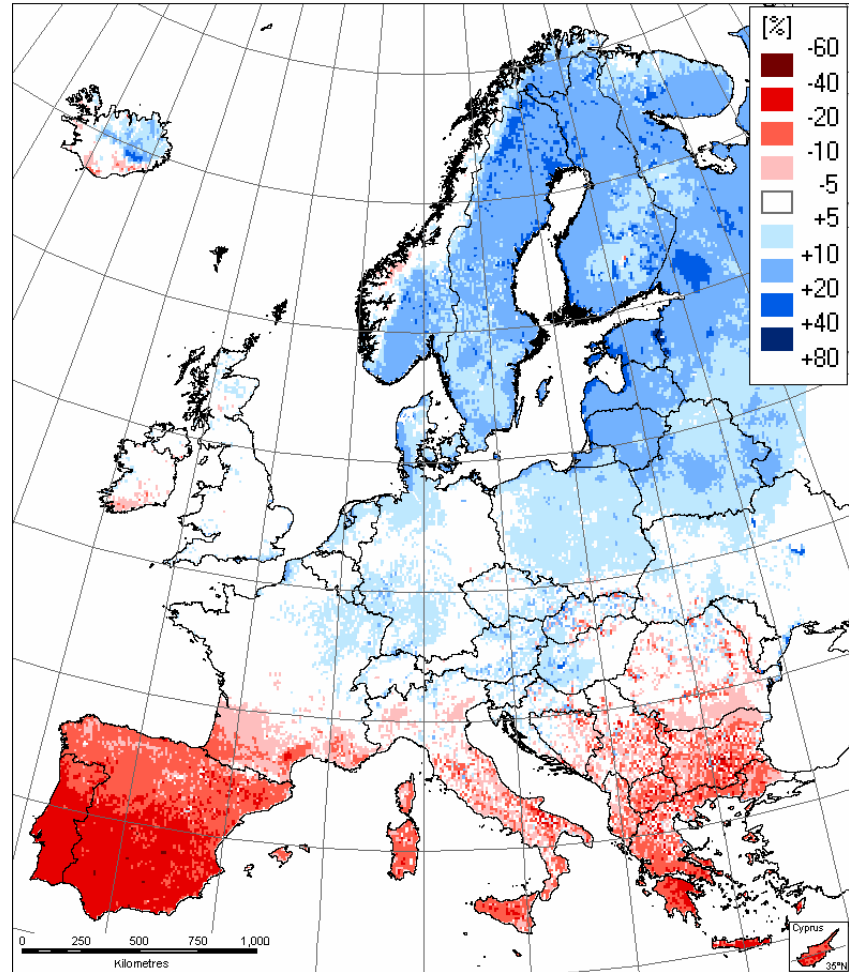
Future climate change

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Change in annual temperature (°C)



Change in annual precipitation amount (%)



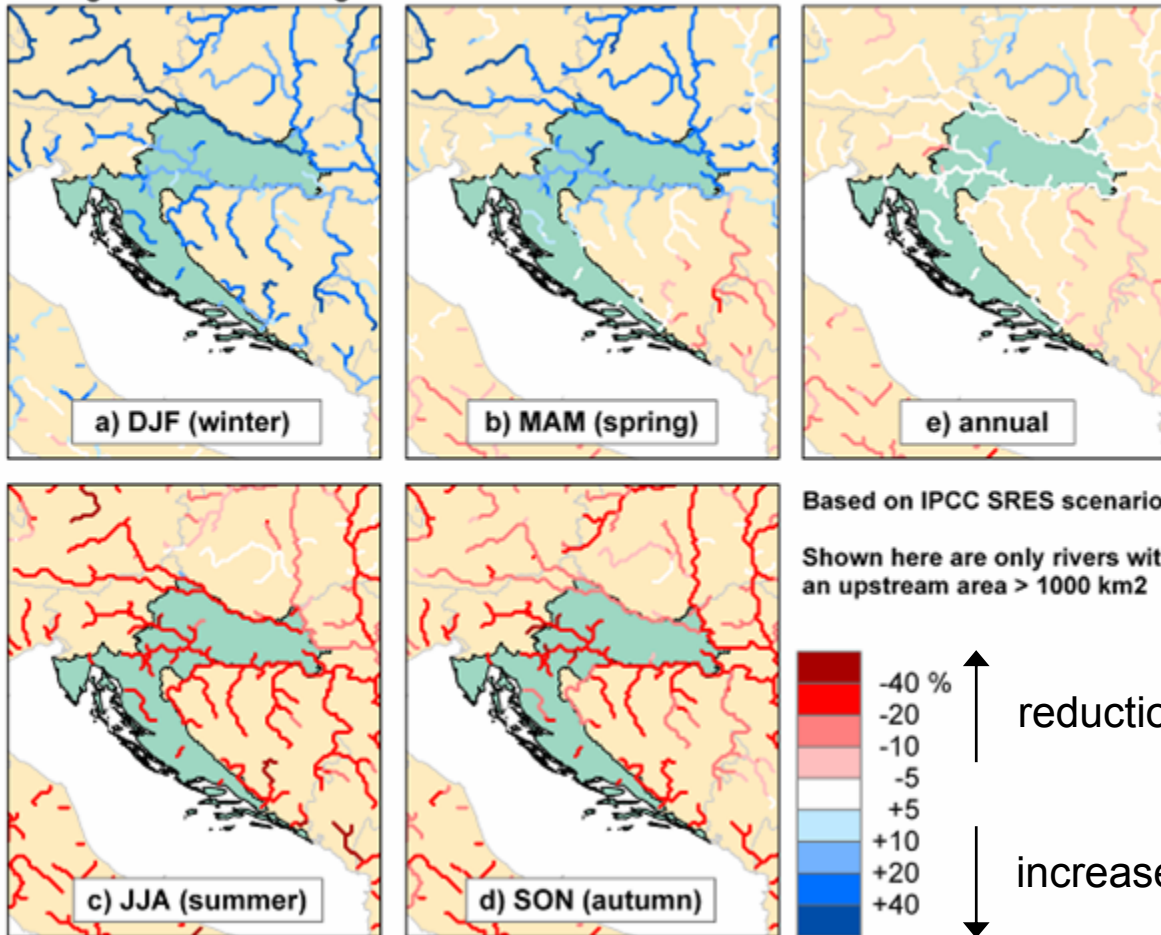
changes by end of this century compared to end previous century (A2 scenario)
PESETA study (<http://peseta.jrc.es>)

Climate change in Croatia

JRC information day, Croatia, Zagreb, 10 April 2008

Change in **sustainable fresh water resources** in Croatia
(between 1961-1990 and 2071-2100. based on IPCC SRES A2 scenario)

Average river flow: change in mean seasonal and annual flow

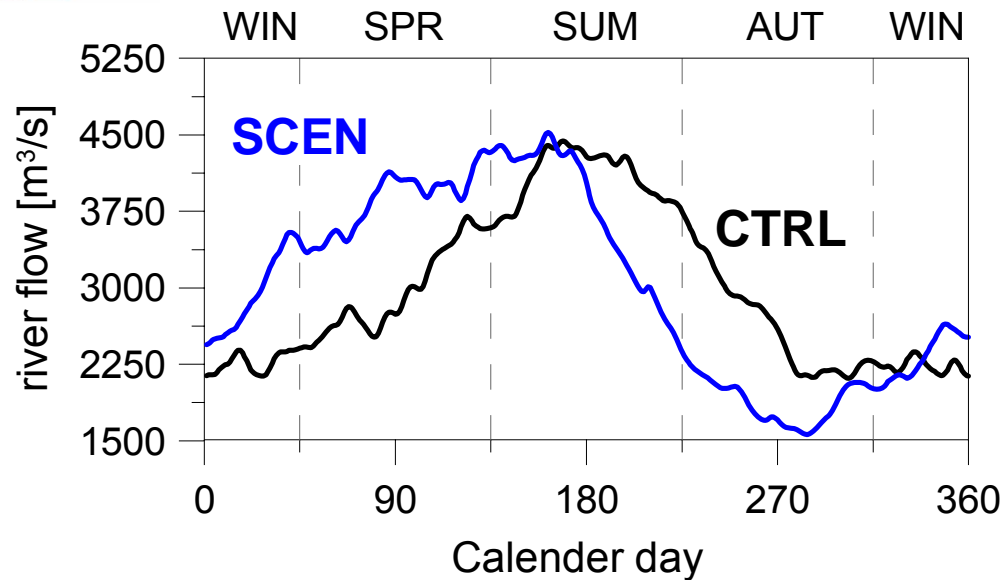
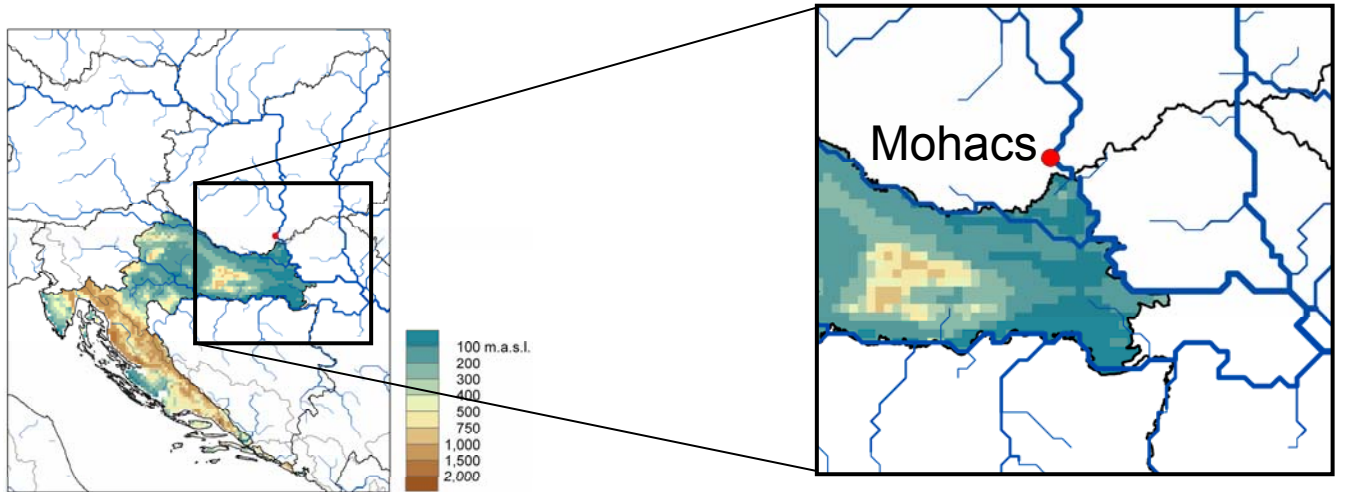


Source: JRC

Climate change in Croatia

JRC information day, Croatia, Zagreb, 10 April 2008

Change of **flow regime** at station Mohacs on Danube (just before inflow into Croatia)
(between 1961-1990 and 2071-2100, based on IPCC SRES A2 scenario)



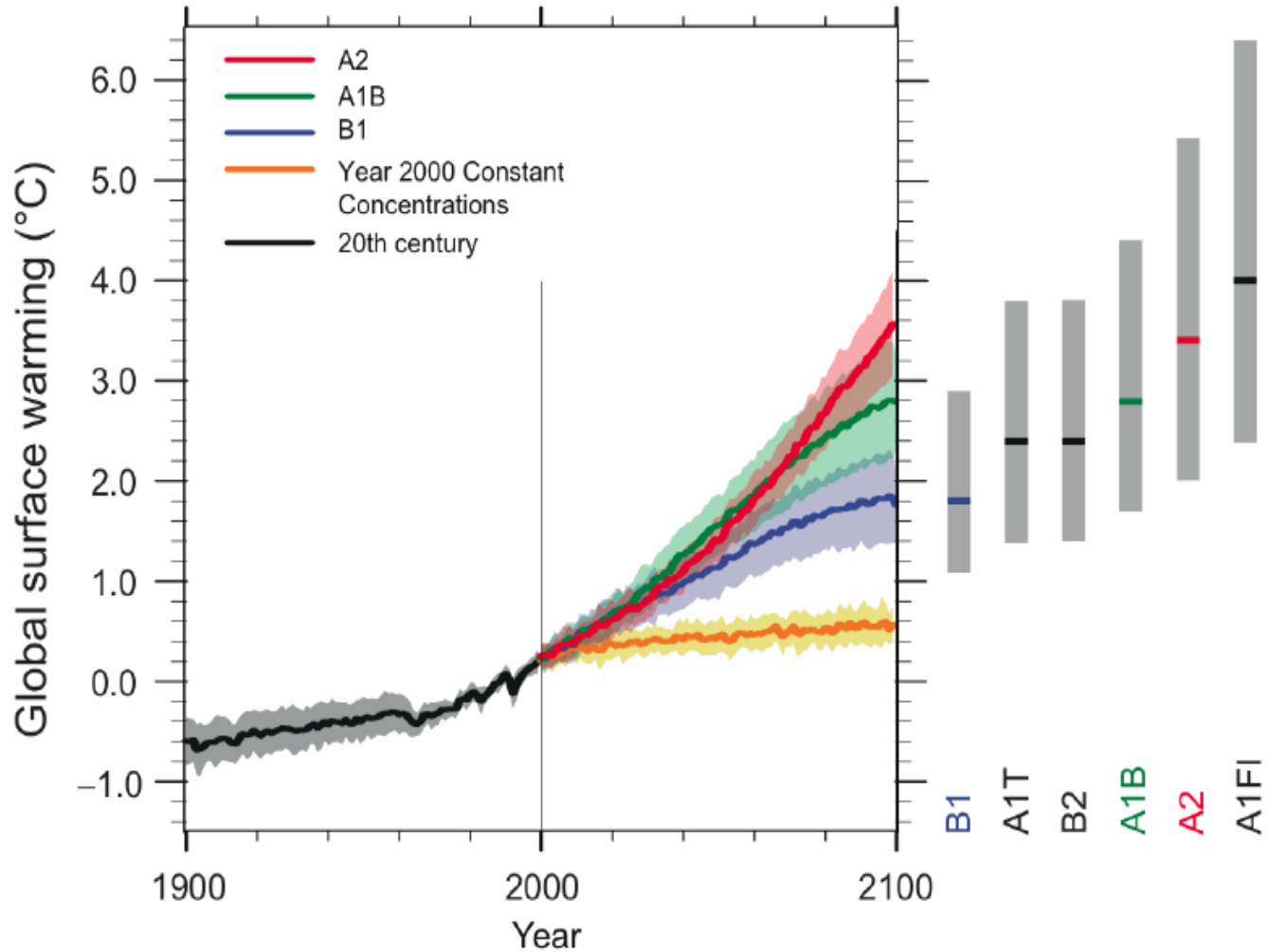
Source: JRC

- Croatia is at the boarder of the Mediterranean and Central European climate regimes, and is a small country.
 - difficult to make forecasts
- Temperature increase with an additional ~ 2.5 degrees by the end of the century under a BAU scenario (A2),
- No changes in annually *average* precipitation
- Possible reduction of extreme precipitation events (floods and droughts)
- Relevant changes in *seasonal* precipitation and snow melt
 - impacts on river flow, floods, drought, irrigation demand, agriculture

future global climate change

JRC information day, Croatia, Zagreb, 10 April 2008

Multi-model Averages and Assessed Ranges for Surface Warming



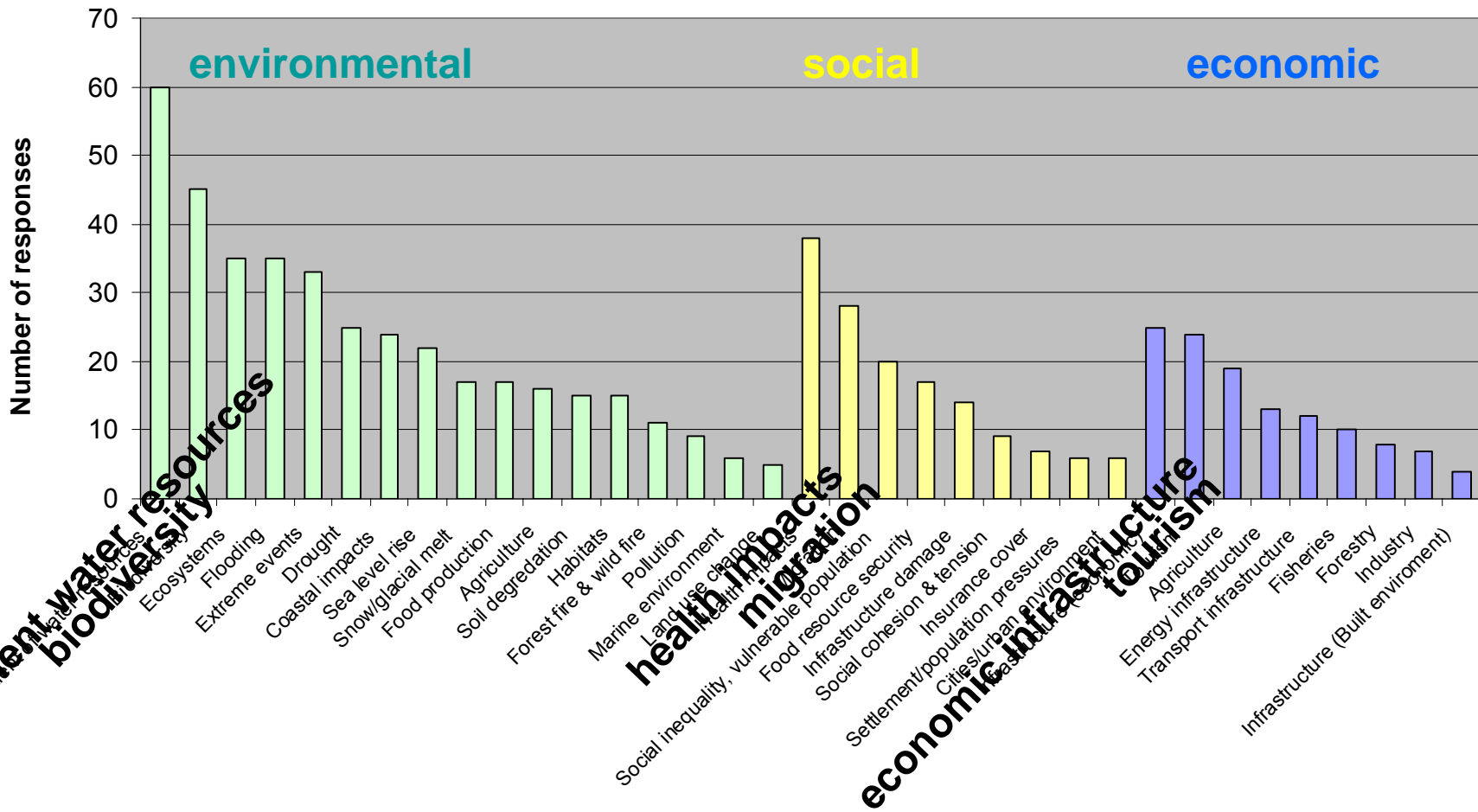
Source: IPCC 4AR

- Climate Change policy aims at reducing the risk of climate change effects at the *least cost* and *largest equity* among states
- Climate Change policy = Mitigation + Adaptation
 - Less mitigation now, more adaptation later
= the expensive option (Stern, IPCC)
 - Mitigation now, less adaptation later
= the cheapest option (Stern, IPCC)
- EU two degrees target (1996)
- Climate Change policy =
Opportunity to modernize society !

- Target of Croatia under the Kyoto Protocol is to reduce GHG emissions by 5 % by 2012, compared to 1990.
- post-2012 Targets for Croatia for are no yet set.
- 20% reduction by 2020 for EU Member States (Council Decision March 2007)
- This EU target will be implemented through a mixture of Emission Trading for the energy sector and energy intensive industries + binding targets for remaining sectors.
 - e.g. target for Slovenia for remaining sectors is a maximum 3% increase in emissions between 2005 and 2020.

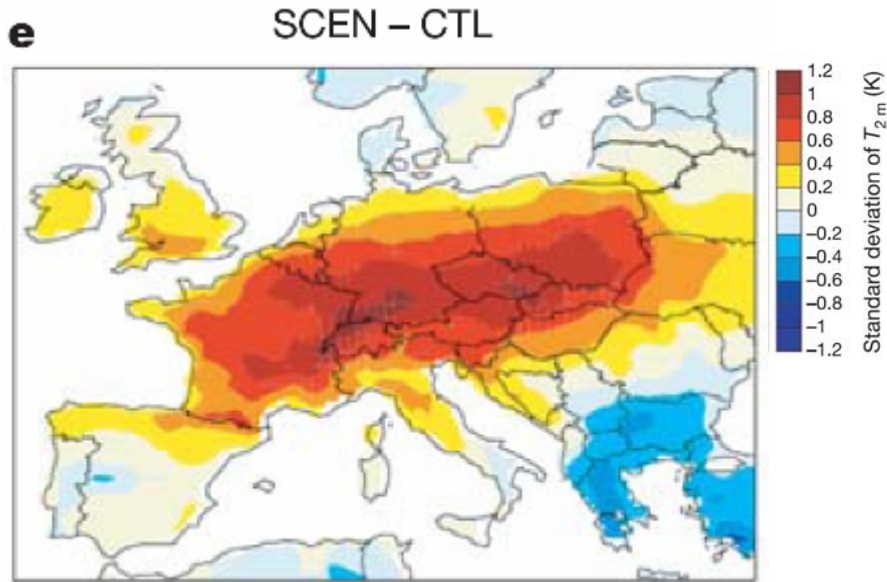
- Adaptation is basically a local issue
- Is there a role for Community action?
- Commissions *Green Paper* on Adaptation
 - integrate adaptation in Community policies and Community funding schemes and
 - CAP, ...Structural Funds, Cohesion Funds, ...
 - Integrate adaptation in EU external action
 - Development aid
 - More research
 - Involve European society, businesses

Green Paper on Adaptation. Public Consultation 2007 Areas of concern

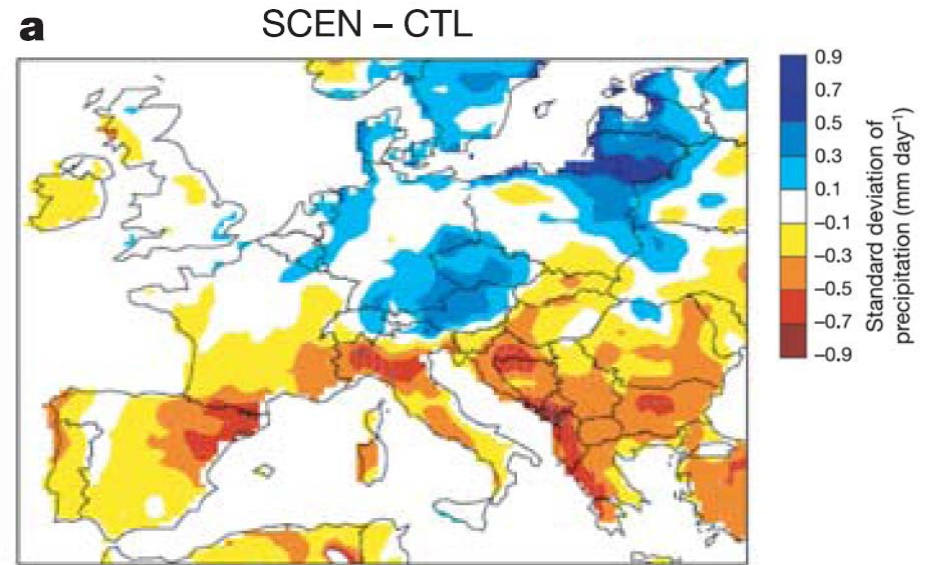


- More integration of natural, socio-economic sciences
 - Climate research = Sustainability research
- How integrate Mitigation and Adaptation
 - synergies, trade-offs
- Regional/Local climate impact studies
 - small countries (Croatia, Belgium, ...), individual cities!
- Cost Benefit Analysis
 - Costs of climate impacts, e.g. value of ecosystems
 - Cost of adaptation measures
- Collaborations with JRC possible
 - JRC makes available its expertise
 - JRC can learn from local knowledge and expertise

Thanks!



Change in temperature variability
by end of century
A2 scenario



Change in precipitation variability
by end of century
A2 scenario