

Klimawandel und Risiko

Die Europäische Perspektive und die österreichische Sicht –
ESPON Ergebnisse mit Österreichbezug

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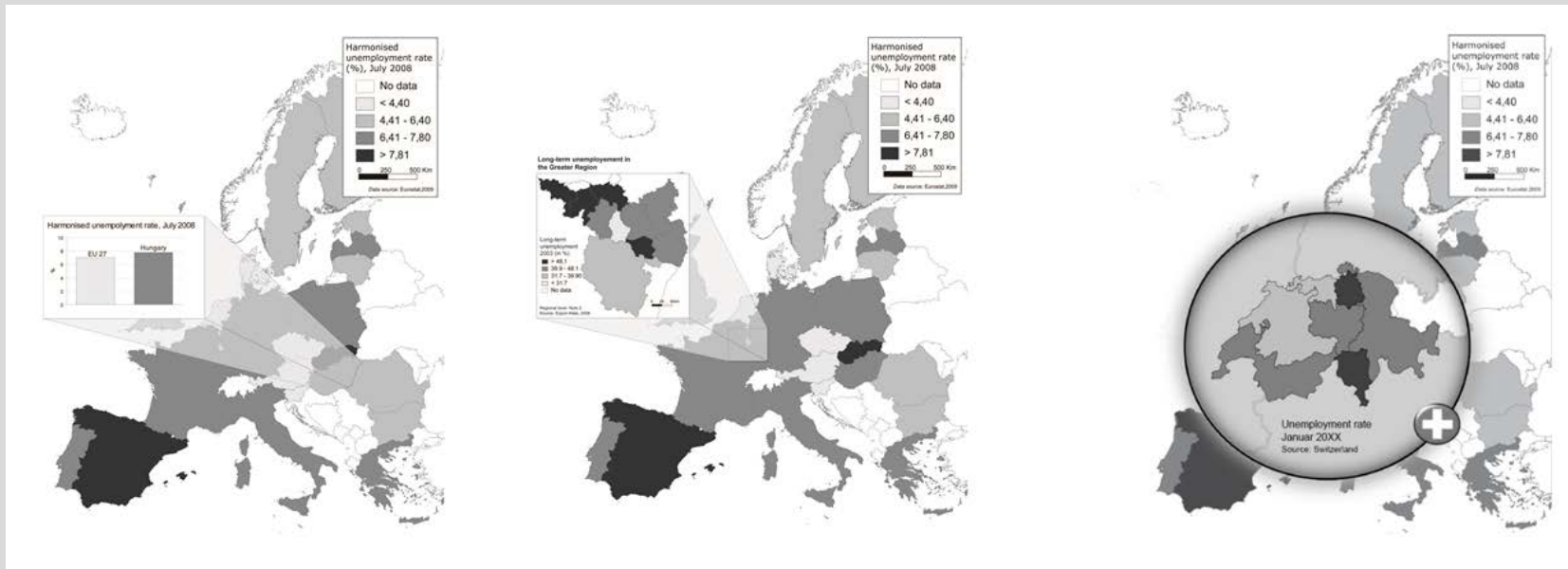
4. Juni 2012

ESPON Scales Ziele

- Adressieren der Frage der räumlichen Skalen:
 - Welche räumlichen Skalen werden betrachtet?
 - Wie brauchbar ist die räumliche Auflösung der ESPON-Ergebnisse für regionale Aussagen & Strategien auf nationaler Ebene
 - Welche Strategien sind nützlich, um Erkenntnisse für feinere Skalen abzuleiten
- Betrachtung verschiedener räumlicher Skalen am Beispiel des Klimawandels anhand:
 - ESPON Ergebnissen auf Europäischer Ebene
 - Ergebnissen regionaler Klimasimulationen für Alpen, Österreich

ESPON Scales Ansatz

Strategien: COZICO



COmparison

Comparing selected regions with the 'own' spatial context of the regional stakeholders

Zoom-In

Presenting ESPON results on a larger scale

COmpletion

Presenting additional data from other sources

Klimarelevante ESPON-Projektinhalte

Inhalte nach Häufigkeit und Bedeutung:

- ESPON Climate

CC, floods, sea level, precipitation, risk, heavy rainfall, temperature, heat waves

- ReRisk (Regions at Risk of Energy Poverty)

renewable energy, risk, CC, fuel costs, income, unemployment, heat waves, floods

- EDORA (EU Development Opportunities in Rural Areas)

CC, risk, renewable energy

- GEOSPECS (EU Perspectives on Specific Types of Territories)

CC, risk, renewable energy, floods, natural hazards

ESPON Climate Inhaltlicher Aufbau und Workshop-Fokus

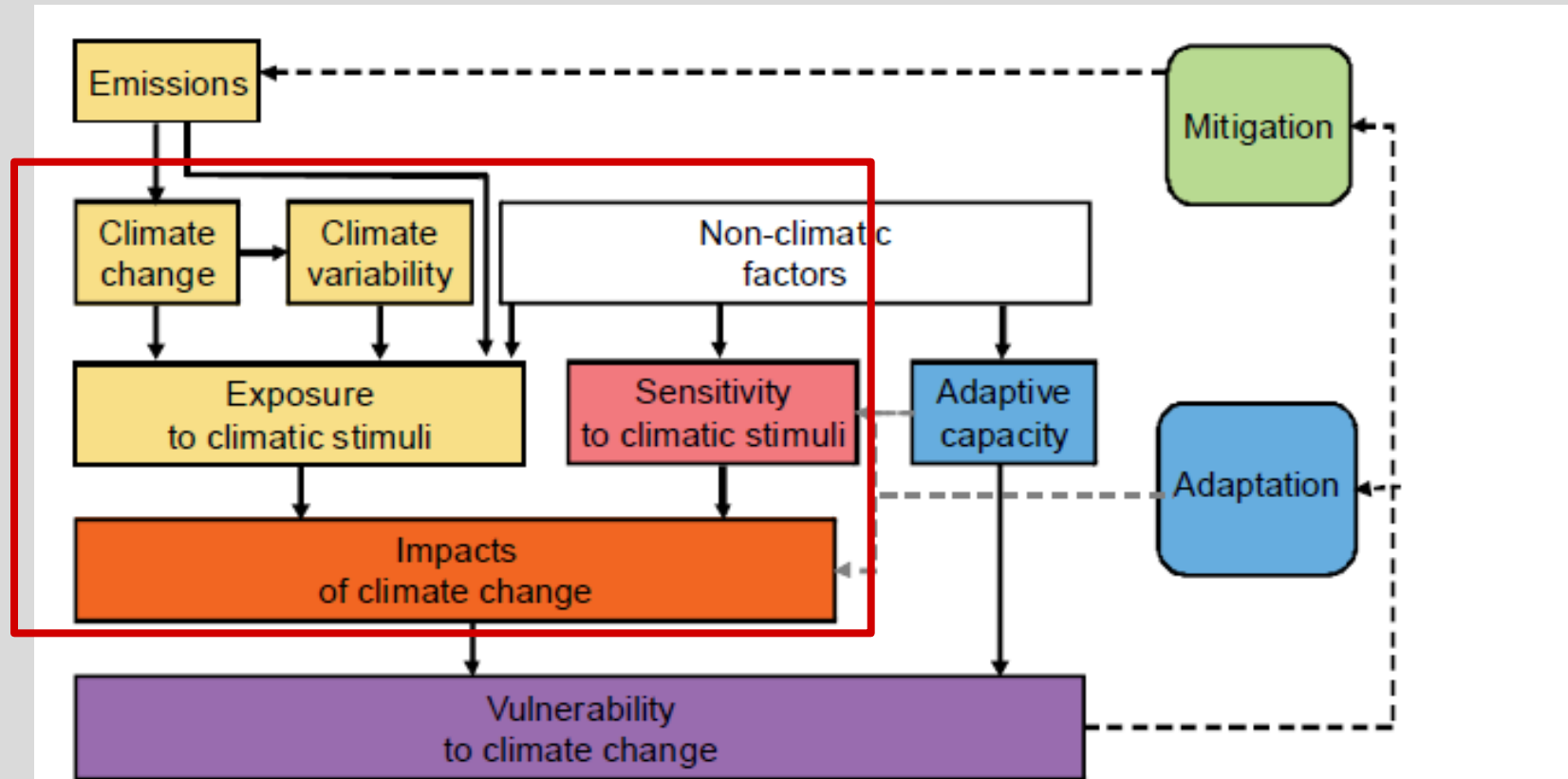


Figure 1: ESPON Climate Change research framework (adapted from Füssel & Klein, 2006, 54)

ESPOON Climate

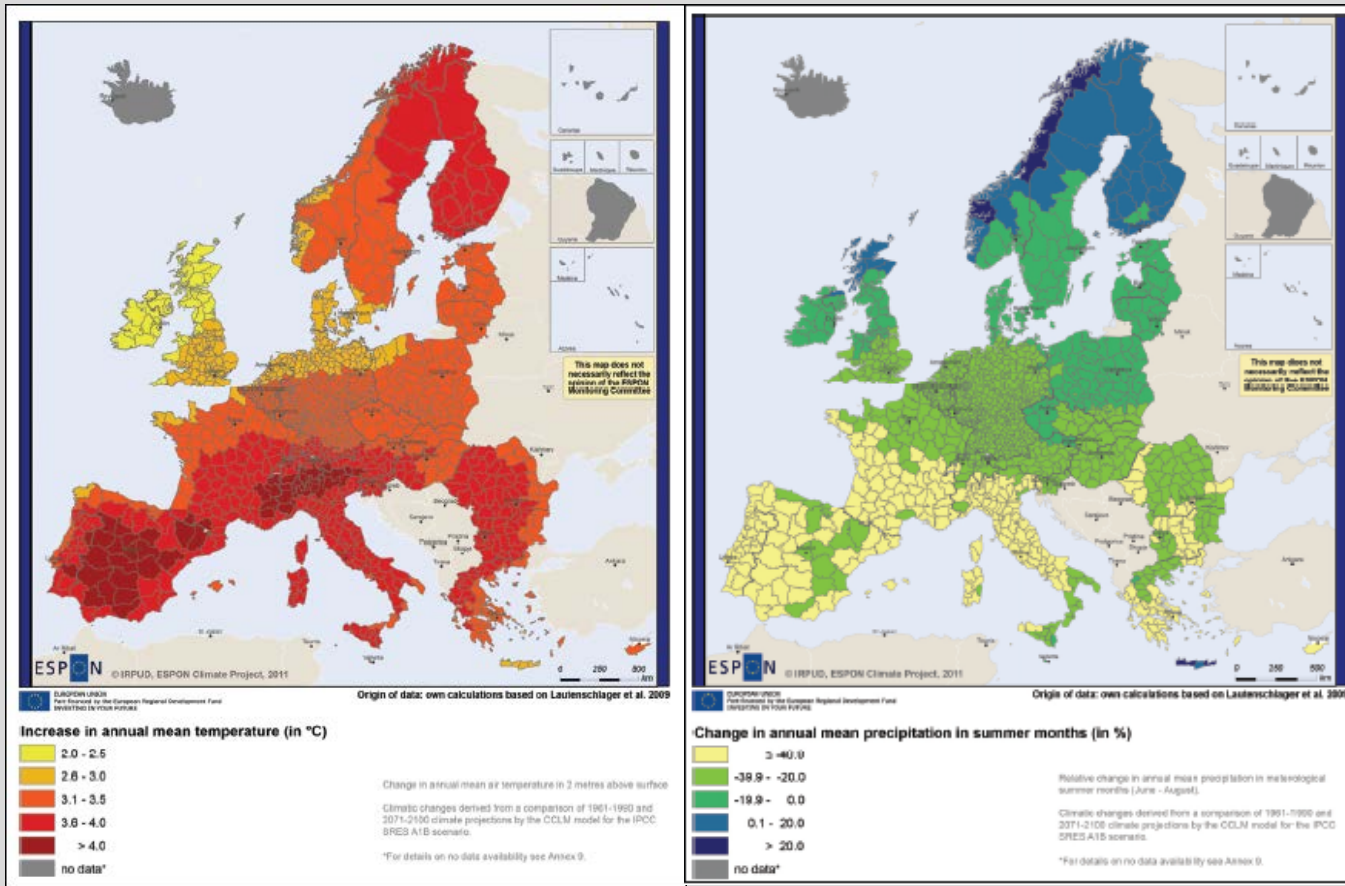
Inhaltlicher Aufbau, angesprochene Skalen

- CC: Muster der climatic stimuli (NUTS 3)
- Regionale Sensitivities (physische Rahmenbedingungen) (NUTS 3)
- CC Impacts auf EU Regionen (kaum regionale Aussagen) (NUTS 3)
- Regionale Adaptive Capacity (NUTS 3)
- Typen von CC Vulnerability (NUTS 3)
- Mitigation & Response Capacity (NUTS 3)
- Policy Implications and Policy Options (Regionstypen)

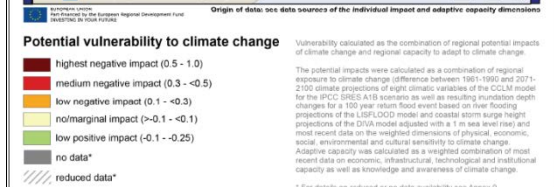
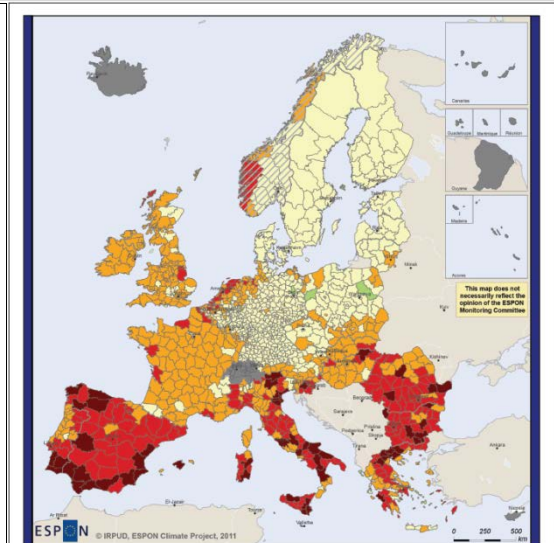
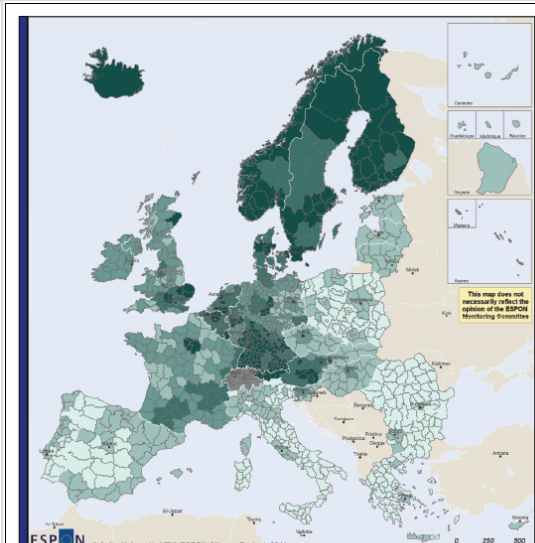
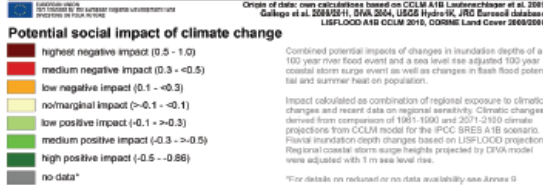
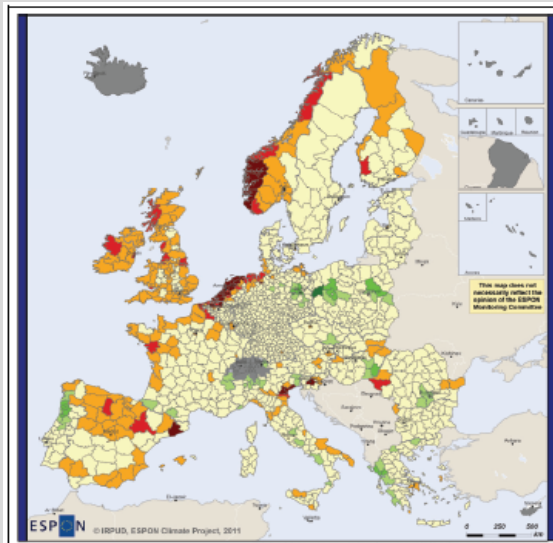
ESPON Climate Themen und Fokus

- Climate Change Patterns, climatic Stimuli:
Temperaturanstieg, Sommer-/Frosttage, *Niederschlag*, *Starkregentage*, Schneedeckenandauer
- Regionale Sensitivities
physische Rahmenbedingungen: Infrastruktur
- CC bedingte Impacts
naturräumlich, *ökonomisch*, sozial, umweltbezogen, kulturell, aggregiert
- Adaptive Capacity (Indikatoren)
economy, technology, *skills*, *variety of infrastructure*, institutions, resources distribution equity
- Regionale Typologie der CC Vulnerability (Indikatoren)
CC impact exposure x adaptive capacity
- Policy Implications and Policy Options:
nach *Regionstypen*: metropolitan/urban; rural; mountain, coastal , sparsely populated
- Case study Alpine Space:
 - analog Gesamtprojekt mit Fokus *Alpiner Tourismus*
 - Adaptation-Strategien (transnationale, nationale)

Climatic Stimuli: temperature, precipitation changes → Regionsmittelwerte

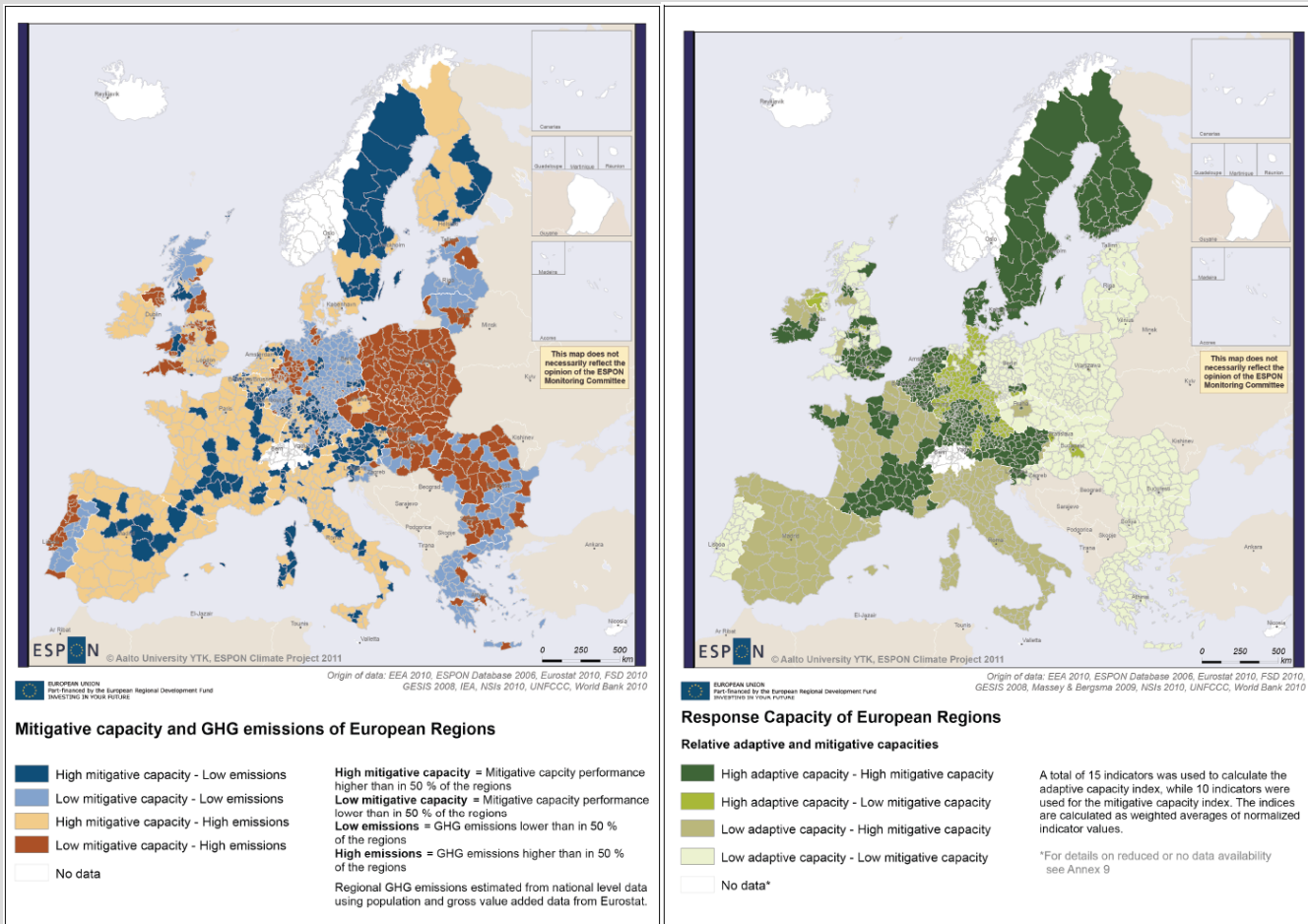


Impacts, adaptation capacity, vulnerability



CC-Policy bezogene Aussagen

auf NUTS-2, NUTS-3 Ebene










Regionale Ergebnisse nutzbar für Österreich?

Beispiel: aggregated impact



Aggregate potential impact of climate change

-  highest negative impact (0.5 - 1.0)
-  medium negative impact (0.3 - <0.5)
-  low negative impact (0.1 - <0.3)
-  no/marginal impact (>-0.1 - <0.1)
-  low positive impact (-0.1 - >-0.27)
-  no data*
-  reduced data*

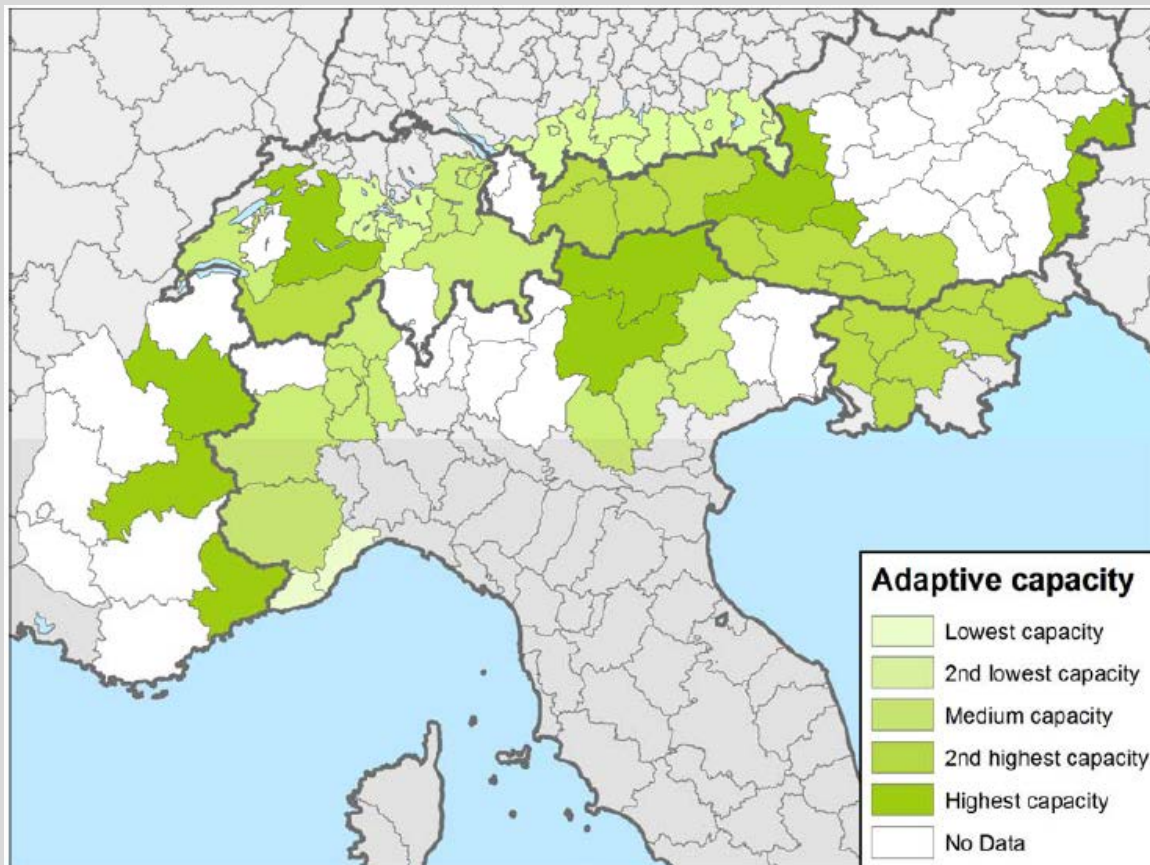
Weighted combination of physical (weight 0.19), environmental (0.31), social (0.16), economic (0.24) and cultural (0.1) potential impacts of climate change. Weights are based on a Delphi survey of the ESPON Monitoring Committee.

Impact calculated as combination of regional exposure to climatic changes and recent data on regional sensitivity. Climatic changes derived from comparison of 1961-1990 and 2071-2100 climate projections from the CCLM model for the IPCC SRES A1B scenario.

*For details on reduced or no data availability see Annex 9.

Regionale Ergebnisse nutzbar für Österreich?

Beispiel: Adaptive Capacity Assessment – Alpine Space
(Quelle: Befragung bei Behörden - in Ö: Bundesländer)



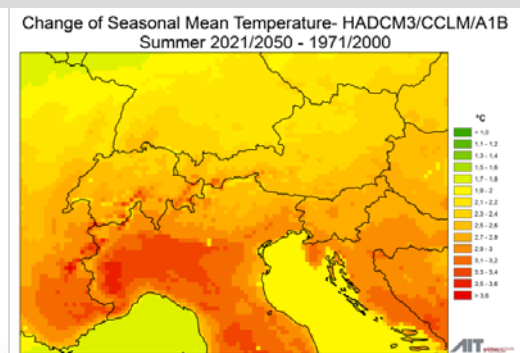
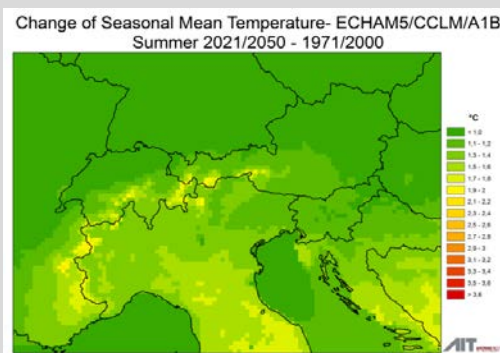
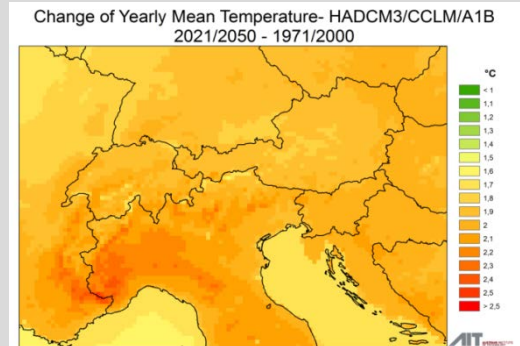
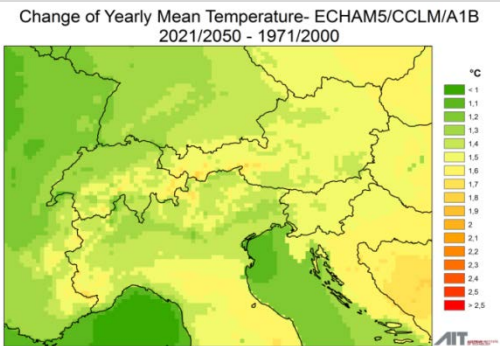
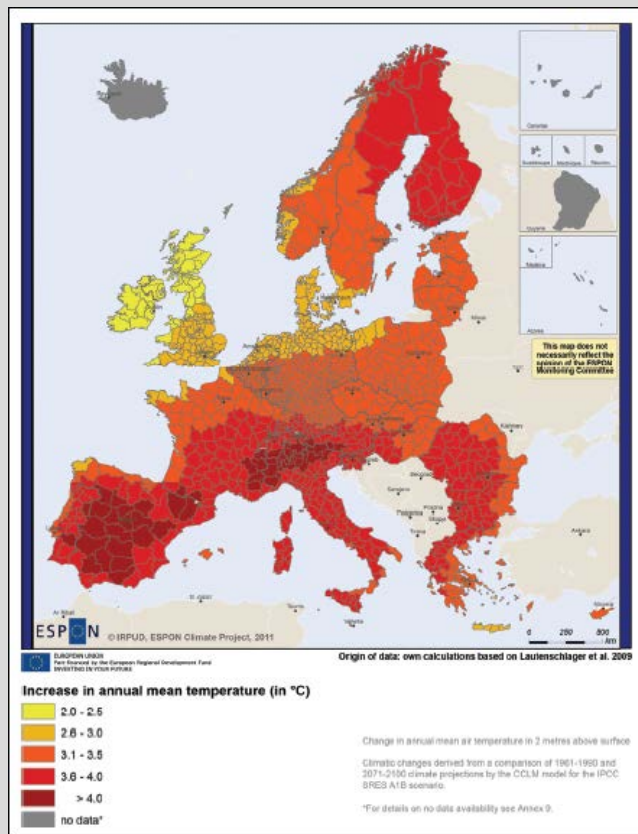
Map 1: Adaptive capacity in the Alps: Overall results of the survey

Wichtig: Ensemble regionaler Simulationen – um Ergebnis-Bandbreite zu betrachten

	Regional climate model (RCM)	Driving model (GCM)	Scenario	Region	
1	CLM (18km) (Consortial)	ECHAM5 (A1B)	A1B	Europe	ESPON Climate
2	CLM (18km) (Consortial)	ECHAM5 (B1)	B1	Europe	CLISP-Analysen
3	REMO-UBA-M 2006 (10km)	ECHAM5 (A1B)	A1B	Germany / Northern alps	
4	REMO-UBA-M 2006 (10km)	ECHAM5 (B1)	B1	Germany / Northern alps	
5	REMO (25km) (Ensembles)	ECHAM5 [r3] (A1B)	A1B	Europe	
6	RegCM (25km) Ensembles)	ECHAM5 [r3] (A1B)	A1B	Europe	
7	CLM (25km) (Ensembles)	HadCM3Q0 (A1B)	A1B	Europe	
8	Aladin (25km) (Ensembles)	ARPEGE	A1B	Europe	
9	CLM (10km) Reclip:century	ECHAM 5	A1B	Greater Alpine Region	
10	CLM (10km) Reclip:century	HADCM3	A1B	Greater Alpine Region	
11	CLM (10km) Reclip:century	ECHAM 5	B1	Greater Alpine Region	
12	CLM (10km) Reclip:century	ECHAM 5	A2	Greater Alpine Region	
13	MM5(10km) Reclip:century	ECHAM 5	A1B	Greater Alpine Region	

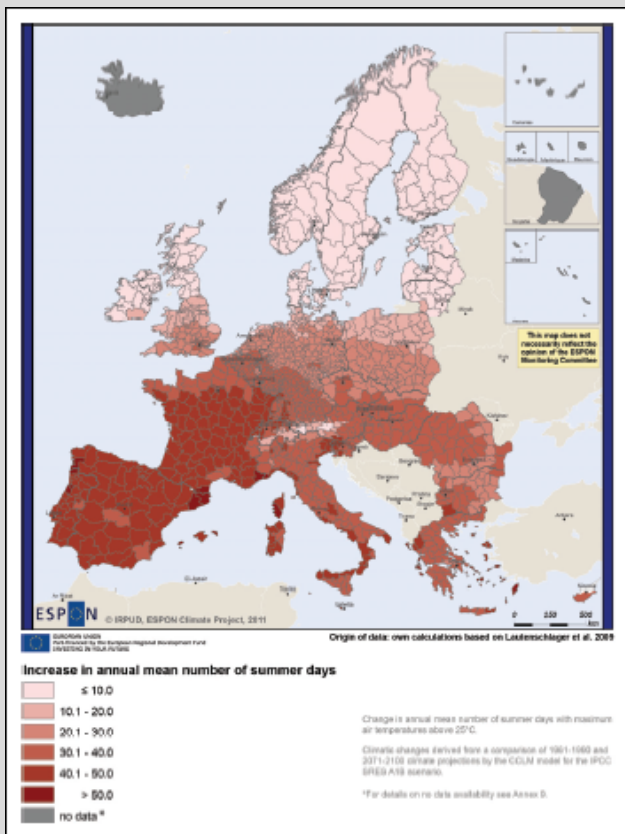
Temperature Change

grobe Skala liefert nur grobe Mittelwerte ESPON (2100 >4°K) vs. reclip:century (2050, ECHAM5, HadCM3: > 2,5 °K)

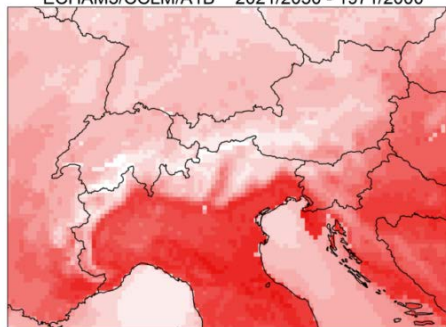


Change of summer days

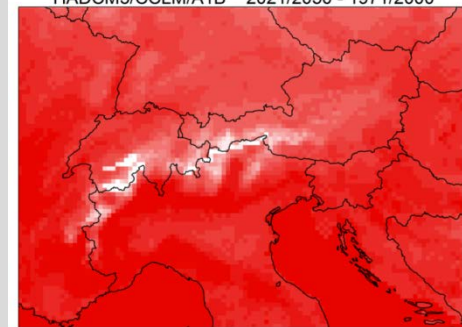
(days – tmax >25°C) ESPON (2100 >+90 days) vs. reclip:century (2050, ECHAM5, HadCM3: >+25 days)



Change Mean Number of Summer Days (>25°C)
ECHAM5/CCLM/A1B 2021/2050 - 1971/2000



Change Mean Number of Summer Days (>25°C)
HADCM3/CCLM/A1B 2021/2050 - 1971/2000



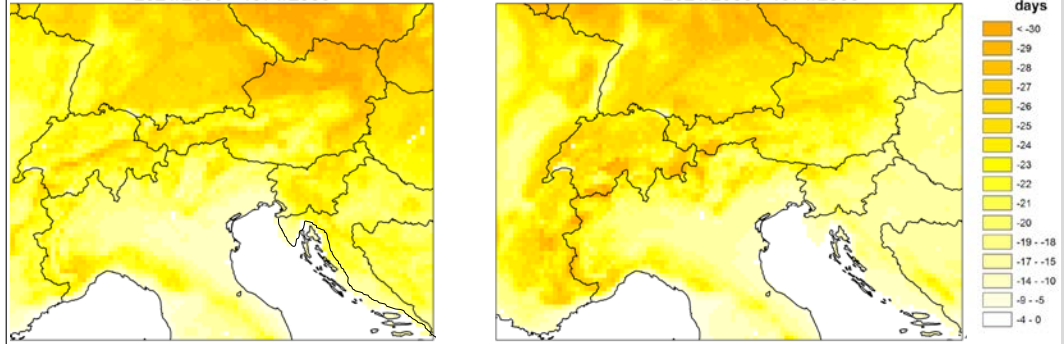
Sommertage bisher:
Osten: bis 30/bis 40, Westen: bis 10/bis 20;

Zunahme der Sommertage (bis 2050):
in Ö: Osten 10-25, Westen: 5 – 15 Tage

Change of frost days

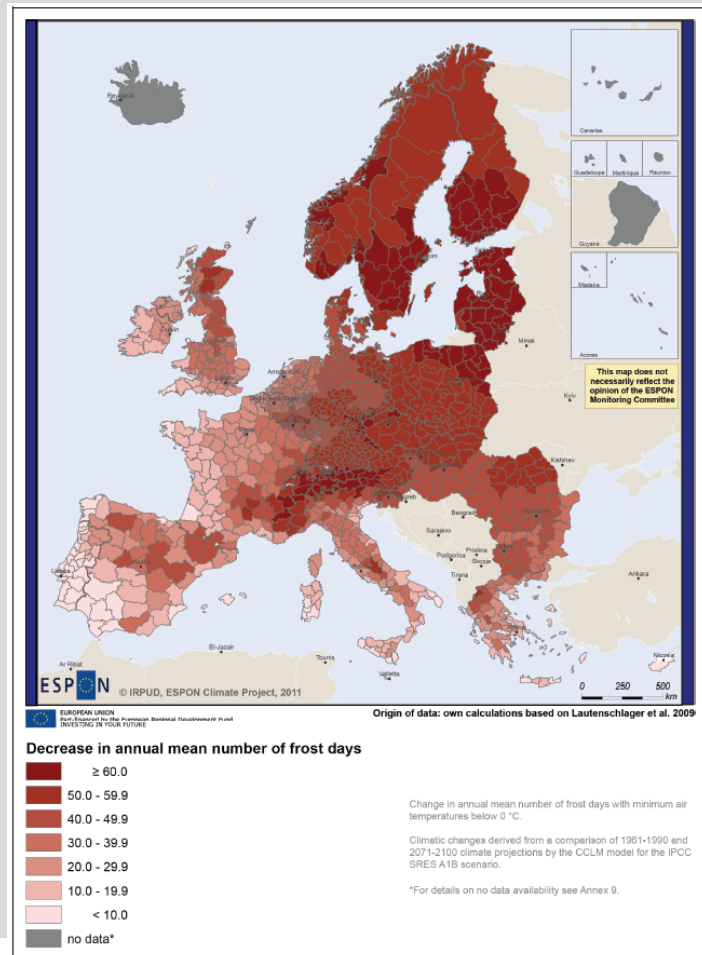
(days – tmin <0°C) ESPON (2100 >-40/ -60 days) vs. reclip:century (2050, ECHAM5, HadCM3: Hochalpen -30, generell -20 days)

Change Mean Number of Frost Days - ECHAM5/CCLM/A1B 2021/2050 - 1971/2000 Change Mean Number of Frost Days - HADCM3/CCLM/A1B 2021/2050 - 1971/2000



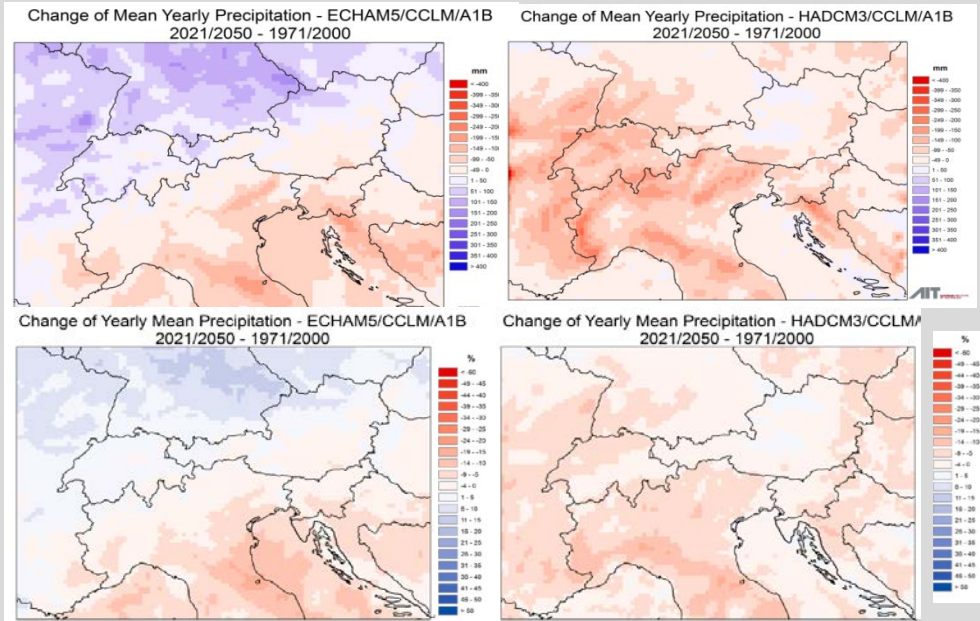
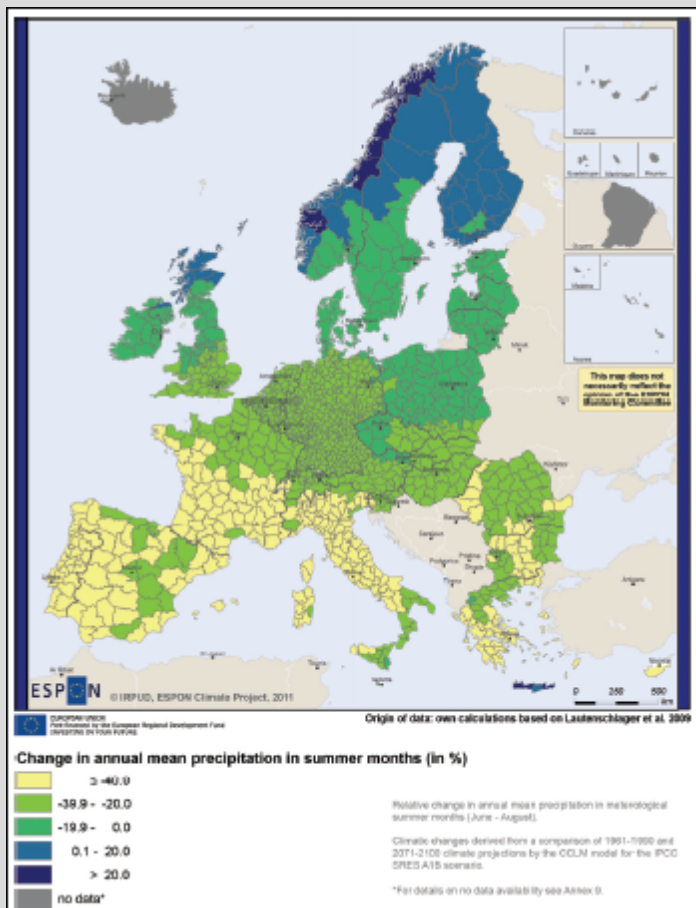
Frosttage bisher:
Osten: bis 60, Westen: 150 & mehr Tage

Abnahme der Frosttage (bis 2050):
in Ö: -20 bis -30 Tage,
v.a. Osten und entlang Alpenhauptkamm)



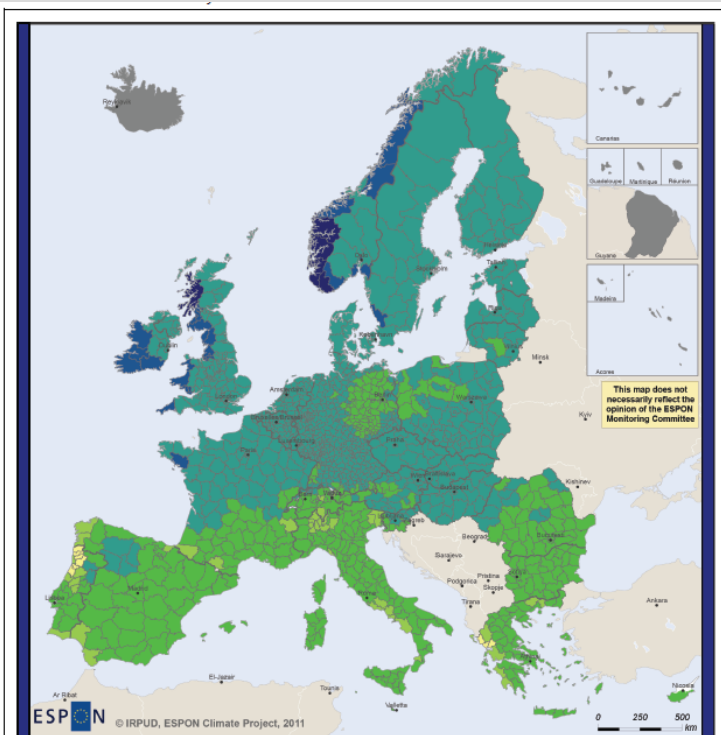
Annual precipitation change

ESPON (2100, <-40 – >+20% , Ö: -40 – 0%) vs.
reclip:century (2050, -250 – + 250 mm; -20 – + 20%)

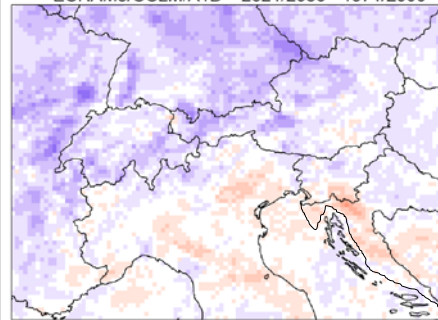


Annual change of heavy rainfall days

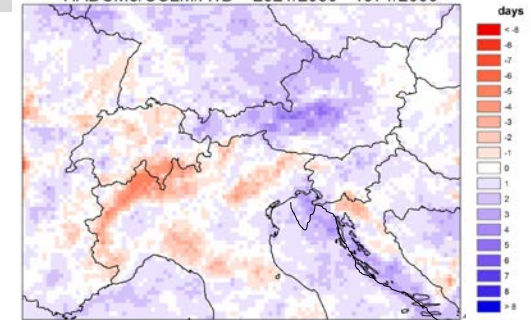
ESPON (2100, -6 – +6 days; Ö: - 3 - + 3 days) vs.
reclip:century (2050, Österreich: Ost/Süd: 0/+3, West/Alpen: +3/+6 days)



Change Mean Number of Heavy Precip. Days (>20mm/d)
ECHAM5/CCLM/A1B 2021/2050 - 1971/2000



Change Mean Number of Heavy Precip. Days (>20mm/d)
HADCM3/CCLM/A1B 2021/2050 - 1971/2000



Starkregenereignisse pro Jahr (>20mm)

Bisher :

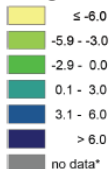
Osten: bis 10/bis 15, Westen: 30 & mehr Tage

Zunahme der Starkregenereignisse (bis 2050):

im Osten & Süden: 0 bis 3,

im Norden, Westen, Alpenhauptkamm: 3-6 Tage

Change in annual number of days with heavy rainfall



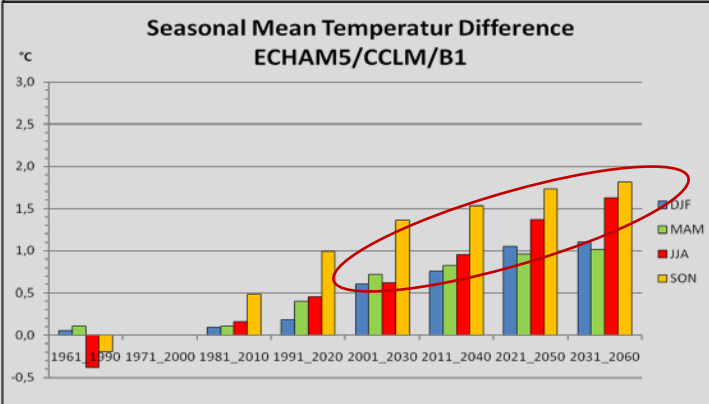
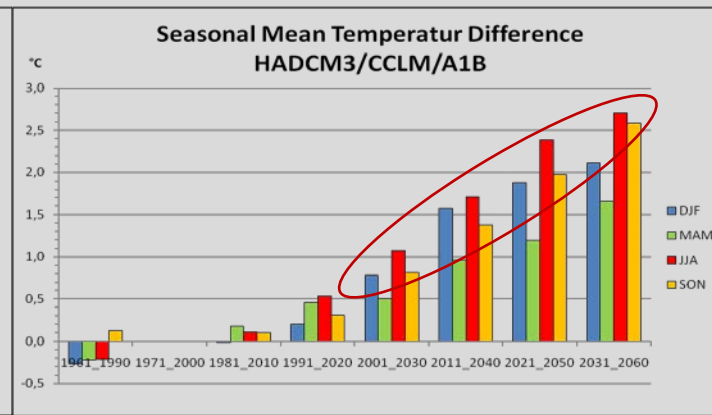
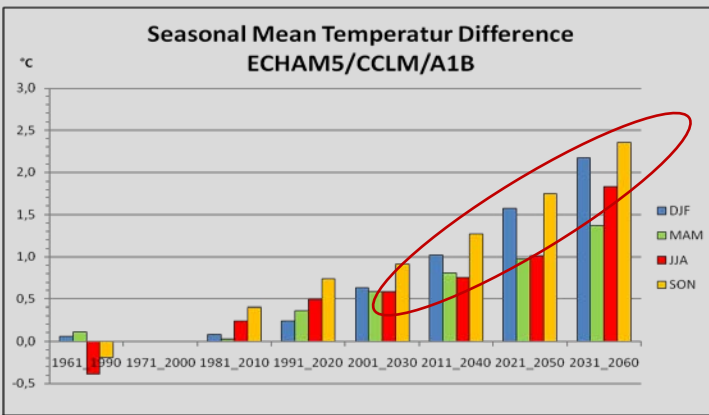
Change in annual mean number of days with more than 20mm/sqm of rainfall.

Climatic changes derived from a comparison of 1961-1990 and 2071-2100 climate projections by the CCLM model for the IPCC SRES A1B scenario.

*For details on no data availability see Annex 9.

Saisonaler Temperaturanstieg

Trends 1971/2000 – 2031/2060 stabil:
unterschiedliche Entwicklungen in den Jahreszeiten



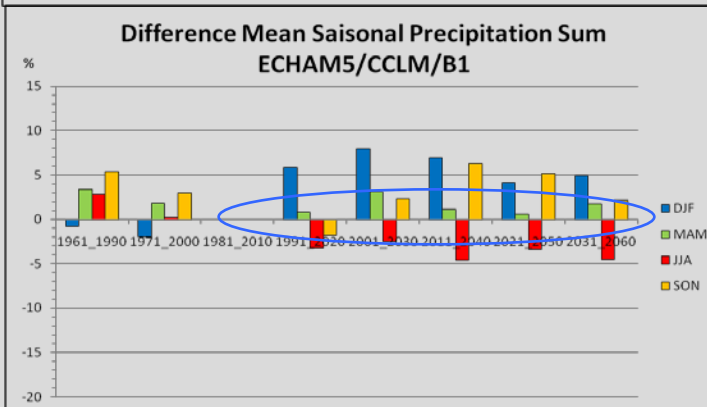
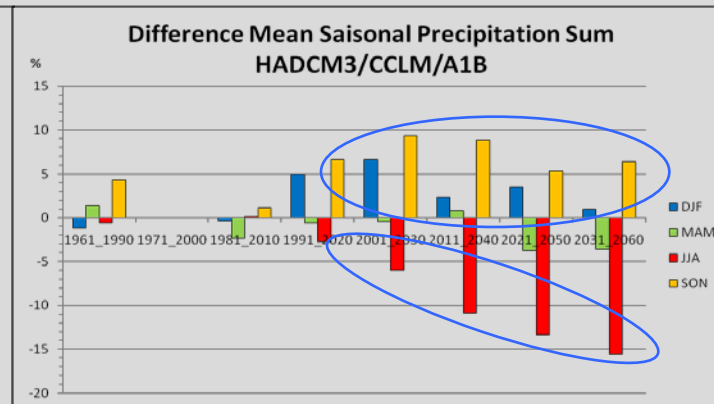
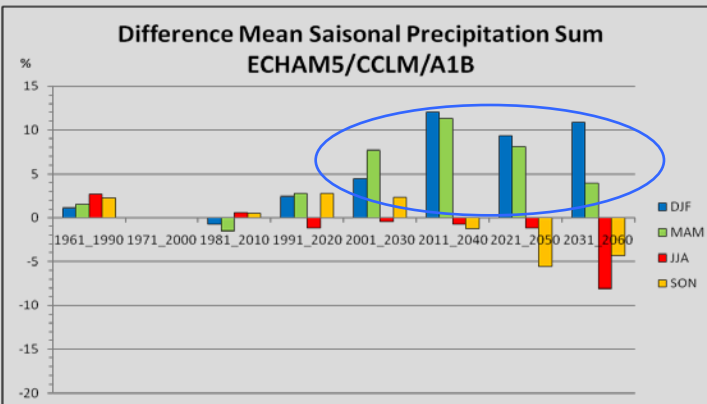
ECHAM5/CCLM/A1B :
Highest increase in fall: +(till 2,4 K),
In winter till +2,3 K

ECHAM5/CCLM/B1:
Less increase.
In winter and spring around +1K

HadCM3/CCLM/A1B:
Highest increase in summer (till +2,6 K),
Increase in fall till +2,5 K, in winter till +2,1 K

Saisonale Niederschlagsentwicklung

Trends 1971/2000 -2031/2060 sehr unsicher:
auch: unterschiedliche Entwicklungen in den Jahreszeiten



ECHAM5/CCLM/A1B :
Little decline (fall.& summer)
(2031/2060: distinct increase in winter & spring
(~ +10%)

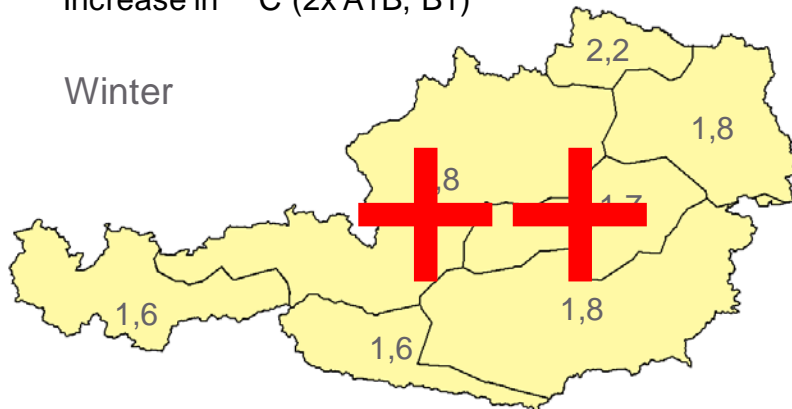
ECHAM5/CCLM/B1:
Little decline in summer,
Little increase infall and winter (~ + 5 %)

HadCM3/CCLM/A1B:
Distinct decline in summer (till -15%)
Increase in fall and winter (+5-10%)

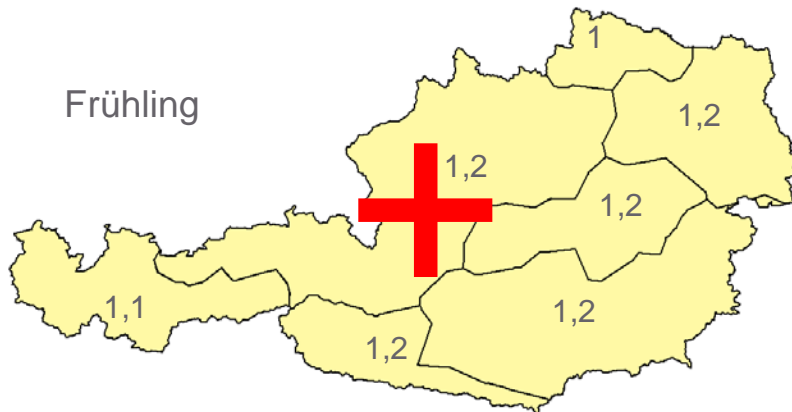
Vergleich von Szenarien nach saisonalen Trends nach Regionen

Temperatur e 1971/2001 - 2021/2050
Increase in ° C (2x A1B, B1)

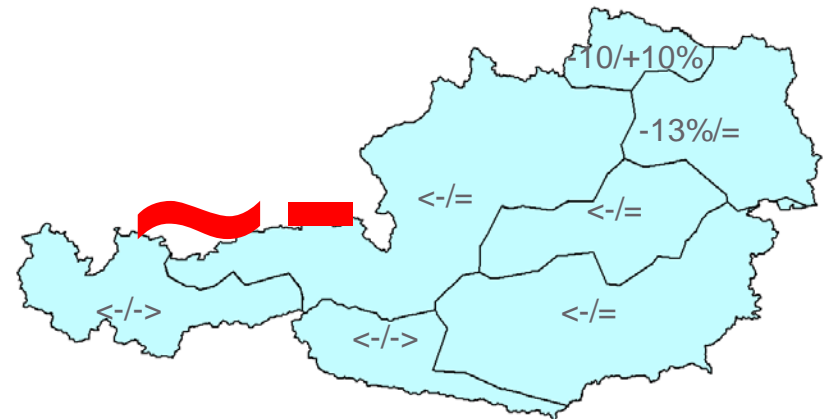
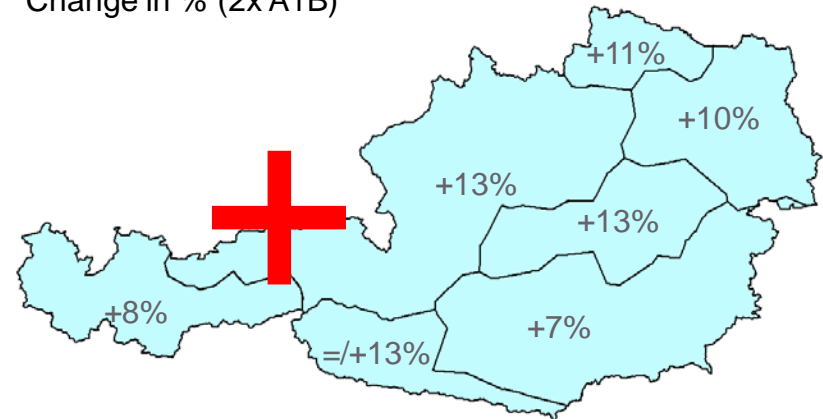
Winter



Frühling



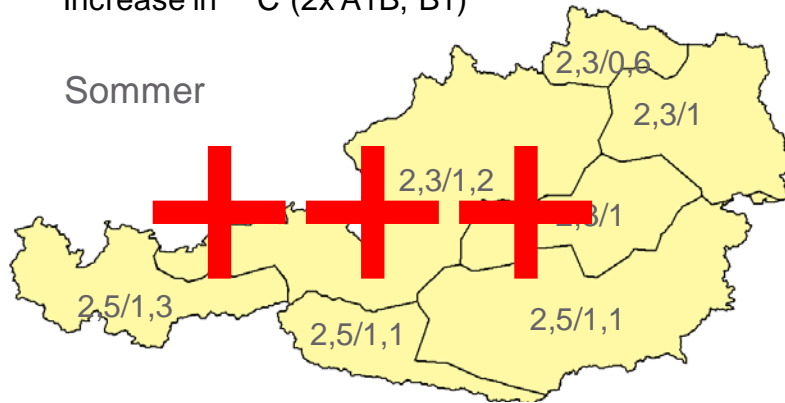
Precipitation 1971/2001 - 2021/2050
Change in % (2x A1B)



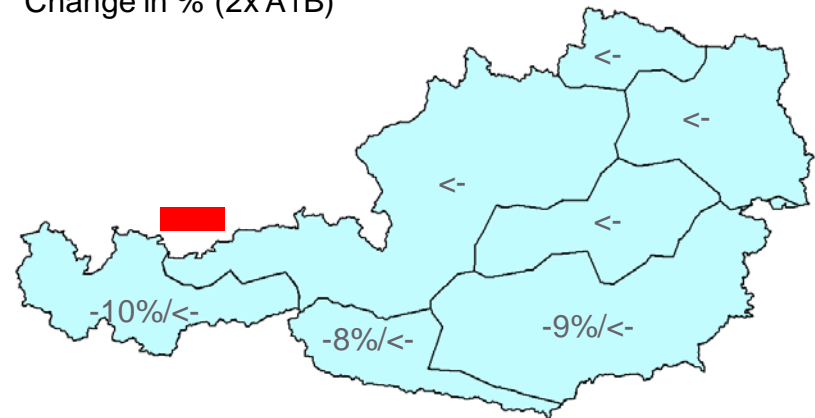
Vergleich von Szenarien nach saisonalen Trends nach Regionen (2)

Temperatur e 1971/2001 - 2021/50
Increase in ° C (2x A1B, B1)

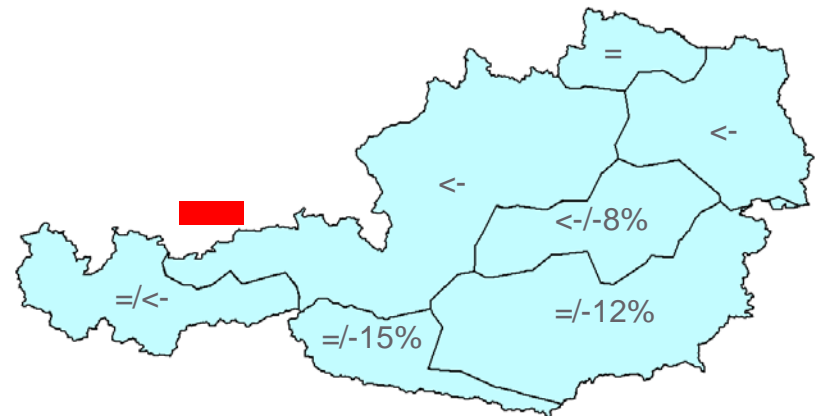
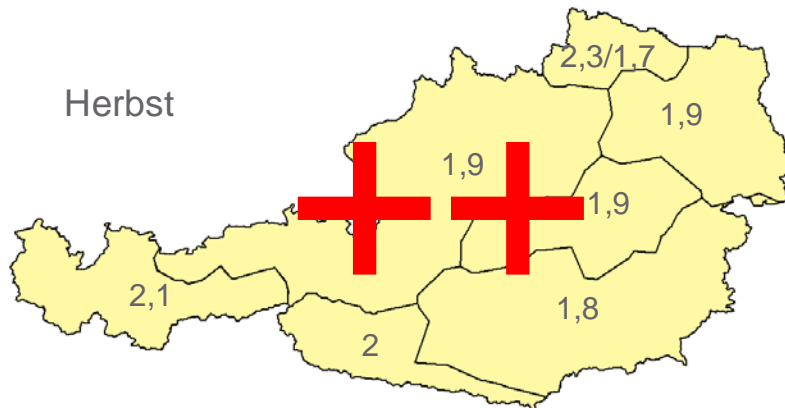
Sommer



Precipitation 1971/2001 - 2021/50
Change in % (2x A1B)



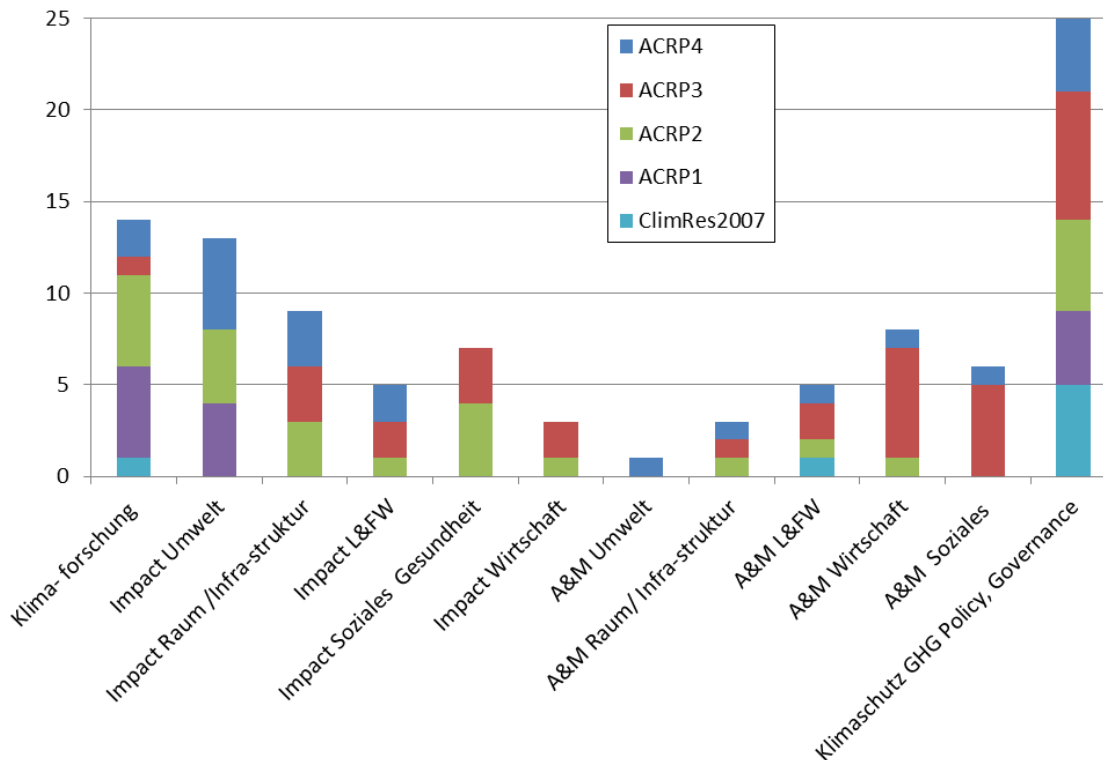
Herbst



CC-Forschungsschwerpunkte in Ö

Projekte und Themen aus den Klimaforschungs-Calls (~80 Projekte)

Klimaforschungsprojekte - angesprochene Themen (nach Programm-Calls)
(Klimaforschung, Impactanalyse, Adaptation&Mitigation, Policy&Governance)

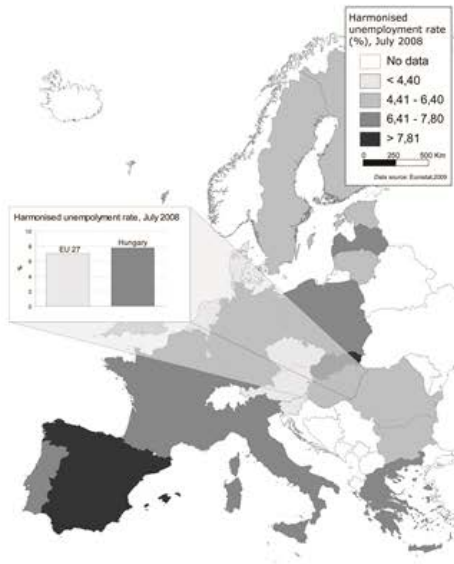


Resumée

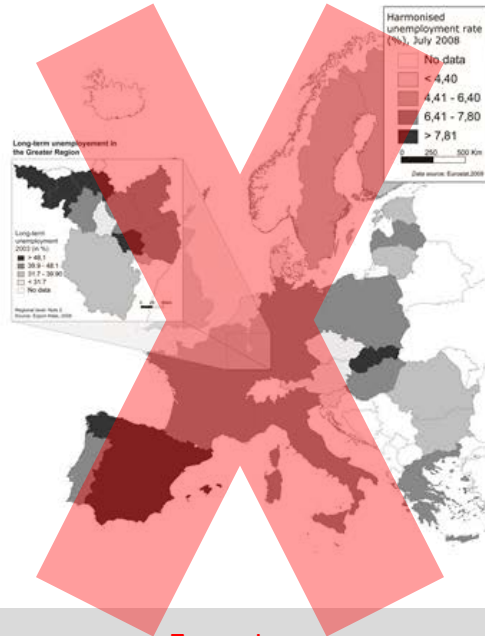
- Räumlich explizite Ergebnisse: Karten
 - Mit NUTS 3 grobe regionale Gliederung (Regionsgröße schwankt zwischen den Ländern)
 - Inhalte: über die Regionen gemittelte Werte
 - Klassengrenzen: Breite Klassen
 - Sichere Werte-Range innerhalb der Regionen
 - intraregionale Variabilität wird nicht sichtbar (Maxima, Minima, ...)
- Zeitbezug:
 - Karten beziehen sich auf Endzeitpunkte (2100)
 - Verlauf der Veränderungen, Aus- und Einwirkungen und der zeitlichen Taktung von Maßnahmen wird nicht angesprochen
- Interpretationen und Strategievorschläge auf EU-Ebene:
 - beziehen sich auf Ländergruppen, weite Regionen sowie auf Regionstypen

ESPON Scales

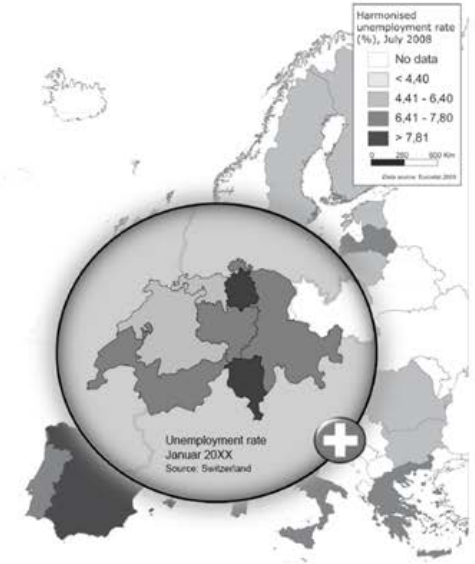
Relevanz der Analysestrategien



Comparison
Comparing selected regions with the 'own' spatial context of the regional stakeholders



Zoom-In
Presenting ESPON results on a larger scale



Completion
Presenting additional data from other sources

Herzlichen Dank für die Aufmerksamkeit!

reclip:century - Berichte und regionale Klimadaten zum Download:

Data Warehouse: http://reclip.ait.ac.at/reclip_century

- daily, monthly, yearly data: temperature, precipitation, extreme event days
- Format: netCDF 3.0

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