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CLIMATE CHANGE RESEARCH

Water and Swiss agriculture

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With contributions by
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CHR – Spring seminar «Socio-economic influences on the discharge of the River Rhine»

26-27 March 2014, Bregenz

Water use by agriculture in Switzerland in the Rhine basin

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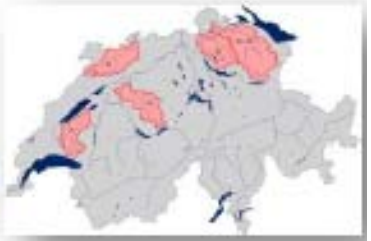
Total water provided to agriculture 2010	**180 mio m^3/a**
Fountains	**90**
irrigation	**36**
use for farm animals	**47**

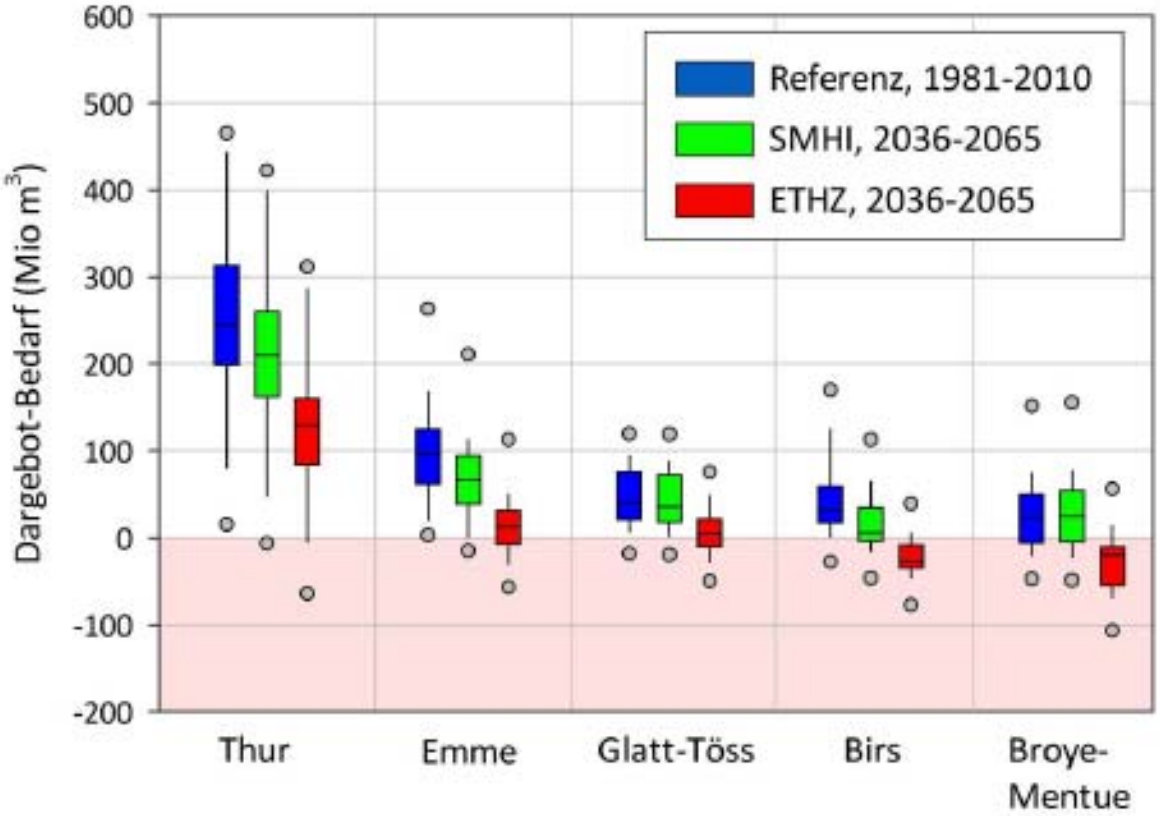
Irrigated land surface 2010: ca. 3% of ca. 1 mio ha

Irrigation necessity (1980-2010)	**106 → 13 m3/s (in 3 months)**
Irrigation necessity (2003)	**483**
Irrigation necessity (2050)	**1.5 – 4x**

Water resources in Swiss Rhine Basin : 26'000 mio m^3/a

Defizitanalyse – Szenarien 2050





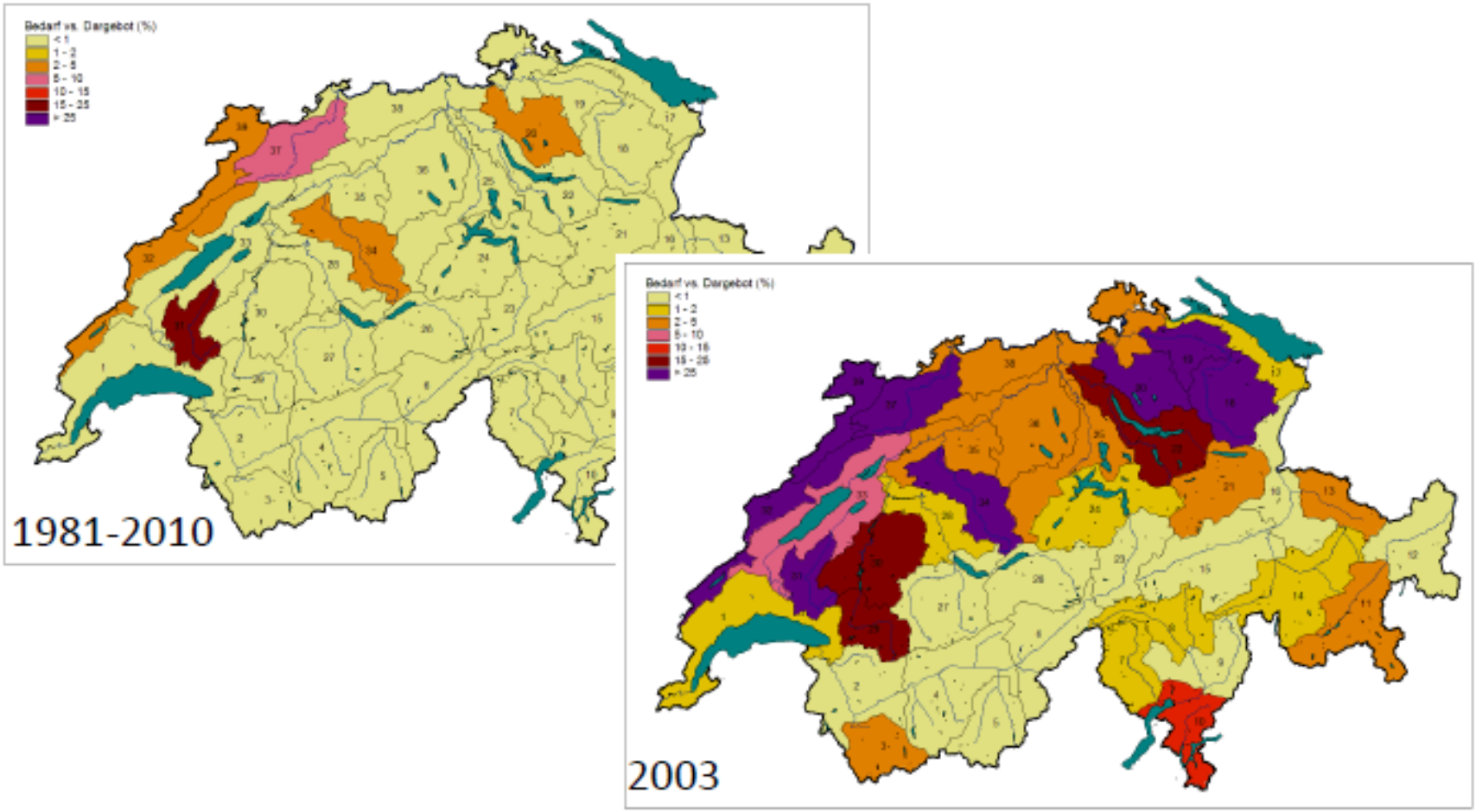
Anzahl Jahre <0%:

	Thur	Emme	Glatt-Töss	Birs	Broye-Mentue
Ref	1	1	2	2	8
SMHI	1	3	2	10	8
ETHZ	3	11	16	25	25

Fuhrer, J., 2014, unveröffentl.

Defizitanalyse 1981-2010

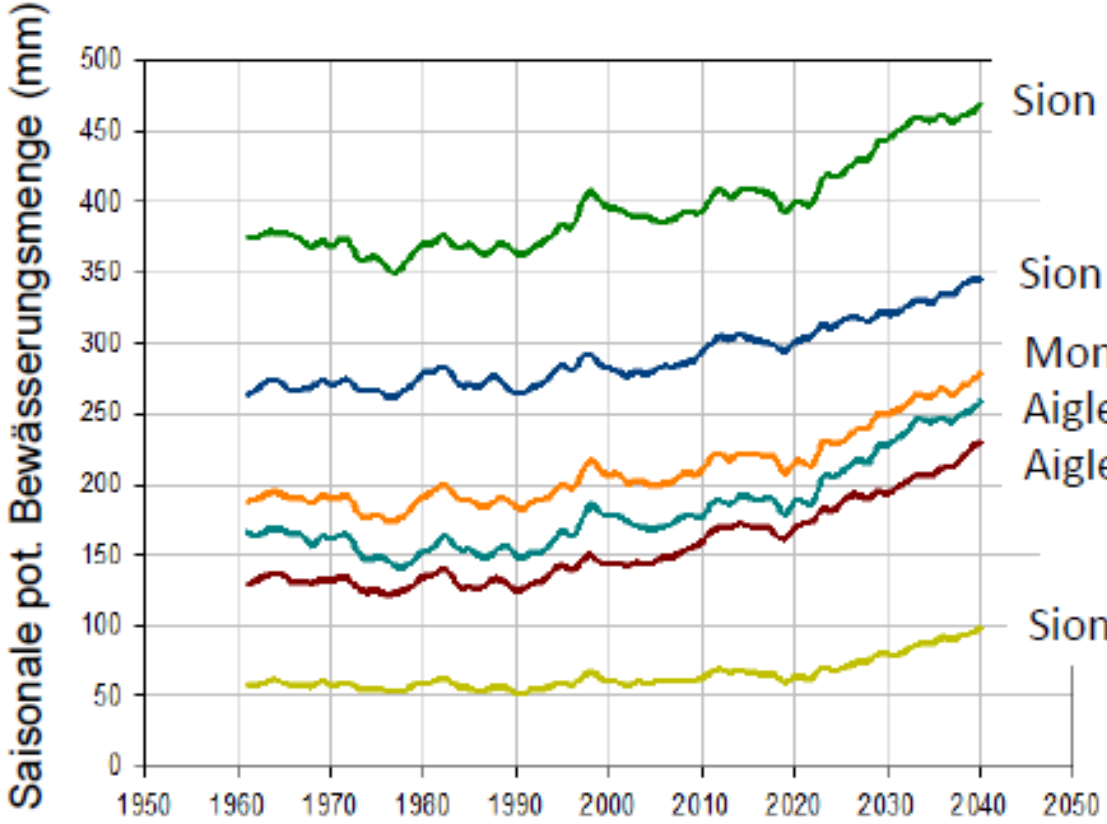
Berücksichtigung einer Mindestrestwassermenge (Q347) und 70% Bewässerungseffizienz



Fuhrer, J., 2014, unveröffentl.

Agroscope

Trend im potentiellen Bewässerungsbedarf zur Ertragssicherung

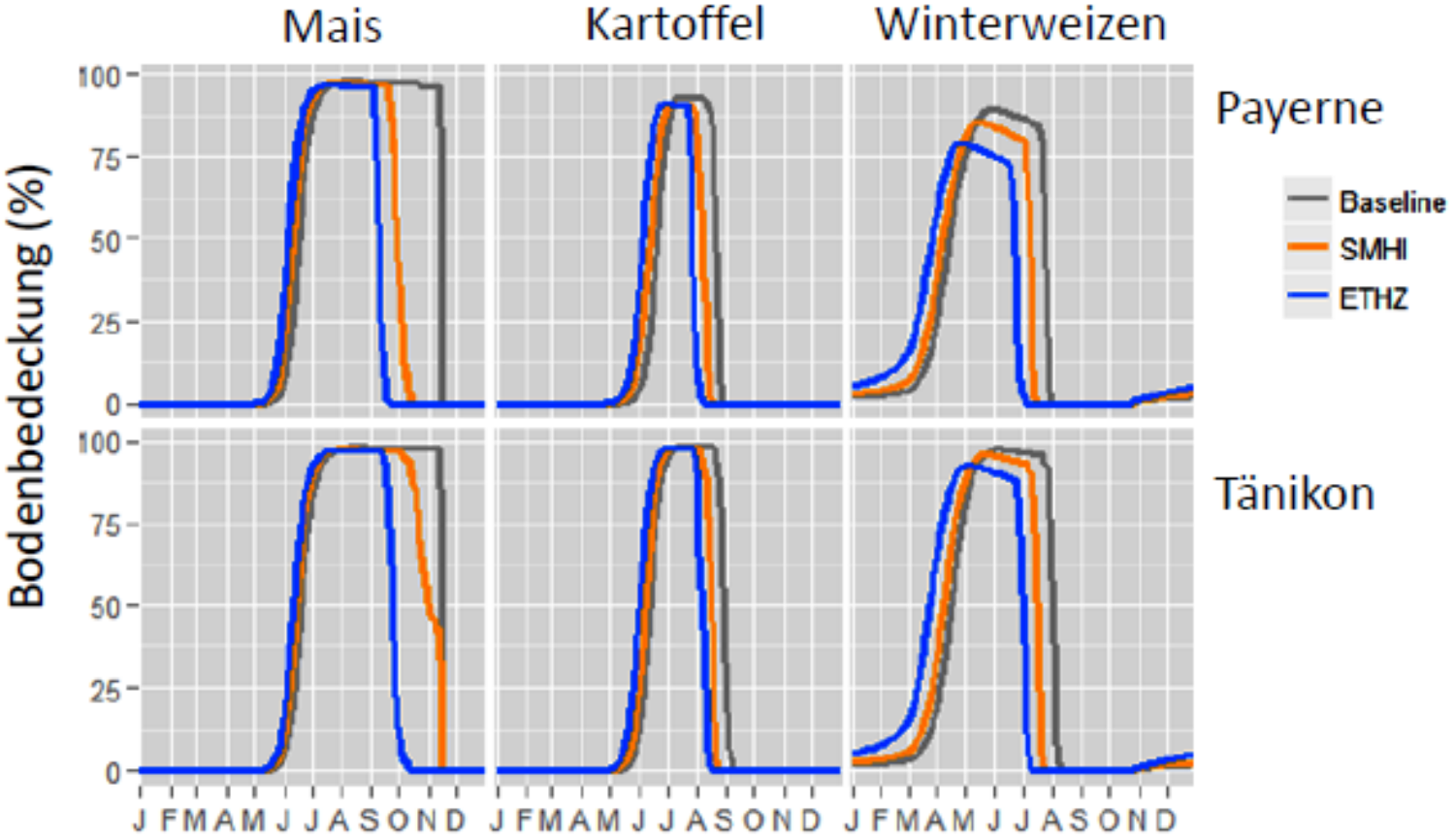


Trendlinien für 4 Klimaszenarien:
- MPI_REMO_ECHAM-r3
- ICTP_RegCM_ECHAM5-r3
- ETHZ_CLM_HADCM3Q0
- SMHI_RCA_HadCM3Q3

Fuhrer, J. et al. STOTEN 2014

Änderung der Pflanzenentwicklung

Simulationen mit CropSyst (1981-2010 vs. 2045-2074)



Wanner C., Masterarbeit ART/UniZH, 2013

Test Region Broye

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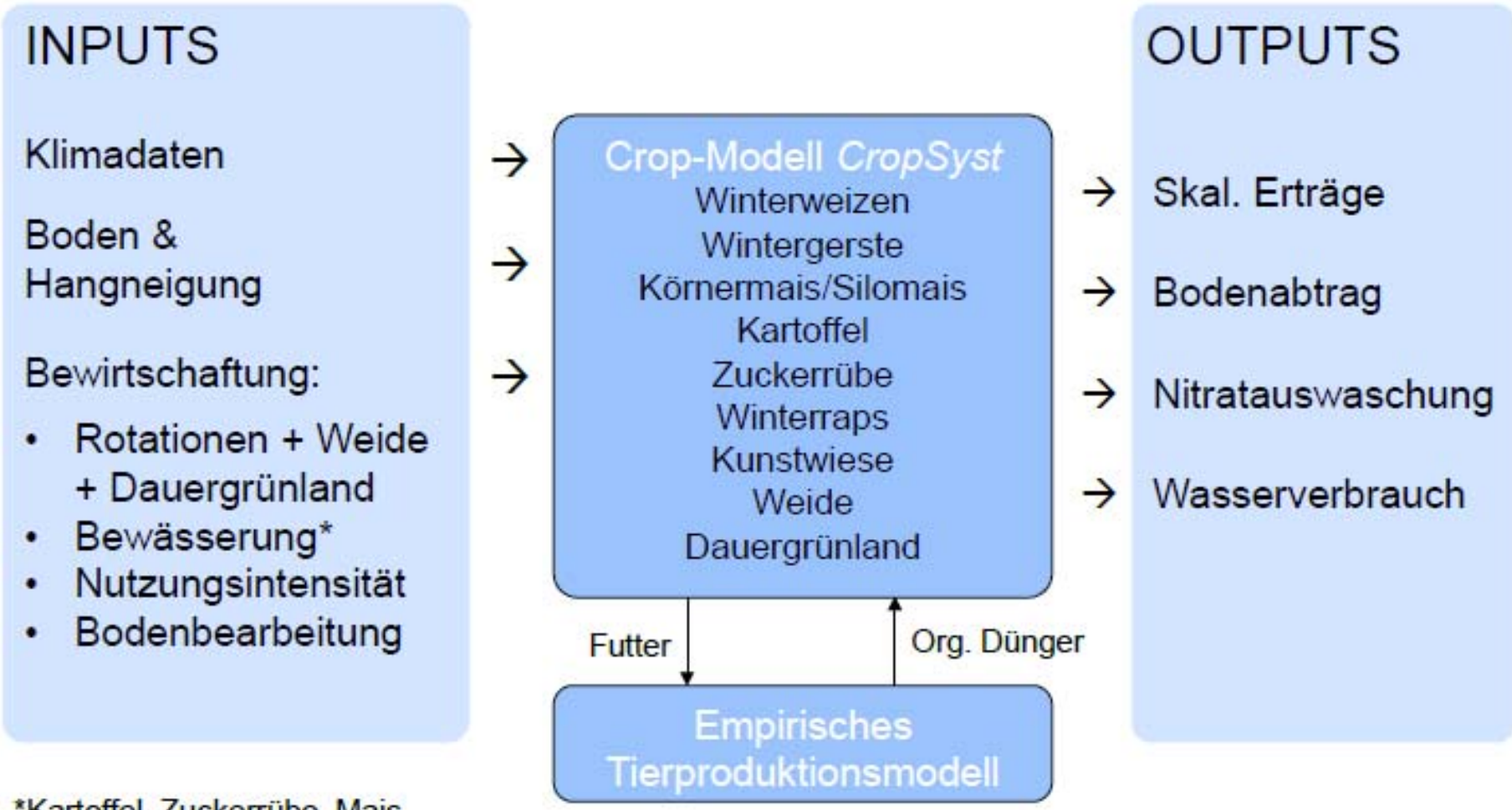
Climate change scenario

Sozio-economic scenario

→Optimize agriculture in optimizing
4 criteria:
- **Income**
- **Soil erosion**
- **N – leakage**
- **Water consumption**

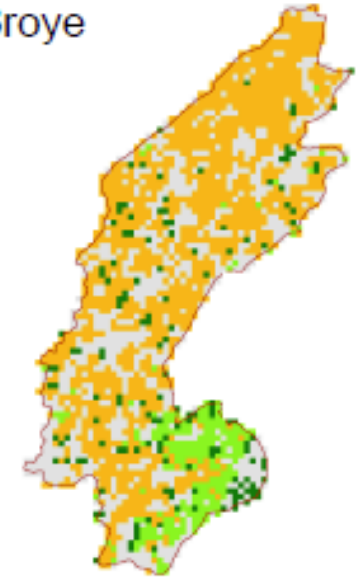
Biophysikalisches Modell

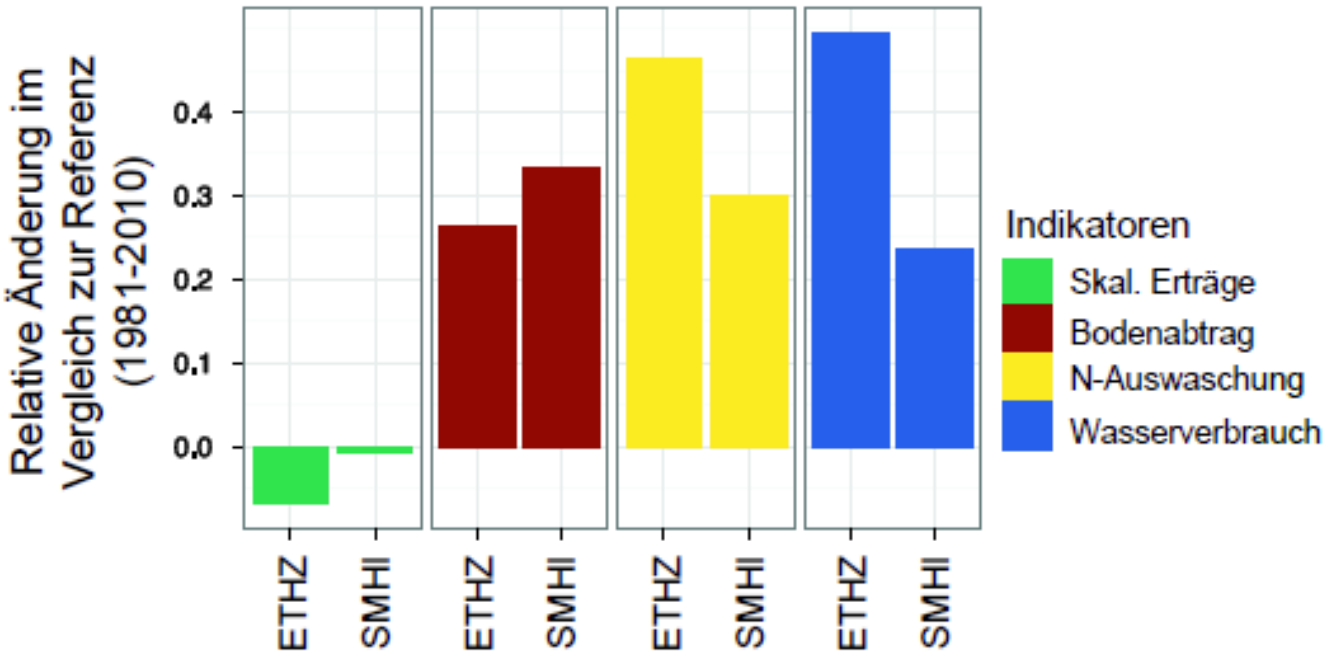


*Kartoffel, Zuckerrübe, Mais

Auswirkungen der Klimaänderungen - Regional

Aktuelle Landnutzung im Einzugsgebiet der Broye

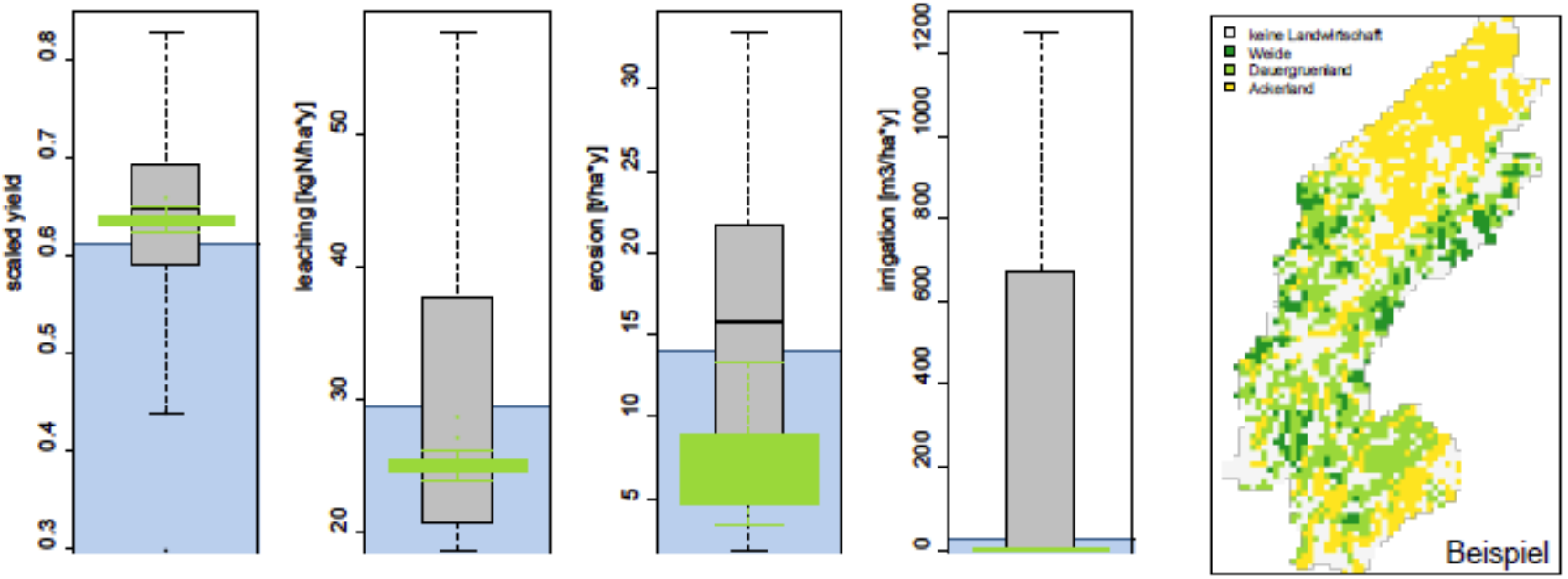


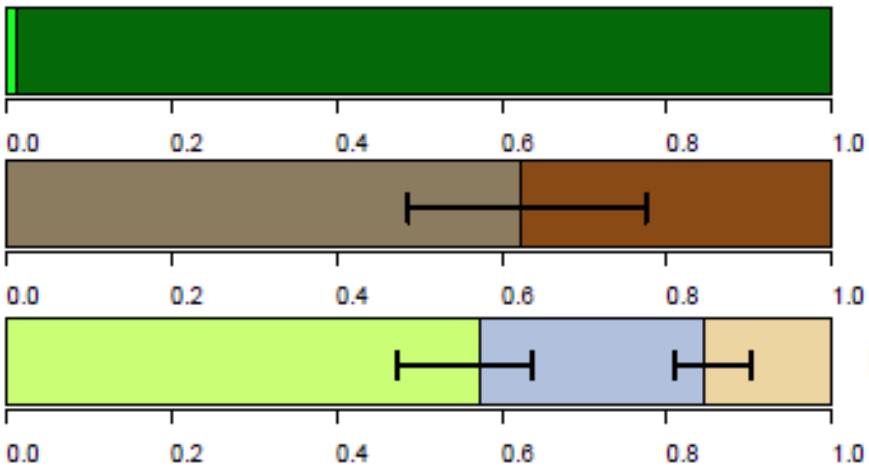


T. Klein

Möglichkeiten für Anpassung

Alle Indikatoren besser als Referenz…



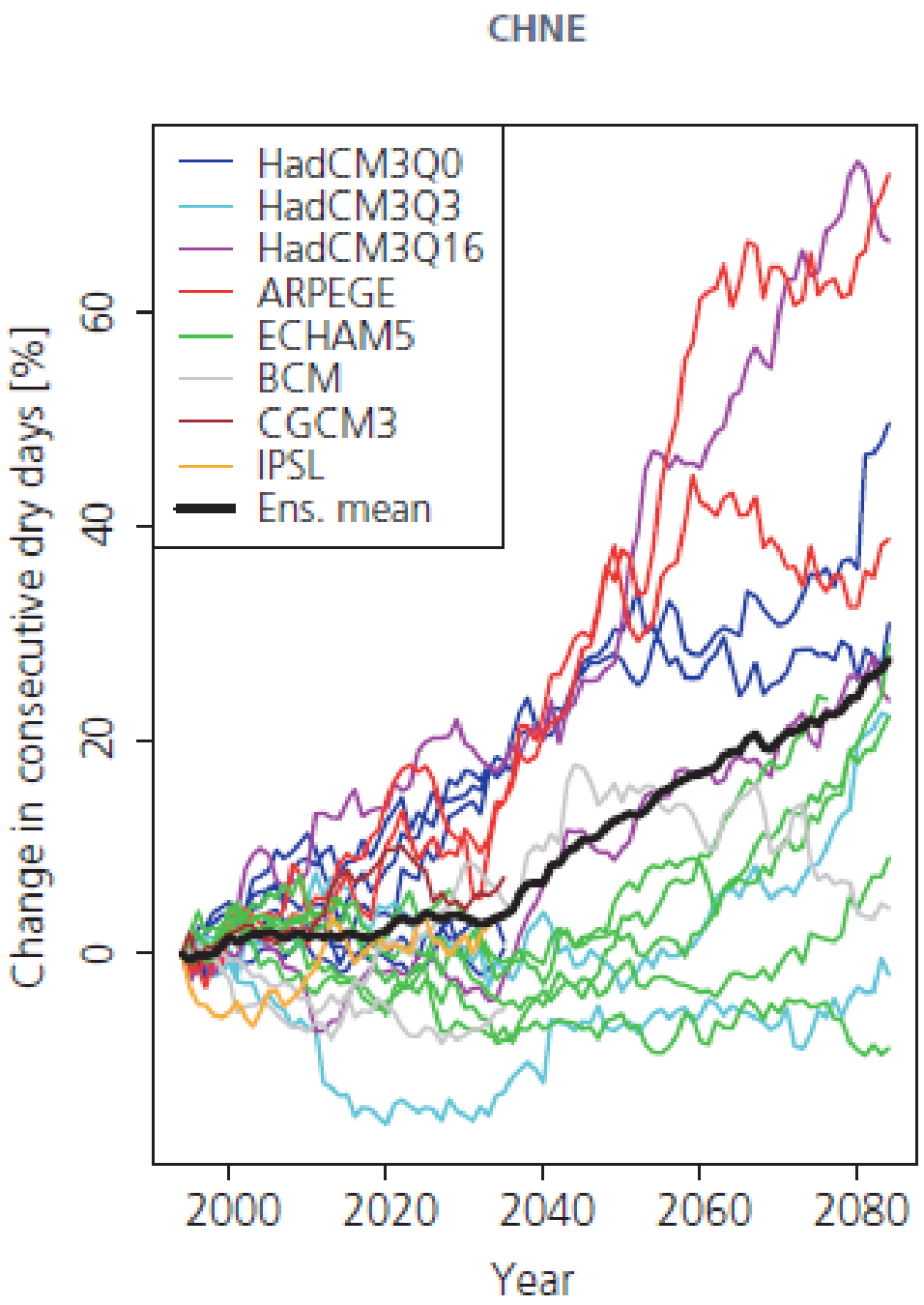


Nutzungsintensität
- Niedrig
- Mittel
- Hoch

Bodenbearbeitung
- Reduziert
- Konventionell

Kulturarten
- Grünland
- Winterkulturen
- Sommerkulturen

Agroscope



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Consecutive dry days:

Uncertainty of CC-model results in NE-CH

CH2011, 2011

Answers to questions

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- **National climate adaptation strategy in progress, Water and agriculture sectors of primary interest**
- **Applied research: CCHydro, NRP 61 (sustainable water resources management), CH2011, CH2014**
- **2030 and 2050 (for strategy)**
- **Spatial differentiation is important (different climates), mostly only for summer season**

Conclusions

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- **Generally enough water for irrigation**
- **BUT: in some hotspots shortage of surface water in dry summers → adaptation necessary (irrigation techniques, species, timing of vegetation period, different places, reservoirs, channels)**
- **Probably little impact on river Rhine discharge by enhanced irrigation**

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