# Water balance and drought projections for Switzerland under changing climate and land management

S.I Seneviratne, E.L. Davin, M. Hirschi, L. Gudmundsson (ETH Zurich)

A. Holzkämper (AGROSCOPE)

sonia.seneviratne@ethz.ch

Goal: Assess changes in evapotranspiration, soil moisture and drought indicators based on the CH2018 projections, taking into consideration land and water management

sonia.seneviratne@ethz.ch
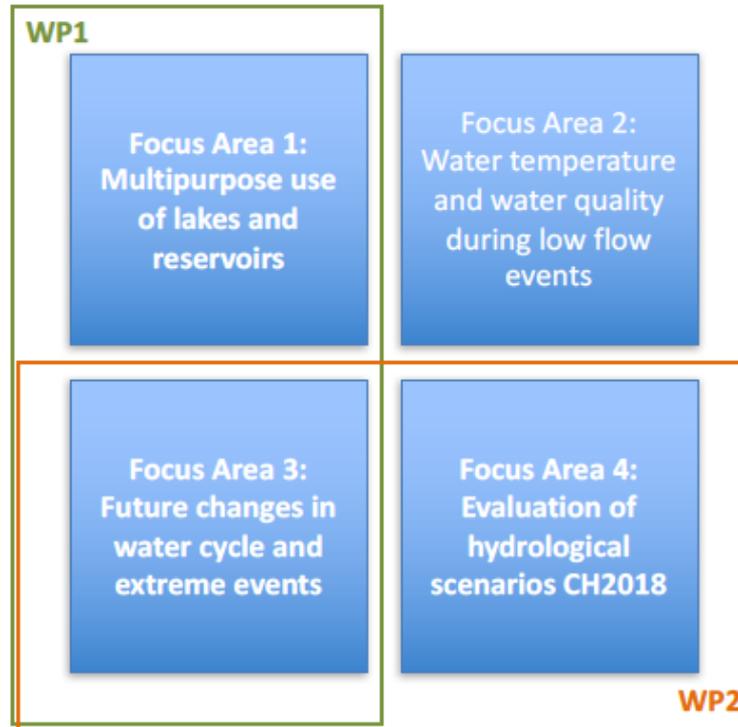
WP1: Land use and irrigation impacts on future water resources and hydrology

- *CH2018 projections (based on CORDEX RCMs) do not represent human management aspects such as land use and irrigation*

- Use the Community Land Model to investigate the influence of land use and irrigation on the Swiss-scale water cycle and water resources

- Gridded simulations for Switzerland (11km and 50km resolution) & case study for seeland basin (in collaboration with Agri-Adapt)

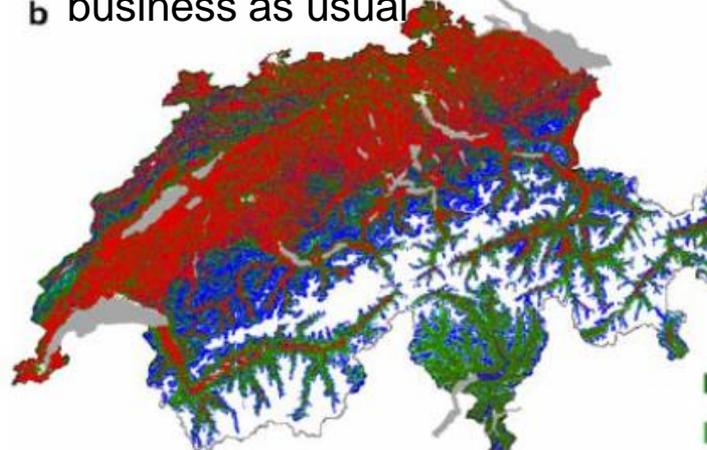sonia.seneviratne@ethz.ch

Oleson et al. 2013

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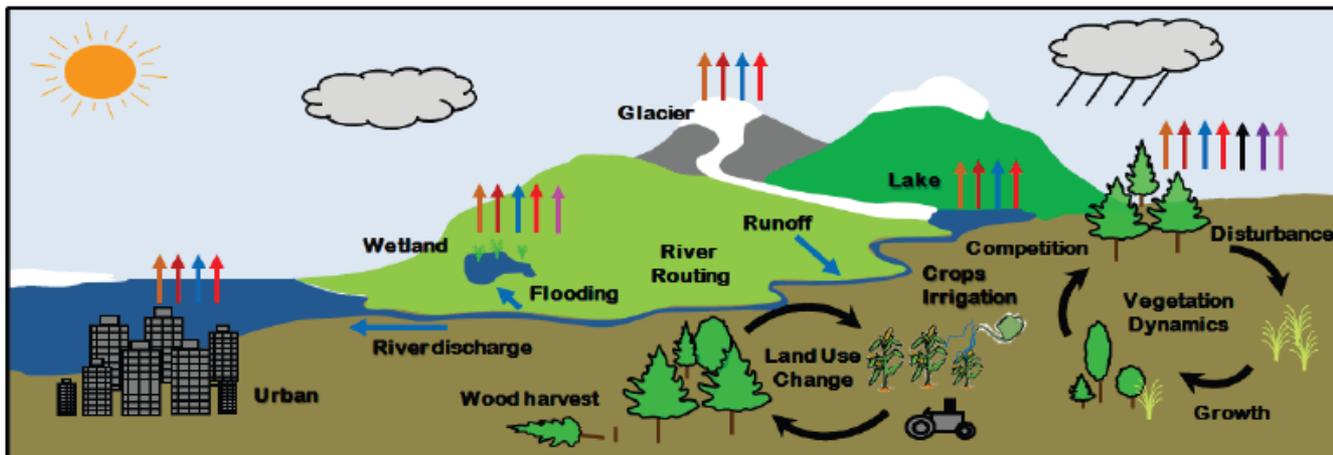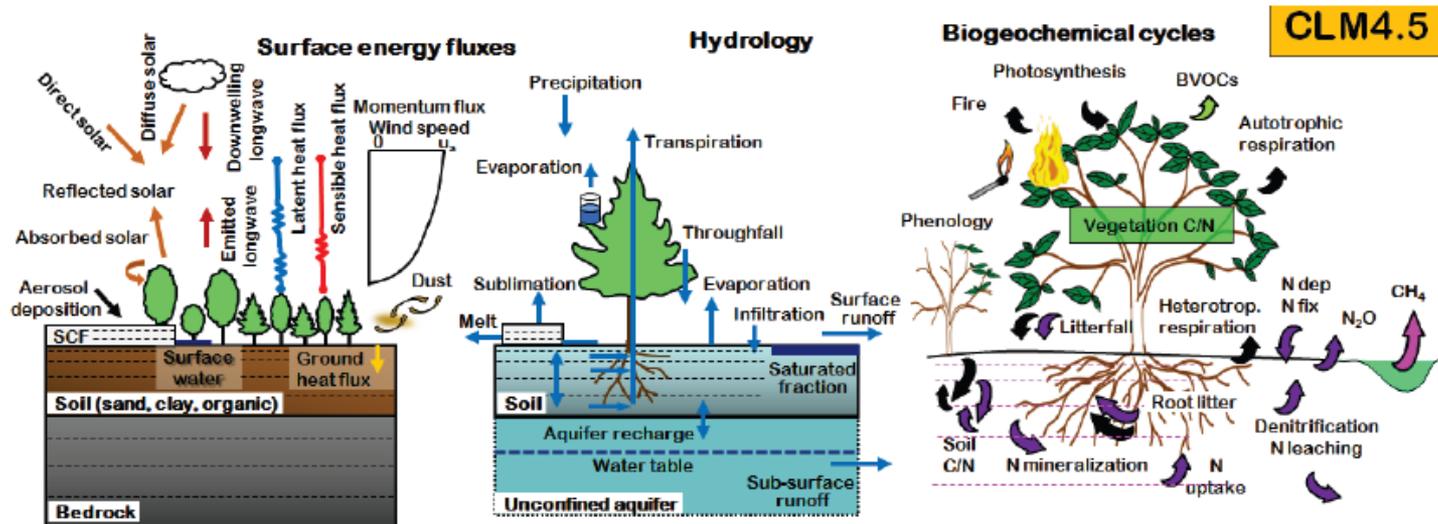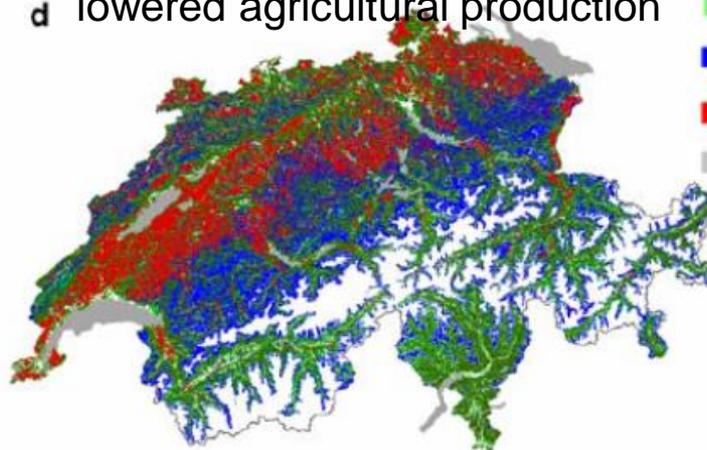
a land-use 1997
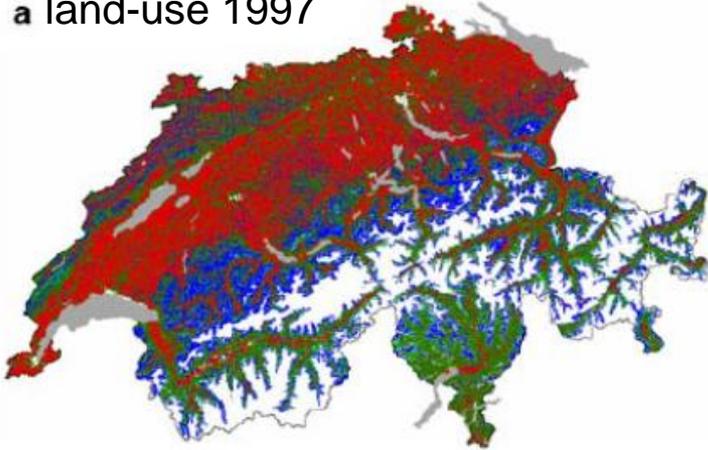
b business as usual

c liberalisation

d lowered agricultural production

Legend:
- Closed canopy forest
- Open canopy forest
- Scrub
- Non-intensive open land
- Intensive open land
- Lakes

After Bolliger et al. 2007

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WP2: Evaluation of reference and human-impact water balance and drought scenarios

- Assess water-balance changes (evapotranspiration, soil moisture) and drought indices associated with the CH2018 scenarios
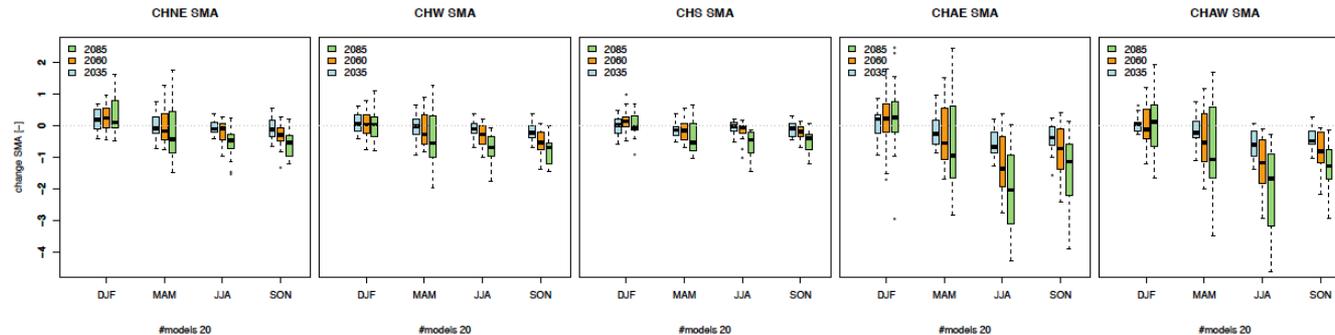
- Include respective projections of the human-impact scenarios from WP1
- Extension of covered indices → full water balance

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WP2: Evaluation of reference and human-impact water balance and drought scenarios

Temperature extremes (TXx), Central Europe
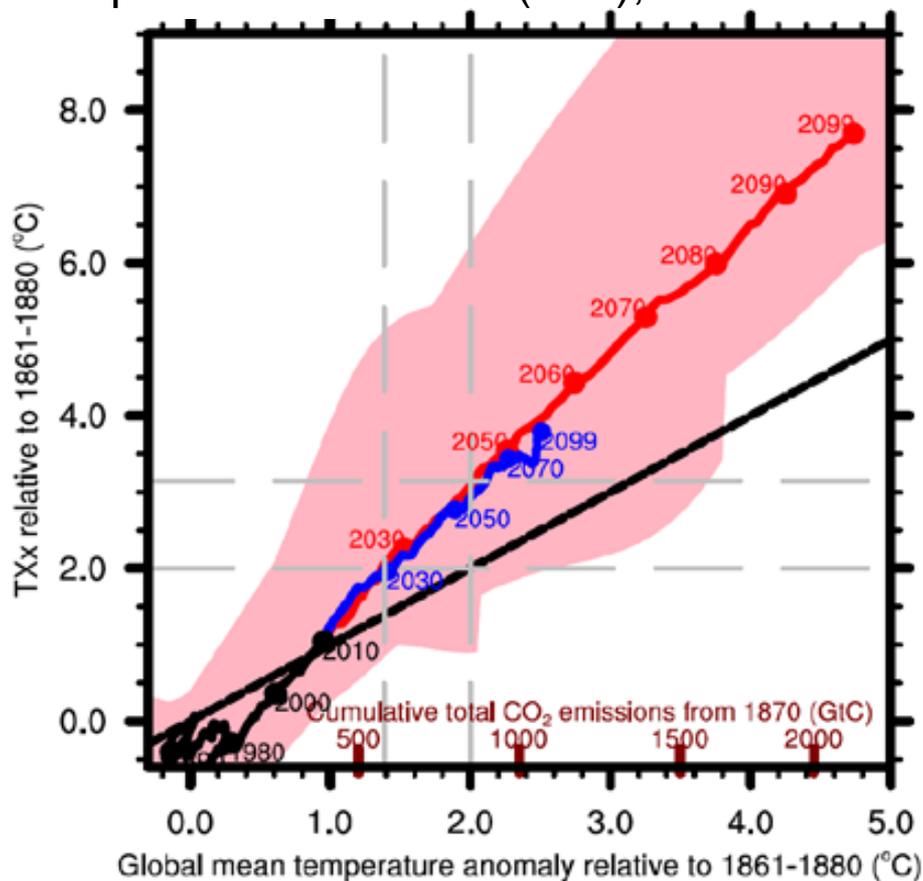
Perform analyses for water cycle variables to assess impact of different **global temperature warming levels** for water resources in Switzerland

(Seneviratne et al. 2016, Nature)

sonia.seneviratne@ethz.ch

Considered observational datasets and drought and water-balance indices

Observational datasets	Description of the dataset	SPI	CDD	P-E	SMA	SRA	ET
					Indices		
E-Obs	Gridded observations from E-Obs (Haylock et al., 2008)	X	X				
RhiresD, RhiresM	Gridded high-resolution data (RhiresD, RhiresM[2]) from MeteoSwiss	X	X				
Rietholzbach, SwissSMEX	In-situ soil moisture and evapotranspiration measurements from the Rietholzbach research catchment (Seneviratne et al., 2012a) and from the soil moisture network SwissSMEX (Mittelbach and Seneviratne, 2012)				X		X
CCI-SM	Remote sensing data from the ESA CCI soil moisture project[3] (Liu et al., 2011)				X		
LandFlux-EVAL	LandFlux-EVAL Evapotranspiration benchmarking product (Mueller et al. 2013)						X
SWBM	Model-based estimates from the Simple Water Balance Model (SWBM, Orth and Seneviratne, 2015) driven with observed meteorological forcing			X	X		X
E-RUN	Observation-based gridded runoff estimates for Europe (E-RUN, Gudmundsson and Seneviratne, 2016)					X	
Swiss runoff and river flow time series	"Monitoring network: water levels and discharge in surface waters" from the Federal Office for the Environment (FOEN)					X	

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WP2 tasks

- Evaluation of the indices with observational datasets → possibly constrain to narrow down related uncertainties in these indices

- Inter-compare WP1 human-impact scenarios with CH2018 reference simulations → is human water management a driver of changes in the water balance in Switzerland?

- Evaluation of the reference and human-impact scenarios as function of global temperature targets

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Conclusions

- Our project will assess the impact of land use changes for the water balance projections in Switzerland

- We will refine assessments of projected changes in hydrological extremes based on the CH2018 and Hydro-CH2018 scenarios

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