



Impact of spring drought on ecosystem carbon and water dynamics in Switzerland – a Swiss FluxNet Synthesis

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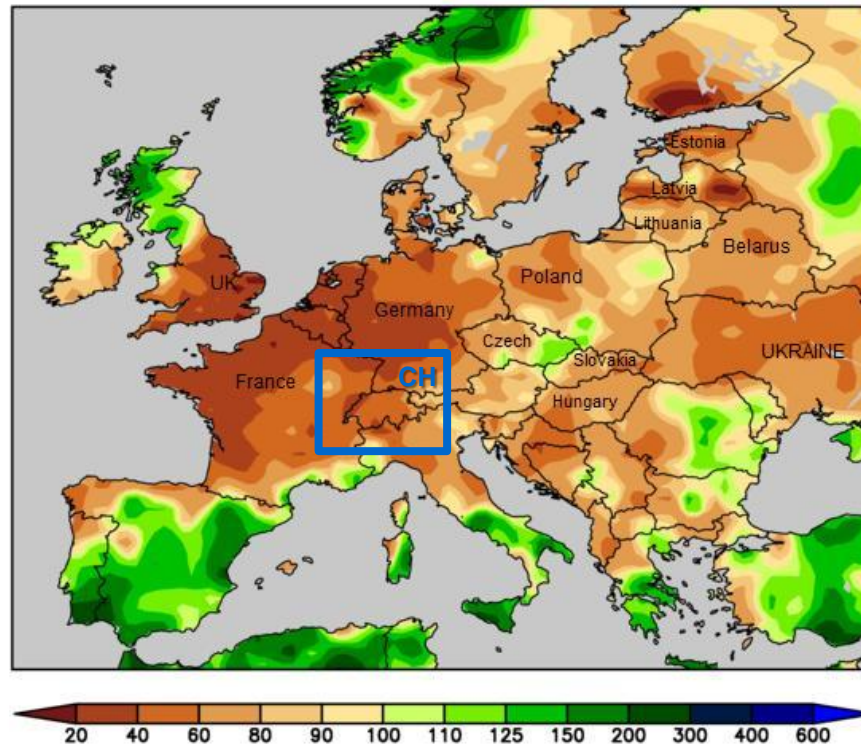
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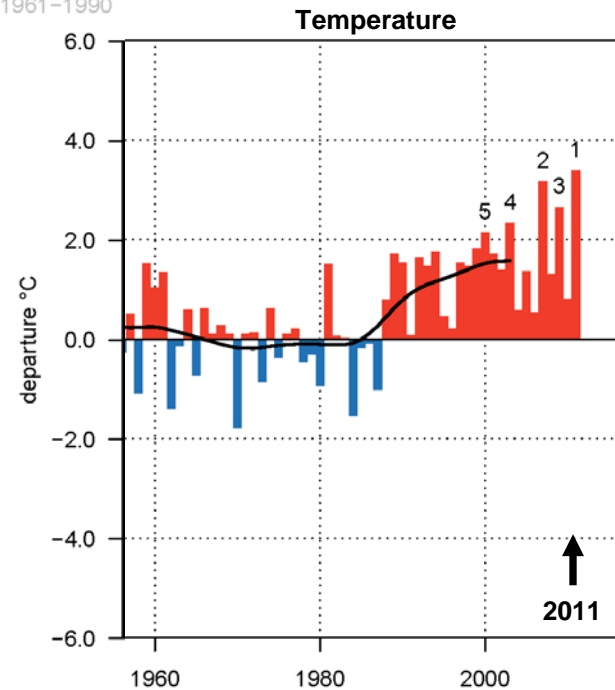
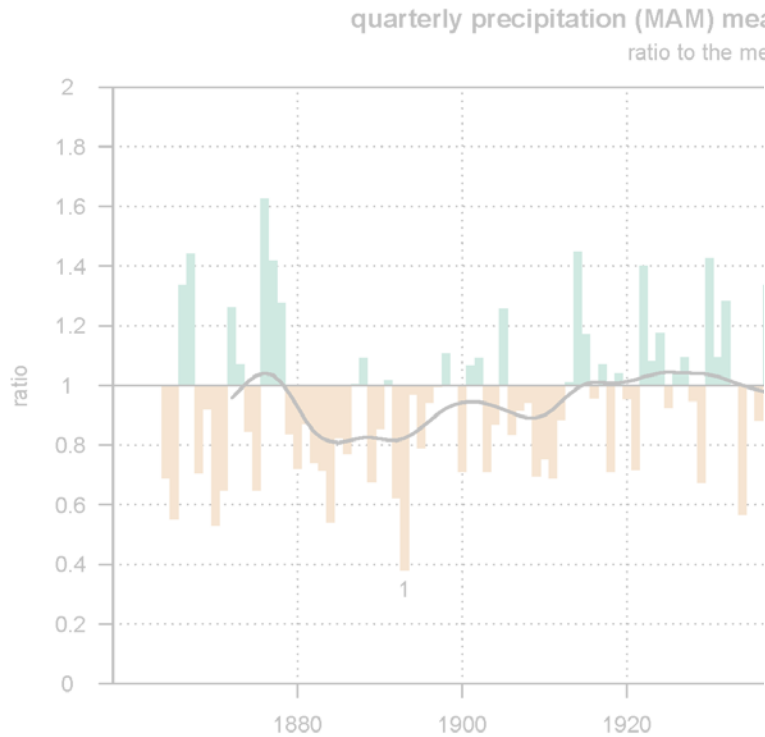
Spring Drought 2011

Martell Crop Projections
90-day Precipitation Analysis
Percent of normal through 31 May 2011



Top wheat producing countries in Europe are France (26%), Germany (17%), United Kingdom (12%) and Poland (6%). Data source USDA.

Spring Drought 2011 - CH



year 2011: +3.4°C (rank 1)

- years above mean 1961–1990
- years below mean 1961–1990
- 20-year weighted mean (Gaussian lowpass filter)

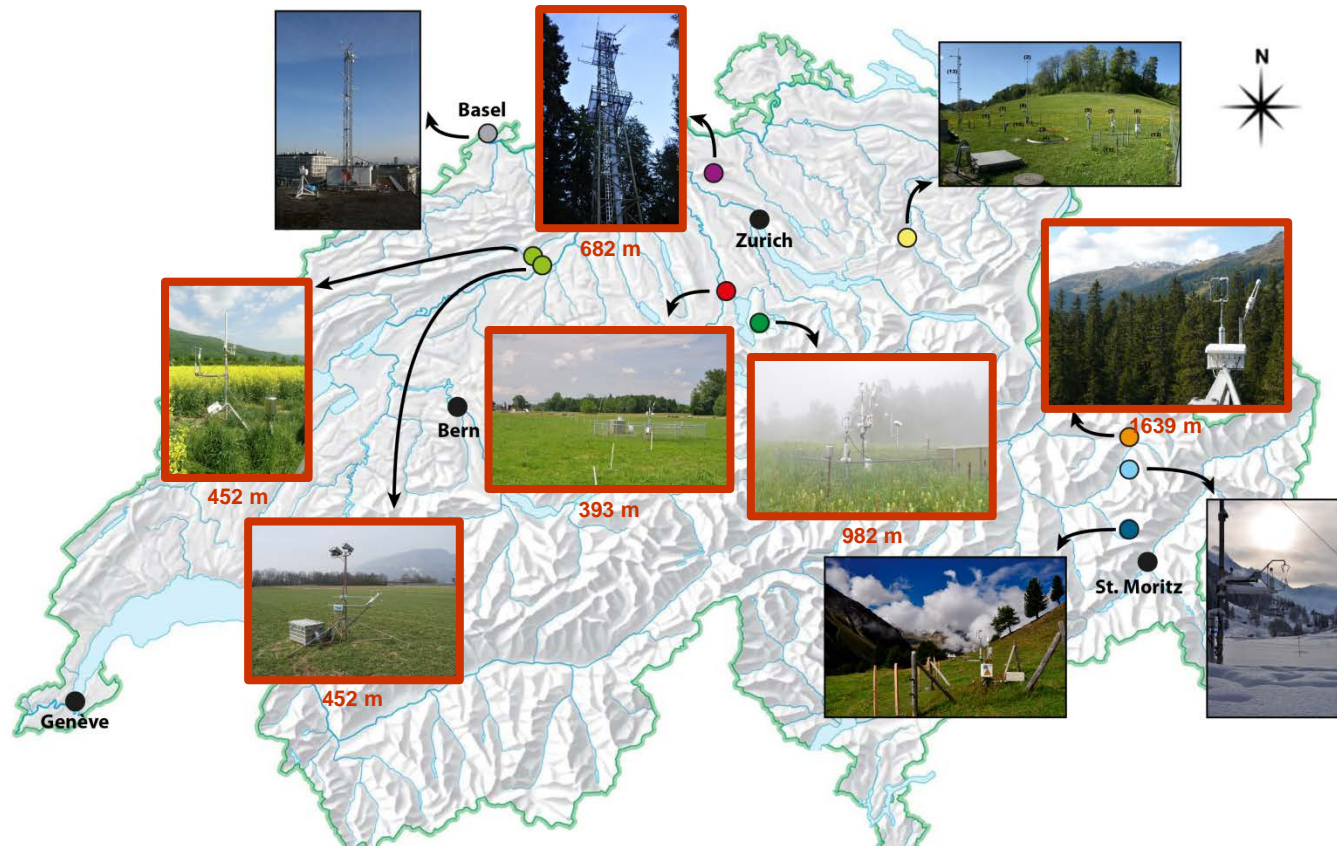
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Objectives

- Overall aim:
 - ⇒ Understand ecosystem **carbon and water dynamics** in response to spring drought

- Objectives:
 - Evaluate phenological development of vegetation
 - Assess the range & magnitude of carbon and water fluxes
 - Quantify carbon and water budgets
 - Investigate potential carry-over effects during and following the spring drought 2011

Swiss FluxNet



- Frühbüel (grassland)
- Chamau (grassland)
- Alp Weissenstein (grassland)
- Oensingen (cropland & grassland)
- Lägeren (forest)
- Dischma (grassland - winter only)
- Davos (forest)
- Rietholzbach (grassland)
- Basel (urban area)

● major cities in Switzerland

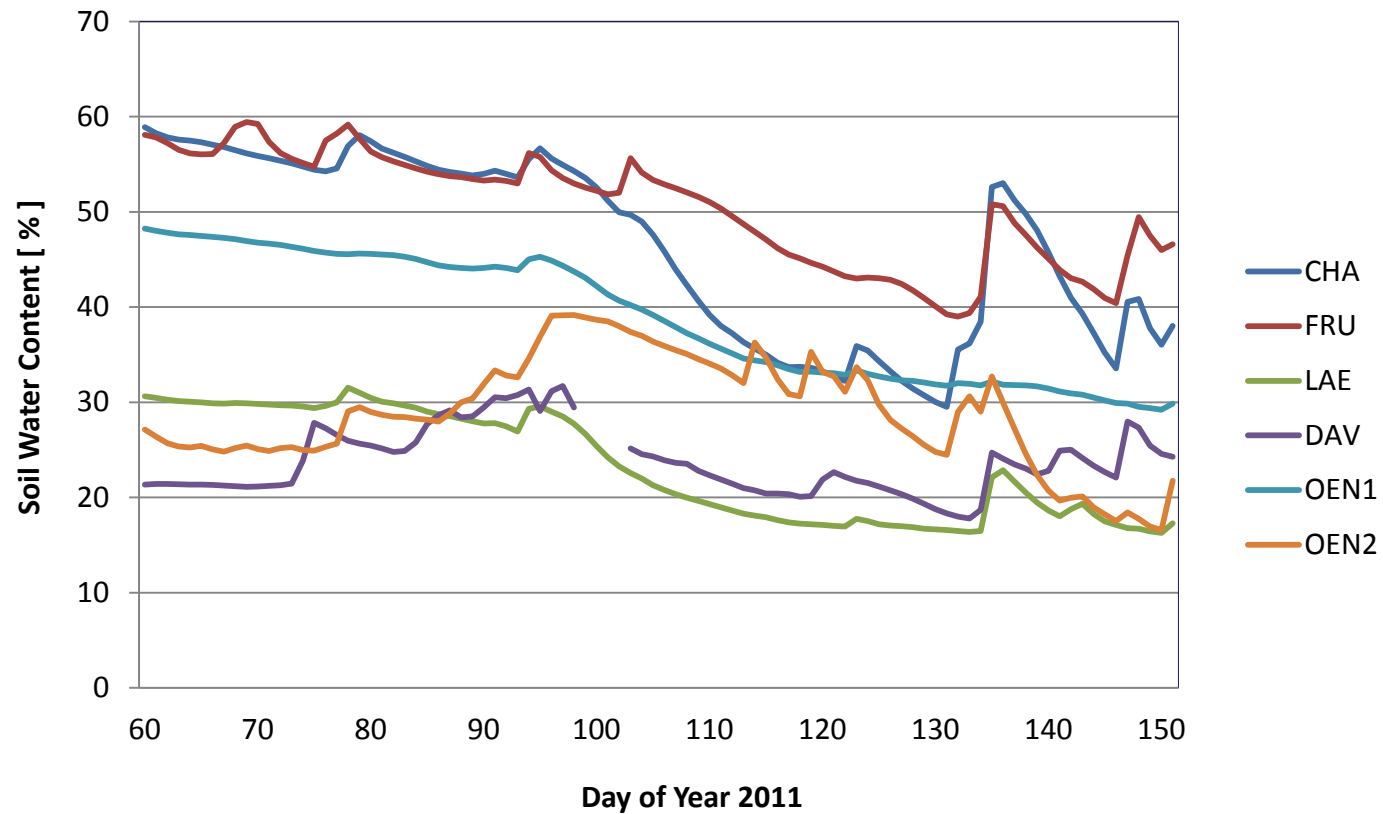
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Synthesis Sites

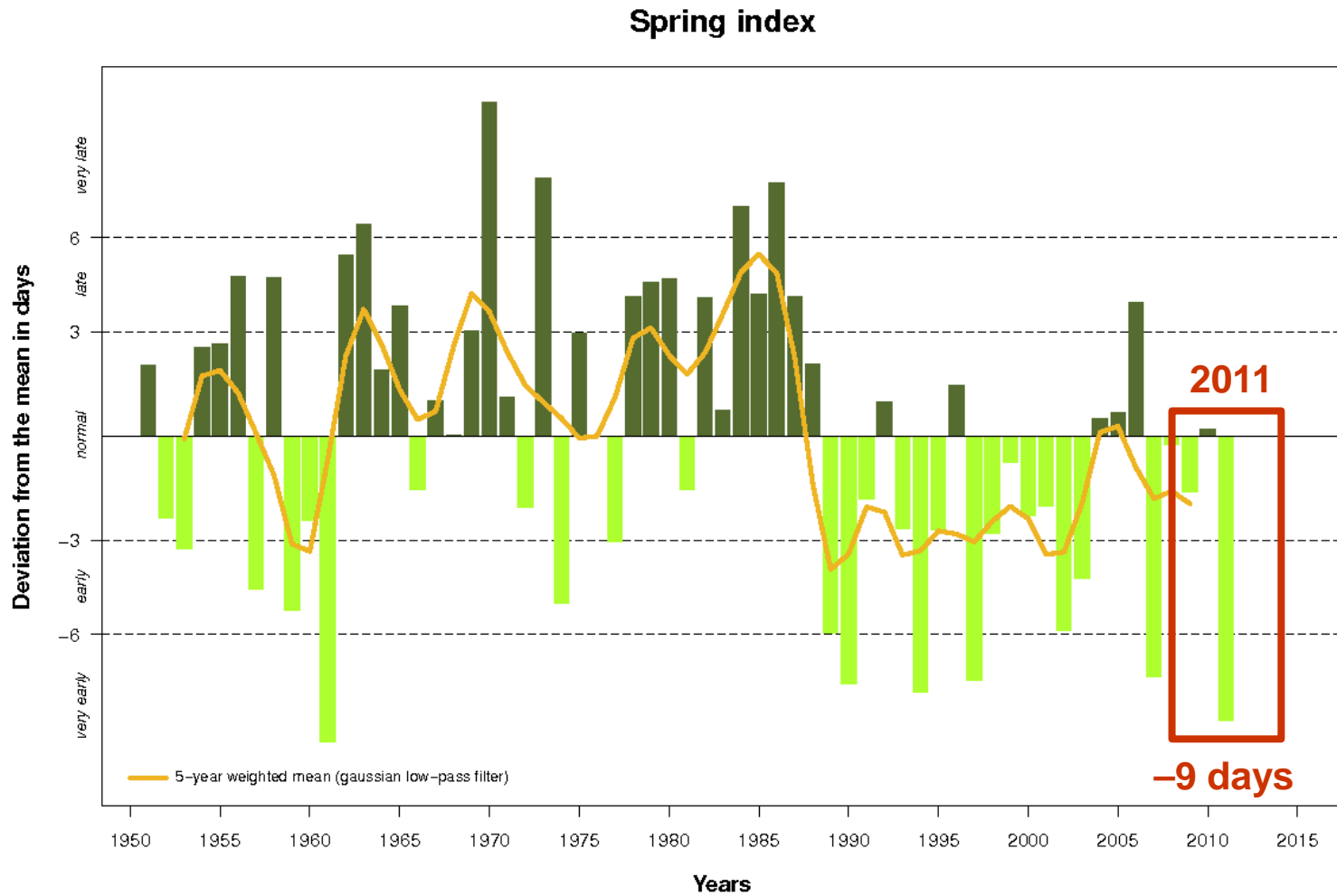
Chamau	Fruebuel	Laegeren	Davos	Oensingen1	Oensingen2
CHA	FRU	LAE	DAV	OEN1	OEN2
Grassland	Grassland	Forest (decid.)	Forest (conif.)	Grassland	Cropland
393 m	982 m	682 m	1639 m	452 m	
-33%	-30%	-55%	-24%	-44%	
-45%	-42%	-55%	-31%	-55%	

Precipitation deficit 2011
vs. lt. vs. 2010

Soil Moisture (5 cm depth)



Phenological development



Carbon Budgets [g/m²]

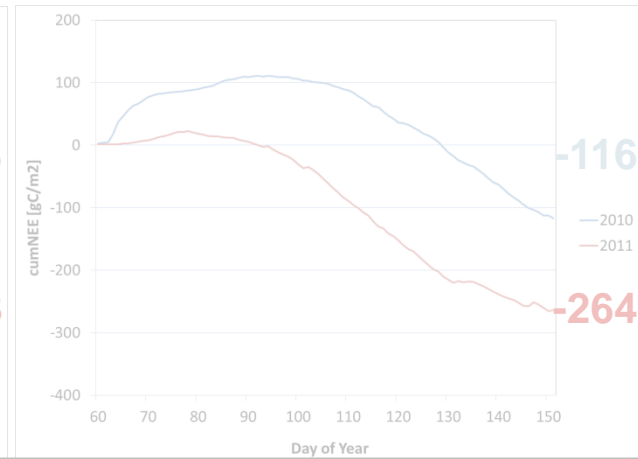
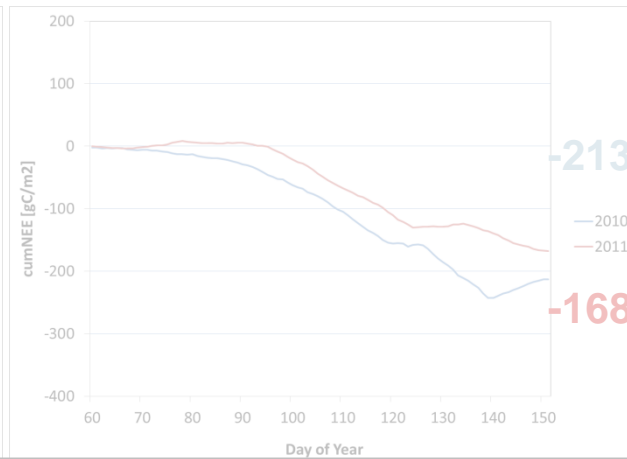
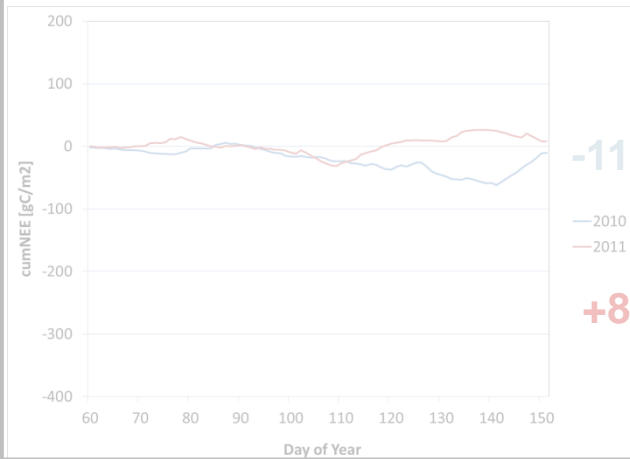
— 2010
— 2011

Grassland ▶/▼/ ▲

Chamau

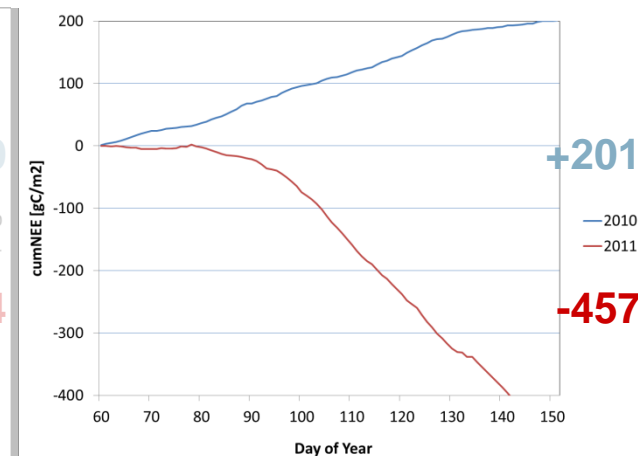
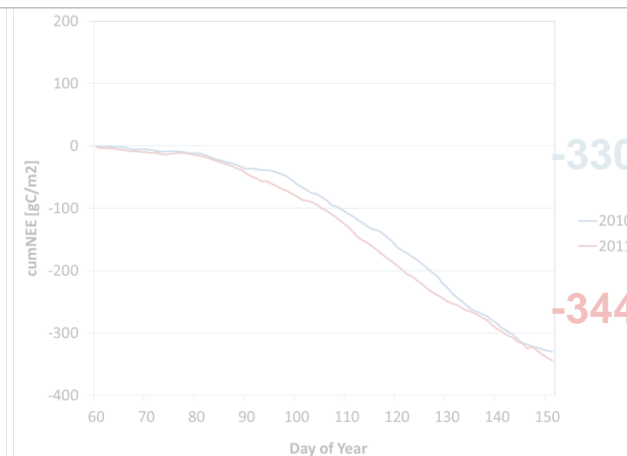
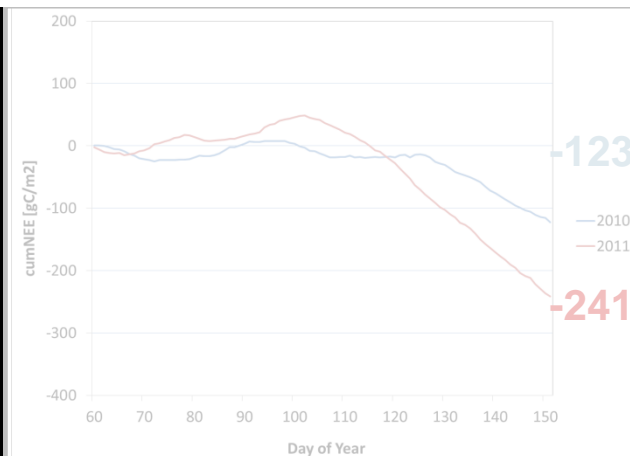
Oensingen1

Fruebuel

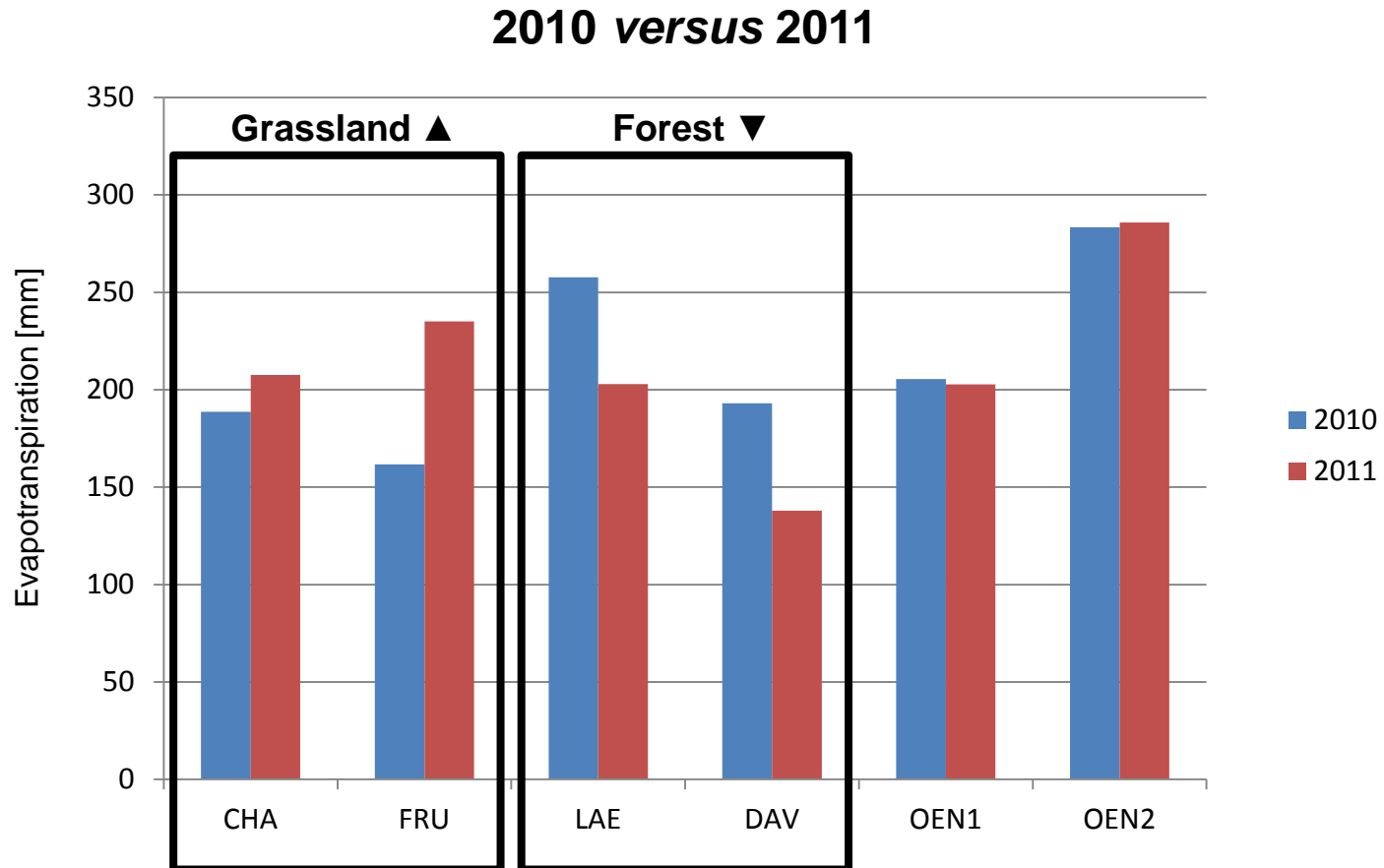


Forest (dec. ▲/ con. ▶)

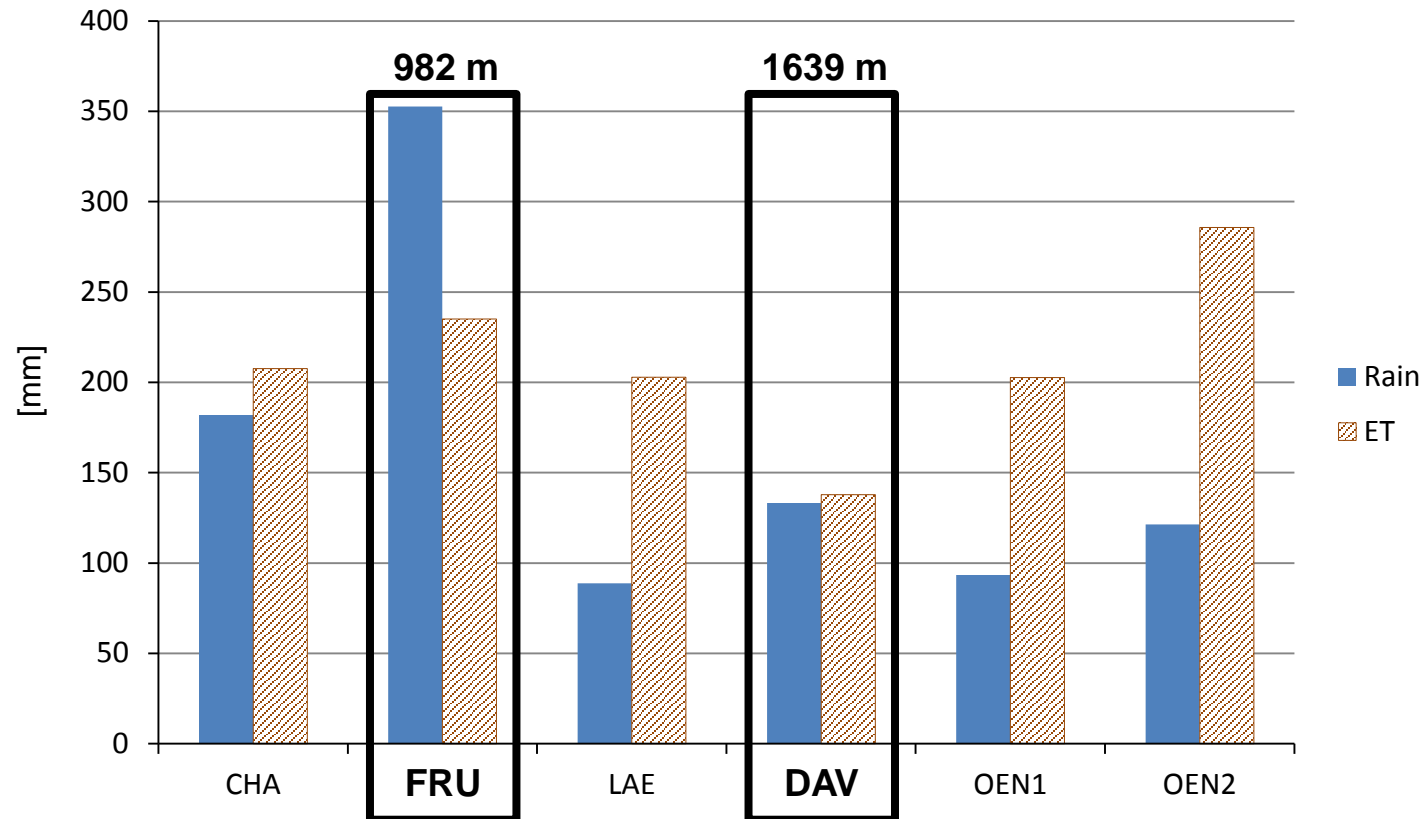
Cropland ▲



Evapotranspiration, Spring (MAM)



Water balance, Spring 2011



2011 [mm]:	-26	+118	-114	-5	-109	-164
2010 [mm]:	+84	+344	-60	-17	-31	-66

Water Use Efficiency (WUE)

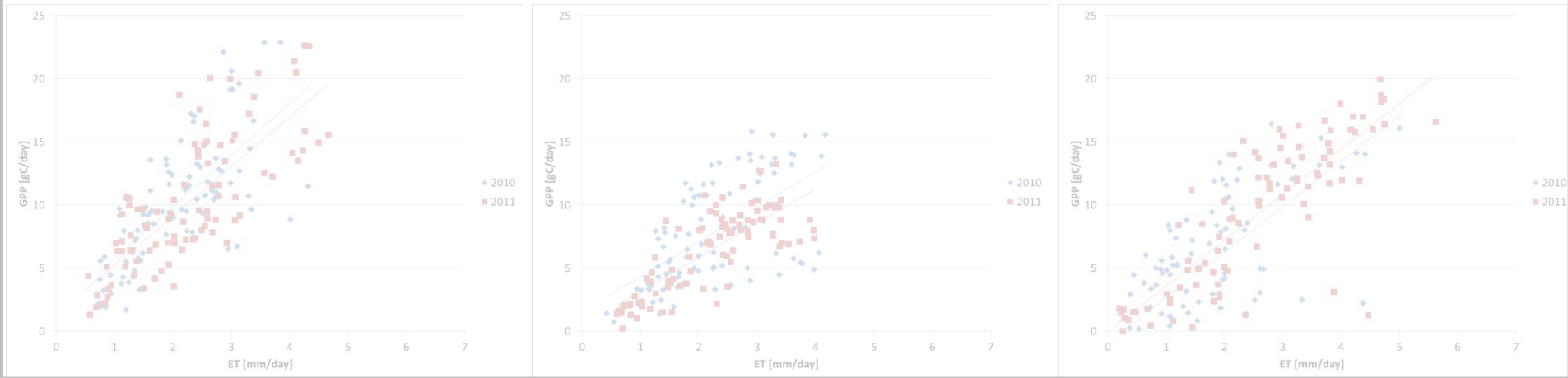
— 2010
— 2011

Grassland ▶

Chamau

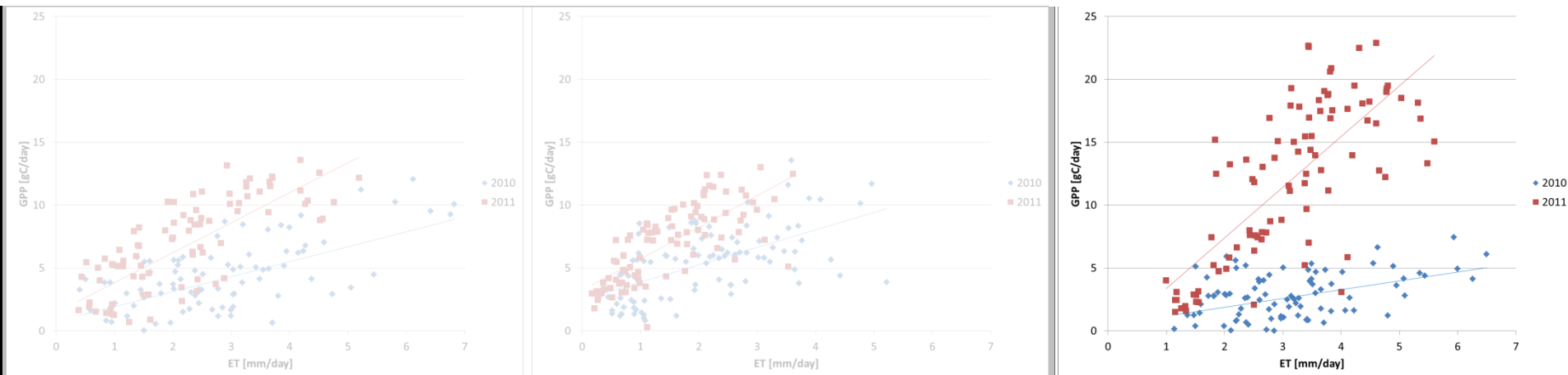
Oensingen1

Fruebuel



Forest ▲

Cropland ▲



Conclusions & Outlook

- Potential for increased Carbon Uptake
- ET: Grasslands ▲, Forests ▼
- Forests adapt well to Drought \Rightarrow WUE ▲
- Elevation & Snow play major role
(Future: less snow \Rightarrow less drought comp. potential)
- Outlook:
 - Phenological site assessment
 - Fall 2011 among driest as well...

Thanks for your attention!

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