

Future scenarios of soil water availability at managed grassland ecosystems in the Austrian Alps

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MOTIVATION & AIMS

Available soil water and snow cover duration are major constraints for numerous ecosystem functions and are likely to be considerably affected by projected shifts in temperature and precipitation. Quantifying likely future changes in soil water content (swc) is therefore essential for assessing impacts of climate change on ecosystem functioning.

Here we present a modeling study addressing changes in future soil water content and snow cover duration of temperate grasslands in the Austrian Alps based on the application of five different regional climate scenarios and “SoilBucket”, an efficient soil moisture model.

RESULTS & CONCLUSIONS

✓ Model SoilBucket

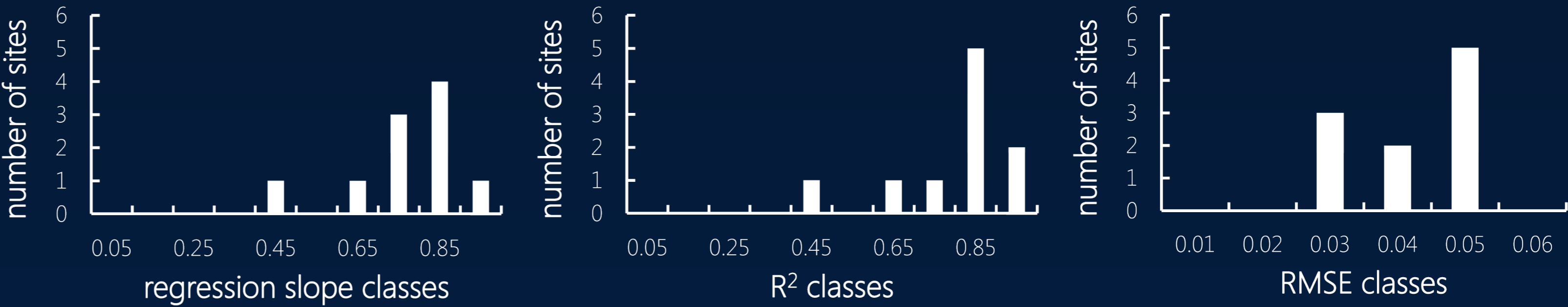
- efficient
- good performance (I)
- minimal input requirements
- broad range of possible applications

✓ Trends until 2050

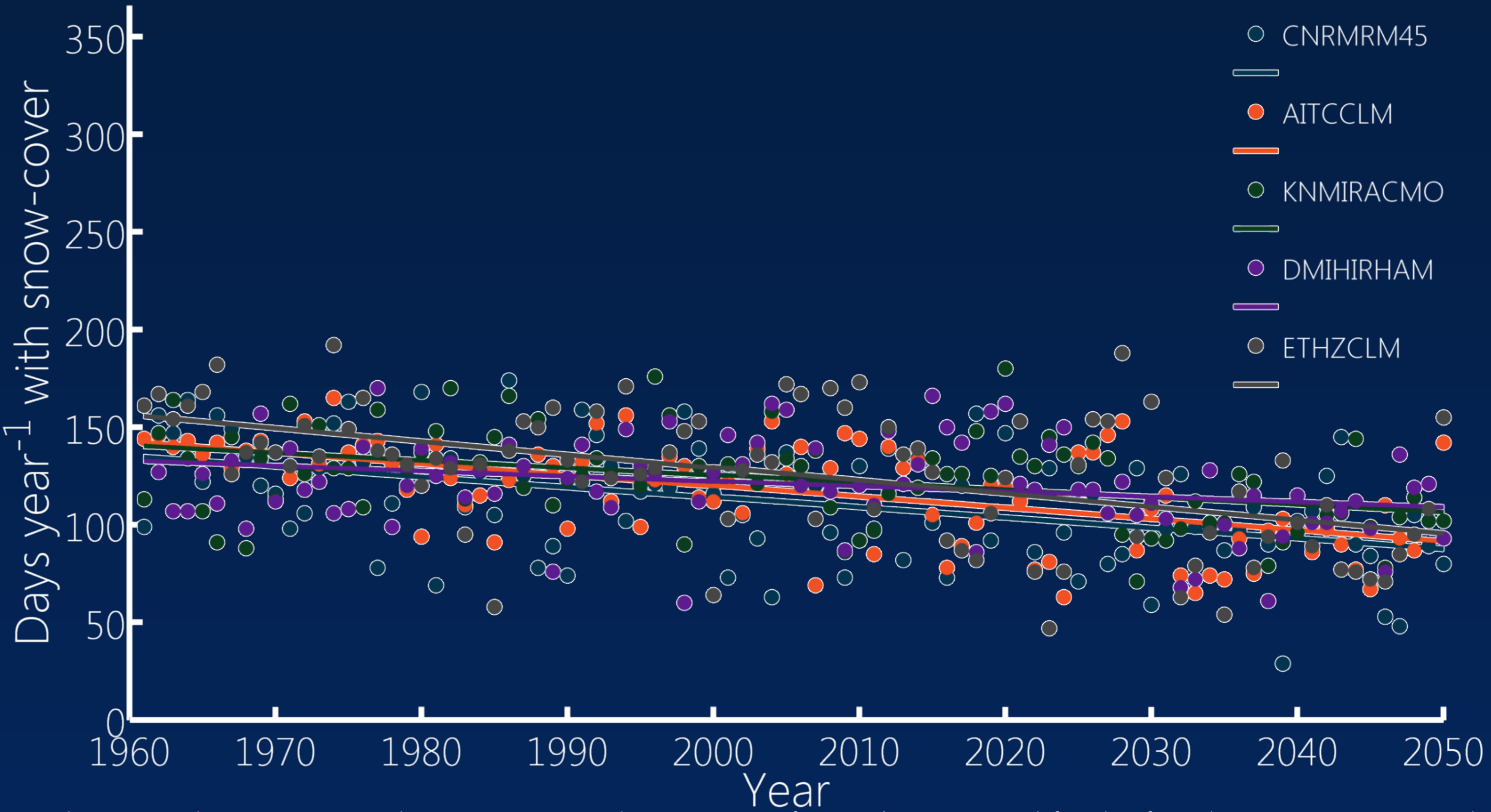
- no clear trend in average swc (IV)
- majority of scenarios leads to wetter conditions on average (IV)
- increase in number of dry days more likely than not (III)
- length of dry periods is likely to increase (III)

✓ Snow-cover (sc)

- later onset of permanent snow-cover
- earlier thawing of snow-cover
- longer vegetation period (II)
- more years without permanent snow cover



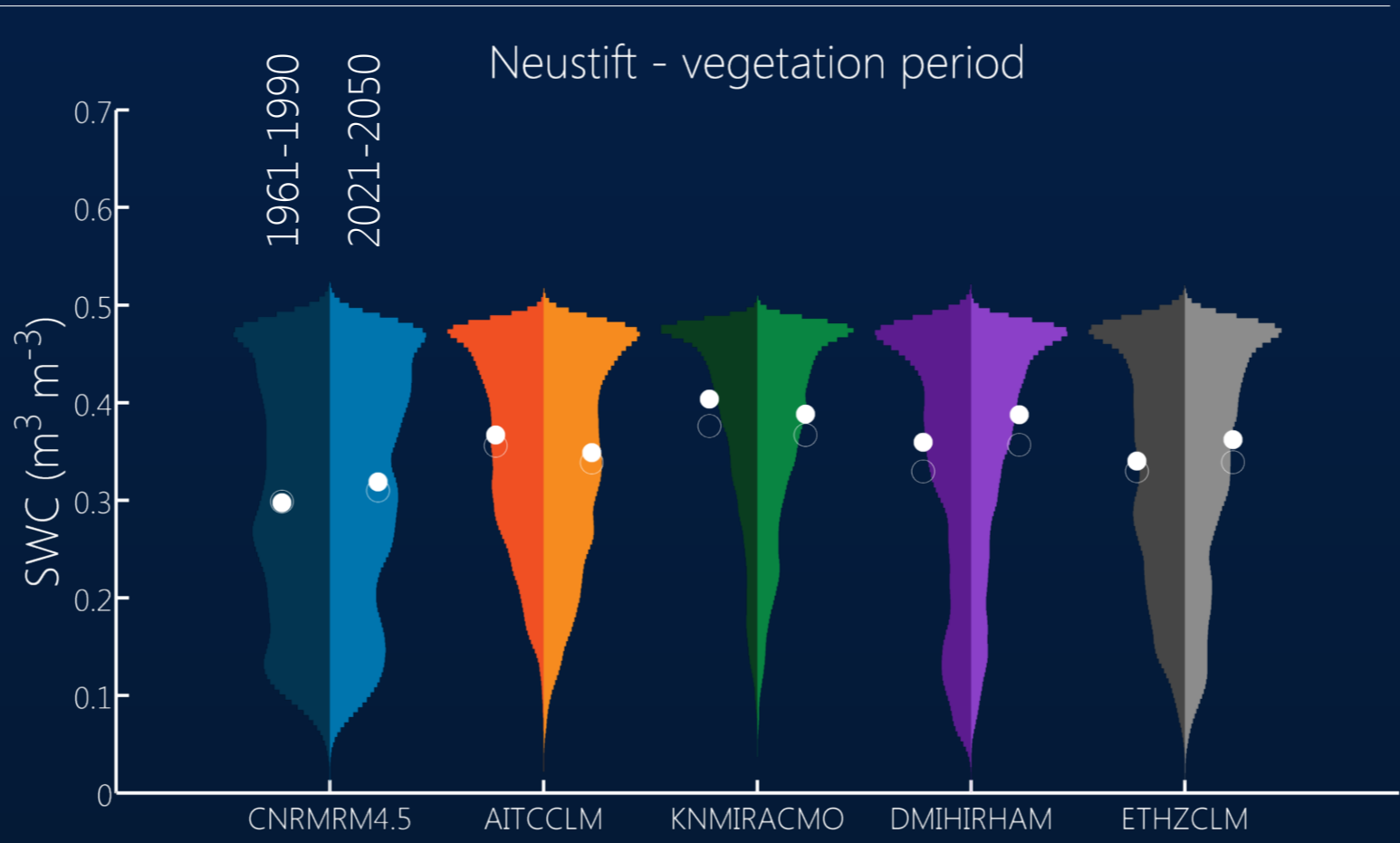
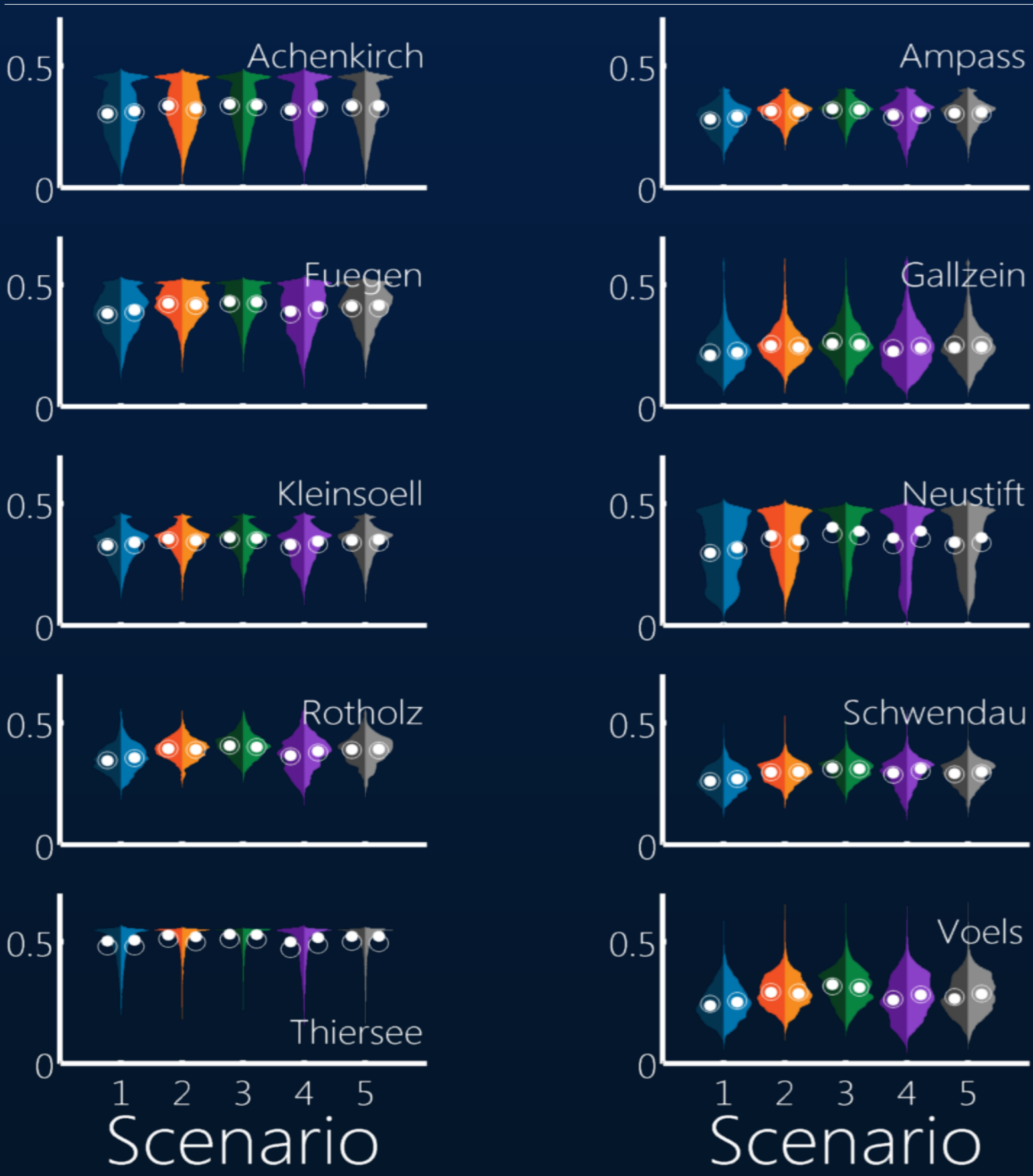
(I) Model performance indices for the 10 sites investigated. Regression parameters (slope and R²) for the comparison of modelled and measured soil water content (SWC) and the root mean squared error for the 10 datasets.



(II) Change in days per year with snow-cover at the site Neustift. Results presented for the five climate scenarios used including a linear trend.

(III) Changes in the number of dry days per vegetation period (veg. per.) and changes in the mean duration of dry periods between 1961-1990 and 2021-2050. Empty cells: no change observed

Model	Dry days per veg. per.		Duration of dry periods (d)	
	1961-1990	2021-2050	1961-1990	2021-2050
CNRM45			8.75	10.14
AITCCLM	10.70	19.70	8.74	10.44
KNMIRACMO				
DMIHIRHAM	10.70	4.00	12.50	8.20
ETHZCLM	10.70	13.70	9.62	11.20



(IV) Changes in SWC-distributions between the reference period 1961-1990 and the period 2021-2050 for each site and the 5 climate scenarios. Open circle: Median; Filled circle: Mean.

