

“The role of soil moisture on summer atmospheric circulation climatology in the Northern Hemisphere” Luo et al.

Supplementary Information
for
The role of soil moisture on summer atmospheric circulation
climatology in the Northern Hemisphere

Authors:

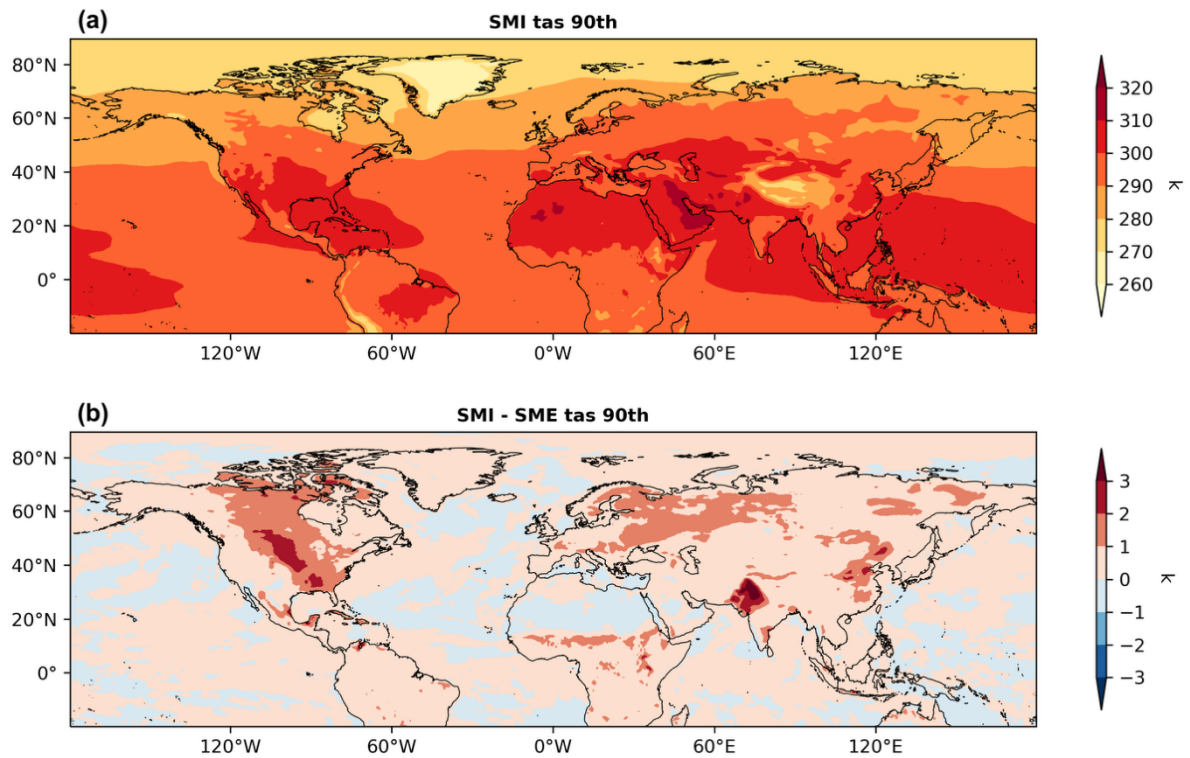
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Affiliation:

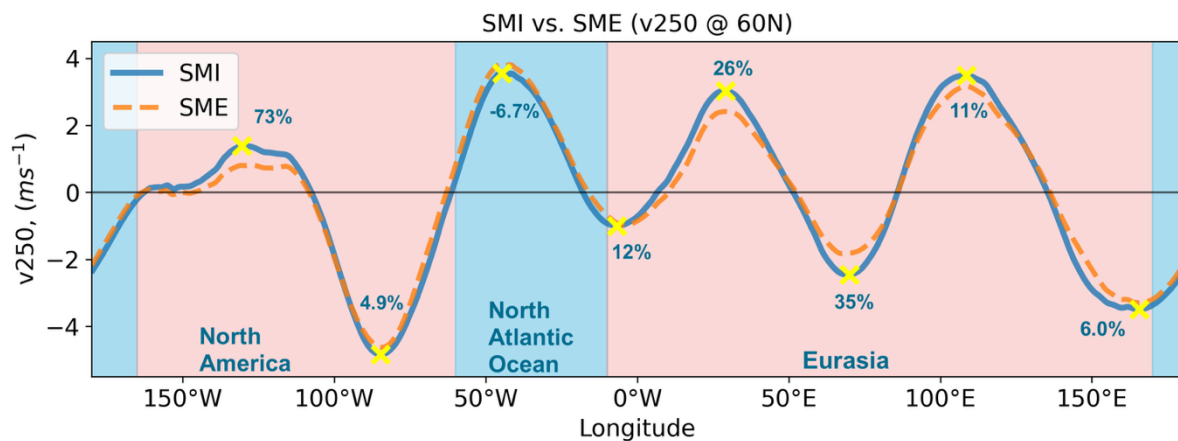
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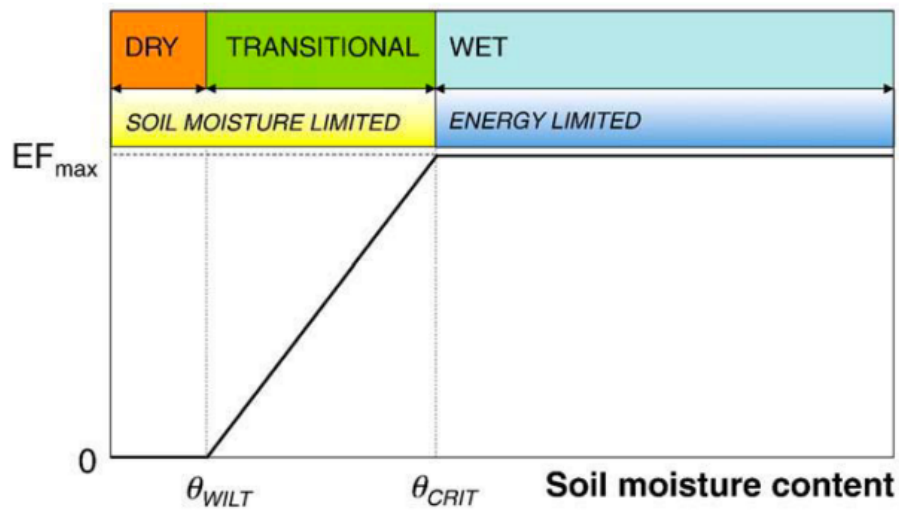
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Supplementary Figure S1. Near-surface temperature extremes. The 90th percentile of the daily near-surface temperature in July for simulated years 2009-2016 of (a) SMI and (b) differences between SMI and SME.

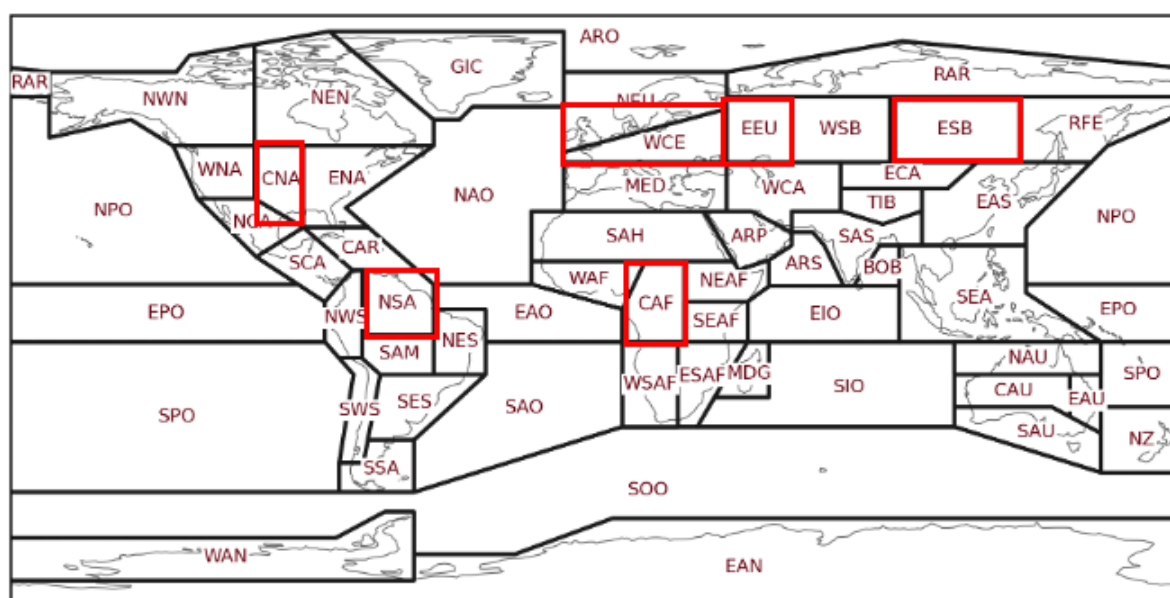


Supplementary Figure S2. Wave amplitudes amplification plots. Meridional wind July ensemble means at 250hPa (v_{250}) from SMI and SME experiments at latitude 60N. Yellow cross marks indicate local maxima.



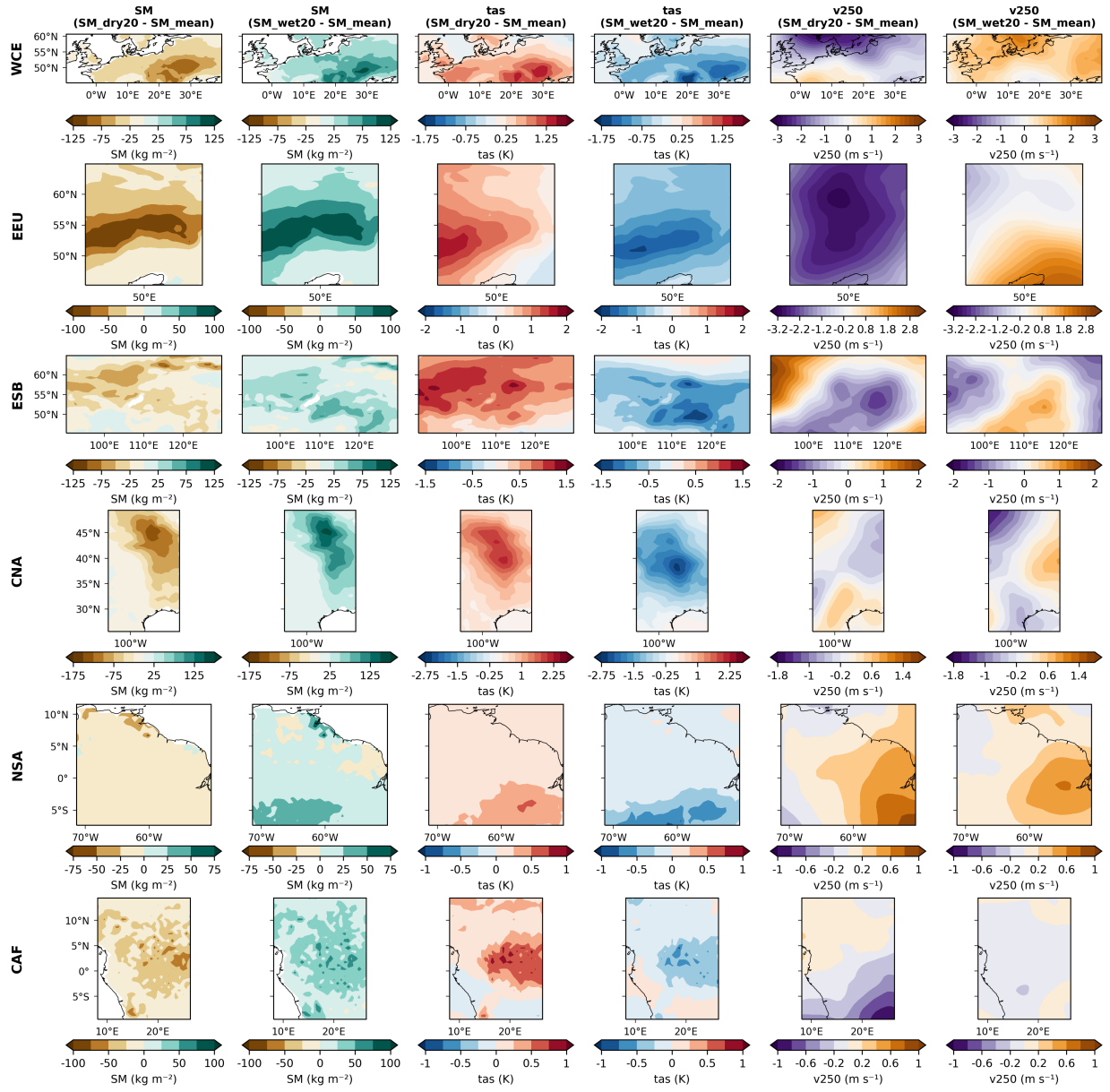
Supplementary Figure S3. Different soil moisture and their corresponding evapotranspiration regimes and definitions. EF represents the evaporative fraction, and EF_{max} is its maximal value. θ is the soil moisture content, θ_{WILT} denotes the wilting point, and θ_{CRIT} denotes the critical point, figure adapted from Seneviratne et al. (2010)¹, *Earth-Science Reviews*, 99, 125–161 (Figure 5). © Elsevier. Reproduced with permission.

AR6 reference regions and study regions



Abbrev.	Name	Abbrev.	Name	Abbrev.	Name
GIC	Greenland/Iceland	NEU	N.Europe	WCA	W.C.Asia
NWN	N.W.North-America	WCE	West&Central-Europe	ECA	E.C.Asia
NEN	N.E.North-America	EEU	E.Europe	TIB	Tibetan-Plateau
WNA	W.North-America	MED	Mediterranean	EAS	E.Asia
CNA	C.North-America	SAH	Sahara	ARP	Arabian-Peninsula
ENA	E.North-America	WAF	Western-Africa	SAS	S.Asia
NCA	N.Central-America	CAF	Central-Africa	SEA	S.E.Asia
SCA	S.Central-America	NEAF	N.Eastern-Africa	NAU	N.Australia
CAR	Caribbean	SEAF	S.Eastern-Africa	CAU	C.Australia
NWS	N.W.South-America	WSAF	W.Southern-Africa	EAU	E.Australia
NSA	N.South-America	ESAF	E.Southern-Africa	SAU	S.Australia
NES	N.E.South-America	MDG	Madagascar	NZ	New-Zealand
SAM	South-American-Monsoon	RAR	Russian-Arctic	EAN	E.Antarctica
SWS	S.W.South-America	WSB	W.Siberia	WAN	W.Antarctica
SES	S.E.South-America	ESB	E.Siberia		
SSA	S.South-America	RFE	Russian-Far-East		

Supplementary Figure S4. Reference regions of the IPCC AR6 as defined in Iturbide et al. (2020)². The composite used areas in the Section. 5.1 and Figure S5 are indicated in red boxes.



Supplementary Figure S5. Same analysis as Figure 3, but with additional regions WCE, ESB, CNA, NSA, and CAF.

Reference

1. Seneviratne, Sonia I., Thierry Corti, Edouard L. Davin, Martin Hirschi, Eric B. Jaeger, Irene Lehner, Boris Orlowsky, and Adriaan J. Teuling. "Investigating Soil Moisture-Climate Interactions in a Changing Climate: A Review." *Earth-Science Reviews*. <https://doi.org/10.1016/j.earscirev.2010.02.004> (2010).
2. Iturbide, M., Gutiérrez, J. M., Alves, L. M., Bedia, J., Cerezo-Mota, R., Gimenez, E., Cofiño, A. S., Di Luca, A., Faria, S. H., Gorodetskaya, I. V., Hauser, M., Herrera, S., Hennessy, K., Hewitt, H. T., Jones, R. G., Krakovska, S., Manzanar, R., Martínez-Castro, D., Narisma, G. T., Nurhati, I. S., Pinto, I., Seneviratne, S. I., van den Hurk, B., and Vera, C. S.: "An update of IPCC climate reference regions for subcontinental analysis of climate model data: Definition and aggregated datasets." *Earth System Science Data (ESSD)*, 12, 2959–2970, <https://doi.org/10.5194/essd-12-2959-2020>, 2020. a, b, c, d