

Supplementary information for

Soil moisture-atmosphere feedbacks mitigate declining water availability in drylands

Sha Zhou^{1,2,3,4,5*}, A. Park Williams¹, Benjamin R. Lintner⁶, Alexis M. Berg⁷, Yao Zhang^{4,5}, Trevor F. Keenan^{4,5}, Benjamin I. Cook^{1,8}, Stefan Hagemann⁹, Sonia I. Seneviratne¹⁰, Pierre Gentine^{2,3}

¹Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, USA

²Earth Institute, Columbia University, New York, NY, USA

³Department of Earth and Environmental Engineering, Columbia University, New York, NY, USA

⁴Climate and Ecosystem Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA

⁵Department of Environmental Science, Policy and Management, UC Berkeley, Berkeley, CA, USA

⁶Department of Environmental Sciences, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA

⁷Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA, USA

⁸NASA Goddard Institute for Space Studies, New York, NY, USA

⁹Helmholtz-Zentrum Geesthacht, Institute of Coastal Research, Geesthacht, Germany

¹⁰Institute for Atmospheric and Climate Science, ETH Zurich, Zurich, Switzerland

*Correspondence to: Sha Zhou (sz2766@columbia.edu)

Table S1. List of the 35 CMIP5 models (historical and RCP8.5 simulations) used in this study.

Model Name	Institute ID	Modeling Center
ACCESS1-0	CSIRO-BOM	Commonwealth Scientific and Industrial Research Organization (CSIRO) and Bureau of Meteorology CSIRO-BOM (BOM), Australia
ACCESS1-3		
bcc-csm1-1	BCC	Beijing Climate Center, China Meteorological Administration
bcc-csm1-1-m		
BNU-ESM	GCESS	College of Global Change and Earth System Science, Beijing Normal University
CanESM2	CCCMA	Canadian Center for Climate Modeling and Analysis
CCSM4	NCAR	National Center for Atmospheric Research
CESM1-BGC	NSF-DOE-NCAR	Community Earth System Model Contributors
CMCC-CM	CMCC	Centro Euro-Mediterraneo per I Cambiamenti Climatici
CMCC-CMS		
CNRM-CM5	CNRM- CERFACS	Centre National de Recherches Météorologiques / Centre Européen de Recherche et Formation Avancée en Calcul Scientifique
CSIRO-Mk3-6-0	CSIRO-QCCCE	Commonwealth Scientific and Industrial Research Organization in collaboration with Queensland Climate Change Centre of Excellence
GFDL-CM3	NOAA GFDL	NOAA Geophysical Fluid Dynamics Laboratory
GFDL-ESM2G		
GFDL-ESM2M		
GISS-E2-H	NASA GISS	NASA Goddard Institute for Space Studies
GISS-E2-H-CC		
GISS-E2-R		
GISS-E2-R-CC		
HadGEM2-AO	NIMR/KMA	National Institute of Meteorological Research/Korea Meteorological Administration
HadGEM2-CC	MOHC (additional realizations by INPE)	Met Office Hadley Centre (additional HadGEM2-ES realizations contributed by Instituto Nacional de Pesquisas Espaciais)
HadGEM2-ES		
inmcm4	INM	Institute for Numerical Mathematics
IPSL-CM5A-LR	IPSL	Institut Pierre Simon Laplace
IPSL-CM5A- MR		

IPSL-CM5B-LR		
MIROC5	MIROC	Atmosphere and Ocean Research Institute (The University of Tokyo), National Institute for Environmental Studies, and Japan Agency for Marine-Earth Science and Technology
MIROC-ESM	MIROC	Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies
MIROC-ESM-CHEM		
MPI-ESM-LR	MPI-M	Max Planck Institute for Meteorology
MPI-ESM-MR		
MRI-CGCM3	MRI	Meteorological Research Institute
MRI-ESM1		
NorESM1-M	NCC	Norwegian Climate Centre
NorESM1-ME		