

# Journal of Climate

The JOURNAL OF CLIMATE (*JCLI*) publishes research that advances basic understanding of the dynamics and physics of the climate system on large spatial scales, including variability of the atmosphere, oceans, land surface, and cryosphere; past, present, and projected future changes in the climate system; and climate simulation and prediction.

MINGFANG TING  
Lamont-Doherty Earth Observatory

*Co-Chief Editors*

DARRYN WAUGH  
The Johns Hopkins University

## *Editors*

MATTHEW COLLINS  
University of Exeter  
YI DENG  
Georgia Institute of Technology  
DIETMAR DOMMENGET  
Monash University  
MICHAEL NEIL EVANS  
University of Maryland, College Park  
ANDY HOELL  
NOAA/Physical Sciences Laboratory  
PANG-CHI HSU  
Nanjing University of Science and  
Technology

XIANGLEI HUANG  
University of Michigan  
ROBERT JNGLIN WILLS  
University of Washington  
JENNIFER E. KAY  
University of Colorado, Boulder  
DAEHYUN KIM  
University of Washington  
CHARLES KOVEN  
Lawrence Berkeley National Laboratory  
WENHONG LI  
Duke University

XIN-ZHONG LIANG  
Earth System Science Interdisciplinary  
Center, University of Maryland  
BENJAMIN R. LINTNER  
Rutgers, The State University of  
New Jersey  
SHAWN MARSHALL  
University of Calgary  
SEUNG-KI MIN  
Pohang University of Science  
and Technology  
HISASHI NAKAMURA  
The University of Tokyo  
JOEL NORRIS  
University of California, San Diego

YUKO OKUMURA  
The University of Texas at Austin  
KEVIN REED  
Stony Brook University  
AGUS SANTOSO  
University of New South Wales  
ISLA SIMPSON  
University Corporation for  
Atmospheric Research  
TOMOKI TOZUKA  
The University of Tokyo  
STEPHEN YEAGER  
UCAR

## *Associate Editors*

RICHARD P. ALLAN  
University of Reading  
ALYSSA ATWOOD  
University of Washington  
ALEXIS BERG  
Princeton University  
RUSSEL BLACKPORT  
Environment and Climate Change Canada  
MASSIMO BOLLASINA  
University of Edinburgh  
SUZANA CAMARGO  
Lamont-Doherty Earth Observatory  
ROBIN CHADWICK  
Met Office  
ANDREW CHARLTON-PEREZ  
University of Reading  
LAURA CIASTO  
University of Bergen  
PETER CLARK  
Oregon State University  
KYLE CLEM  
Victoria University of Wellington  
BENJAMIN COOK  
Lamont-Doherty Earth Observatory,  
NASA Goddard Institute for Space Studies  
QINGHUA DING  
University of California, Santa Barbara  
AMATO T. EVAN  
Scripps Institution of Oceanography,  
University of California, San Diego  
PAUL FIELD  
Met Office  
CHAIM GARFINKEL  
The Hebrew University of Jerusalem  
PETER GENT  
National Center for Atmospheric Research  
DENNIS HARTMANN  
University of Washington

CHRIS JONES  
Met Office  
YU KOSAKA  
The University of Tokyo  
YOUNG-OH KWON  
Woods Hole Oceanographic Institution  
JOHN LANZANTE  
NOAA/Geophysical Fluid Dynamics Laboratory  
PAUL LOIKITH  
Portland State University  
RIYU LU  
LASG, Institute of Atmospheric Physics,  
Chinese Academy of Sciences  
ELINOR MARTIN  
University of Oklahoma  
KAREN MCKINNON  
University of California, Los Angeles  
BRIAN MEDEIROS  
University Corporation for Atmospheric Research  
TIMOTHY MERLIS  
McGill University  
VINCENT MORON  
Centre Européen de Recherche et d'Enseignement  
des Géosciences de l'Environnement  
KATHY PEGION  
George Mason University  
BING PU  
University of Kansas  
THOMAS REICHLER  
University of Utah  
BENJAMIN SCHENKEL  
University of Oklahoma

HYODAE SEO  
Woods Hole Oceanographic Institution  
RYAN SRIVER  
University of Illinois at Urbana-Champaign  
LANTAO SUN  
Colorado State University  
KEN TAKAHASHI  
Servicio Nacional de Meteorología e Hidrología del Perú  
NEIL TANDON  
York University  
GABRIELE VILLARINI  
The University of Iowa  
HANS VON STORCH  
GKSS Research Centre  
HAILAN WANG  
NOAA/Climate Prediction Center  
HUI WANG  
NOAA/Climate Prediction Center  
LIN WANG  
Institute of Atmospheric Physics, Chinese  
Academy of Sciences  
DA YANG  
University of California, Davis  
SONG YANG  
School of Atmospheric Sciences, Sun Yat-sen  
University  
SANG-WOOK YEH  
Hanyang University  
QING YUE  
NASA Jet Propulsion Laboratory  
RENHE ZHANG  
Fudan University  
XUEBIN ZHANG  
Environment and Climate Change Canada  
YANG ZHANG  
Nanjing University  
FRANCIS ZWIERS  
Pacific Climate Impacts Consortium

## *AMS Lead Technical Editor for Journal of Climate*

RICHARD R. BRANDT

## *AMS Lead Copy Editor for Journal of Climate*

KRISTIN GILBERT

## *Peer Review Staff*

FELICIA GULLOTTA (Assistant to Drs. Ting and Waugh)

DJ ARRUDA  
CRISTINA BARLETTA  
TIFFANY BISCHOFF  
HAYLEY CHARNEY

ERIN GUMBEL  
ANDREA HERBST  
ROBBIE MATLOCK  
CHRISTINE ZIEBARTH

## *AMS Scientific and Technical Journals Staff*

*Director of Publications*  
GWENDOLYN WHITTAKER

*Publications Billing and  
AMS Office Manager*  
CAITLIN GARRISON

*Senior Production Assistant*  
DANIELLE M. JOYCE

*Managing Copy Editor*  
JESSICA A. LAPOINTE

*Senior Manager for Publishing  
Operations*  
MICHAEL A. FRIEDMAN

*Production Manager*  
SHEILA F. GAFVERT

*Production Assistants*  
KATIE QUIRK  
ABBY WOODWARD

*Senior Copy Editors*  
KRISTIN GILBERT  
RAMESH PILLAY  
NICOLE E. RIETMANN  
ANDREA L. SCHEIN

*Peer Review Support Manager*  
GWENDOLYN WHITTAKER

*Production Team Coordinator*  
LIZ WRIGHT

*Managing Technical Editor*  
MARK E. FERNAU  
*Senior Technical Editors*  
HOLLIS E. BAGUSKAS  
RICHARD R. BRANDT

© Copyright 2022 American Meteorological Society (AMS). For permission to reuse any portion of this work, please contact [permissions@ametsoc.org](mailto:permissions@ametsoc.org). Any use of material in this work that is determined to be "fair use" under Section 107 of the U.S. Copyright Act (17 U.S. Code § 107) or that satisfies the conditions specified in Section 108 of the U.S. Copyright Act (17 USC § 108) does not require AMS's permission. Reproduction, systematic reproduction, posting in electronic form, such as on a website or in a searchable database, or other uses of this material, except as exempted by the above statement, require written permission or a license from AMS. All AMS journals and monograph publications are registered with the Copyright Clearance Center (<https://www.copyright.com>). Additional details are provided in the AMS Copyright Policy statement, available on the AMS website (<https://www.ametsoc.org/PUBSCopyrightPolicy>).

The JOURNAL OF CLIMATE (ISSN 0894-8755) is published semimonthly by the American Meteorological Society at 45 Beacon Street, Boston, MA 02108-3693. Subscription rates for this and other AMS titles are available online at <https://www.ametsoc.org/index.cfm/ams/publications/subscription-information>. For information on becoming an AMS member and/or subscribing to the Society's journals, visit the AMS website: <https://www.ametsoc.org>. Subscription orders, claims for missing numbers, changes of address, and other business correspondence should be sent to [amsinfo@ametsoc.org](mailto:amsinfo@ametsoc.org) (or to the American Meteorological Society, 45 Beacon Street, Boston, MA 02108-3693). Periodical postage paid at Boston, MA, and at additional mailing offices. POSTMASTER: Send address changes to the JOURNAL OF CLIMATE, American Meteorological Society, 45 Beacon Street, Boston, MA 02108-3693.