

# **2024 CFMIP/CLIVAR Meeting on Clouds, Circulation and Climate**

Hosted at Boston College June 3-6, 2024; Last updated: April 18, 2024 (v6)

## **Program Notes:**

- 1) *Plan for 12-minute talks leaving 3-minutes for questions.*
- 2) *Posters can be displayed the entire week. Poster session assignment is not thematic.*
- 3) *Breakout discussion sessions may include invited presentations.*

## **Monday June 3**

### **10am-12:30 pm - Registration**

12:30-12:45 – Logistics Welcome from the Local Organizers

12:45-1:00 – Science Welcome CFMIP/CLIVAR Committees

### ***Session #1: Climate sensitivity and feedbacks***

***Chairs: Jen Kay and George Tselioudis***

1:00-1:15 - Implications of a pervasive climate model bias for low-cloud feedback, Paulo Ceppi

1:15-1:30 - An observational estimate of the "pattern effect" on climate sensitivity, Dave Thompson

1:30-1:45 - Impact of state-dependent forcings and feedbacks on projections of warming under SSP scenarios, Jonah Bloch-Johnson

1:45-2:00 - Radiative Feedbacks in CO2 removal scenarios, Ivan Mitevski

2:00-2:15 - Paleoclimate Pattern Effects and Revised Estimates of Modern-day Climate Sensitivity, Vincent Cooper

2:15-2:30 - discussion

### **2:30-3:00 pm - Coffee/Tea/Treats Break**

### ***Session #2: Climate sensitivity and feedbacks***

***Chairs: Yi Ming and Clare Singer***

3:00-3:15 - An observational estimate of short-term longwave high cloud feedbacks on a global scale, Juliet Pilewskie

3:15-3:30 - On the Relationship between Cloud Biases in AMIP Simulations and Cloud Feedbacks: An Emergent Constraint Analysis using the MISR Simulator, Travis Aeronson

3:30-3:45 - Understanding the tropical high-cloud feedback through the ice-water-path lens, Jakob Deutloff

3:45-4:00 - Convection amplifies subtropical cloud feedback via surface turbulent fluxes in HadGEM3-GC3.1-LL., Mark Webb

4:00-4:15 - Climate Sensitivity and Relative Humidity Changes in Global Storm-Resolving Model Simulations of Climate Change, Timothy M. Merlis

4:15-4:30 - discussion

### **4:30-6:30 pm - Poster Session #1**

### **6:30 pm Welcome Reception**

## **Tuesday June 4**

### ***Session #3: Energy Imbalance***

***Chairs: Yoko Tsushima and Mark Zelinka***

9:00-9:15 - Consistency of Earth energy imbalance across observational platforms: moving beyond the global mean, Aaron Donohoe

9:15-9:30 - Current uncertainty in Earth energy imbalance mean trend and variability and challenges for improved long-term monitoring, Benoit Meyssinac

9:30-9:45 - Risk and Impact of a Data Gap in the Earth Radiation Budget Satellite Climate Data Record, Norman Loeb

9:45-10:00 - Improving the comparisons between models and observations in the CERES period, Gavin Schmidt

10:00-10:15 - Oceanic cloud trends during the satellite era and their radiative effects, George Tselioudis

10:15-10:30 - discussion

### **10:30-11:00 - Coffee/Tea Break**

### ***11:00-12:30 - Breakout discussion session #1***

- 1) Long-term radiative flux monitoring (led by Yoko Tsushima and Thorsten Mauritsen)
- 2) Constraining cloud processes using observations: Are models getting better and how would we know? (led by Ivy Tan and Johannes Mulmenstadt)
- 3) Mechanisms behind tropical warming patterns including machine learning, GFMIIP etc. (led by Sarah Kang and Yen-Ting Hwang)

### **12:30-2:00 - Lunch**

### ***Session #4: Warm Cloud Processes***

***Chairs: Paulo Ceppi and Brian Medeiros***

2:00-2:15 - Examining Cloud Feedbacks in DOE's Global Storm Resolving Model, Li-Wei Chao

2:15-2:30 - Constraining model simulations of aerosol cloud interactions using activation rate from satellites observations, Chanyoung Park

2:30-2:45 - Improving aerosol indirect forcing from marine low clouds, Tianle Yuan

2:45-3:00 - A new method for diagnosing effective radiative forcing from aerosol-cloud interactions in climate models, Brandon Duran

3:00-3:15 - Shallow convective momentum transport in complex cloud fields and its impact on larger-scale circulations, Louise Nuijens

3:15-3:30 - discussion

### **3:30-4:00 - Coffee/Tea Break**

### ***3:30-5:30 - Poster Session #2***

***7 pm Red Socks Baseball Game (opt-IN, arranged by Local Organizers)***

## **Wednesday June 5**

### ***Session #5: Climate Dynamics (Clouds, Circulations, Pattern Effect)***

***Chairs: Sarah Kang, Yue Dong***

9:00-9:15 - Tropical Pacific SST Pattern Problem, Masahiro Watanabe

9:15-9:30 - Crucial Role of Sea Surface Temperature Warming Patterns in Near-Term High-Impact Weather and Climate Projection, Ming Zhao

9:30-9:45 - The role of the Bjerknes and low-cloud feedbacks in the formation of the eastern equatorial Pacific warming pattern, Alexey Fedorov

9:45-10:00 - Tropical Pacific responses to idealized subtropical low cloud forcing through subsurface oceanic adjustment, Matt Luongo

10:00-10:15 - ENSO provides a strong observational constraint on the pattern effect, Tyler Hanke

10:15-10:30 - discussion

### **10:30-11:00 - Coffee/Tea Break**

### ***11:00-12:30 - Breakout discussion session #2***

- 1) What happened in 2023/2024? Implications for pattern effect, cloud-aerosol interactions, and climate sensitivity (led by Gavin Schmidt and Masahiro Watanabe)
- 2) Informal MIPs including RCEMIP (led by Allison Wing)
- 3) *TBD. Ideas? let Jen Kay know.*

### **12:30-2:00 - Lunch**

### ***Session #6: Climate Dynamics (Clouds, Circulations, Pattern Effect)***

***Chairs: Masahiro Watanabe, Yen-Ting Hwang***

2:00-2:15 - Examining the Relationship between Cloud Biases and Climate Modes in Large Ensembles, Brian Medeiros

2:15-2:30 - Unforced Earth's energy imbalance tied to subtropical low-cloud variations, Ayumu Miyamoto

2:30-2:45 - Distinct drivers of changes in Walker circulation and tropical convection, Sarah Kang

2:45-3:00 - discussion

### **3:00-3:30 - Coffee/Tea Break**

### **Session #7: Convective Cloud Processes**

**Chairs: Clare Singer, Allison Wing**

3:30-3:45 - A robust constraint on the response of convective mass fluxes to warming, Andrew Williams

3:45-4:00 - The SST pattern effect on OLR: the role of convective aggregation, Heng Quan

4:00-4:15 - T Mock-Walker Simulations as the Second Phase of RCEMIP, Allison Wing

4:15-4:30 - discussion

**4:30-6:30 pm - Poster Session #3**

**7 pm Conference Dinner (OPT-IN, arranged by Local Organizers)**

## **Thursday June 6**

### **Session #8: Extratropical Cloud Processes**

**Chairs: Alejandro Bodas-Salcedo, Jen Kay**

9:00-9:15 - A New Estimate of the Climate Sensitivity of CMIP Earth System Models, Ivy Tan

9:15-9:30 - Cloud albedo biases over high-latitude oceans from a cloud controlling factor perspective, Joaquin Blanco

9:30-9:45 - Clouds drive the wintertime surface energy budget response to temperature variations at a long-term Arctic observatory, Leah Bertrand

9:45-10:00 - Why Does Atmospheric Radiative Heating Weaken Midlatitude Cyclones?, Eric Mischell

10:00-10:15 - discussion

**10:15-10:45 - Coffee/Tea Break**

### **Session #9: Precipitation Processes**

**Chairs: Arianna Varuolo-Clarke, Mark Webb**

10:45-11:00 - Response of atmospheric circulation and precipitation to warming in a global storm resolving model, Ilai Guendelman

11:00-11:15 - Cloud radiative effects promote a large intermodel spread in hydrological sensitivity, Zachary McGraw

11:15-11:30 - Long-term changes in the shape of the precipitation distribution from station observations, Angeline Pendergrass

11:45-12:00 - Discussion

### **12:00-12:30 – Concluding discussions and Looking forward**

12:00-12:20 – CFMIP Experiments for CMIP7, Mark Zelinka, Paulo Ceppi, Alejandro Bodas-Salcedo

12:20-12:30 – Next plans for CFMIP with co-chairs Jen Kay, Sarah Kang, George Tselioudis

**Adjourn at 12:30. Box Lunch to go or to stay**

## **Poster Session #1**

- 1) Climate and climate response to forcing for a wide range of ocean circulations - Kyle Armour, Zho Ragen, Robert Fajber, and Aaron Donohoe
- 2) Constraining low-level cloud feedback and cloud dependency to environmental factors in CMIP6 models - Assia Arouf, Gregory V. Cesana, Andrew Ackerman, Robert Pincus, Ann Fridlind, Gregory Elsaesser and Maxwell Kelley
- 3) Two Ubiquitous Radiative States Observed Across the High Latitudes - Tristan L'Ecuyer, Cameron Bertossa
- 4) The relationship between condensate lifetime and precipitating efficiency and their response to sea surface warming - Hassan Beydoun, Nadir Jeevanjee, Aaron Donahue, and Peter Caldwell
- 5) Assessment of the simulation the tropical SST pattern during the historical period in the CMIP6 ensemble - A. Bodas-Salcedo, J. M. Gregory, D. M. H. Sexton, and C. P. Morice
- 6) The differences between  $\tau_1=1$  and  $\tau_3=3$ : Energy gain kernel for climate feedbacks - Ming Cai, Xiaoming Hu, Jie Suna, Feng Ding, and Jing Feng
- 7) Assessing the Thermodynamic Contribution to Trade Cumulus Feedback - Ruy Hernan Campos, Lukas Kluft, Ann Kristin Naumann, Bjorn Stevens
- 8) Towards a cloud microphysics parameterization for a tropical coastal region - Salvador Castillo; Ruth Cerezo-Mota
- 9) An evaluation of Arctic supercooled clouds in GISS-ModelE3 and CMIP6 models - Greg Cesana, Israel Silber, McKenna Stanford, Yuan-Jen Lin, Ann Fridlind, Andrew Ackerman, Greg Elsaesser and Maxwell Kelley
- 10) CloudBench: Benchmark Large-eddy Simulations for Parameterizations of Turbulence, Convection, and Clouds - Sheide Chammas, Tapio Schneider, Qing Wang, Yi-fan Chen, Cenk Gazen, John Anderson
- 11) The fast responses of CO<sub>2</sub> increase: insights from a general circulation model and a global storm-resolving model - Yan-Ting Chen, Timothy M. Merlis, Yi Huang
- 12) Learning Entrainment Closures in a Hybrid Machine-learning Parameterization: A Case Study on Eastern Pacific cfSites - Costa Christopoulos, Zhaoyi Shen, Tom Beucler, Tapio Schneider
- 13) The Transition to Double-Celled Circulations in Mock-Walker Simulations - Nicholas Lutsko, Timothy Cronin
- 14) A simple model for instantaneous radiative forcing by optically-thin gases - Paulina Czarnecki, Lorenzo Polvani, Robert Pincus
- 15) Tropical High Cloud Feedback Relationships to Climate Sensitivity - Emma Dawson, Kathleen Schiro
- 16) Leveraging a radiatively-balanced climate model PPE to better understand how cloud and convective processes affect the southern hemisphere jet stream location - Bithi De, Gregory Elsaesser and Allegra N. LeGrande
- 17) High resolution does not consistently improve climate models, the equatorial Pacific sea surface temperature discrepancy - Shreya Dhame, Dirk Olonscheck, Maria Rugenstein
- 18) Understanding of mesoscale convective systems simulation in weather and climate models - Wenhao Dong; Ming Zhao; Lucas Harris; Kai-yuan Cheng; Linjiong Zhou; V. Ramaswamy

- 19) Contribution of stratospheric ozone depletion to the recent tropical La Nina-like warming pattern - Yue Dong; Lorenzo Polvani; Yen-Ting Hwang; Mark England
- 20) Mechanisms of the pattern effect in CESM - Margaret L. Duffy, Brian Medeiros, Andrew Gettelman
- 21) Mid-Pliocene climate forcing, sea-surface temperature patterns, and implications for modern-day climate sensitivity - Dvorak, M., Armour, K., Feng, R., Cooper, V., Burls, N., Zhu, J., Proistosescu, C.
- 22) Overview of TVOC and Indoor Air Quality Assessment of Agricultural Institution in Nigeria - Francis Olawale Abulude, Samuel Dare Oluwagbayide, and Adebola Oyebola Elemide
- 23) An analytical model for convective system areal growth rates - Gregory Elsaesser, Remy Roca, Thomas Fiolleau, Jingbo Wu, Andreas Prein, Scott Giangrande, Steve Lang, Adrian Loftus, Qilong Min
- 24) The Shortwave Cloud Feedback and its Impact on East Pacific Multi-Decadal Variability - Zachary Espinosa and Mark Zelinka
- 25) The Seasonal Evolution of Low Clouds and the Southern ITCZ over the East Pacific Ocean - Fouzia Fahrin, Alex O. Gonzalez, Gregory V. Cesana, Charlotte A. DeMott, and Richard Neale
- 26) Influence of turbulent mixing on clouds and cloud feedbacks in storm-resolving models - Romain Fievet, Cathy Hohenegger, Bjorn Stevens
- 27) Constraining Model Representations of Shallow Convective Mixing and Shallow Cumulus Physics with Observations of Stable Water Isotopes - Michelle Frazer, Sylvia Dee, Adriana Bailey, Jesse Nusbaumer
- 28) A Radiative Feedback Jacobian from Regularized Linear Regression - Leif Fredericks, Maria Rugenstein, Dave Thompson
- 29) How to chase the signal of a model parameterization change in a global climate model - Ash Gilbert, Jen Kay, Penny Rowe
- 30) The Importance of Relative Humidity Trends for Global Clear-Sky Longwave Feedback Estimates from Reanalysis Data – Helene Gloeckner, Lukas Kluft, Bjorn Stevens, Hauke Schmidt
- 31) The dependence of the climate sensitivity on the Coriolis effect of rotating planets - Abisha Mary Gnanaraj, Jiawei Bao and Hauke Schmidt
- 32) Dynamical Importance of the Trade Wind Inversion in Suppressing the Southeast Pacific ITCZ - Alex O. Gonzalez, Indrani Ganguly, Marissa Osterloh, Gregory V. Cesana, Charlotte A. DeMott
- 33) Impact of atmospheric cloud radiative effects on the persistence of the Southern Hemisphere eddy-driven jet stream in observations and CMIP6 models - Xinhuiyu Liu, Kevin M. Grise
- 34) Understanding the relationship between cloud controlling factors and the ISCCP weather states - Kevin M. Grise, George Tselioudis
- 35) The influence of stratocumulus on climate sensitivity - Jian Guan, Nicole Neumann, Robert Pincus, Arlene Fiore, Brian Medeiros, Clare Singer

- 36) The pattern effect induces spurious global cooling of the surface in historical climate model simulations, which is compensated for by an underestimation of the radiative response to global mean surface warming - Robin Guillaume-Castel, Benoit Meyssignac
- 37) What Causes the Low-Level Cloud Increase from April to May Over the Arctic? - Ryan Haas
- 38) Impacts of the Atlantic Meridional Overturning Circulation on Global and High-Latitude Warming Uncertainty - Hahn, L.C., Eisenman, I., and Lutsko, N. J.
- 39) State dependence of radiative feedbacks and its implications for climate sensitivity - Haozhe He, Brian J. Soden, Bosong Zhang, Wenchang Yang, Gabriel A. Vecchi
- 40) Investigating the importance of the Limpopo Low-Level Jet in association with the development of squall lines over the Free State, South Africa - Elani Heyneke
- 41) Consistent cloud tracer transport and aerosol activation by boundary layer updraft improve low clouds in the GFDL atmospheric models with two-moment cloud microphysics - Zhihong Tan, Ming Zhao, and Huan Guo
- 42) Little Change in Apparent Hydrological Sensitivity at Large CO<sub>2</sub> Forcing - Dana Raiter, Lorenzo M. Polvani, Ivan Mitevski, Angeline G. Pendergrass, Clara Orbe

## **Poster Session #2**

- 1) Cloud feedback uncertainty in the equatorial Pacific across CMIP6 models - PG Hill, DL Finney, MD Zelinka
- 2) More extreme Indian monsoon daily rainfall in El Niño summers - Spencer A. Hill, Destiny Zamir Meyers, Michela Biasutti, Adam H. Sobel, Mark A. Cane, Fiaz Ahmed, Michael K. Tippett
- 3) The Role of Clouds in Connecting Atmospheric Blocking and Surface Extremes - Ka Ying Ho, Lei Wang, Bryce E. Harrop, L. Ruby Leung
- 4) Observed Relationships between Sea Surface Temperature, Vertical Wind Shear, Tropical Organized Deep Convection, and Radiative Effects - Wei-Ting Hsiao, Eric D. Maloney, Nicolas M. Leitmann-Niimi, and Christian D. Kummerow
- 5) A Radiator Fin in the Arctic? - Yi Huang and Han Huang
- 6) Understanding the radiative feedback mechanisms from the perspective of atmospheric heating rate - Han Huang and Yi Huang
- 7) Robust Increase in South Asian Monsoon Rainfall Under Global Warming Driven by Southern Ocean Heat Uptake and Eurasia Cloud Changes - Yong-Jhih Chen, Yen-Ting Hwang\*, and Jian Lu
- 8) ClimKern: a new Python package and kernel repository for calculating radiative feedbacks - Tyler P. Janoski, Ivan Mitevski, Ryan J. Kramer, Michael Previdi, and Lorenzo Polvani
- 9) Can global storm-resolving models simulate the land-ocean contrast in deep convection? - Tristan Abbott and Nadir Jeevanjee
- 10) Potential applications of PATMOS-x cloud datasets in climate model research - Jongjin Seo, Michael Foster, and Coda Phillips
- 11) Sea surface temperature trend discrepancies impact Southern Hemisphere extratropical circulation trends - Joonsuk M. Kang, Tiffany A. Shaw, Sarah M. Kang, Isla R. Simpson, Yue Yu

- 12) Factors determining tropical upper-level cloud radiative effect in the radiative-convective equilibrium framework - Hyoji Kang, Yong-Sang Choi, and Jonathan H. Jiang
- 13) Representation of intraseasonal variability in rainfall over the Indian region using different physics in GFS and CFSv2 - Nirupam Karmakar, Manpreet Kaur, Susmitha Joseph, Atul Kumar Sahai, R Phani, Raju Mandal, Avijit Dey
- 14) Do Low-level Clouds Strengthen Summertime Subtropical Highs? - Hideaki Kawai and Tsuyoshi Koshiro
- 15) Sea ice feedbacks cause more greenhouse cooling than greenhouse warming at high northern latitudes over a millennium - Jennifer E. Kay, Yu-Chiao Liang, Shih-Ni Zhou, Nicola Maher
- 16) Wetter East Asia and Western United States with projected delayed Southern Ocean warming - Hanjun Kim, Sarah M. Kang, Angeline G. Pendergrass, Flavio Lehner, Yechul Shin, Paulo Ceppi, Sang-Wook Yeh, Se-Yong Song
- 17) Disentangling the roles of tropical sea surface temperature and anthropogenic forcings on post-1980 wintertime North Pacific circulation change - Yan-Ning Kuo, Flavio Lehner
- 18) Atmospheric convection over Amazonian forests - Jung-Eun Lee
- 19) Large-scale vs local environmental controls on convective cloud development and organization in the Southeast U.S - Nicolas M. Leitmann-Niimi, Gregory Elsaesser, Jingbo Wu, John Mecikalski, Scott Giangrande
- 20) Why do recent-warming based TCR estimates using emergent constraints substantially exceed those using AR6 forcing values? - Nicholas Lewis
- 21) Reconstruction of Instrumental Observation and CMIP6 Energy Budget Constraints Aim to Reduce Uncertainty in Climate Sensitivity Estimates - Qingxiang Li
- 22) The direct effect of CO<sub>2</sub> on North America Summer Precipitation - Wengui Liang, Ming Zhao, Zhihong Tan, Wenhao Dong, Bosong Zhang, Thomas Knutson
- 23) Compensating Energy Transport by Mean Circulation and Eddies over the Deep Tropics Simulated in GCMs at Different Resolutions - Pu Lin, Chiung-Yin Chang, Isaac Held, Tim Merlis and Pablo Zurita-Gotor
- 24) Intermodel spread of radiative feedback patterns traced to regional surface warming using NASA GISS ModelE3 Green's Function - Yuan-Jen Lin, Gregory V. Cesana, Cristian Proistosescu, Yue Dong, Kate D Marvel
- 25) Changing coherence of sea surface temperature trends in the northern and southern tropical Pacific- Lin Yueh-Chi, Masahiro Watanabe
- 26) Evaluation of CMIP6 models against observationally determined surface longwave cloud feedback over land - Lei Liu, Yi Huang, John R. Gyakum
- 27) Convectively-Coupled Global Rossby Modes in an Idealized Moist GCM - Cameron G MacDonald, Pablo Zurita-Gotor, Isaac Held, Yi Ming
- 28) Influence of SST warming patterns on atmospheric circulation and cloud feedbacks - Anna Mackie, Michael P. Byrne, Andrew I.L. Williams
- 29) Darwinian-information theory of organization's evolution - Brian Mapes
- 30) Impact of local and remote atmospheric heating interventions on subtropical low clouds - Danny McCulloch, Hugo Lambert, Mark Webb, Geoffrey Vallis
- 31) Pattern-effectMIP: model & dataset dependency on pattern effect estimate - Angshuman Modak, Thorsten Mauritsen, Yechul Sin, Sarah Kang, Adriana Sima, Jean-Louis



Dufresne, Tsuyoshi Koshiro, Hideaki Kawai, Miki Arai, Masahiro Watanabe, Romain Roehrig

- 32) Dominant cloud controlling factors for low-level clouds over the global oceans: observational versus ESM depictions - Catherine M Naud, Gregory S Elsaesser and James F Booth
- 33) Regional tropical rainfall shifts under global warming: an energetic perspective - Paul A Nicknisch, John C H Chiang, Aixue Hu, and William R Boos
- 34) Tropical precipitation extremes and their modulation by convective organization in RCEMIP - Graham L. O'Donnell, Allison A. Wing (presenter)
- 35) Different roles of sensible and latent heat fluxes in regulating low cloud feedback in MIROC5 - Tomoo Ogura, Mark J. Webb, and Adrian P. Lock
- 36) Impact of moist thermodynamics expressions on climatological temperature fields represented in a global cloud resolving model - Tomoki Ohno and Shuhei Matsugishi
- 37) Large-eddy Simulation of Tropical Cloud Regimes in a Channel with a Walker-Circulation - Jeffrey B. Parker, Tapio Schneider, Sheide Chammas, Qing Wang, Cenk Gazen, Rob Carver, Yi-fan Chen, John Anderson
- 38) Extra-tropical radiative response driven by equatorial warming - Pappu Paul, Cristian Proistosescu, Maile Sasaki
- 39) What is the ECS of GFDL CM4? - D. Paynter, V. Ramaswamy, L. Wilcox
- 40) Effects of Horizontal Grid Spacing on Climate Sensitivity and Clouds: Aquaplanet experiments from 160 km to 1km - Angel Peinado Bravo, Daniel Klocke, Bjorn Stevens

### **Poster Session #3**

- 1) Enhancing Low Cloud Feedback Analysis through High-Resolution Multi-scale Modeling Frameworks - Liran Peng , Peter Blossey , Walter Hannah , Chris Bretherton, Chris Terai, Andrea Jenney, Michael Pritchard
- 2) Putting an oscilloscope to the climate system: resonant response of the tropical Pacific to external forcing - Cristian Proistosescu, Malte F Stuecker
- 3) Exploring the Interplay between Cloud Feedback and Aerosol-Cloud Interaction Using an E3SM Perturbed Parameter Ensemble - Yi Qin, Po-Lun Ma, Mark Zelinka, Stephen Klein
- 4) Dependence of the precipitation intensity distribution on spatial resolution in GPM-IMERG - Akshay Rajeev, Angeline G. Pendergrass
- 5) Assessing the Impact of Surface Energy Inputs on Radiative Feedbacks in Tropical and Extra-tropical Regions: Strength, Evolution, and Timescales - Pietro Salvi, Jonathan Gregory, Paulo Ceppi
- 6) Natural surface temperature variations in regions of tropical deep convection are strongly damped by atmospheric heat transport - Maile Sasaki, Cristi Proistosescu, Chen Zhou
- 7) Evaluation and Improvement of Numerical Models Constrained to Doppler Velocity Observations with the EarthCARE Satellite: Insights from Sub-Kilometer Mesh NICAM Simulations - Masaki Satoh, Woosub Roh, Shuhei Matsugishi
- 8) Cloud radiative heating and its role in controlling oceanic tropical mesoscale convective lifecycles - Laura Paccini, Kathleen Schiro, James Ruppert

- 9) Evaluating convective quasi-equilibrium in a global cloud-resolving model - Seth Seidel, Nathan Arnold
- 10) Decadal Variability of radiative properties of Aerosols over the Indo-Gangetic Plain in South Asia - Muhammad Zeeshan Shahid
- 11) New Spectral Radiation Diagnostics for Model Evaluation and Climate Change Detection - Jonah Shaw, Dustin Swales, Jennifer Kay
- 12) Integrating an Eddy-Diffusivity Mass-Flux Scheme in the CLiMA Atmosphere Mode - Zhaoyi Shen, Anna Jaruga, Dennis Yaturin, Charles Kawczynski, Costa Christopoulos, Nat Efrat-Henrici, Tapio Schneider
- 13) Constraining turbulent mixing in oceanic shallow cumuli using in situ and simulation methods - Walter Shen, Fayçal Lamraoui, Zhiming Kuang
- 14) Earth's hemispheric albedo asymmetry: an energy budget perspective - Clare E. Singer, Robert Pincus, Yi Ming
- 15) Radiative Feedbacks from Dry Environmental Air Accelerate Tropical Cyclogenesis- Brian Soden, Shun-Nan Wu
- 16) Diagnosing Surface Cloud Feedbacks in the Arctic: A Novel Method - Catherine L. Stauffer, Ivy Tan, and Quentin Coopman
- 17) Beyond the mean: Drivers of the SST variance change pattern - Malte F. Stuecker, Jacob Gunnarson, Sen Zhao
- 18) Response of Aerosol-Cloud Interactions to Global Warming in Large Eddy Simulations - Hongwei Sun, Peter Blossey, Robert Wood, Ehsan Erfani, Sarah Doherty
- 19) Limited-Domain Radiative Convective Equilibrium with a Surface-Driven Diurnal Cycle for Understanding the Precipitation Diurnal Cycle Over Land - Zhihong Tan, Ming Zhao, and Baoqiang Xiang
- 20) Elucidating boundary-layer aerosol-cloud interactions in the southeast Atlantic - Tyler Tatro and Paquita Zuidema
- 21) Climate feedbacks and its resolution sensitivity in Cess-Potter simulations with the global kilometer-scale SCREAM - Christopher Terai, Noel Keen, Peter Caldwell, Hassan Beydoun, Benjamin Hillman, Li-Wei Chao, Mark Zelinka, and the SCREAM team
- 22) Relationship between tropical cloud feedback and climatological biases in clouds and precipitation - Chad Thackeray, Mark Zelinka, Jesse Norris, Alex Hall, Stephen Po-Chedley
- 23) Predicting the Frequency of Low Cloud Mesoscale Morphologies in Extratropical Cyclones Using Cloud Controlling Factors - Shuoyun Tong; Robert Wood; Tianle Yuan
- 24) Systematic Errors in Regional Sensitivities to Cloud Controlling Factors and their Implications to Cloud Feedback in a Perturbed Parameter Ensemble - Yoko Tsushima, David Sexton, John Rostron, and Gill Martin
- 25) Constraint on Net Long Term Climate Feedback to Emerge From Satellite Observed Internal Variability by Mid 2030s - Alejandro Uribe, Frida A.-M. Bender, and Thorsten Mauritsen
- 26) Nonlinear Feedbacks Elucidated by Explainable Artificial Intelligence - Senne Van Loon, Maria Rugenstein, & Elizabeth A. Barnes
- 27) Effect of Cloud Layer on Instantaneous Radiative Forcings of Greenhouse Gases - W. A. van Wijngaarden and W. Happer

- 28) Exploring drivers of observed and modeled mid-latitude precipitation change - Arianna Varuolo-Clarke, Jennifer Kay, Brian Medeiros
- 29) Effects of idealized thermal and mechanical forcings on tropical rainfall at scales of tens to hundreds of kilometers - Martin Velez-Pardo, Timothy W. Cronin
- 30) Constraining model cloud feedback by cloud sources and sinks in extratropical cyclones.- Geethma Werapitiya, Daniel McCoy, Greg Elsaesser, Ci Song, Andrew Gettelman, Trude Eidhammer, Jingbo Wu, Emily Dellaripa
- 31) The Response of Global Mean Precipitation to Surface Warming in AMIP and CMIP Experiments - Wenchang Yang, Chenggong Wang, Gabriel Vecchi
- 32) A Predator-Prey Model for Nonlinear Precipitation Oscillations in Hothouse Climates - Da Yang
- 33) On the Impacts of Ice Optical Property Parameterization on Climate State and Feedback Simulations - Bingqi Yi, Chen Zhou, Yong-Sang Choi
- 34) Recommendations for Diagnosing Cloud Feedbacks Using Cloud Radiative Kernels- Mark D. Zelinka, Li-Wei Chao, Timothy A. Myers, Yi Qin, and Stephen A. Klein
- 35) Climate feedback and sensitivity depend on the pattern of radiative forcing - Bosong Zhang , Ming Zhao , Haozhe He , Brian J. Soden , Zhihong Tan , Baoqiang Xiang , and Chenggong Wang
- 36) Sea ice pattern effect on the Earth's energy budget - Chen Zhou
- 37) A Pattern-aware Feedback Framework for Climate Responses based on Green's Function Experiments - Parvathi Kooloth, Jian Lu, Yi Huang, Derek DeSantis
- 38) PJ Tuckman, An Assessment of the Atmospheric Energy Transport in CMIP6 Models
- 39) Yue Dong, Jen Kay, Antonietta Capotondi, Sara Sanchez, Clara Deser - Competing and synergistic climate effects of anthropogenic aerosols and greenhouse gases