

Aerosols, Clouds, Precipitation and Climate (ACPC) Workshop
Virtual meeting, 24–27 May, 13:00-16:00 UTC

Note: All presentations are short discussion contributions, grouped by several key themes related to the ACPC activities. We offer an option to upload pre-recorded longer talks if speakers want to provide further supporting materials. Here is the website for uploading pre-recorded longer talks: <http://www.acpcinitiative.org/upload.html> (name convention: day(May24/May25/May26/May27)_speaker (last name only))

Low-Cloud Sessions

Monday May 24th

13:00 Introduction: Logistics

Cloud Morphology and Warm Rain

6 minutes talks + 2 minutes Q/A

13:10 **Jingyi Chen** Factors Controlling the Mesoscale Morphology and Evolution of Shallow Clouds During Cold Air Outbreaks Over the Western North Atlantic Ocean.

13:18 **Jan Kazil** Role of subsidence vertical structure for stratocumulus precipitation and mesoscale organization - a CLARIFY case study

13:26 **Xiquan Dong** New MBL cloud and drizzle retrievals and their application in warm rain processes

13:34 **Kentaroh Suzuki** Multi-model evaluations of the warm rain process: Early results from GEWEX PROES-WR

13:42 **Pornampai Narenpitak** From Sugar to Flowers: A Transition of Shallow Cumulus Organization During ATOMIC

2 minutes research highlights

13:50 **Xiaoli Zhou** Sea surface temperature control on marine cloud darkening over the North Atlantic Ocean

13:52 **Xiangyu Li** Large-eddy simulations of marine boundary-layer clouds associated with cold air outbreaks during the ACTIVATE campaign

13:54 **Rachel Sansom** Using emulators to explore stratocumulus behavior in the face of stochastic variability

13:56 **Youtong Zheng** Role of surface latent heat flux on shallow cloud transitions: perspectives from theory and LES

13:58 **Sandip Pal** On the empirical evidence for frontal modifications of atmospheric boundary layer depth variability over land

- 14:00 **Jake Gristey** Understanding and predicting surface solar irradiance variability beneath shallow cumulus clouds
- 14:02 **James Hudson** High-resolution CCN Spectral Relationships with Drizzle in Cumulus and Stratus
- 14:04 Discussion (Moderator: Matthew Christensen)
- 14:30 Break

Aerosol Effects

6 minute talks+2 minutes Q/A

- 14:45 **Alyson Douglas** Evaluating Aerosol-Cloud-Precipitation Interactions in Cloud Controlling Regimes
- 14:53 **Isabel McCoy** Influences of Recent Particle Formation on Southern Ocean Aerosol Variability and Low Cloud Properties
- 15:01 **Tom Goren** A heuristic model for estimating the Sc breakup front and radiative effect under a hypothetical cleaner atmosphere
- 15:09 **Shang Wu** Effects of aerosol on macrophysical and microphysical properties in shallow convective clouds
- 15:17 **Haruka Hotta** Aerosol effect on warm clouds in a global cloud-system-resolving model: Sensitivity to microphysics schemes

2 minutes research highlights

- 15:25 **Siddhant Gupta** Observations of changes in marine stratocumulus cloud properties over the southeast Atlantic Ocean due to variable above- and below-cloud aerosol concentrations
- 15:27 **Jianhao Zhang** Meteorological constraints on low-cloud radiative forcing sensitivity to cloud droplet number concentration perturbations over the northeast Pacific stratocumulus region
- 15:29 **Hao Wang** Cloud water response to aerosols in CESM2 with improved treatment of subgrid cloud variability
- 15:31– 16:00 Discussion and Next steps (Moderator: Andrew Gettelman)

Tuesday May 25th

- 13:00 ACPC Natural Laboratories Overview
Matthew Christensen Opportunistic Experiments for Aerosol Forcing

Ships and Volcanoes

6 minute talks+2 minutes Q/A

- 13:10 **Franziska Glassmeier** Aerosol-cloud-climate cooling overestimated by ship-track data
- 13:18 **Velle Toll** Day-night contrast in the cloud water responses in polluted cloud tracks
- 13:26 **Michael Diamond** Semi-direct effects from large-scale smoke-circulation interactions influence the southeast Atlantic stratocumulus-to-cumulus transition during the southern African biomass burning season
- 13:34 **Daniel Rosenfeld** The dependence of ship-polluted marine cloud properties and radiative forcing on background drop concentrations
- 13:42 **Edward Gryspeerd** Observing the timescales of aerosol-cloud interactions
- 13:50 **Mahnoosh Haghighatnasab** Impact of volcano eruptions on clouds in clouds-system resolving simulations
- 13:58 **Yannian Zhu** Volcanic aerosols lend causality to exceptionally large susceptibility of clouds to aerosol over global oceans
- 14:06 Discussion (Moderator: Andrew Gettelman)
- 14:35 Break

COVID and Trends

6 minute talks + 2 minutes Q/A

- 14:50 **Andrew Gettelman** Aerosol-Climate Impacts of COVID-19 Induced Emission Changes
- 14:58 **Johannes Quaas** 2.COVID-19 shutdown as laboratory to learn about aviation cirrus
- 15:06 **Yang Cao** Strong Aerosol Effects on Cloud Amount Based on Long-Term Satellite Observations Over the East Coast of the United States
- 15:14 **Daniel Grosvenor** What controls the historical timeseries of shortwave fluxes in the North Atlantic?
- 15:22 **Daniel McCoy** Constraints on RFaci through trends in and present-day patterns of Nd
- 15:30 – 16:00 Discussion and next steps (Moderator: Matthew Christensen)

Deep-Cloud Sessions

Wednesday May 26th

13:00 **Daniel Rosenfeld, Michael Jensen** Welcoming Remarks

Overview: Aerosol-Deep Convective Interactions

Moderator (introducing speakers and slide show): Die Wang

Co-Host (timing and PDF Share Secondary): Mike Jensen

Rapporteur: Bobby Jackson

Discussion moderator (watching chat and question): Jiwen Fan

8 minutes talks + 2 minutes Q/A

13:04 **Alexander Khain** What is convective invigoration?

13:14 **Daniel Rosenfeld** Observational Quantification of Aerosol Invigoration for Deep Convective Cloud Lifecycle Properties Based on Geostationary Satellite

13:24 **Guy Dagan** Idealized cloud resolving simulations overestimate the effect of aerosol on the environment

13:34 **Daniel Hernández-Deckers** Thermals versus cloudy updrafts: what do they tell us about the microphysics/dynamics coupling in deep convection?

2 minutes research highlights + 2 minutes Q/A

13:44 **Philip Stier** Budgetary control of radiative and microphysical aerosol effects on regional precipitation

13:48 **Yuwei Zhang** How representations of condensation in models impact aerosol effects on deep convective clouds?

13:52 **Avichay Efraim** New insights on satellite-based detection of microphysical zones of particles nucleation and growth in convective clouds

13:56 **Johannes Quaas** Updates on weekly cycles over Europe

14:00 Discussion (Moderator: Jiwen Fan)

14:30 Break

Severe Storm and Weather Hazards

Moderator (introducing speakers and slide show): Yuwei Zhang

Co-Host (timing and PDF Share Secondary): Philip Stier

Rapporteur: Marcus van Lier-Walqui

Discussion moderator (watching chat and question): Scott Collis

8 minutes talks + 2 minutes Q/A

14:45 **Jiwen Fan** Aerosol Impacts on Severe Convective Storms and Hail

14:55 **Jungmin “Minnie” Park** Environmental modulation of aerosol impacts on tropical sea breeze convection – Part 1: The Sea Breeze System

- 15:05 **Yuan Wang** Distinctive Effects of Atmospheric Aerosols on Tropical Cyclones
- 15:15 **Jiaxi Hu** Climatology of the vertical profiles of polarimetric radar variables and radar-retrieved microphysical parameters in the continental / maritime MCSs and tropical cyclones
- 2 minutes research highlights + 2 minutes Q/A
- 15:25 **Qian Chen** The Roles of Mineral Dust as Cloud Condensation Nuclei and Ice Nuclei During the Evolution of a Hail Storm
- 15:29 **Xiaofei Li** Notable contributions of aerosols to the predictability of hail precipitation
- 15:33 **Sue van den Heever** Environmental modulation of aerosol impacts on tropical sea breeze convection – Part II: The Deep Convection Mode
- 15:37 Discussion (Moderator: Scott Collis)

Thursday May 27th

- 13:00 **Jiwen Fan & Scott Collis** Welcoming Comments

Aerosol-Convection Interactions around the world

Moderator (introducing speakers and slide show): Jingyi Chen
Co-Host (timing and PDF Share Secondary): Mike Jensen
Rapporteur: Jiaxi Hu
Discussion moderator (watching chat and question): Yuan Wang

8 minutes talks + 2 minutes Q/A

- 13:04 **Tianmeng Chen** Potential impact of aerosols on convective clouds revealed by Himawari-8 observations over different terrain types in eastern China
- 13:14 **Manoj M.G.** Contrasting Aerosol Effects in Triggering Deep Convection: Results from GVAX Campaign
- 13:24 **Yan Yin** The impacts of deep convection on vertical distribution of gaseous pollutants
- 13:34 **Ross Herbert** Isolating large-scale smoke impacts to the diurnal cycle of convection and precipitation over the Amazon with convection permitting resolution
- 2 minutes research highlights + 2 minutes Q/A
- 13:44 **Yanda Zhang** Impacts of long-range transported mineral dust aerosols on summertime convective cloud and precipitation: a case study over the Taiwan region
- 13:48 **Bhupendra Raut** Raindrop size distributions at the surface and characteristics of their source precipitation during monsoon
- 13:52 **Chandan Sarangi** Aerosol-induced vertical re-distribution of monsoon clouds over India

13:56 **Gayatri Kulkarni** Pathways of precipitation formation in different Thermodynamic and Aerosol environments over the Indian peninsular region

14:00 Discussion (Moderator: Yuan Wang)

14:30 Break

TRACER and ACPC Roadmap

Moderator (introducing speakers and slide show): Minnie Park

Co-Host (timing and PDF Share Secondary): Scott Collis

Rappoteur: Jessica Souza

Discussion moderator (watching chat and question): Ann Fridlind

8 minutes talks + 2 minutes Q/A

14:45 **Marcus van Lier Walqui** Lifecycle studies of convective updrafts and microphysics in variable aerosol concentrations via simulated and observed polarimetric radar and lightning flash analysis

14:55 **Stephen Saleeby** Evaluating Aerosol Indirect Effects on Convective Cells in the MIP Models from a Joint Modeling and Radar Simulator Perspective

15:05 **Die Wang** Linking synoptic patterns to cloud properties and local circulations over the Houston, TX region

15:15 **Mike Jensen, Jiwen Fan, Scott Collis** ACPC Deep Convective Roadmap

2 minutes research highlights + 2 minutes Q/A

15:25 **Michael Jensen** Latest developments and planning for the TRacking Aerosol Convection interactions ExpeRiment (TRACER)

15:29 **Pavlos Kollias** The Experiment of Sea-Breeze Convection, Aerosols, Precipitation and Environment (ESCAPE)

15:33 – 16:00 Discussion (Moderator: Ann Fridlind)