#### UPDATES FROM COLUMBIA UNIVERSITY AND NASA GISS: COLD AIR OUTBREAK CLOUD TRANSITIONS AND CLOUD FEEDBACK



Florian Tornow and others

presenting at the 2023 ACTIVATE Science Team Meeting, Tucson, AZ November 13th, 2023



## (1) CAO CLOUD TRANSITIONS DRIVEN BY A DRY INTRUSION

- pre-campaign case with shorter overcast period farther north
- hypothesis: overlying DI imposes gradients in meteorology
  - reduced FT subsidence
  - greater FT humidity
  - in addition to greater MBL windspeed and lower temperature
- Lagrangian LES along four trajectories:
  - swifter MBL deepening causes sooner rain (via faster LWP buildup and CCN reduction)

< Previous Article Next Article >		•
Article Type: Research Article	Full access	
On the impact of a dry intrusion driving cloud-regime transitions in a		**
midlatitude cold-air outbreak		Ø
Florian Tornow, Andrew S. Ackerman, Ann M. Fridlind, George Tselioudis, Brian Cairns, David Painemal, and Gregory Elsaesser		۷
Online Publication: 27 Oct 2023		<
DOI: https://doi.org/10.1175/IAS-D-23-0040.1		
Article History 🔯 Download PDF		
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Abstract		

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### (2) REPORT FROM 2023 CFMIP-GASS MEETING, PARIS



- co-led by Gregory Cesana (Columbia U, NASA GISS)
- COMBLE as colder past and ACTIVATE as warmer future
- learn from ongoing model intercomparison efforts conducted for COMBLE
- breakout participants with split interests:
  - individual CAO cases for Lagrangian LES and SCM
  - earth system model analysis of AMIP(+4K) runs

BREAKOUT GROUP: CAO

CLOUD FEEDBACK



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 earth system model analysis of AMIP(+4K) runs



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## (2) Report from 2023 CFMIP-GASS Meeting, Paris

AMIP4K - AMIP

ACTIVATE - COMBLE

• • • Tun2 COMBLE: 1.28 Wm<sup>-2</sup>K<sup>-1</sup>

Tun1 COMBLE: 1.82 W/m<sup>-2</sup>K<sup>-1</sup>

Obs: 1.67 Wm<sup>-2</sup>K<sup>-1</sup>

Using ACTIVATE as the future of COMBLE results in an estimated cloud feedback very similar to the "real" cloud feedback





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Code to generate: initial and timevarving profile and surface forcing

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