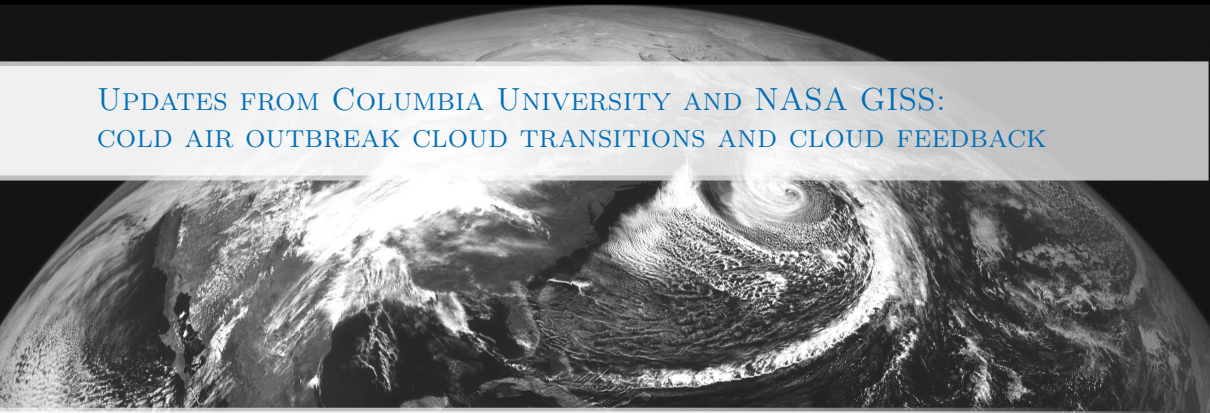
Updates from Columbia University and NASA GISS: cold air outbreak cloud transitions and cloud feedback



Florian Tornow and others

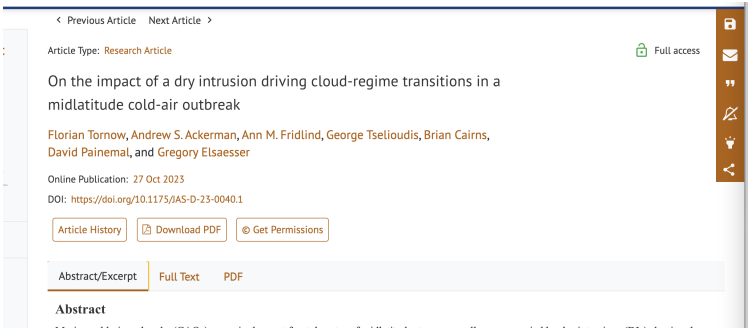
presenting at the 2023 ACTIVATE Science Team Meeting, Tucson, AZ

November 13th, 2023

(1) CAO cloud transitions driven by a dry intrusion

Recent Paper in JAS

- 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)



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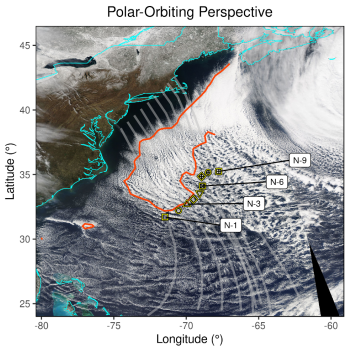

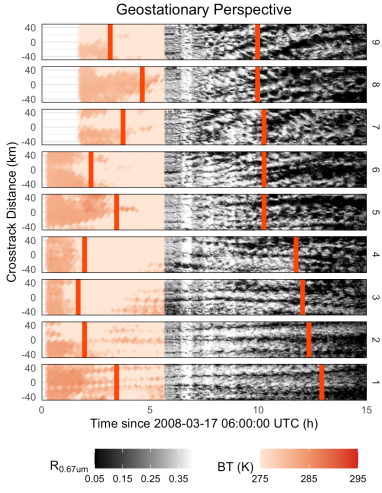

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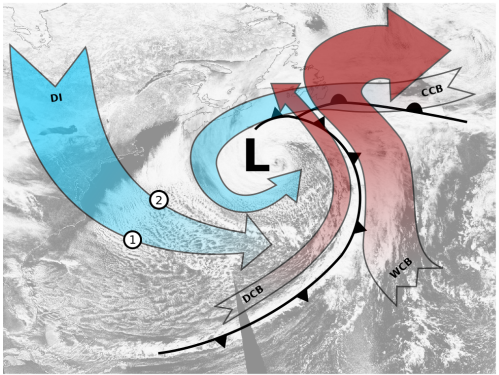

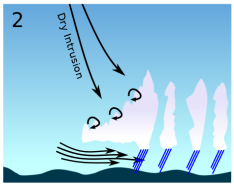

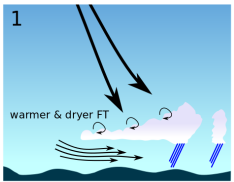

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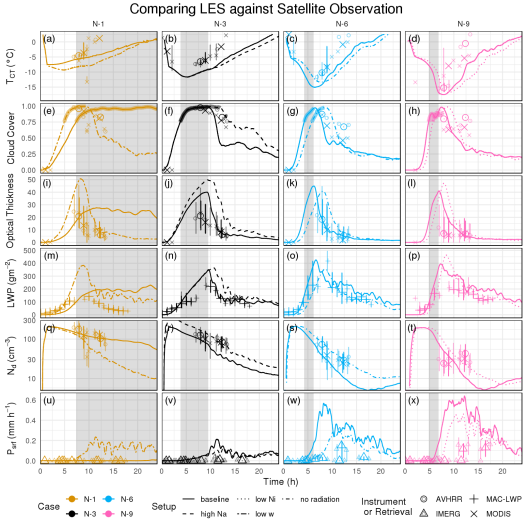
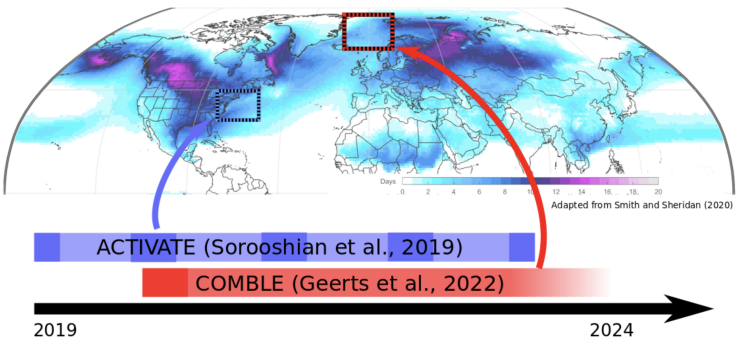


(2) Report from 2023 CFMIP-GASS Meeting, Paris



Breakout group: CAO cloud feedback

- 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

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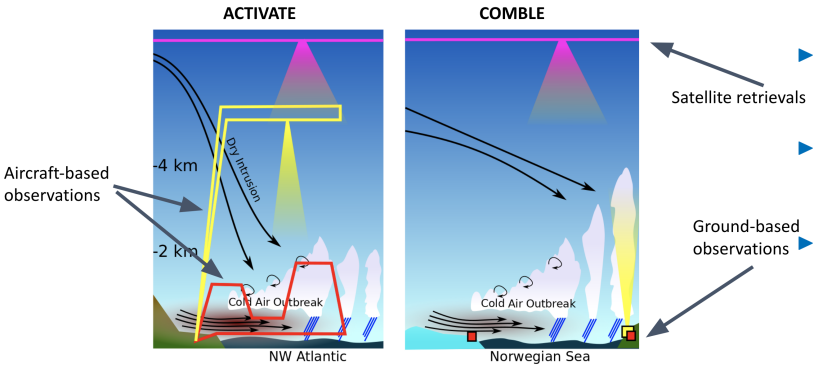

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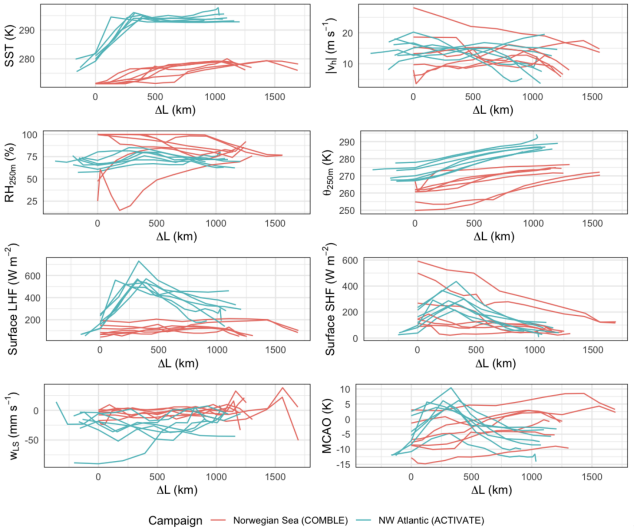

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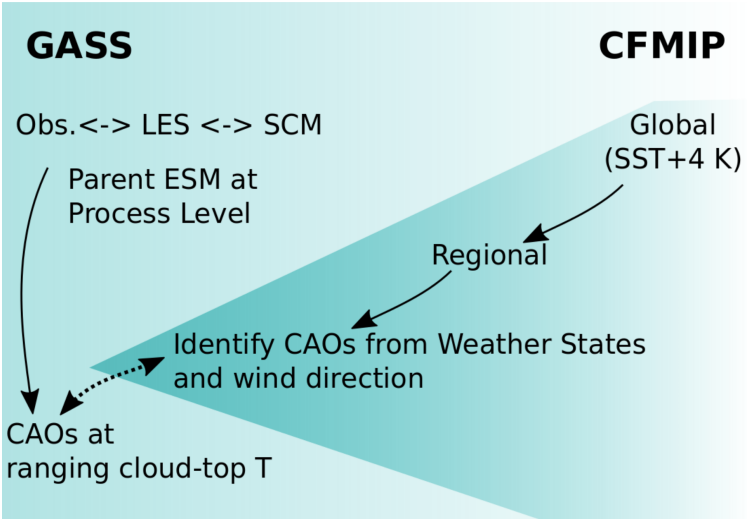

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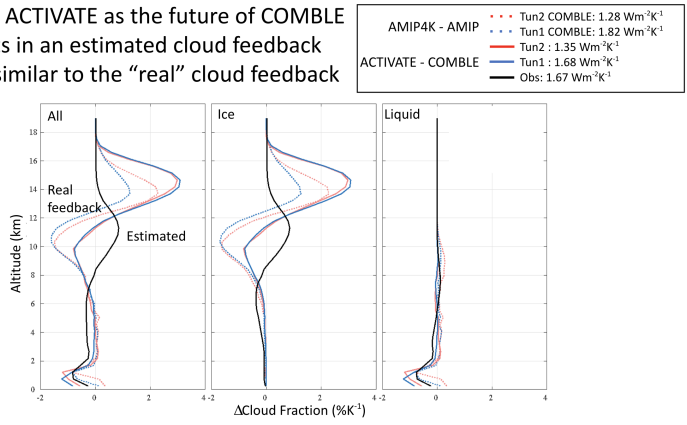
Using ACTIVATE as the future of COMBLE results in an estimated cloud feedback very similar to the "real" cloud feedback



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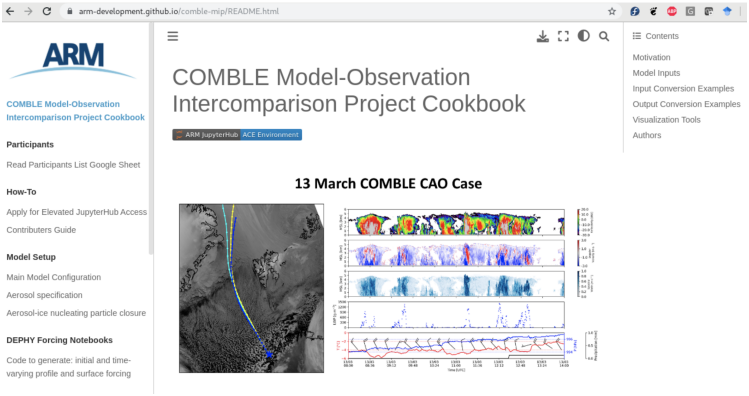

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