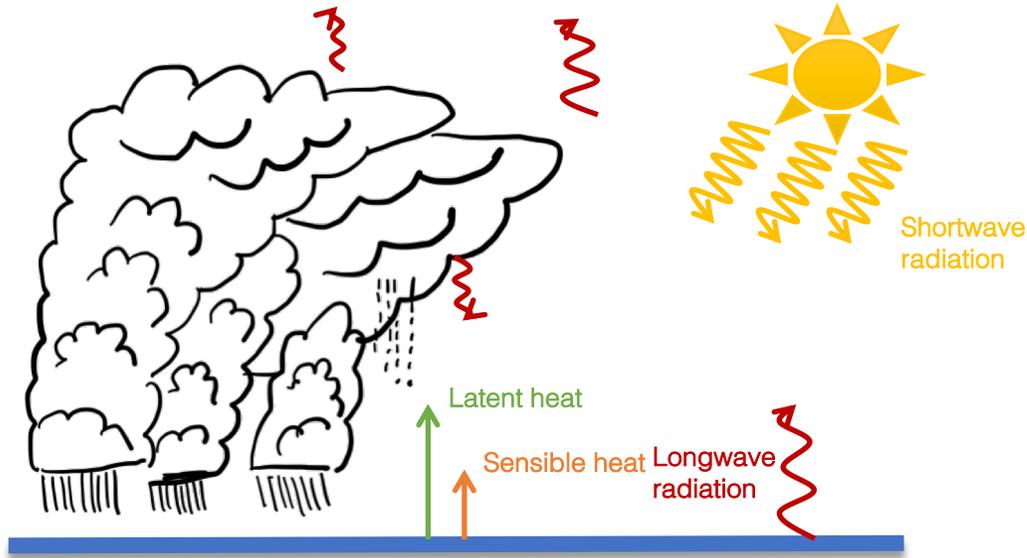


# Clouds and Convective Self-Aggregation in a Multi-Model Ensemble of Radiative-Convective Equilibrium Simulations



## Radiative-Convective Equilibrium:

- Simplest possible way to phrase questions about climate
- Common baseline needed
- Accessible by GCM, SCM, GCRM, CRM, LES models

## RCEMIP:

- Robustness of RCE state
- Response of clouds to warming
- Self-aggregation and climate

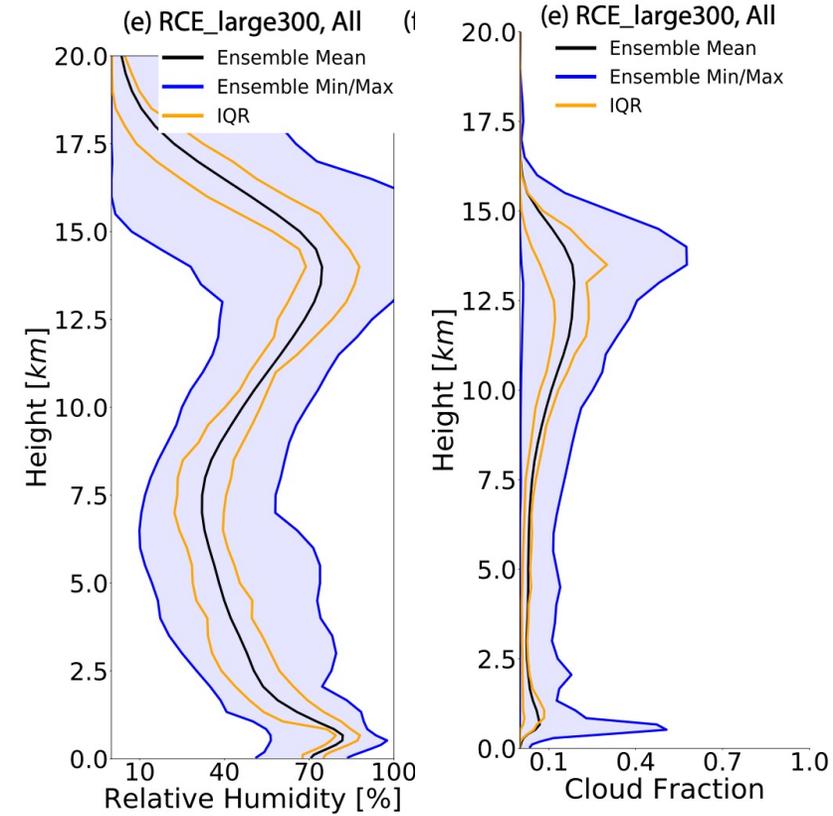
Allison Wing\* Catherine Stauffer, Tobias Becker, Kevin Reed, Min-Seop Ahn, Nathan Arnold, Sandrine Bony, Mark Branson, George Bryan, Jean-Pierre Chaboureau, Stephan de Roode, Kulkarni Gayatri, Cathy Hohenegger, I-Kuan Hu, Fredrik Jansson, Todd Jones, Marat Khairoutdinov, Daehyun Kim, Zane Martin, Shuhei Matsugishi, Brian Medeiros, Hiroaki Miura, Yumin Moon, Sebastian Mueller, Tomoki Ohno, Max Popp, Thara Prabhakaran, David Randall, Rosimar-Rios Berrios, Nicolas Rochetin, Romain Roehrig, David Romps, James Ruppert Jr., Masaki Satoh, Levi Silvers, Martin Singh, Bjorn Stevens, Lorenzo Tomassini, Chiel van Heerwaarden, Shuguang Wang, Ming Zhao

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Thanks to DKRZ for hosting data.

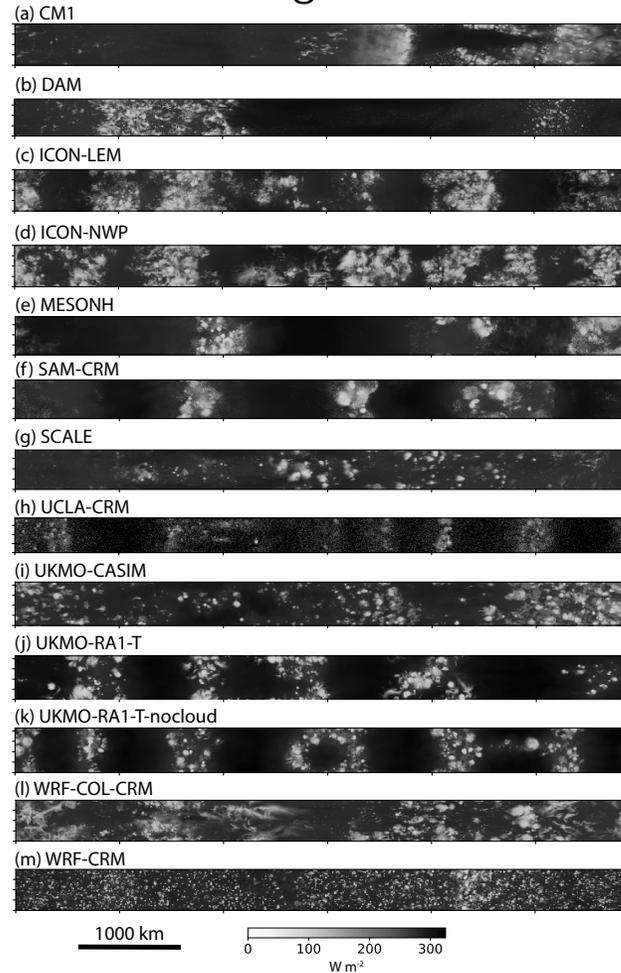
# Key Results:

Temperature, humidity, and clouds in RCE vary substantially across models



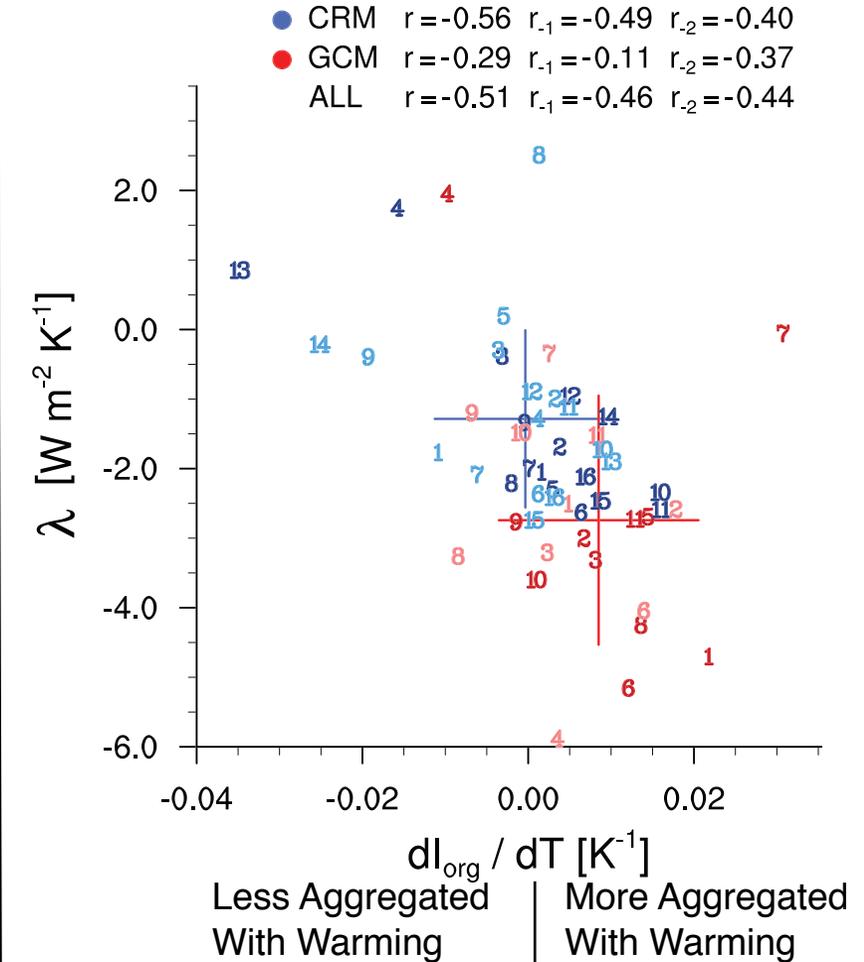
In 70% of models, anvil cloud fraction decreases with warming

Models agree that self-aggregation dries and warms the atmosphere and reduces high cloudiness



Wide spread in aggregation and no consensus on how it changes with warming

Part of the intermodel spread in climate sensitivity is explained by changes in aggregation with warming



RCEMIP data publicly available at

- <http://hdl.handle.net/21.14101/d4beee8e-6996-453e-bbd1-ff53b6874c0e>
- All are encouraged to make use of this unique dataset to do interesting science

Please consider submitting a paper to our special collection in JAMES/GRL/ESS/JGR!

- [Using Radiative-Convective Equilibrium to Understand Convective Organization, Clouds, and Tropical Climate](#)
- ALL papers using RCE encouraged, not limited to RCEMIP!

Questions? Contact Allison Wing ([awing@fsu.edu](mailto:awing@fsu.edu))

<http://myweb.fsu.edu/awing/rcemip.html>

Wing, A.A., C.L. Stauffer, T. Becker, K.A. Reed, M.-S. Ahn, N.P. Arnold, S. Bony, M. Branson, G.H. Bryan, J.-P. Chaboureau, S.R. de Roode, K. Gayatri, C. Hohenegger, I.-K. Hu, F. Jansson, T.R. Jones, M. Khairoutdinov, D. Kim, Z.K. Martin, S. Matsugishi, B. Medeiros, H. Miura, Y. Moon, S.K. Müller, T. Ohno, M. Popp, T. Prabhakaran, D. Randall, R. Rios-Berrios, N. Rochetin, R. Roehrig, D.M. Romps, J.H. Ruppert, Jr., M. Satoh, L.G. Silvers, M.S. Singh, B. Stevens, L. Tomassini, C.C. van Heerwaarden, S. Wang, and M. Zhao (2020): [Clouds and convective self-aggregation in a multi-model ensemble of radiative-convective equilibrium simulations](#), J. Adv. Model. Earth Syst., 12, e2020MS002138, doi:10.1029/2020MS002138.

Becker, T. and A.A. Wing (2020): [Understanding the extreme spread in climate sensitivity within the Radiative-Convective Equilibrium Model Intercomparison Project](#), J. Adv. Model. Earth Syst., 12, e2020MS002165, doi:10.1029/2020MS002165.