

Machine Learning the Warm Rain Process

Gettelman, A., D. J. Gagne, C.-C. Chen, M. W. Christensen, Z. J. Lebo, H. Morrison, and G. Gantos. 2021. "Machine Learning the Warm Rain Process." Journal of Advances in Modeling Earth Systems 13 (2): e2020MS002268. <https://doi.org/10.1029/2020MS002268>.

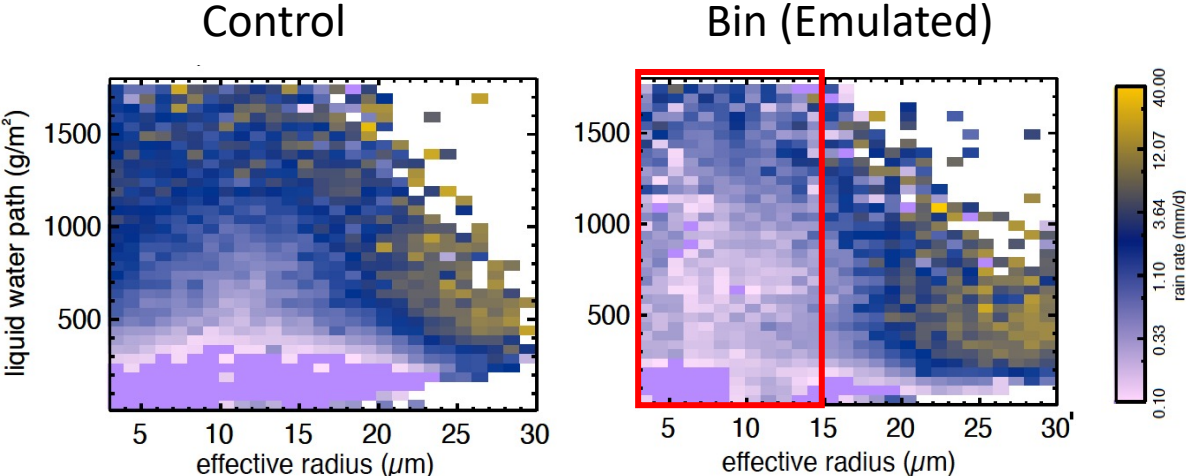
Can we do the warm rain process better with Machine Learning?

NN Emulator reproduces detailed code

Replace traditional GCM bulk rain formation with a detailed model formulation. This is too expensive for climate use. So emulate it with a neural network.

Results:

- We can change the answer in the model with the bin code. Very slow.
- Recover speed and recover results with a neural network emulator (it works)
- Embedded NN in the microphysics: maintains conservation with series of checks



Bin code is Different than original model

