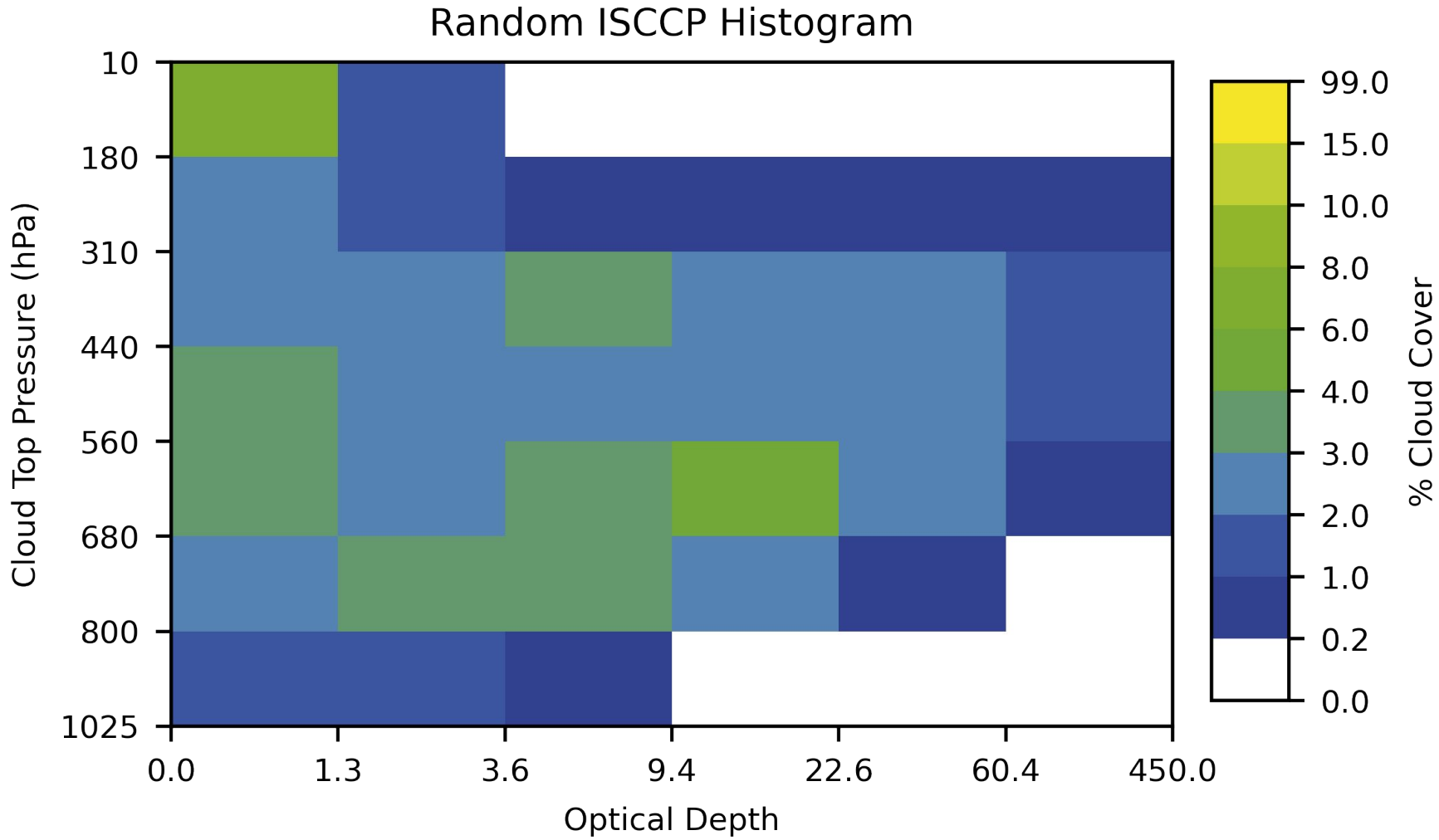
Cloud Regimes in ISCCP, MODIS, MISR and CAM

Isaac Davis, Brian Medeiros

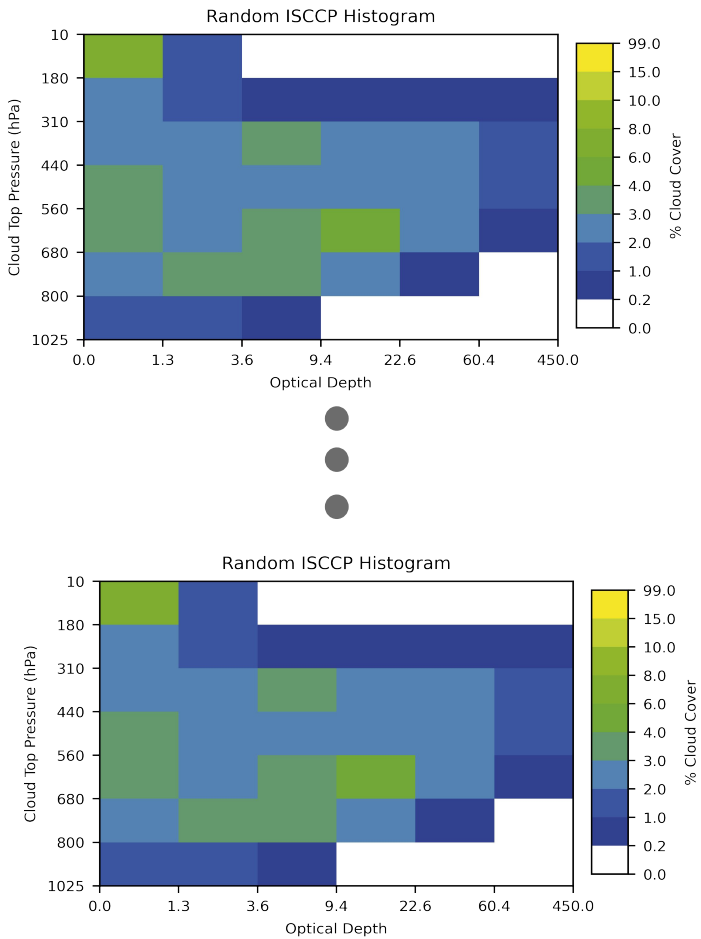
AMWG - February 1, 2023

This material is based upon work supported by the National Center for Atmospheric Research, which is a major facility sponsored by the National Science Foundation under Cooperative Agreement No. 1852977.

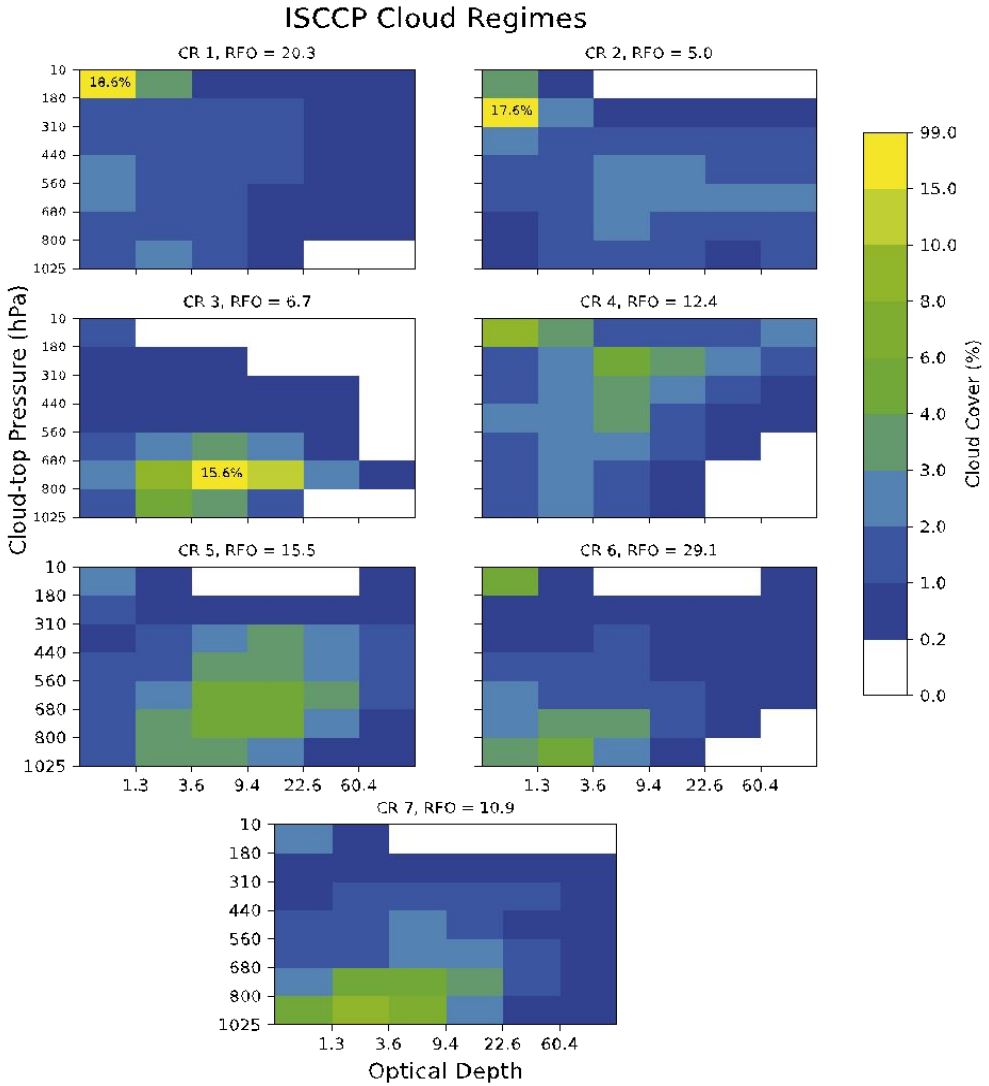
What a CTP-Tau Histogram Looks like



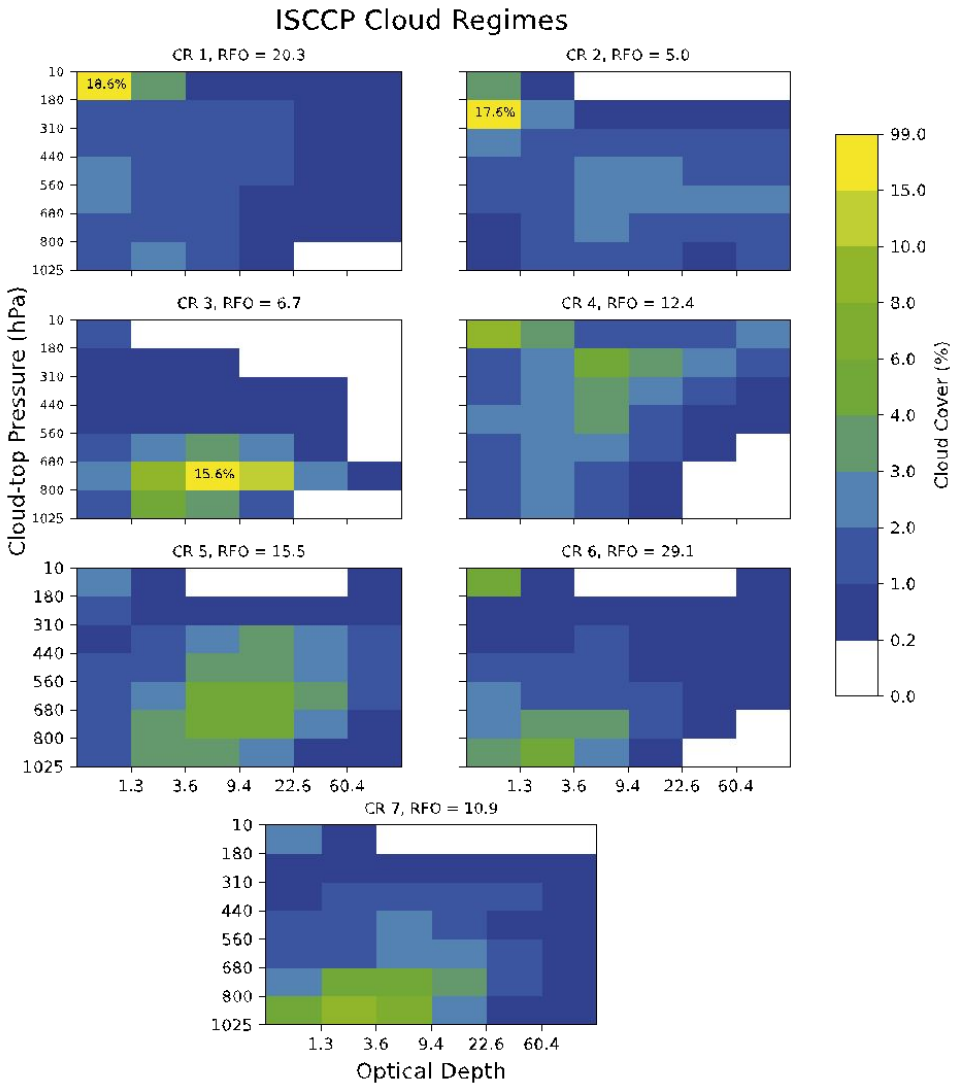
What is a Cloud Regime?

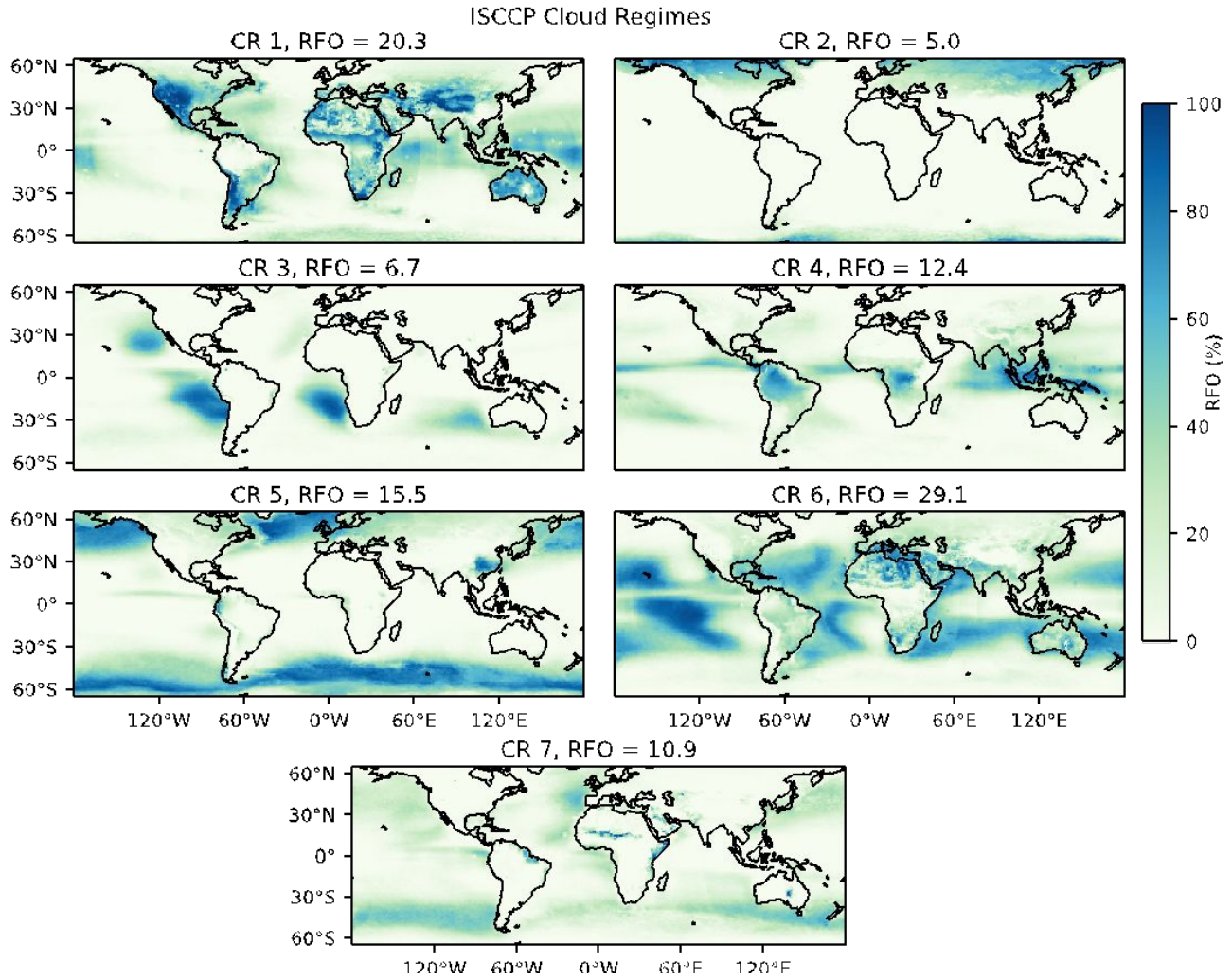


K-Means

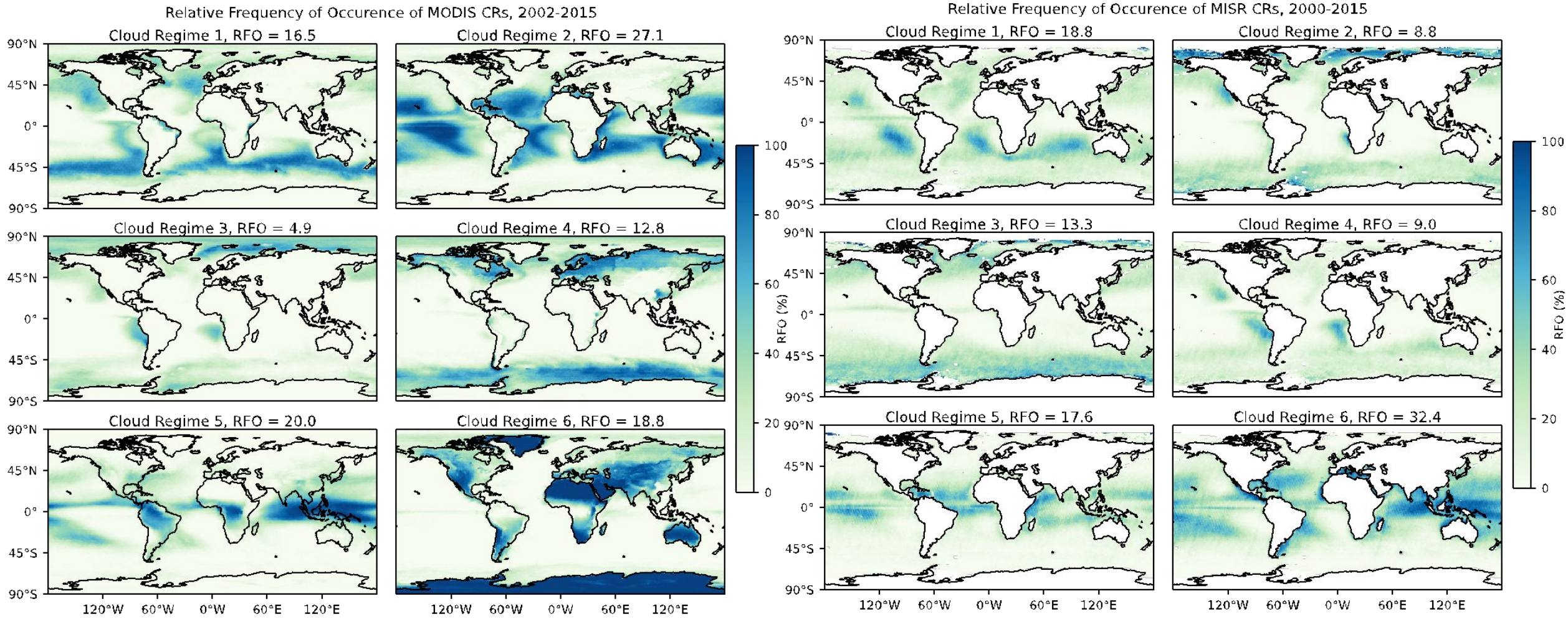


Monthly ISCCP CRs



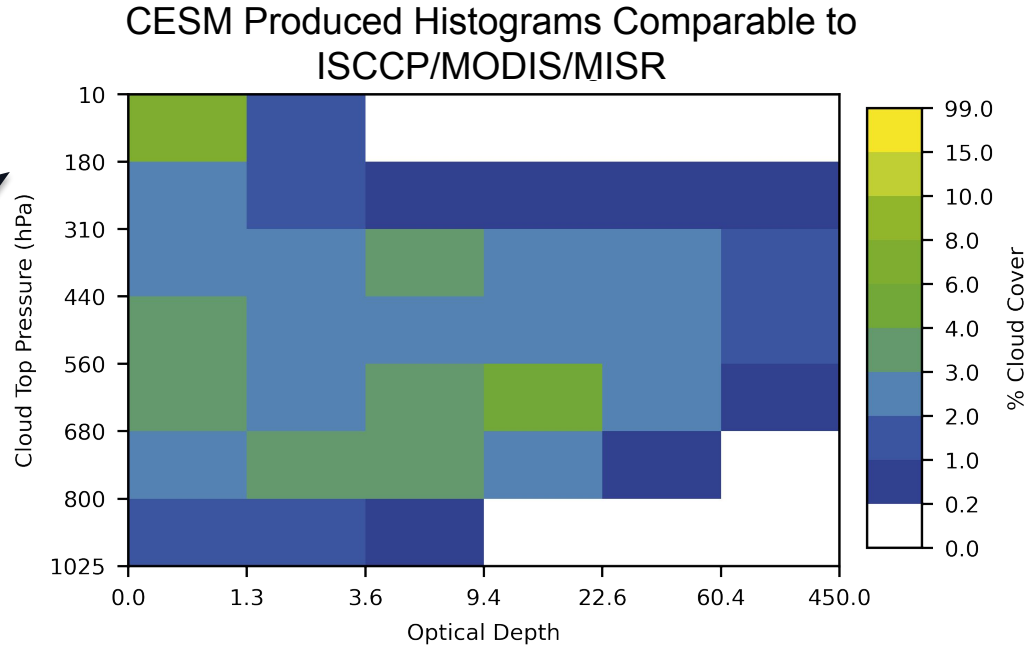


MODIS and MISR Clustering Results

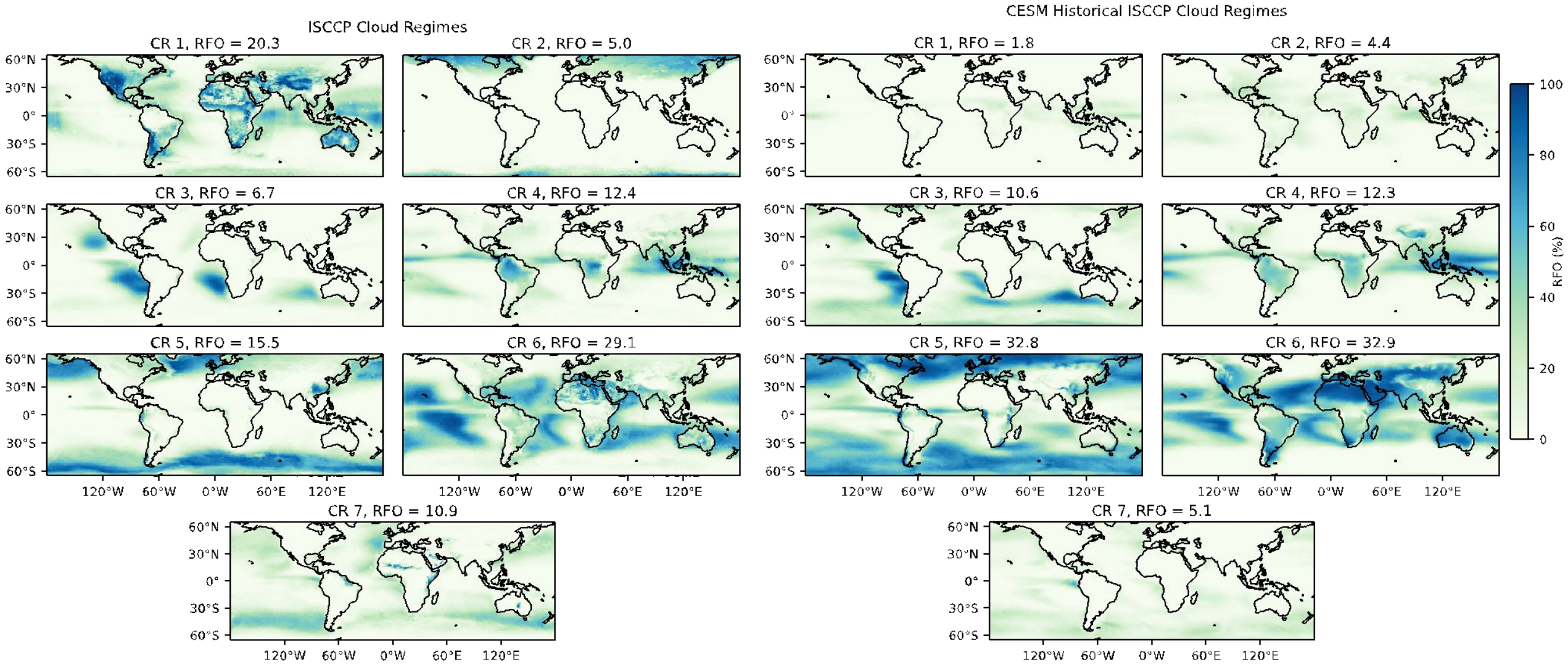


Apply CRs to CESM

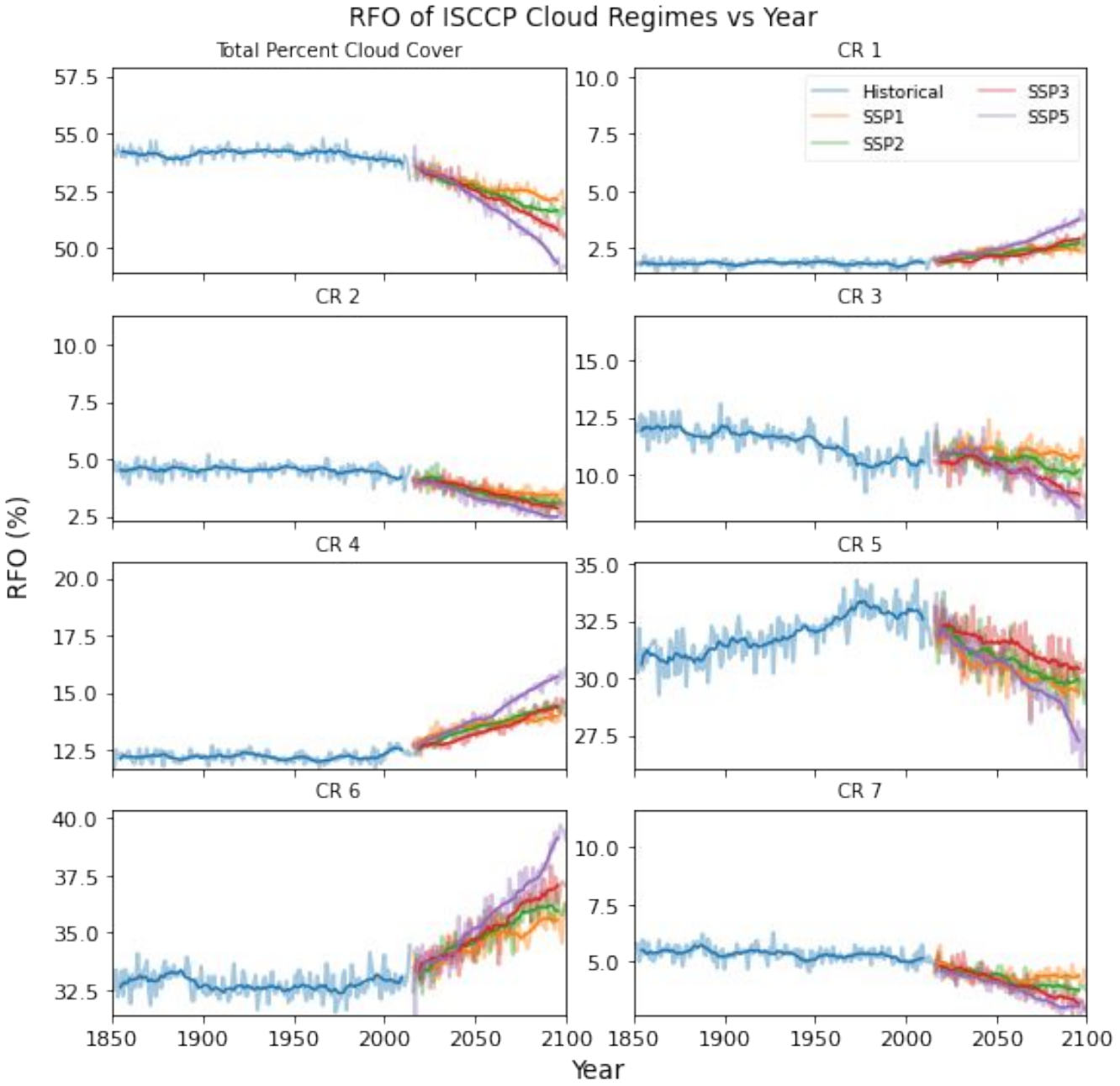
COSP



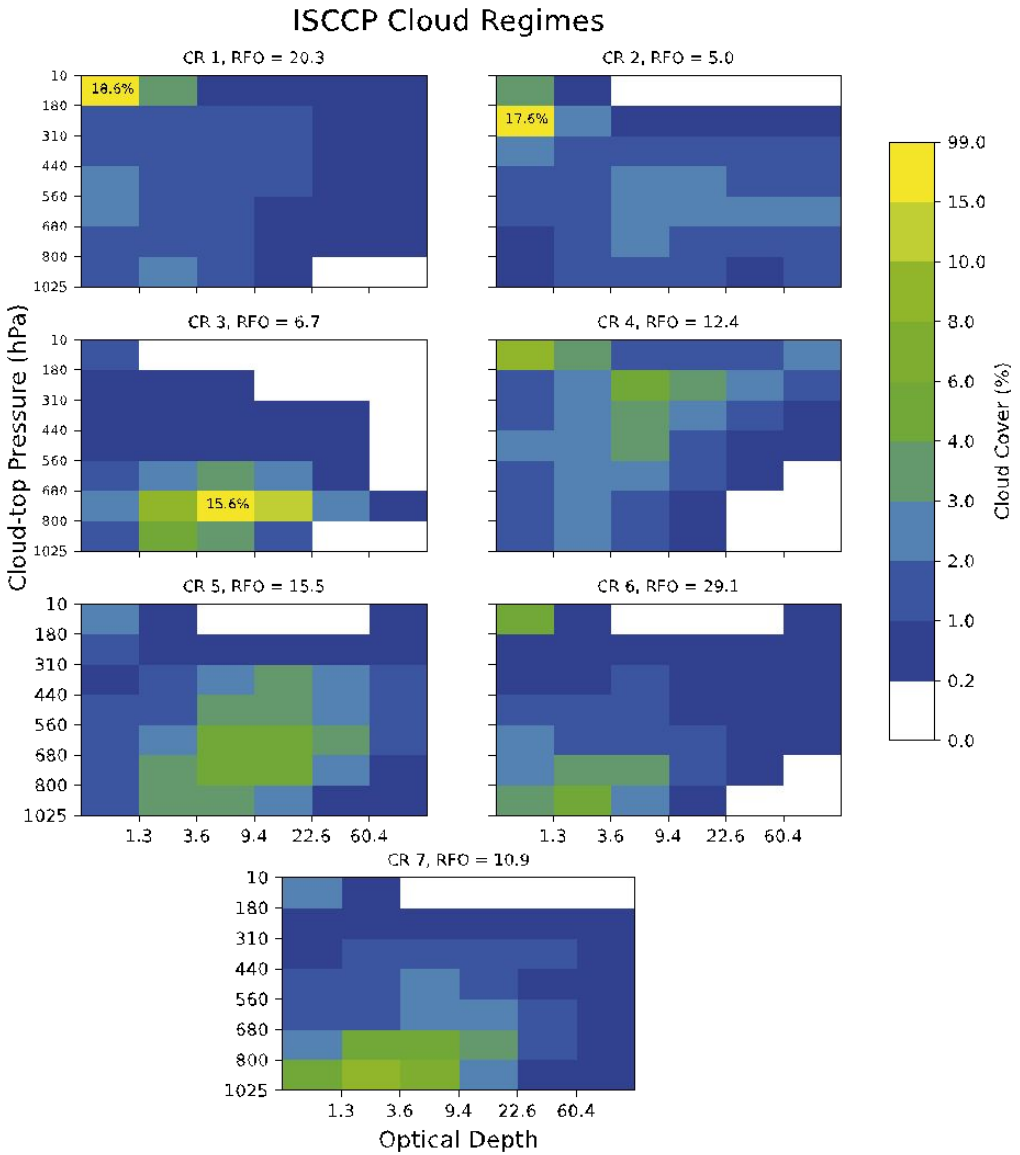
ISCCP Observation vs CESM Historical

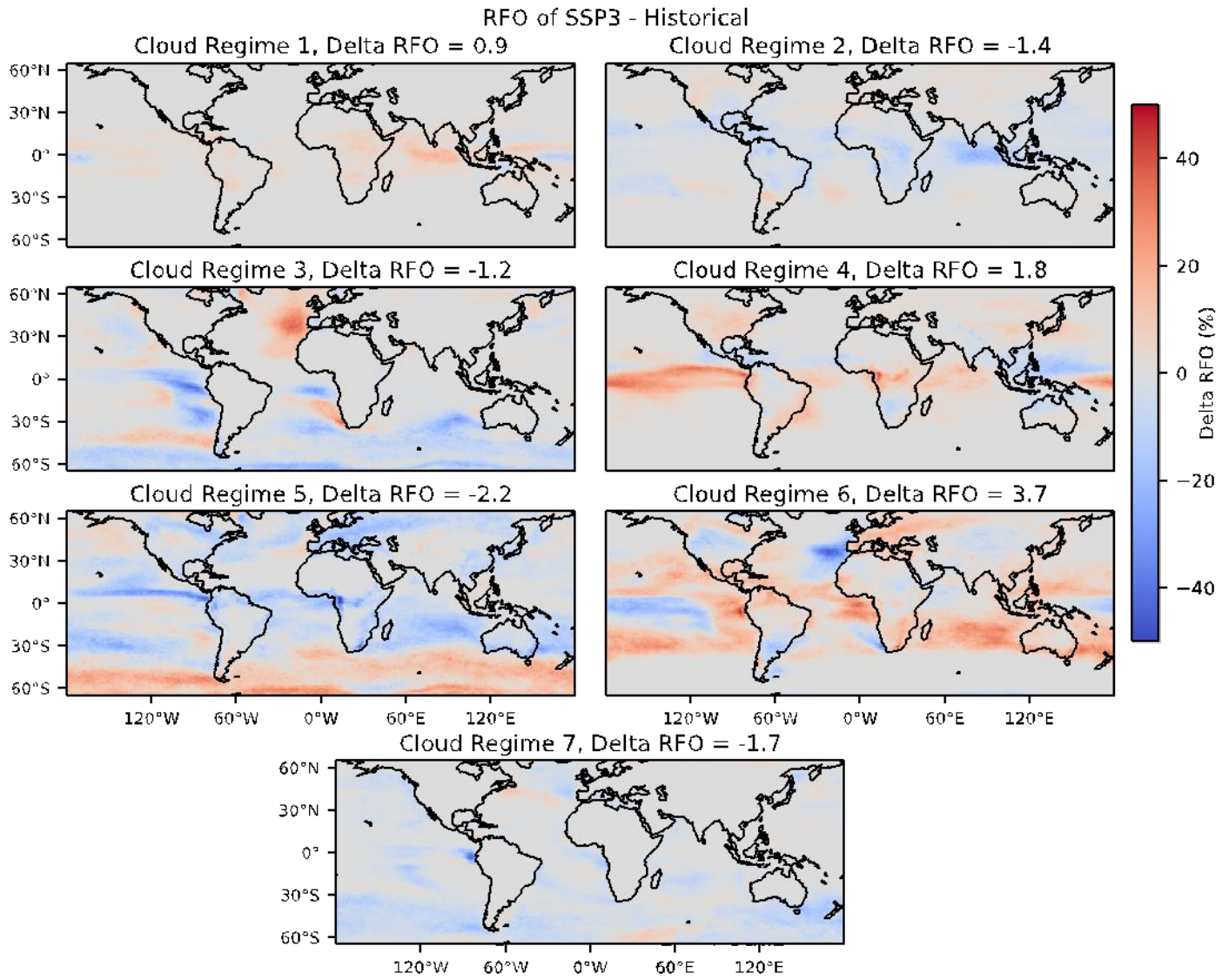


Relative Frequency of Occurrence of Each CR Through Time

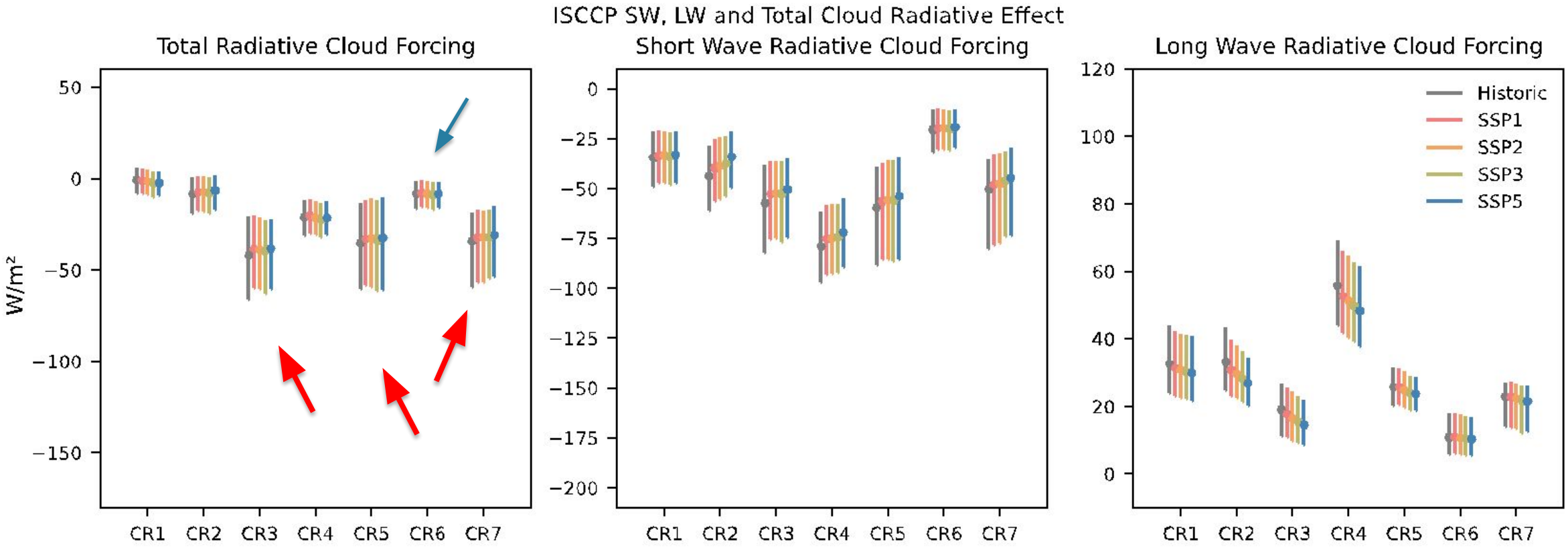


SSP3 vs CESM Historical

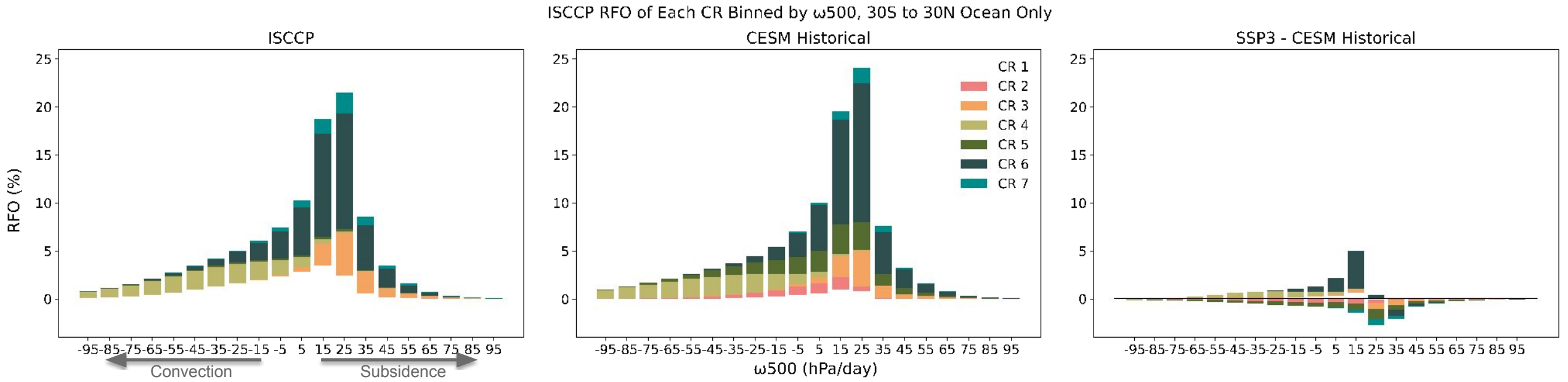




Cloud Radiative Effects



CRs Broken Down by Dynamical Regime



Conclusions

- We’ve applied the concept of CRs to three different cloud datasets
- Applied the CRs CESM output
- CESM does relatively well putting CRs in the right places, but with some biases
- We applied CRs to the SSPs to investigate how cloud structures may change in a warming environment
- Diagnostic approaches like the W500 breakdown let us understand the changes in terms of their driving physical factors