

## **An upper tropospheric cloud-convection (UTCC) process study**

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The WCRP clouds grand challenge (GC) calls out for a focus on the role of convection on cloud feedbacks (Bony et al., 2015). Some of the questions posed in this GC concern the role of convection on cloud feedback and thus climate sensitivity. In particular there is a focus on feedbacks involving convection and UT clouds. There is some evidence that UT clouds (and cirrus in particular) assert a control on convection itself and thus on precipitation, an influence perhaps more important than on climate sensitivity. Critical to these feedbacks is the radiative heating in the upper troposphere and it has been hypothesized that high clouds regulate convection. The initial goal of this UTCC PROES, is to: understand the relation between convection and the heating introduced by the UT clouds produced by convection and provide observational based metrics that can be used to evaluate this process in models. This heating will be affected by at least 3 main factors:

- 1) Areal coverage of high clouds
- 2) Cloud emissivity
- 3) Temperature difference between the UTC and clouds underneath

Data are being assembled to address the question and to examine the factors that influence this heating. The data collected and initial results obtained will be presented. The hypothesis that it is the lower emissivity parts of anvils that produce the greatest UT heating and not those parts of anvils adjacent to the convection is being tested. The study is to be extended to examine relative roles of convectively generated UT clouds versus synoptically forced UT clouds and work toward this goal will be described.