CONSEQUENCES OF SCALING IN RADIATIVELY ACTIVE SPECIES NEAR THE TROPICAL TROPOPAUSE

S. J. Hovde (1,2), A. F. Tuck (1)
(1) NOAA Aeronomy Laboratory, (2) CIRES, University of Colorado (tuck@al.noaa.gov)

The upper tropical troposphere is a central region for climate, because it is the altitude range where many water vapour infrared absorption bands change from being optically thin above to optically thick below. Despite this, in situ observations are scarce. Here, we show that total water and ozone observed in 4 ER-2 and 13 WB57F flight segments show generalized scale invariance in the potential temperature range from 350 to 420 K, on scales from 200 m to 2800 km. The radiative energy budget is therefore determined by input and output on all scales. This result appears to exclude a conservative energy cascade with fluid mechanics driven by solar input on the largest scales and molecular diffusivedissipation on the smallest scales. The results also imply that all scales are involved in the dehydration of air entering the stratosphere. It is clear that more data are required in this observation-poor region.