
# *Influences of Remote Deep Convection on Aviation Turbulence*

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Prediction of aviation turbulence outside of deep convection presents an ongoing challenge due to its difficult detection using standard weather hazard identification technologies (e.g., onboard and ground-based radars, satellite, and lightning networks), and the difficulty operational numerical weather prediction (NWP) models have in simulating mechanisms directly responsible for it. Many studies have attributed clear-air turbulence (CAT) at commercial aviation cruising altitudes (z = 9-12 km MSL) away from significant terrain to shearing instabilities such as Kelvin-Helmholtz instability (KHI). However, recent research simulations of observed turbulence cases with high-resolution NWP models suggest that aviation turbulence may often be influenced by remotely occurring deep convection. In this way, physical processes producing CAT in many cases may differ from those thought to produce more classically defined clear-air turbulence.

In these cases of convectively-induced turbulence (CIT), gravity waves can play a crucial role in connecting the mesoscale forcing from distant organized convection to the smaller-scale turbulence that aircraft experience. These gravity waves may impact aviation turbulence both directly through wave breaking or, indirectly, by perturbing environments where the Richardson Number is initially small, and thereby allowing KHI or shallow convective instabilities to occur. When moisture is sufficient such instabilities sometimes manifest as banded cirrus clouds, which can mark locations of observed turbulence. In this talk we diagnose different mechanisms for CIT using high-resolution simulations of observed turbulence cases over a broad range of meteorological settings.

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**Thursday, 7 April 2016, 3:30 PM**
Refreshments 3:15 PM
NCAR-Foothills Laboratory
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