Geophysical Research Abstracts
Vol. 20, EGU2018-16582, 2018
EGU General Assembly 2018

Strong turbulence encountered by the research aircraft HALO: Large Eddy Simulations to assess the cause

Henrike Wilms, Martina Bramberger, and Andreas Dörnbrack
Institut für Physik der Atmosphäre, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Oberpfaffenhofen, Germany

During the North Atlantic Waveguide and Downstream Impact EXperiment (NAWDEX), the High Altitude and LOng Range research aircraft HALO encountered strong turbulence over Iceland at 13.85 km altitude on the 13 October 2016. For this flight the Graphical Turbulence Guidance tool (GTG) predicted moderate or greater (MOG) turbulence, in particular mountain wave turbulence. Indeed, prevailing southerly surface winds with wind speeds exceeding 15 m/s likely excited mountain waves. In this study we assess whether the strong turbulence encountered by HALO was caused by breaking mountain waves.
We perform high resolution Large Eddy simulations (LES) of this event using the multiscale geophysical flow solver EULAG. The numerical domain of 600km x 500km covers Iceland with a horizontal resolution of 1km and vertical resolution of 250m. The initialization conditions are based on the ECMWF operational analysis of the 13 October 2016 at 12 UTC. The simulation reveals that the wave field extends up to the flight altitude of HALO. After evaluating this simulation by characterizing the wave field along the flight track and comparing the results to the HALO high resolution in-situ measurements, the simulation results are used to analyze whether the mountain waves could have caused the turbulence encountered by HALO.