



## **Turbulence encounter by the research aircraft HALO above Iceland during NAWDEX - A case study to analyze the generation mechanism**

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In September/October 2016, the North Atlantic Waveguide and Downstream Impact EXperiment (NAWDEX) campaign took place in Keflavik, Iceland. During this campaign, on 13 October 2016, the synoptic background conditions in and around Iceland favored the excitation of mountain waves and their vertical propagation through the troposphere. The research flight (RF) RF10 lead the High Altitude and Long Range Research Aircraft HALO through this mountain wave field at lower stratospheric flight levels when it encountered strong localized turbulence. We hypothesize that mountain wave breaking is the dominant mechanism leading to the observed turbulence. To test this hypothesis, we present a comprehensive case study in which turbulence-resolving in-situ aircraft measurements with 100 Hz resolution are employed to analyze and quantify turbulence in the described region with parameters such as e.g. turbulent kinetic energy and the eddy dissipation rate. Furthermore, the in-situ measurements are compared to turbulence forecasts of the graphical turbulence guidance system (GTG). This analysis is supported by idealized 3D EULAG simulations to determine the involved processes for the generation of turbulence. Complementing, forecasts and operational analyses of the integrated forecast system (IFS) of the European Centre for Medium-Range Weather Forecasts (ECMWF) are used to thoroughly analyze the meteorological situation.