EMS Annual Meeting Abstracts
Vol. 10, EMS2013-615, 2013
13th EMS / 11th ECAM


# Forecasting of Clear-Air Turbulence Induced by Low Convective Clouds

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Clear air turbulence (CAT) is a well known phenomenon creating considerable problems for air traffic, but rather difficult to forecast or even detect unless the aircraft runs into it. The main difficulty follows from the fact that CAT may be generated by various mechanisms like wind shear instability or breaking gravity (buoyancy) waves, which in turn may be of different nature and origin (mountain, Kelvin-Helmholtz, deep convective clouds, etc.). In each case a specific forecasting procedure is required, unfortunately most of them suffer from various deficiencies. In 1962 K. E. Haman noticed that CAT may also be induced by gravity waves generated by low level convection and showed that in some vertical profiles of wind and temperature amplitude of such waves may grow with altitude, so that at a certain level the waves break. Vertical dependence of the amplitude can be found by solving a second order ordinary linear differential equation (a variant of the Scorer equation). In the present paper a forecasting procedure for such type of CAT is proposed and tested on a set of AMDAR reports. It is based on automatic analysis of a bundle of solutions of the Haman's equation for the specific choice of wave vectors, frequencies and initial conditions. We look for and select such which suggest a possibility of wave breaking at the level of interest. If found, the forecaster may look at the mesoscale model or satellite picture to see whether low convective cloud fields able to generate waves with wave vectors and frequencies corresponding to the selected solutions are present, or can be predicted, in the area of interest. This procedure, presently the only one dealing explicitly with such CAT generation mechanism, may be also considered as an element of complex forecasting algorithms, like e.g., NOAA GTG.