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Characterizing the severe turbulence environments associated with commercial aviation accidents. A real-time turbulence model (RTTM) designed for the operational prediction of hazardous aviation turbulence environments

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Meteorology and Atmospheric Physics, Volume 94, Issue 1-4, pp. 235-270

In this paper, we will focus on the real-time prediction of environments that are predisposed to producing moderate-severe (hazardous) aviation turbulence. We will describe the numerical model and its postprocessing system that is designed for said prediction of environments predisposed to severe aviation turbulence as well as presenting numerous examples of its utility. The purpose of this paper is to demonstrate that simple hydrostatic precursor circulations organize regions of preferred wave breaking and turbulence at the nonhydrostatic scales of motion. This will be demonstrated with a hydrostatic numerical modeling system, which can be run in real time on a very inexpensive university computer workstation employing simple forecast indices. The forecast system is designed to efficiently support forecasters who are directing research aircraft to measure the environment immediately surrounding turbulence. The numerical model is MASS version 5.13, which is integrated over three different grid matrices in real-time on a university workstation in support of NASA-Langley's B-757 turbulence research flight missions. The model horizontal resolutions are 60, 30, and 15 km and the grids are centered over the region of operational NASA-Langley B-757 turbulence flight missions. The postprocessing system includes several turbulence-related products including four turbulence forecasting indices, winds, streamlines, turbulence kinetic energy, and Richardson numbers. Additionally there are convective products including precipitation, cloud height, cloud mass fluxes, lifted index, and K-index. Furthermore, soundings, sounding parameters, and Froude number plots are also provided. The horizontal cross section plot products are

provided from 16,000 46,000 feet in 2,000 feet intervals. Products are available every three hours at the 60 and 30 km grid interval and every 1.5 hours at the 15 km grid interval. The model is initialized from the NWS ETA analyses and integrated two times a day.

DOI: 10.1007/s00703-005-0181-4