Use of satellite imagery severe convection products for aviation

Overview

This report summarises work done using the severe convection products developed from satellite imagery to look into several serious aviation incidents caused when aircraft experienced severe turbulence en route to their destination, causing injuries and even death to passengers, and damage to the aircraft.

The convection products show some cases where flights flew directly into intense thunderstorms that had been identified by the products for some considerable time prior to the aircraft encountering them, and others in which the aircraft is seen to have entered regions of developing thunderstorms.

Preliminary data from the new Lightning Imager (LI) on-board the Meteosat Third Generation (MTG) satellite has been used to demonstrate the capacity of MTG-LI to detect lightning and convective storms in regions beyond the range of the ground-based LEELA lightning detection system, including in southern Africa where lightning and thunderstorms dangerous to aviation occur extensively, and in northern latitudes not covered by the severe convection products. This illustrates the potential future use of MTG-LI in near real-time to aid identification of thunderstorm regions dangerous to fly through. A need to develop a parallax correction of MTG-LI data is confirmed in order to make best use of its detections, especially in higher latitudes away from sub-satellite locations.

A new algorithm to estimate the height of the tropopause has been developed and implemented, which has been shown to remove errors in the original version, and to improve several satellite imagery products, including the severe convection and aircraft icing products used for identifying aviation hazards.