

The impact of future thunderstorm activity on the air traffic system

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I. INTRODUCTION

Convective events (thunderstorms) affect transport system in various ways causing sudden disruptions in traffic. By exploring the uncertainties in the future changes in local severe thunderstorm activity, major options can be identified to reduce the vulnerability of aviation system and facilitate the development of methodologies of quick reaction in emergency situations. This study provides an estimate in the possible short and long-term changes in local severe thunderstorm activity in the vicinity of selected European hubs.

II. MOWE-IT PROJECT

This study is associated with the EU FP7 project MOWE-IT (Management of weather events in transport system, <http://www.mowe-it.eu/>). The major goal of the project is to identify existing best practices and to develop methodologies to assist transport operators, authorities and transport system users to mitigate the impact of natural disasters and extreme weather phenomena on transport system performance.

The European transport system has shown vulnerability to external shocks, which have partially or, in some cases, totally shut down part of the transport system. MOWE-IT will examine practical applications to manage transport networks more effectively.

Our work presented here is done in the work package Aviation. The aim of this work package is to analyze the vulnerability of the global aviation system to extreme weather phenomena concerning passenger and freighter services, to identify reaction patterns for air transport users in cases of massive regional disruptions or a system wide shutdown emphasizing the benefit of intermodal cooperation, and to identify informa-

tion availability and development needs for higher efficiency and increased resilience in the air transport system.

III. ANALYSIS OF CONVECTION INDEXES

Convection indexes are used as the proxy in estimating the possible short and long-term changes in local severe thunderstorm activity. The study concentrates on the selection of large airports in Europe.

The ERA-Interim reanalysis (Dee et al., 2011) dataset provided by ECMWF and Europe-wide surface data (originating from ECMWF and ESWD) are utilized for the present day study of severe thunderstorms. In order to assess the possible future changes in the convective events the high-resolution regional climate model (RCM) runs, available from the ENSEMBLES project (Hewitt and Griggs, 2004), will be used.

Variations in convective available potential energy (CAPE) as well as other robust indices are defined and ranking of convection intensity is provided. The defined indices are applied to the RCM data to define the changes in the probability of severe thunderstorms under the projected future climate conditions.

IV. REFERENCES

Dee D. P., Uppala S. M. et al. 2011, The ERA-Interim reanalysis: configuration and performance of the data assimilation system. *Quarterly Journal of the Royal Meteorological Society*, 137, 553-597

Hewitt C.D., Griggs D.J., 2004: Ensembles-based predictions of climate changes and their impacts. *Eos*, 85, 566.