EMS7/ECAM8 Abstracts,
Vol. 4, EMS2007-A-00150, 2007
7th EMS Annual Meeting / 8th ECAM

1 High impact weather program at KNMI - Extreme weather forecasts and knowledge linked to operations and warning systems

Albert J.M. Jacobs

Royal Netherlands Meteorological Institute (KNMI), PO Box 201, 3730 AE De Bilt, The Netherlands, Phone: +31 30 2206 687. Fax: +31 30 2210 407.

E-mail: Albert.Jacobs@knmi.nl

1.0.1 1. INTRODUCTION

In the last decennia we have observed that our society and economy has become more vulnerable for the effects of extreme weather events such as heavy winds, heavy rainfall, dense fog, lightning, droughts and heat waves. Moreover, as our climate changes, these extreme events are expected to increase in number and intensity as well. A major challenge in the next decennia is the reduction of the adverse effects of extreme weather on social issues such as human health, welfare, and financial losses. At KNMI we address this challenge by improving both the quality and the usefulness of our weather forecasts. The various aspects in our approach that need our attention, range from increasing the amount of spatial and temporal detail in our observations and forecasts, providing different weather scenarios and their probabilities, providing early warnings, integrating forecast information in decision support systems, towards an increase of public awareness of the impact of extreme weather on society.

2. TRENDS AND DEVELOPMENTS

New generation observing systems such as Meteosat Second Generation (MSG) satel-

lite, Doppler weather radar, and various other ground based remote sensing instruments (cloud radar, microwave radiometer, lidar), enable us to observe the state of the atmosphere with much higher spatial and temporal resolution. These observations have also been of great importance to increase our understanding of the fundamental physical processes that are associated with the formation of weather events such as fog and low clouds. In present day operational weather prediction models these processes, in particular boundary layer processes and cloud formation, are often poorly represented. A more detailed and consistent description is required to improve the model forecasts. Furthermore, in order to fully benefit from the high resolution observations, increasing the resolution of our weather prediction models to scales of 1 or 2 km is necessary as well. Fortunately, present day computer resources make that possible. But, increasing the model physics and resolution is not sufficient to achieve all our goals. As many extreme weather events are characterized by a low probability of occurrence but with high risk, decision making becomes more difficult, and at the same time more important as well. Probabilistic forecasts instead of deterministic information from numerical weather prediction models may offer a solution.

Next to improving the weather forecasts, authorities responsible for public safety, decision makers with economic interests and the general public, require adequate and timely information (early warnings) and should be made aware as well. As a result part of our focus has shifted towards: linking our forecasts and knowledge to warning systems, a growing attention for the development of user-specific products that can readily be used in decision making systems, and more attention for user awareness.

3. THE PROGRAM APPROACH

Besides the various operational aspects, fundamental research to understand the atmospheric processes still plays an important role, and is part of our ongoing research. Altogether, we have to cover a broad field with many players from the different disciplines of research, application development, operations, and user community. In order to keep our focus, and prevent waste of our scarce means, in 2005 we launched a ‘high impact weather program’ under which innovation on extreme weather research, products, warning systems and decision making is carried out in a controlled way.

KNMI’s high impact weather program initiates and leads innovation projects which contribute to the improvement of weather forecasts for high impact events, and the usefulness of the meteorological information that we provide to our users. For the research part, a collaboration on cross-cutting issues, in particular on boundary layer meteorology, has been established between the research sections of the climate and weather departments. Users are preferably involved in partnerships, where the focus is on the establishment of risk profiles, on decision making, and on awareness. In this

presentation a selection of the achievements that have been accomplished in recent years will be presented.