EMS Annual Meeting Abstracts
Vol. 12, EMS2015-501, 2015
15th EMS / 12th ECAM

Radar-derived precipitation products for forecasting of floods, landslides and avalanches

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A collaboration project has been established between the Norwegian Meteorological Institute (MET) and the Norwegian Water Resources and Energy Directorate (NVE) to promote the use of radar-derived precipitation estimates in the operational flood- and landslide forecasting at NVE. The aim is to extend the use of radar-derived precipitation products from tasks where a qualitative information is needed (such as the monitoring of an ongoing extreme precipitation event) to the use of quantitative information, i.e. hydrological modelling and now-casting of precipitation events.

This presentation will address two tasks within the project: (1) the improvement of radar-derived estimates for instantaneous precipitation fields and (2) the improvement of radar-derived estimates for accumulated precipitation field (accumulation time intervals: 1, 3 and 24 hours).

At present, NVE receives radar-derived best estimate of precipitation fields from MET both at the original time resolution of 7.5 minutes (15 minutes for past data) and as hourly accumulated precipitation. The first task aims to improve the quality of this fields by revising the correction for non-uniform Vertical Profiles of Reflectivity (VPR) and the reflectivity-rainfall rate (Z-R) relationship.

The background for the second task is a need for the hydrological modelling activities at NVE of reliable 3-hourly and daily accumulated precipitation fields. Currently, both estimates from a single weather radar and from the MET radar composite are considered for hydrological modelling. The accumulation of radar-derived precipitation fields could introduce significant errors or unwanted artefacts due to the nature of the radar measurements (i.e. temporal discontinuity, blocking effects). We will describe the techniques we are testing to mitigate these effects by making use of so-called advection-correction procedures. At the end of this chain of data processing, it is challenging to achieve a realistic description for the uncertainties of radar-derived precipitation fields. This error field will in the end be used for correction of systematic errors and the combination of radar-derived estimates with other sources of information.

The work presented here constitute the basis for the creation of a radar-based dataset of precipitation products to be evaluated as an input forcing for NVE hydrological models, which is a task planned for 2016.