Winter Weather - Probabilistic Nowcasting to increase airport safety and capacity

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Abstract

We describe the intermediate results of a SJU/EU -funded research activity, called Probabilistic Nowcasting of Winter Weather for Airports (PNOWWA), developing methods to support the Air Traffic Management (ATM) challenged by winter weather. Our methodology is based on probabilistic nowcasting of winter weather, which will enable the estimation of winter weather conditions affecting the ground part of air traffic 4D trajectories. This kind of ATM methods and tools are called for, because the uncertainties during flight, departure and arrival at airports create a need to effectively utilize probability forecasts, both in the local operational user environment and en-route.

PNOWWA research work

The PNOWWA project has following work package structure:
- Management
- Probabilistic winter weather prediction
- Winter weather forcing
- Assessment of the potential of the ATM tools and roadmap generation
- Tools enhancing meteorological support for ATM decision making process
- Demonstrators and data dissemination
- SESAR2020 interaction and outreach

PNOWWA will demonstrate very short-term (0-3h, "nowcast") probabilistic winter weather forecasts in 15min time resolution based on an extrapolation of movement of weather radar echoes and improve predictability of changes in snowfall intensity caused by underlying terrain (such as mountains and seas). Research demonstrations are conducted both offline and online at the Operative User Environment (OUE) site representing influence of the underlying terrain to forecast accuracy. An extensive user consultation will analyze needs to ensure products are suitable to be integrated in various applications on the ATM side. The adjustment to user needs will cover the most relevant parameters (visibility, intensity and snow depth) and operationally important thresholds of the selected parameters (e.g. heavy snowfall).

Links to other related activities

The PNOWWA project has linkages to completed work in ongoing EU SESAR1 program, where FMI developed Step 1 (Time Based Operations) winter weather solutions based on deterministic forecasts to local OUE. The initial concept of short-range snowfall forecasts improvement with usage of weather radar has been validated in that context, and the second phase solutions (Step 2: Trajectory-based Operations) will be developed in EU SESAR 2020 program. The PNOWWA project will develop the methods for deducing probability forecasts of winter weather required by SESAR 2020. PNOWWA project will also deliver a roadmap towards implementation with connection points in future SESAR projects.