



## Short term alarm system for road weather

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During winter, snow or ice presence on the road might have serious consequences on road traffic and security. So this is a major problem and consequently many efforts have been made at Météo-France to develop decision-making tools for road management in winter. The main specific decision-making tool dedicated to road weather forecast, OPTIMA, has been used for several years by road managers and it has been continually improved. Based on this system, a real-time alarm system (OPTIMAAlarm) was developed and tested during winter 2014/2015 with a road manager and is now operationnaly used.

OPTIMA is a high-frequency (5 min) nowcasting system, based on data fusion approach, providing 1 hour forecasting (which will be extended to 3 hours during following months) of parameters of interest as road surface temperature, snow, freezing rain... So it is dedicated to real time and short range anticipation of impacting phenomenon for the road network. The basis concept of OPTIMA is to use all the available data for the forecast process:

- Radar observation and nowcasting (with the same 5 min time step)
- Surface observations network and road weather stations observations from customers
- Best available weather forecast (i.e. expertized by human forecasters)
- Specific road models numerical forecast (road temperature, snow height, water and ice content on road surface).

OPTIMAAlarm is an alert system which uses outputs from the OPTIMA decision-making tool for sending alarm (by phone call or SMS) to road managers, on road sections they have previously defined, in aim to anticipate the arrival of an impacting phenomenon (snow or freezing rain for example) on these road sections. The current version of the OPTIMAAlarm system is only dedicated to precipitations, and it will be improved during next winter using new specific road weather numerical prediction system at 1km resolution for the forecast of road surface conditions, in aim to provide additional alarms for road slipperiness phenomenons. The future evolution of this alarm system will be its generalization for all road users, as embedded system in vehicles. A first version of this embedded alarm sytem will be soonly available and will be followed by a significant improvement thanks to the use in real time of data coming from the vehicle (air temperature, pressure and indirect parameters derived from wipers, braking systems. . .).