Winter Weather Tool in the Netherlands

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Introduction

Monitoring winter weather and their impacts on the road are one of the safety-related tasks at KNMI. To effectively monitor the road conditions over the Netherlands KNMI makes use of a network of 220+ stations across the highway network. These stations are maintained by the responsible ministry.

To determine impacts of the weather on potentially hazardous road conditions there are numerous significant factors involved. These include weather conditions but also road conditions, type of road (bridge vs 'normal' highway) or material used , soil conditions, previous and type of precipitation, salinity and conductance of the road, location of the road (city vs country), et cetera.

To assess the risks based on meteorologically predictable factors, insight is needed into road-, air-, dewpoint- and wet bulb temperatures. These variables in conjunction with radar and satellite data are needed to assess the actual or forecast risk of safety-related impact on roads.

Again an operational meteorologist needs to act quickly, so products need to be efficient and effective. As should be clear now, there are many variables and factors involved, nearly too many for the meteorologist to ingest in an efficient manner. The need for a tool that combines these factors and variables in an easy and quick way from a forecaster-point of view is clear. Therefore the Winter Weather Tool has been developed.

Operational use

The Winter Weather Tool is a web-based tool accessible through the intranet. The main screen of the Winter Weather tool is displayed in the image below. On the far left-hand side the user can navigate through time, and the imagery in the rest of the tool will react accordingly.

Map

In the middle of the tool the map of the Netherlands is displayed. On top of this map several layers are displayed. The user can select several layers to choose from:

• Different measurements from the 220+ stations (turning red on threshold)
• 1.5 m temperature/dewpoint and relative humidity/wet bulb
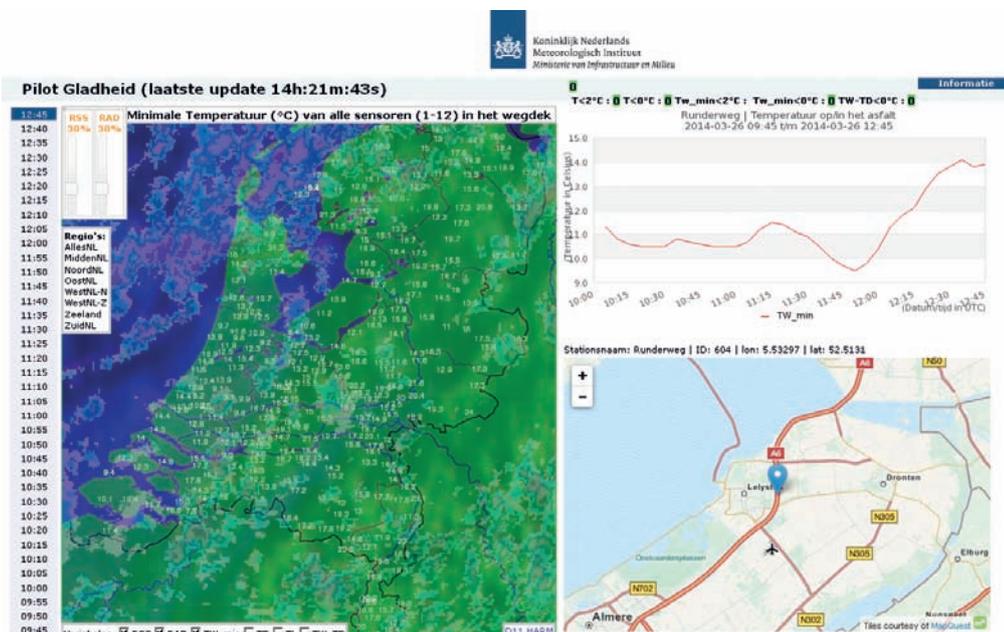
• Road temperatures
• Difference between road temperature and dewpoint to determine transport of moisture to the road surface, which in turn may lead to slippery roads.
- Radar imagery
• Radar imagery is being displayed and can be made transparent with the sliders on the left top in order to gain insight into the conjunction with clouds.
- Satellite imagery
• Satellite imagery is displayed and can be made as transparent as the user desires to gain insight into the conjunction of clouds with rainfall and to identify cloud clearance.
- Selectable regions
• Choose a region of interest and show all corresponding highways

Right-top
Triggers are displayed for certain thresholds within the 3 hour time window that is being monitored. When thresholds are reached the triggers turn red and show the number of stations reaching this threshold. In this way the user is alerted in a quickly, and can request an in-depth inspection of those thresholds and react accordingly.

Also an information button is present. On-click the user is presented with all different types of hazards and redirected to in-depth theoretical background information at the users request.

Right-graph
At the right top of the tool a graph of the past 3 hours is displayed for the selected variable. In correspondence with radar/satellite imagery, feed-back from precipitation or clouds/clearings can be easily deducted and m

Right-map
A map of a more specific location of the sensor in relation to its surroundings is displayed to give the user more awareness of the location of the measurement and its potential impact for the surroundings.

Hoverable/clickable- archive
All stations in the map can be hovered with the mouse and the graph and the map at the right-hand side of the tool will change accordingly.

When the user clicks a station a new window will be opened with in-depth information on that station, its location and a menu to access the archive to select every desired variable for the past two-weeks.

For archival, validation, training and research purposes this archive can be accessed to look back into historic events and create graphs on the fly.