

USE ERRORS IN OBSERVATION DATA TO DISCOVER VALUABLE INFORMATION FOR ROAD FORECASTING

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Nowadays road forecasting is mainly based on observations from traditional (road) weather stations. Although these stations provide high quality observations, the spatial resolution is often poor and local wintry conditions are not always detected. To fill these gaps, we developed a method to retrieve valuable information from consumer weather stations.

A lot of people have their own private weather station in the garden or on the balcony. Currently there are over 200.000 stations worldwide available online, providing very high information density compared to the approximately 10.000 official weather stations. Private weather stations are however often not properly installed, maintained or equipped compared to official professional weather stations, and therefore the data can be erroneous. Looking to individual stations it is hard judge the data quality, but by looking to a big number of these stations, we can even find valuable information within the errors!

We highlight two examples of valuable information which can be derived from these structural errors in consumer weather stations: night-time cloud cover and solid precipitation. Both are relevant information for road forecasting, so could be a helpful additional source of data.

Night-time cloud cover can be derived based on cooling behavior of the station. The principle is based on the fact that most consumer stations are not placed in ventilated Stevenson screens, and are therefore more sensitive to changes in long wave radiation, which indicate clear spells. We derive a machine learning model to nowcast effective cloud cover. Night-time cloud cover is crucial information for road weather forecasting, as a clear spell can bring the road surface temperature down in a very short time period and result in icy road conditions.

Solid precipitation can be derived based on the “problem” that the rain gauge of the consumer weather station stops working in case of solid precipitation, because there is ice formation or the cups are filled with snow. When this information is combined with radar or satellite images, the precipitation type can be derived. Looking to the big amount of consumer weather stations, this method can create very local precipitation type information, close to real-time.

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