

Mobile road weather observations: Benefits and Applications

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Topics for discussion

- What are mobile observations
- What is the value of mobile observation data
- Application areas:
 - Monitoring / Verification
 - Dynamic Spreading
- Case Studies

What are mobile observations?

- Vehicle-based sensor observations
 - Spreaders
 - Patrol Vehicles
 - Inspection Vehicles
- Observations can include:
 - Road surface temperature
 - Road surface state
 - Layer thickness of water, ice, snow
 - Grip
 - Air temperature
 - Dew point / RH
- Increase spatial awareness between fixed observation points (weather stations)

Increased spatial awareness



0.42 MM

1.32 MM

0.22 MM

1.13 MM

0.35 MM

What do mobile sensors look like?



Typical installation

Can be used with:

- Spreaders
- Patrol vehicles
- Inspection vehicles

Mobile Sensor



Mobile sensor use cases

Quality control

I want to make sure maintenance actions were effective

Road condition inspections

I want to inspect road conditions from selected routes to determine maintenance need and tactics

Enhancing forecasts

I want to get the best possible forecasts by enhancing them with mobile sensor data

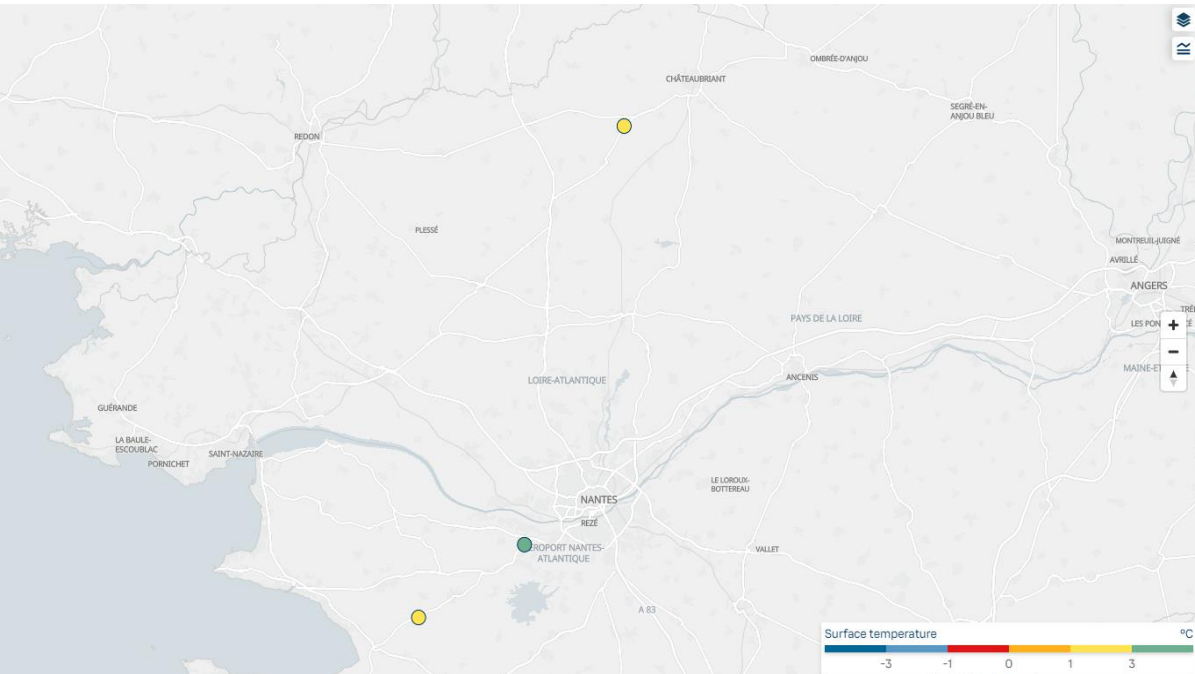


Dynamic spreading

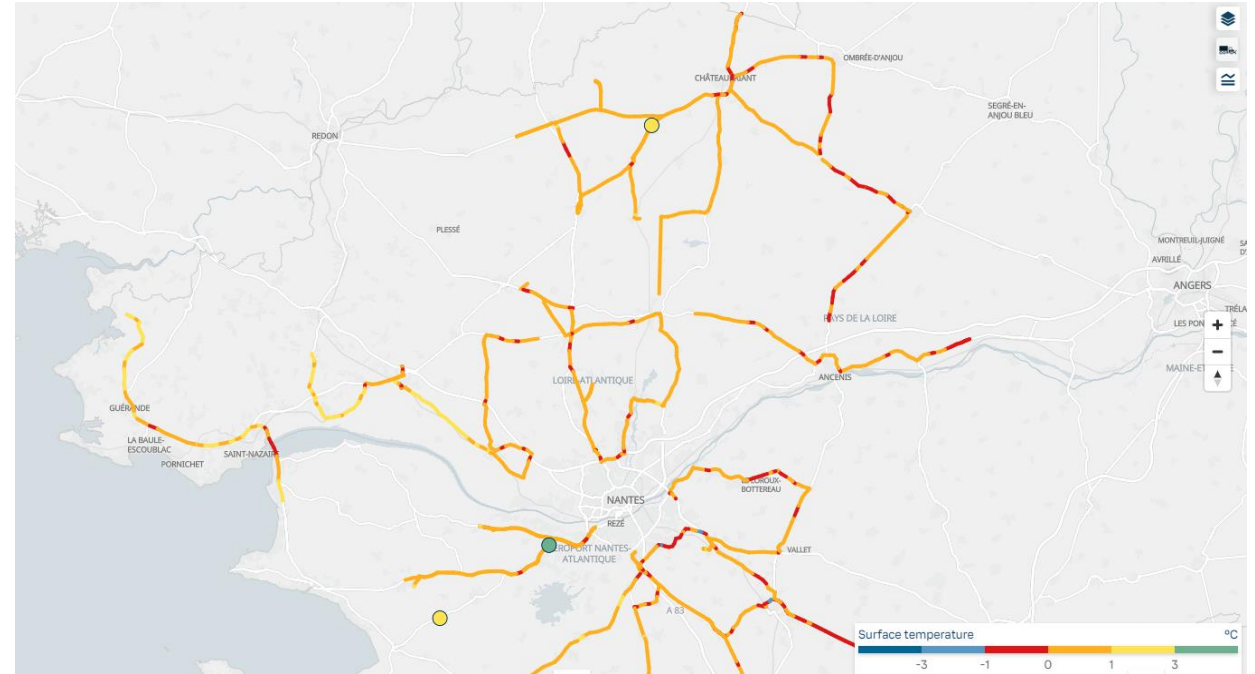
I want to adjust the salt spreading rate based on measured road conditions

Application: Monitoring / Verification

Point based data from road weather stations



Mobile sensor data

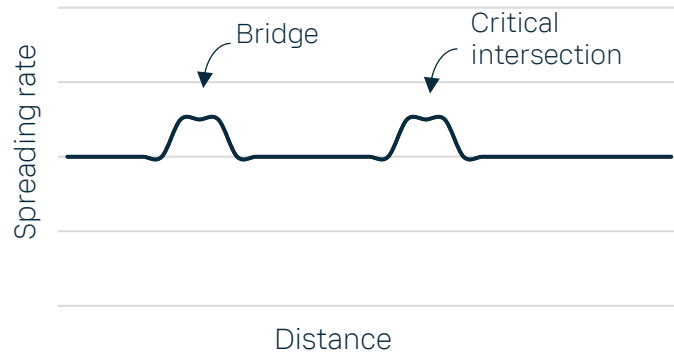


Application: Dynamic Spreading

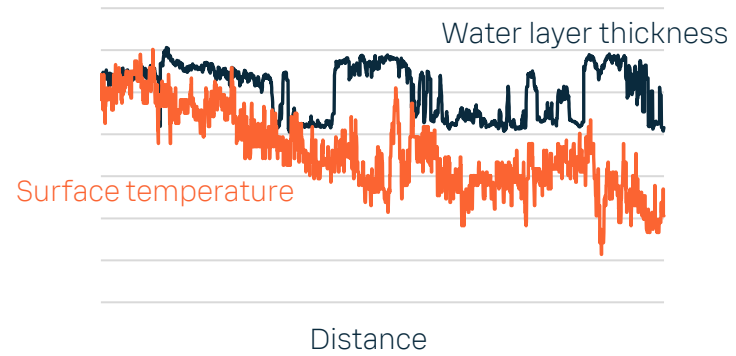
- When spreaders are deployed to treat roads, they typically adhere to predetermined spreading rates depending on the winter event
- Dynamic spreading uses vehicle-mounted sensors and computerized dispensing systems to automatically adjust the amount of treatment materials based on real-time road conditions.
- This targeted approach helps in maintaining optimal road conditions, reduces material waste and minimizes environmental impact
- Benefits include:
 - Enhanced road safety
 - Cost efficiency
 - Environmental sustainability

Manual vs dynamic spreading

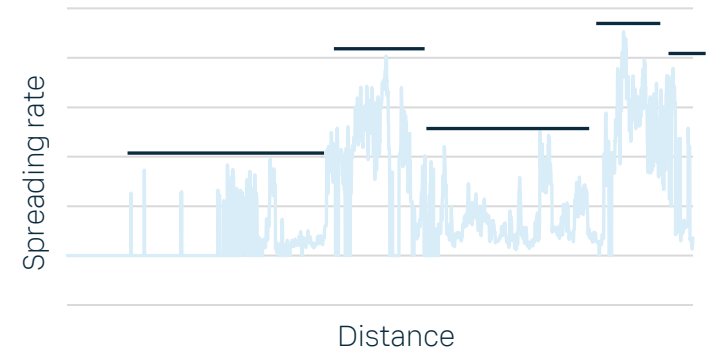
Manual spreading



Real road conditions



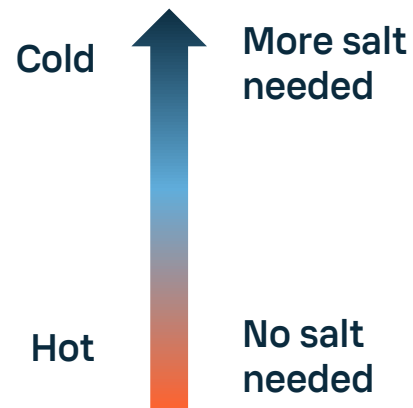
Dynamic spreading



Road conditions impact application rate

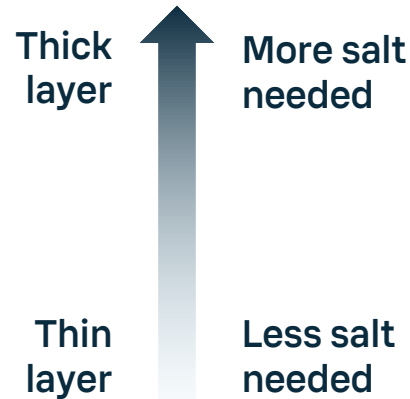
Surface temperature

The cooler the surface, the more treatment material is needed



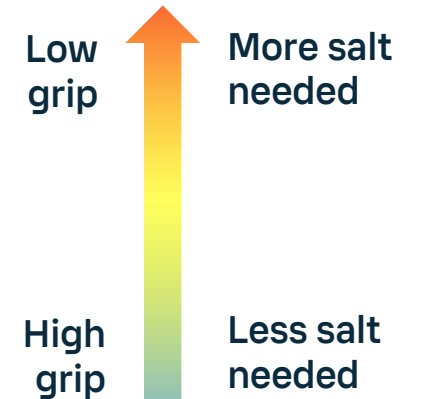
Layer thickness

Surface state and layer thicknesses impact treatment material needs



Grip

The lower the grip, the more treatment material is needed



Example spreading logic for pre-treatment

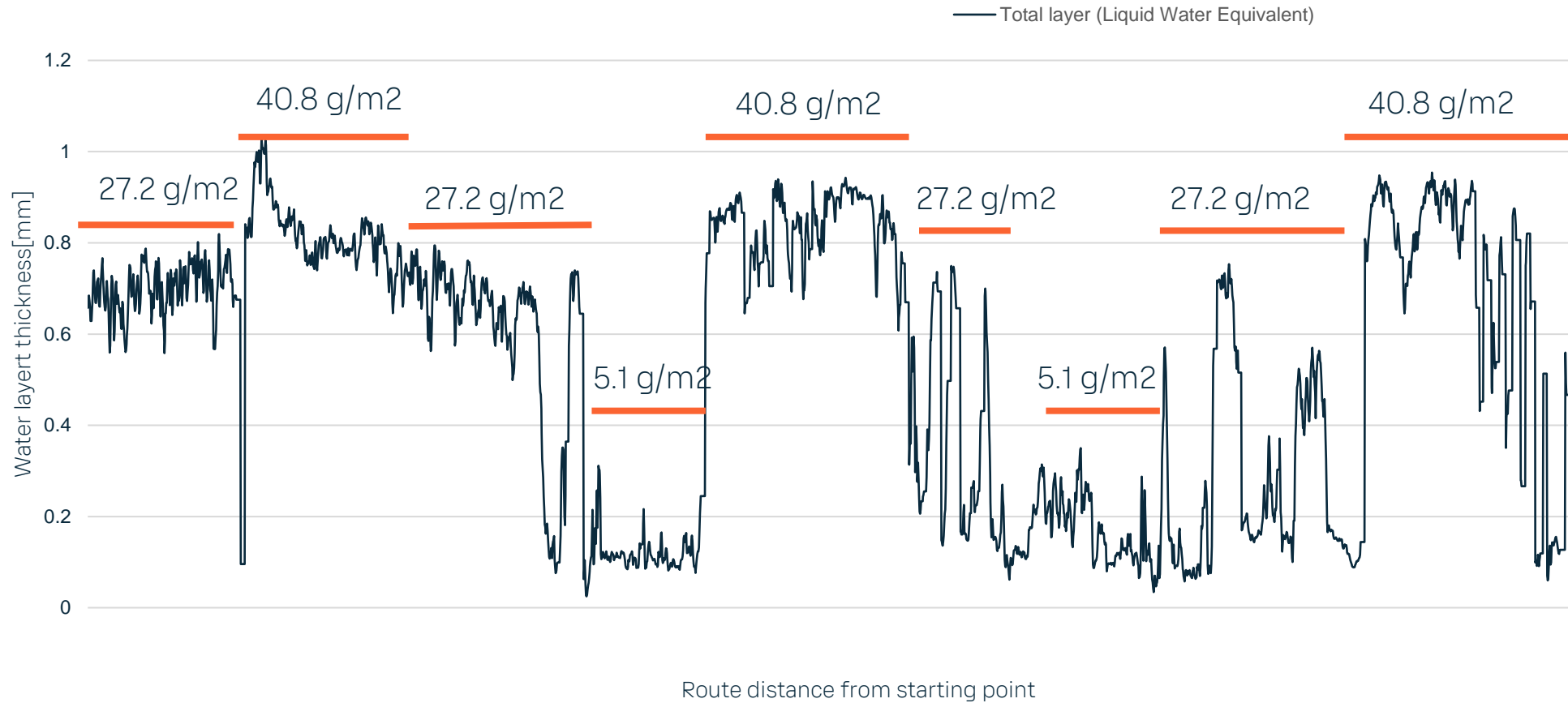
Measured by
mobile sensor

Automatic or
manual input

Calculated

Measured water layer thickness	Forecasted minimum RST for the night	Salt required	Forecasted minimum RST for the night	Salt required
<0.03 mm	-2 °C	1.02 g/m ²	-1 °C	0.51 g/m ²
<0.10 mm	-2 °C	3.4 g/m ²	-1 °C	1.7 g/m ²
<0.30 mm	-2 °C	10.2 g/m ²	-1 °C	5.1 g/m ²
<0.50 mm	-2 °C	17.0 g/m ²	-1 °C	8.5 g/m ²
<0.80 mm	-2 °C	27.2 g/m ²	-1 °C	13.6 g/m ²
<1.20 mm	-2 °C	40.8 g/m ²	-1 °C	20.4 g/m ²

Minimum RST forecast is -2°C



Results so far

Several winter maintenance teams have tested dynamic spreading in Europe, US and Asia

- Reported savings range from -30% to -50%
- Different teams used different spreading logics

Reduction in treatment material usage

-50% -30%



Dynamic spreading webinar

Experts from the City of Fort Collins and Vaisala talked about how they are driving advances in dynamic spreading in collaboration with spreader manufacturers.

What was covered:

- The journey towards dynamic spreading
- An inside look at dynamic spreading systems and the technology behind it
- Fort Collins pilot with dynamic spreading: Learnings and expectations going forward
- Cost savings -44% and 92.7 k€ over winter period was presented (dynamic vs traditional spreading)

Watch the webinar



[Fireside Chat: City of Fort Collins and dynamic spreading | Vaisala](#)

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Summary

- Mobile observations provide increased spatial awareness of conditions across a network
 - Quality control
 - Forecast enhancement
 - Inspections
- Recent developments by spreader manufacturers mean that dynamic spreading based upon road condition is now a possibility
 - Early adopters so far based in USA, mainland Europe & Asia
 - Discussions have started in UK, but still early days
 - Demand is driven by end users - ask your current suppliers if they are already working on development of dynamic spreading and if not, when are they planning to start?

An aerial photograph of a winding road and a river flowing through a dense forest. The road curves from the bottom left towards the top right, with a few vehicles visible. The river winds parallel to the road. The entire scene is overlaid with a semi-transparent dark blue filter.

Thank you