

The logo for Roadscanners, featuring a stylized white arrow pointing downwards with a curved top, set against a dark grey background.

ROADSCANNERS

Winter Maintenance and Frost Problems

Tomi Herronen, Roadscanners Oy

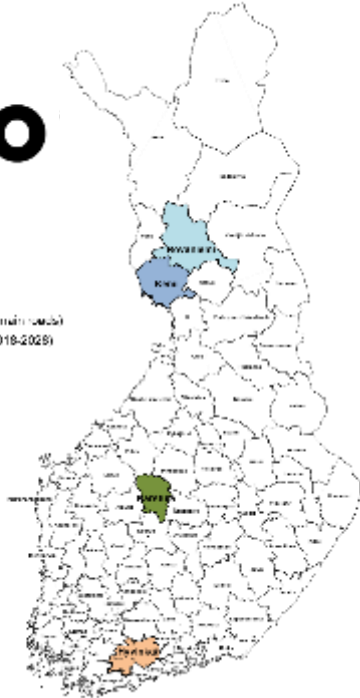
**BEYOND
THE
SURFACE**

Winter Maintenance and Frost Problems

- Observations based on experiences from



- Karsola
- Kemi-Tornio
- Rovaniemi (main area)
- Hyvinkää (2018-2028)

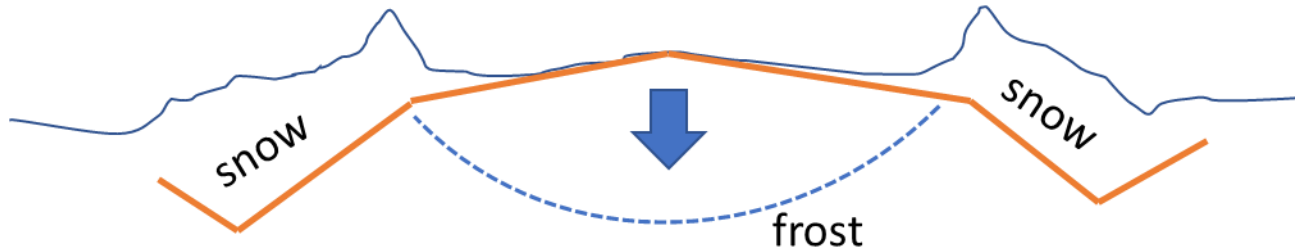


Main road in winter condition



Frost in late winter

- Road structure frozen down to 2,5 m depth
- Snowbanks contain a high amount of water late in the winter

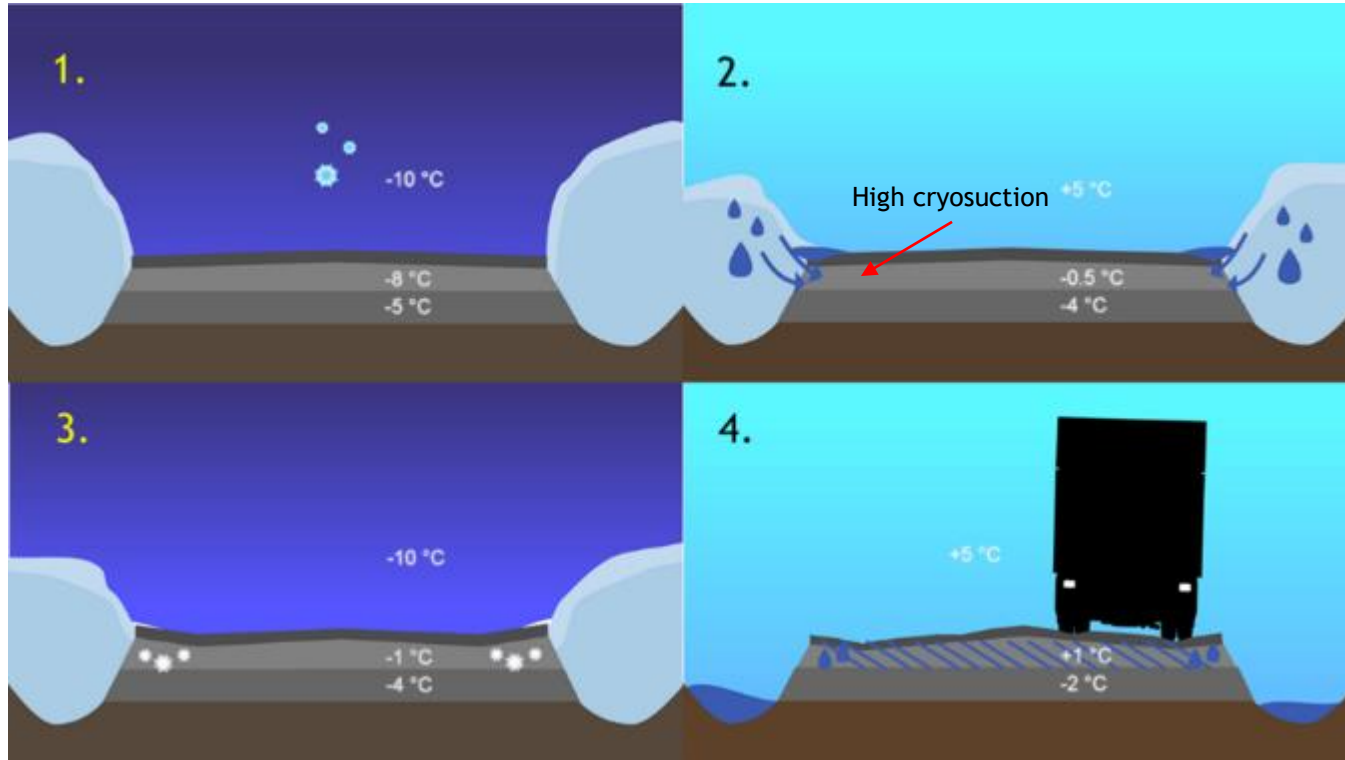


Spring and snow / melting

- Water/snow/ice on road (safety hazard)
- Due to cryosuction water flows into the road structure



Snowbanks and Pavement Deformation



The Process – Tertiary Ice Lenses

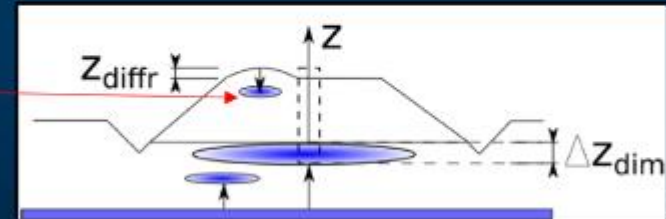


TOTAL HEAVE

- Primary (In-Situ, 9% expansion)
- Secondary (Segregational heave)
- Tertiary (Ice-lens growth in frozen zone)



DIFFERENTIAL HEAVE

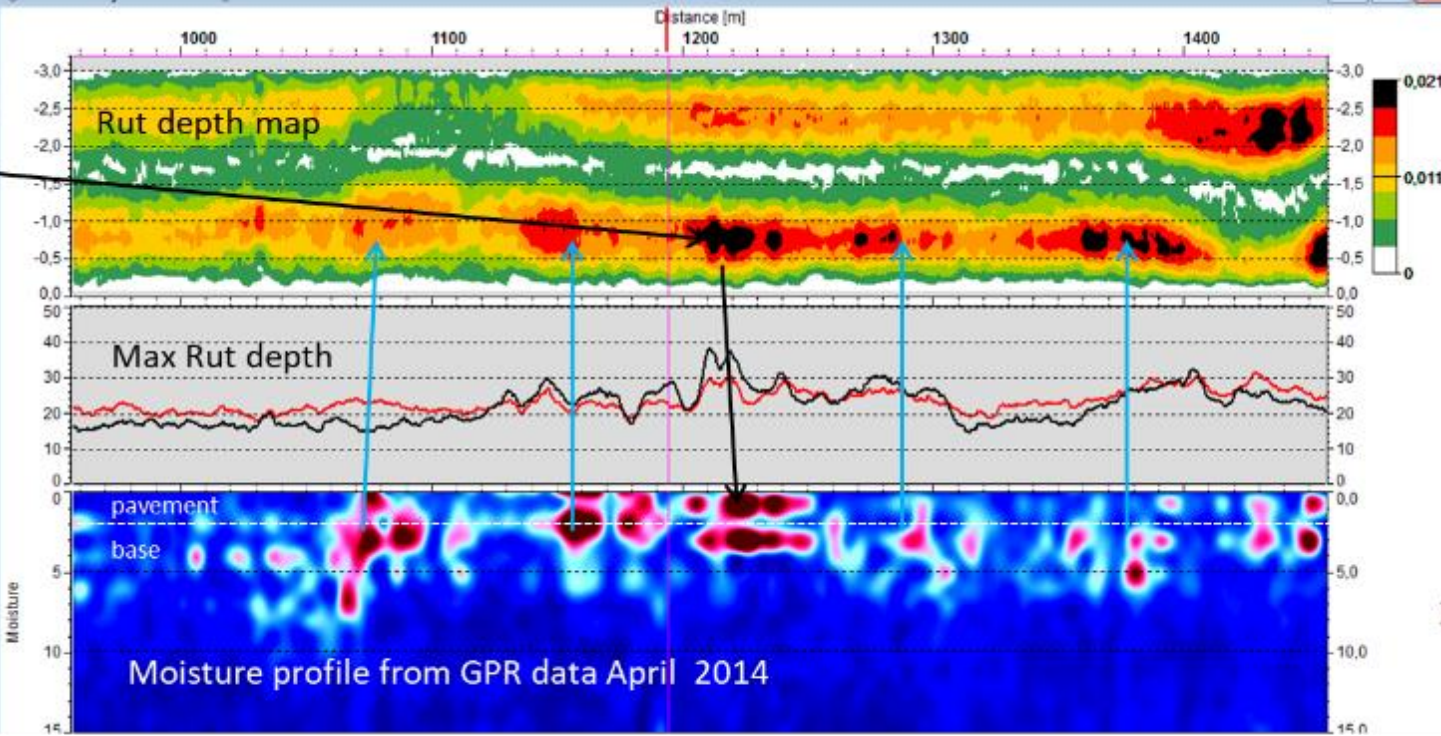
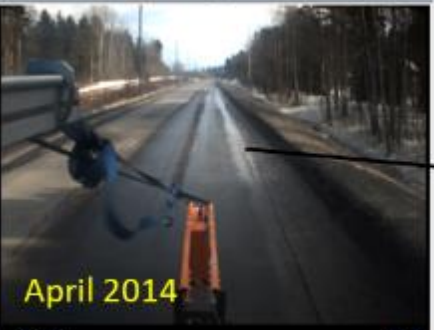


By Luleå University of Technology

Delayed Removal of Snowbanks



Water in Pavement and Base Course – Results from tests in Finland



Snowbank removal before melting



- Pushing the snow into ditches
- Reducing the amount of water accessible to road structure
- Improving road safety



Tie 4 Rovaniemi, Santa Claus

PEHKO Findings 2016

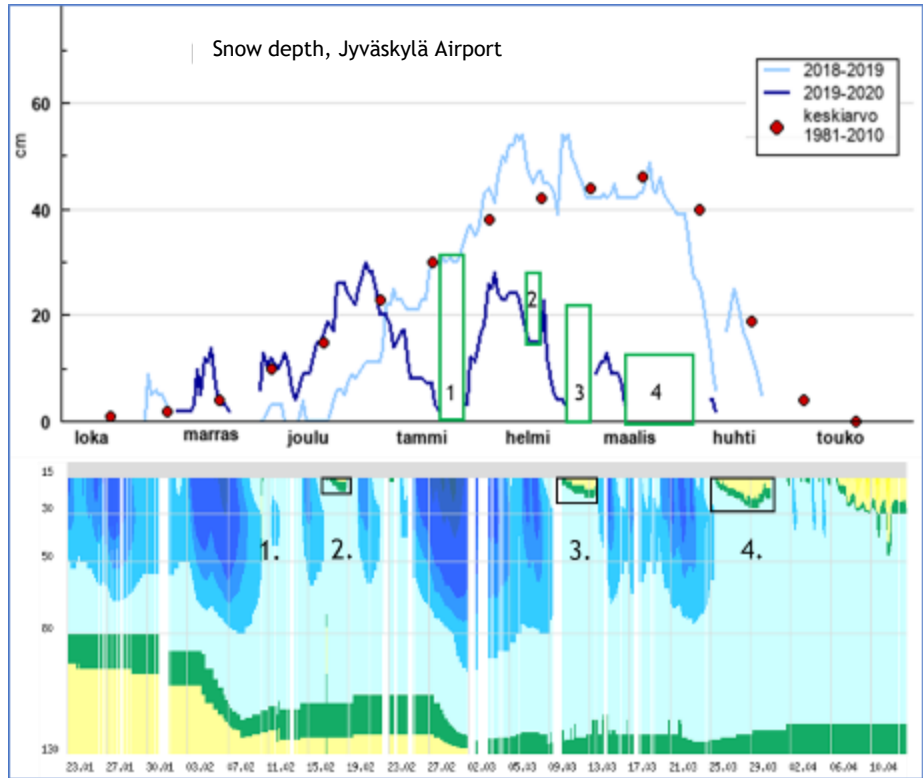


If snow removal from road shoulders is done early enough (in February) the road is safer and road shoulder damages do not appear

Repeated snow removal possibly required



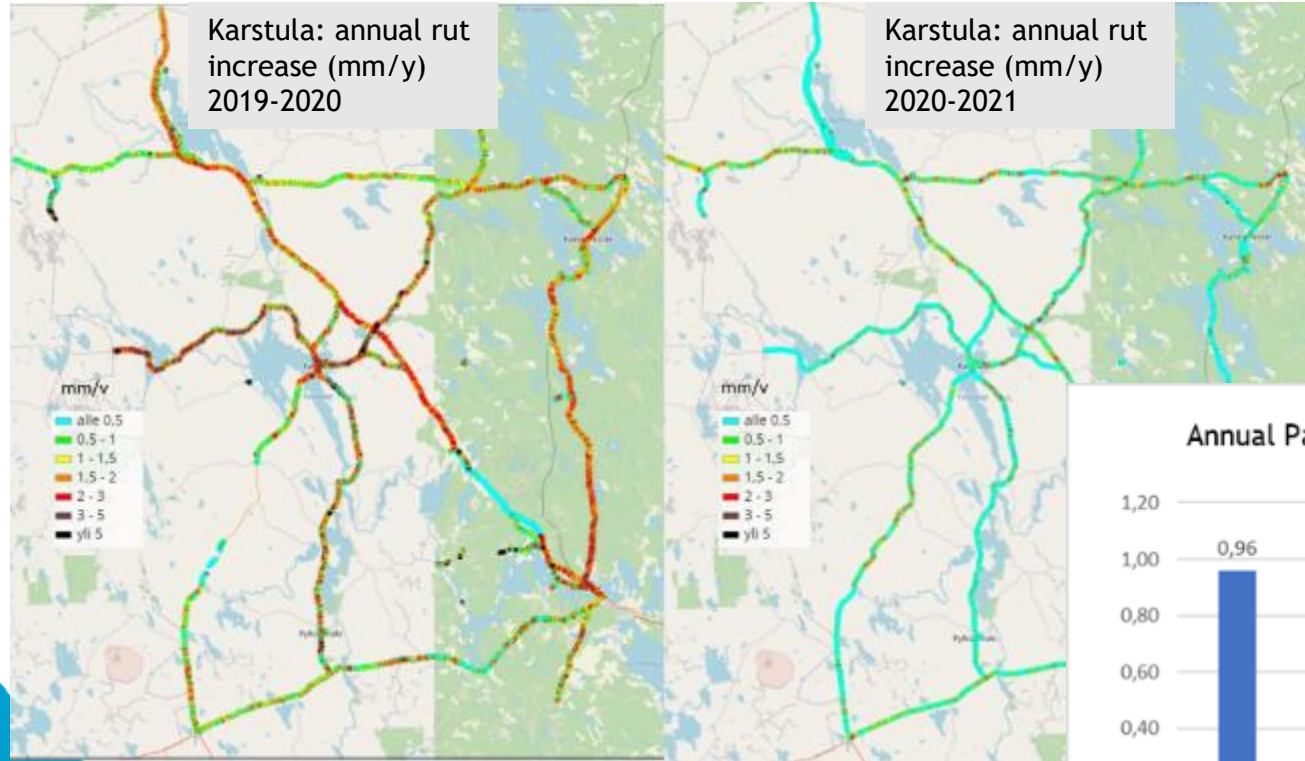
- Several snowing/melting periods
- Snow removal should have been done several times
- Road structures stayed wet



Impact on Annual rut Increase and LCC

Karstula: annual rut increase (mm/y) 2019-2020

Karstula: annual rut increase (mm/y) 2020-2021



- High increase in rutting was measured as a result
- High cost for road owner - snow removal is cheaper in long term

Annual Paving Costs PEHKO Central-Finland (M€)



Great Impact on Annual Paving Costs



Frozen or clogged private access road culverts leading to deformations.
Annual cost effect: ~10%



Delayed snow removal from road shoulders leading to water infiltration under the pavement and permanent deformations.
Annual cost effect: 13 - 17 %

With better winter maintenance it is possible to cut even 50% of the annual paving backlog in Finland (50-60 M€)

Comparison of maintenance for road user



March 31st, 2018. Road outside PEHKO areas



March 31st, 2018. PEHKO Road

Thank you!

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Photo: Veidekke

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