



A true performance evaluation of winter maintenance

Johan Petersson, NIRA Dynamics
2024-05-31

If you don't measure, you're a guesser

Why measure?

What was the result?

Was the decision correct?

Was the execution correct?

Could it have been done better?

Could less money have been spent?

How winter maintenance is measured today



Weather

Drivers stranded on French roads as snow and ice cause chaos

 The Local France - news@thelocal.fr
Published: 9 Jan, 2024 CET. Updated: Tue 9 Jan 2024 09:33 CET



LATEST

News > Scottish News

WINTER WHITEOUT Heavy snow flurries blanket Scotland's roads sparking travel chaos

Some areas have seen four inches of snow already with more expected to fall

Sarah Peddie

Published: 14:49, 16 Jan 2024 | Updated: 15:51, 16 Jan 2024



SEVERAL roads in Scotland have been blanketed following heavy snow flurries across the country.

Motorists have been warned of difficult driving conditions as the [wintry weather](#) causes travel chaos.

Swedish snow chaos leaves 1,000 vehicles trapped on main E22 road

4 January 2024
By Ido Vock, BBC News

Share



EDITORS' PICK

Winter Storms Cause Travel Chaos In Northern Norway

David Nikel Senior Contributor
Travel with a focus on Norway & Scandinavia, and the cruise industry.

Follow

Jan 22, 2020, 09:50am EST

This article is more than 4 years old.



The remote town of Hanningsvåg near the North Cape in northern Norway is one of many places cut off ... [-] RADIO NORDKAPPA/FP VIA GETTY IMAGES

Severe winter storms across northern Norway have left several communities cut off with many local roads closed and ferry departures canceled. Air traffic remains operational but is subject to delays, with just one canceled service between Tromsø, Bodo and Trondheim reported.



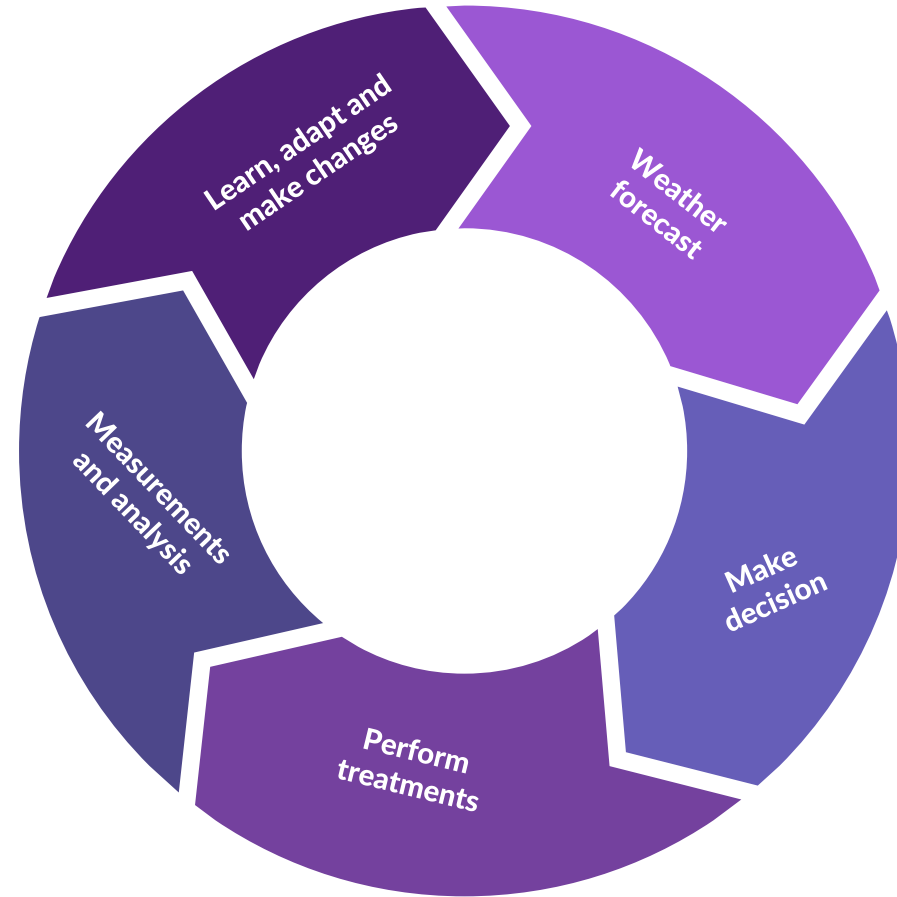
1 / 5 - The Metro Vancouver weather forecast includes a deep freeze, and TransLink and Drive BC warn of treacherous conditions on roads as of Jan. 11, 2024. | Photo via @JeremyHunka and @DriveBC/X

 Listen to this article
00:06:27

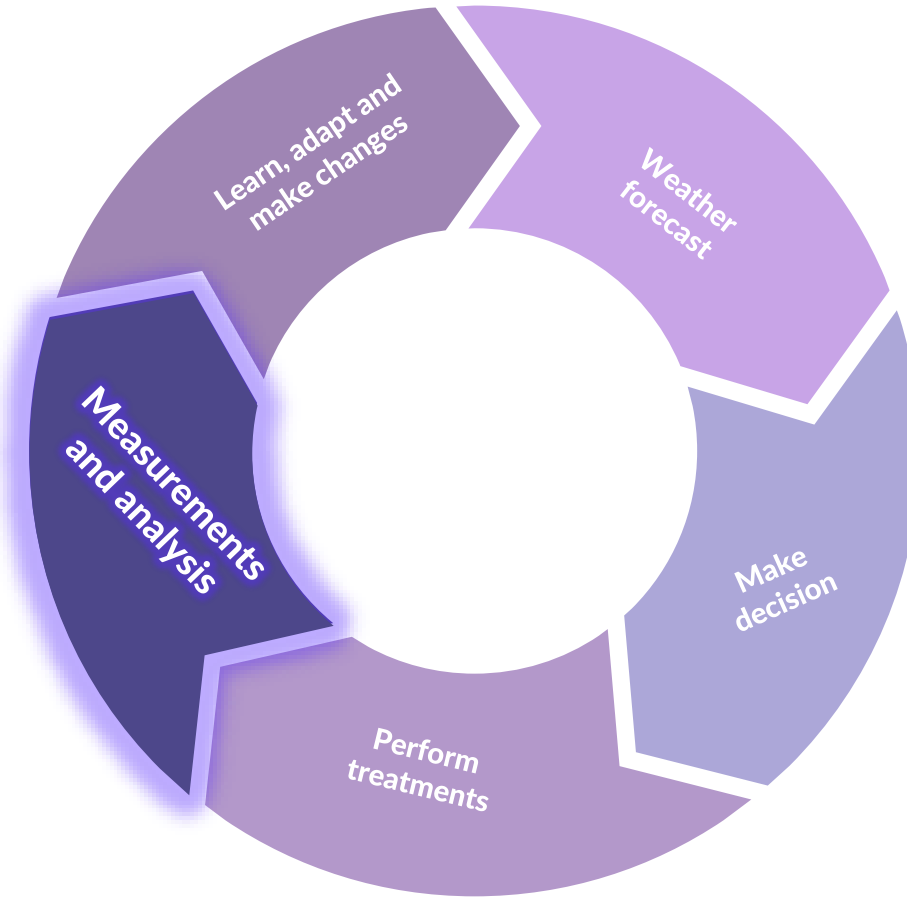
Metro Vancouverites have taken to social media to share scenes of commuter chaos caused by the winter's first significant snowfall.



Preferred way of working

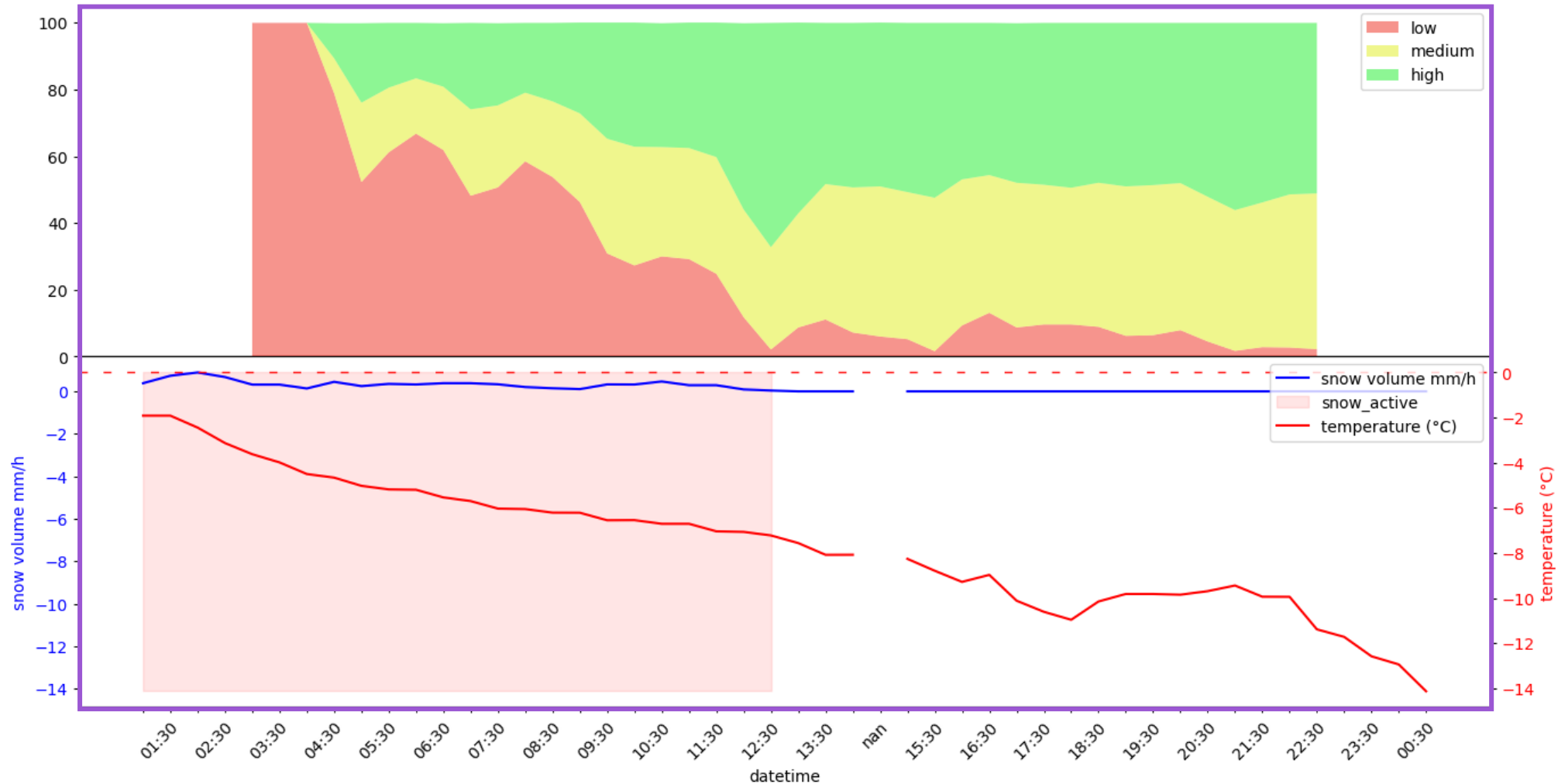


Preferred way of working



Result – Snowy day

January 15 – Östergötland, Sweden



A silver SUV is driving on a snowy road in a winter forest. The car is covered in snow and has its headlights on. The road is covered in snow and has tire tracks. The background shows snow-covered trees and a bright sky. The text "Why friction?" is overlaid on the image.

Why friction?

How do I measure it?

Friction trailers



source: <https://www.nordfou.org/sektion/road-state-monitoring-system#3>

Optical sensors



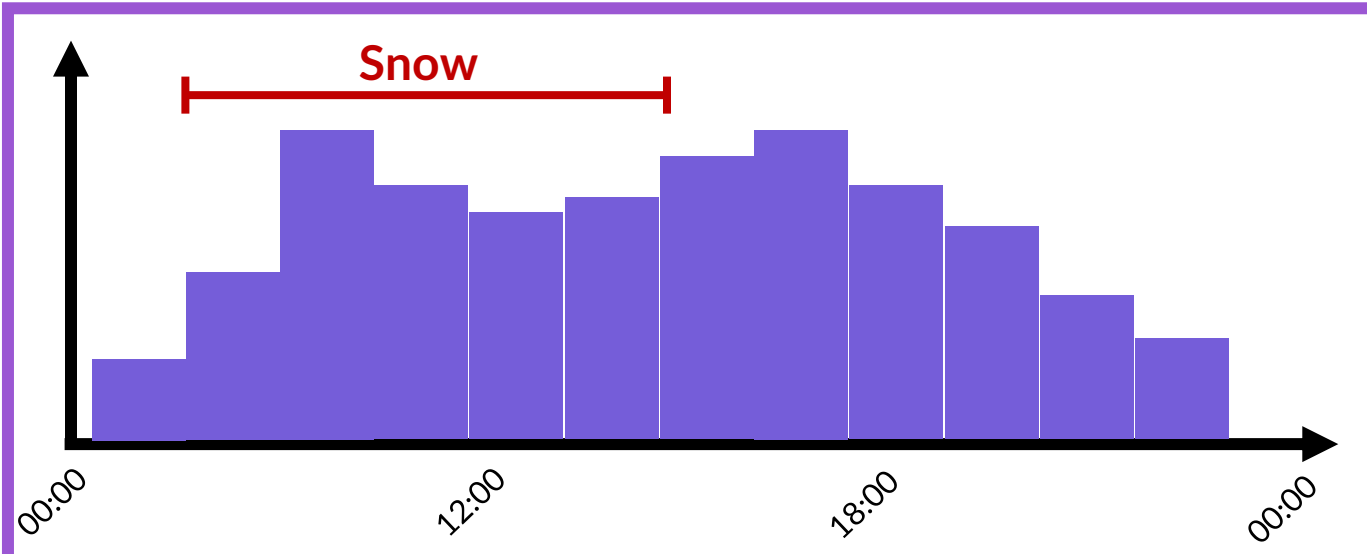
source: <https://www.nordfou.org/sektion/road-state-monitoring-system#3>

Friction from floating car data



source: www.volkswagen.se, www.volvo.se

Measurement requirements



Continuous measurements before, during, and after a winter weather event.



Spatial spread of simultaneous measurements

How

1.

Define low, medium and high friction

low friction [0, 0.35[
medium friction [0,35, 0,7[
high friction [0.7, 1.0]

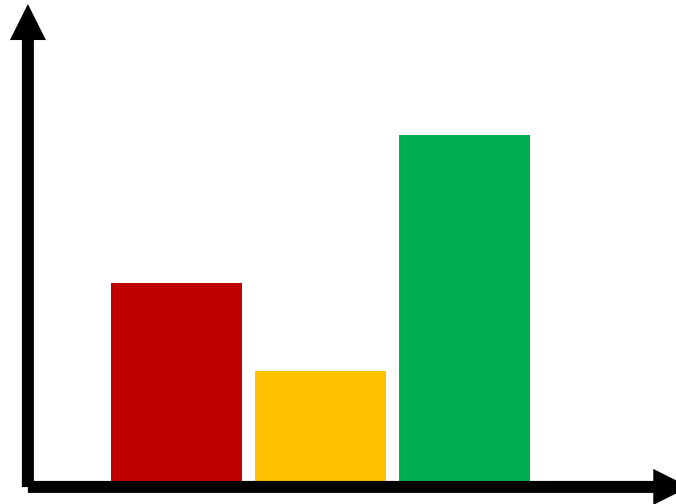
2.

Define a district



3.

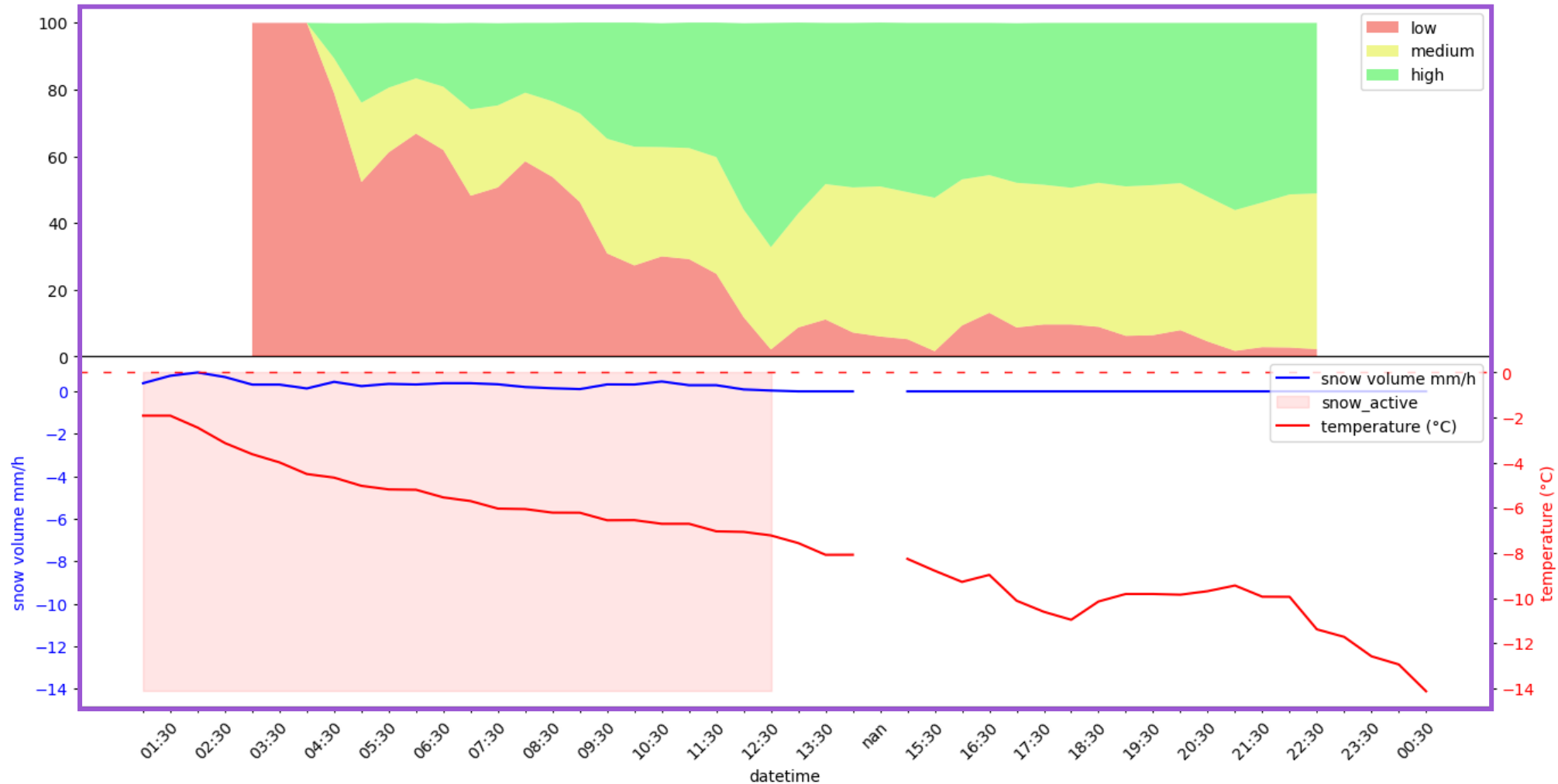
30 min
increments



Compute the percentage of low, medium and high friction

Result – Snowy day

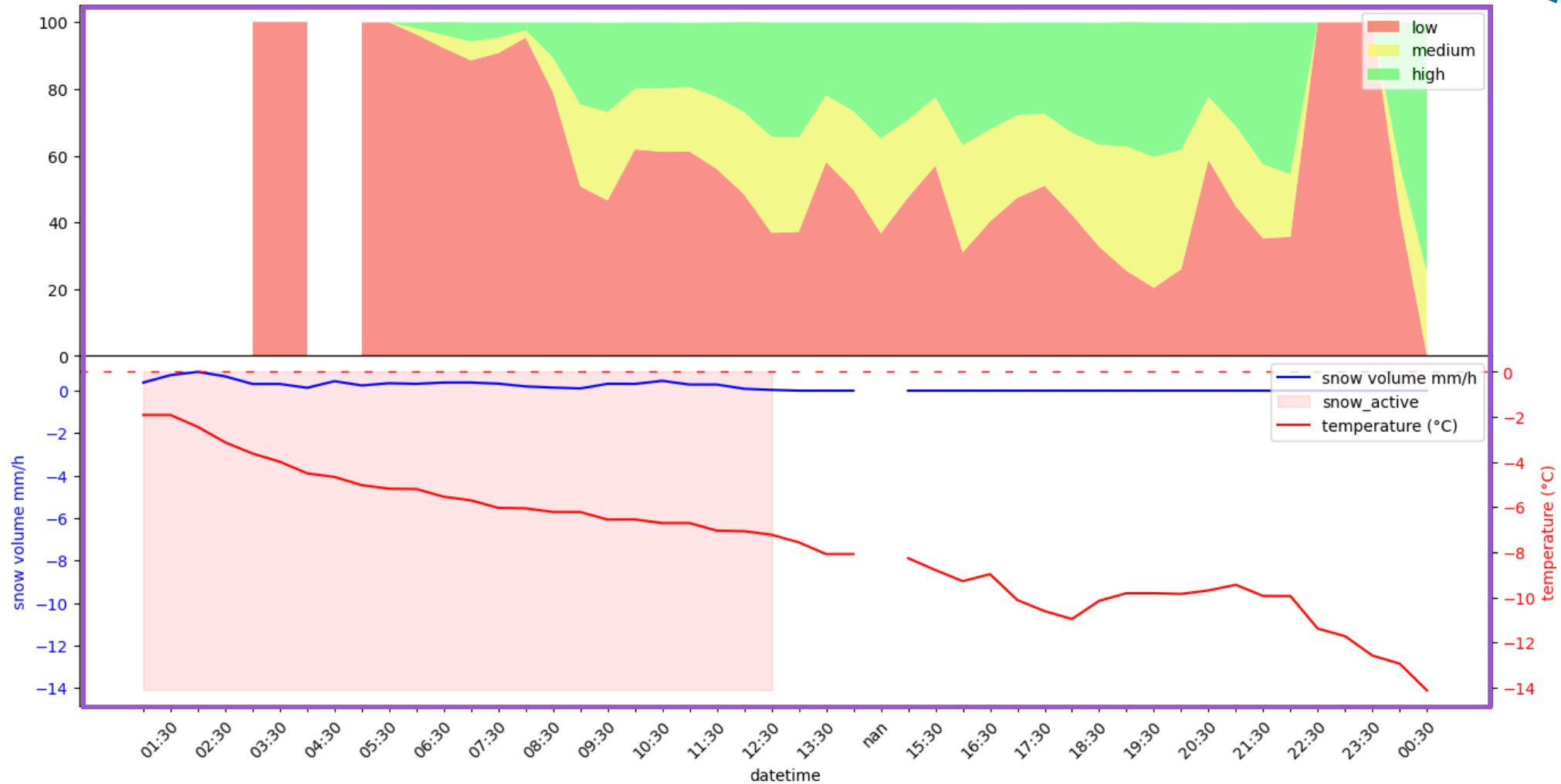
January 15 – Östergötland, Sweden – main road network



Result – Snowy day

January 15 – Östergötland, Sweden – low priority roads

“Reference network”



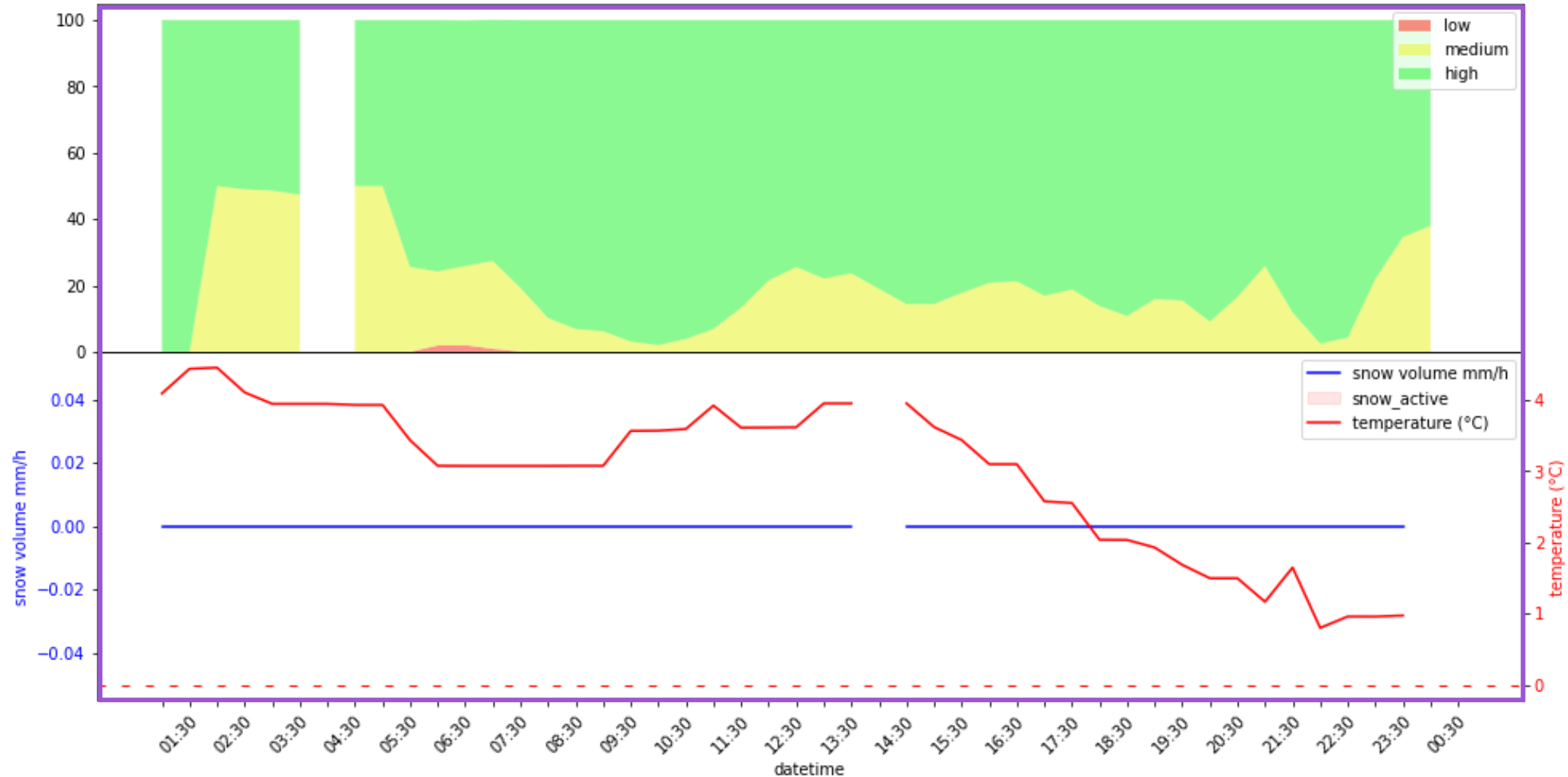
Result – Snowy day

January 15 – Östergötland, Sweden

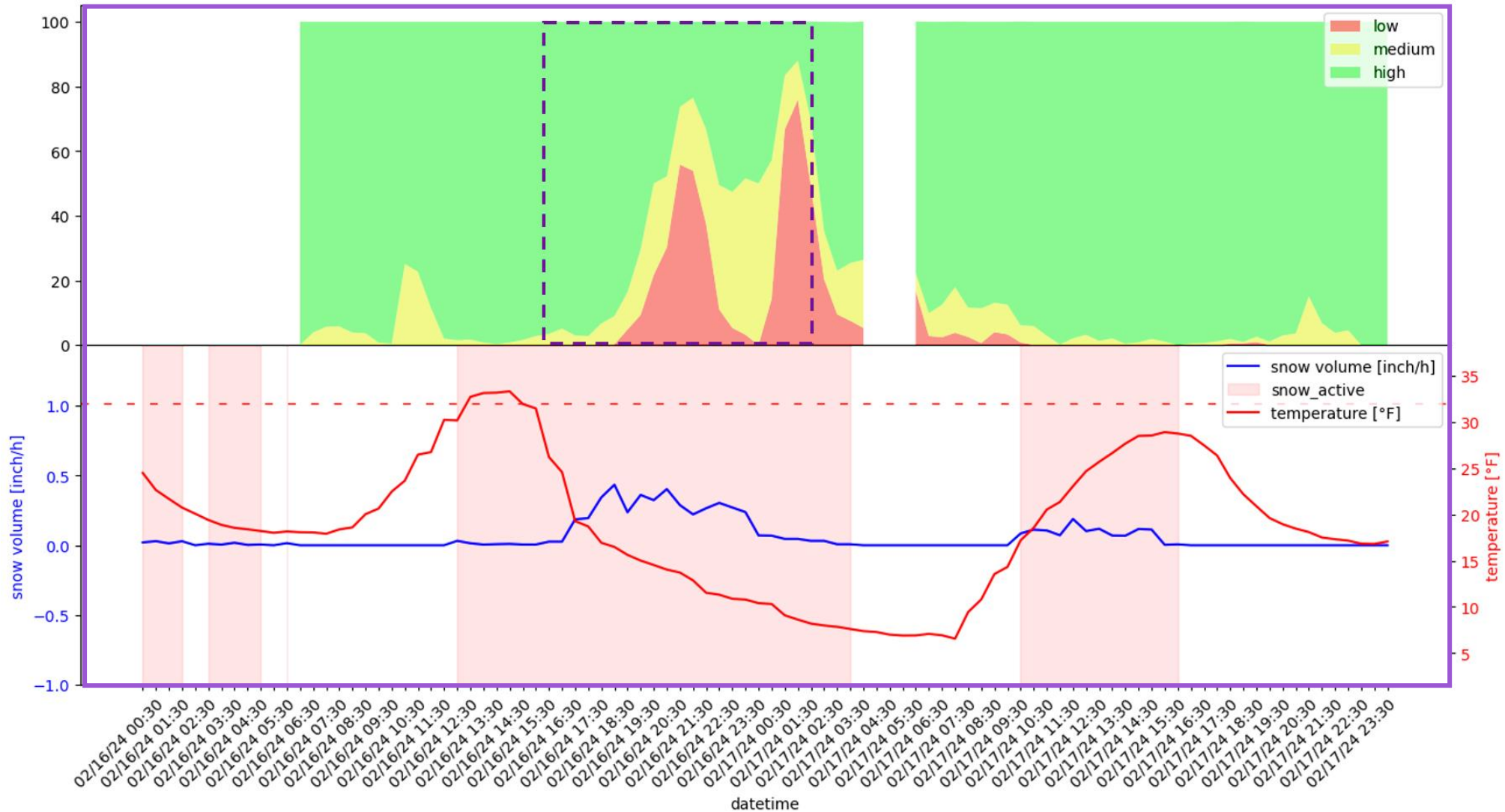


Result - A mild day

February 2 - Östergötland, Sweden

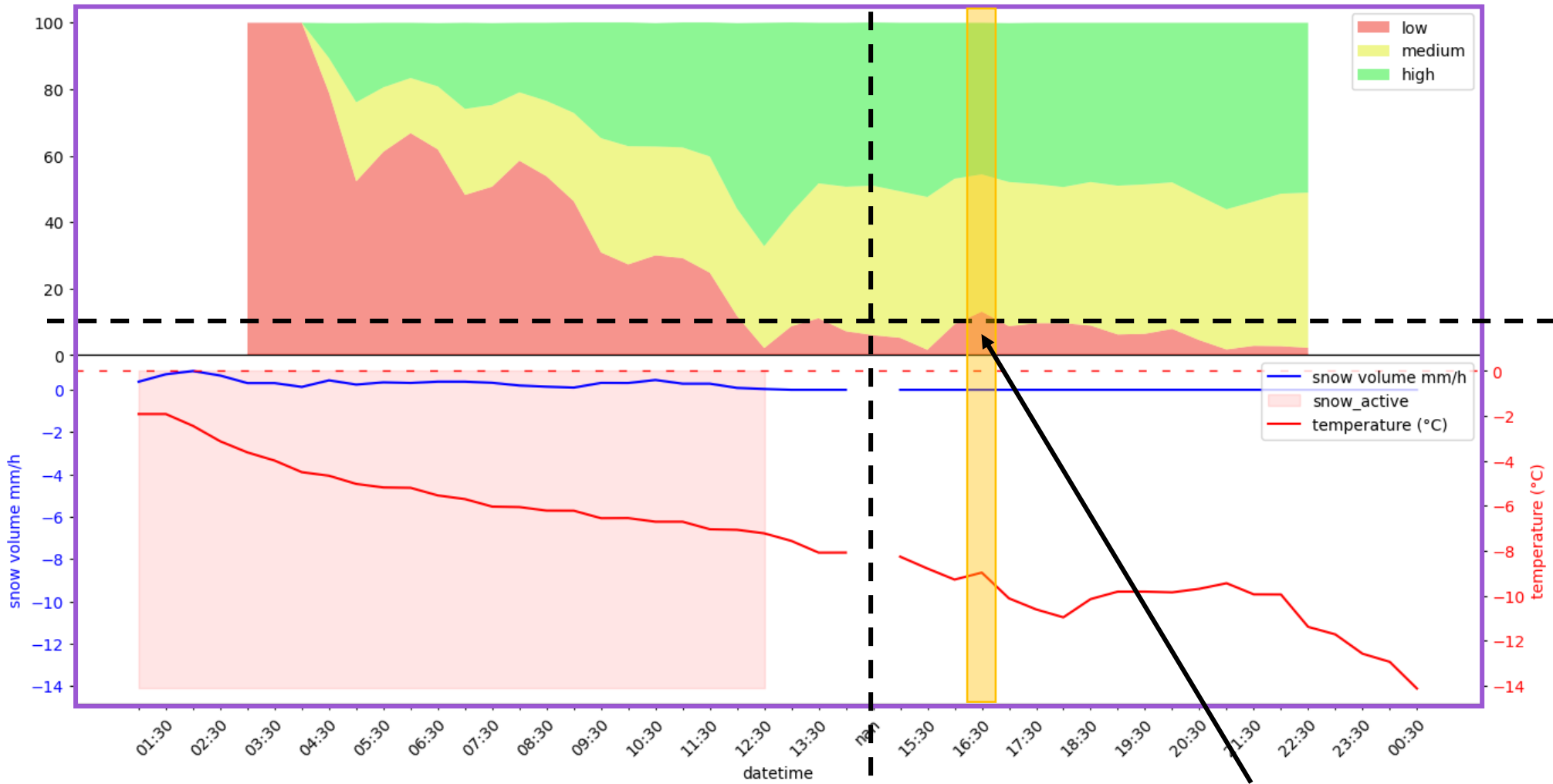


Example from Colorado



The KPI proposal

Time after snowfall



Tolerance

30 minutes of not approved

The KPI proposal

$$\text{KPI} = \frac{\text{minutes not approved}}{\text{number of winter weather events}}$$

Example

December

$$\text{KPI} = \frac{30 + 0 + 60 + 90 + 60}{5} = 48$$

January

$$\text{KPI} = \frac{0 + 0 + 0 + 90 + 30 + 30 + 60}{7} = 30$$

Conclusion

If you don't measure, you're a guesser