Reducing Chloride Application to Parking Lots with Liquid Anti-Icing

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Salt Symposium
August 7, 2024

Introduction

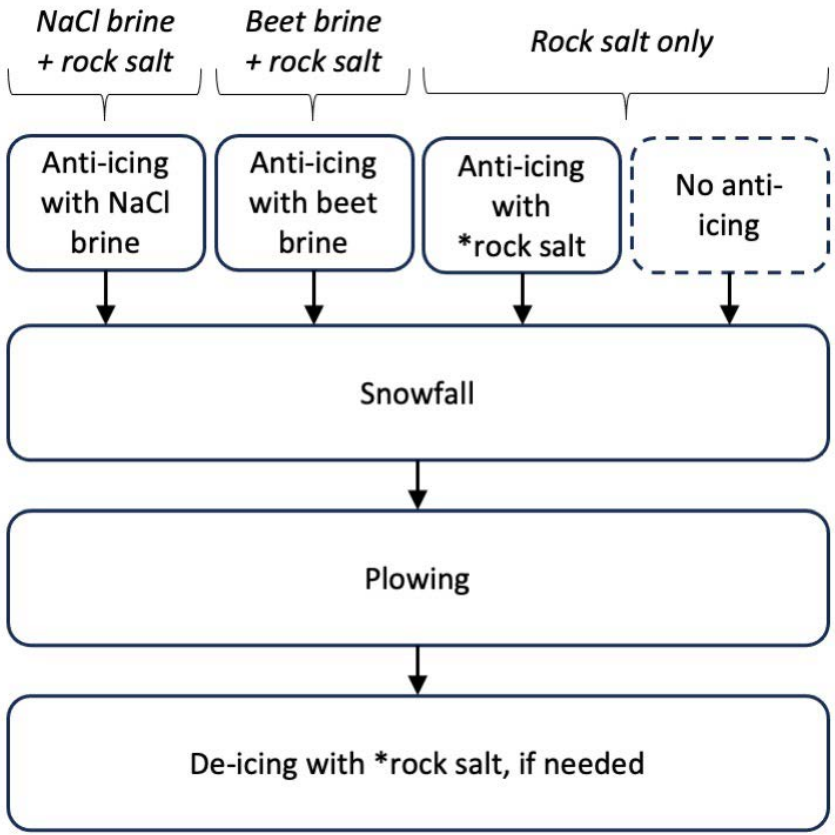
- Chloride on the rise to harmful levels because of road salt
  - Impacts entire ecosystem
- Mostly NaCl
  - Also MgCl, CaCl
- Up to 50 % of salt applied is to parking lots
  - No regulation or guidance
  - Incentives for over-application
- Canada: Code of Practice
- BMPs exist

Liquids and anti-icing

- Salt dissolved in water
  - Starts working faster
  - Better coverage
  - Less chloride
- Anti-icing
  - Pro-active
  - Prevents bonding with pavement
- Agricultural by-products
  - Beet, corn, cheese
  - Lower freezing point
  - Sticks to surface

Research Questions

1. Does the use of liquids for anti-icing reduce chloride inputs to parking lots during winter maintenance compared to the use of rock salt alone?
2. Does the addition of an agricultural byproduct (i.e., beet juice) to a liquid anti-icer reduce the chloride input to parking lots during winter maintenance?



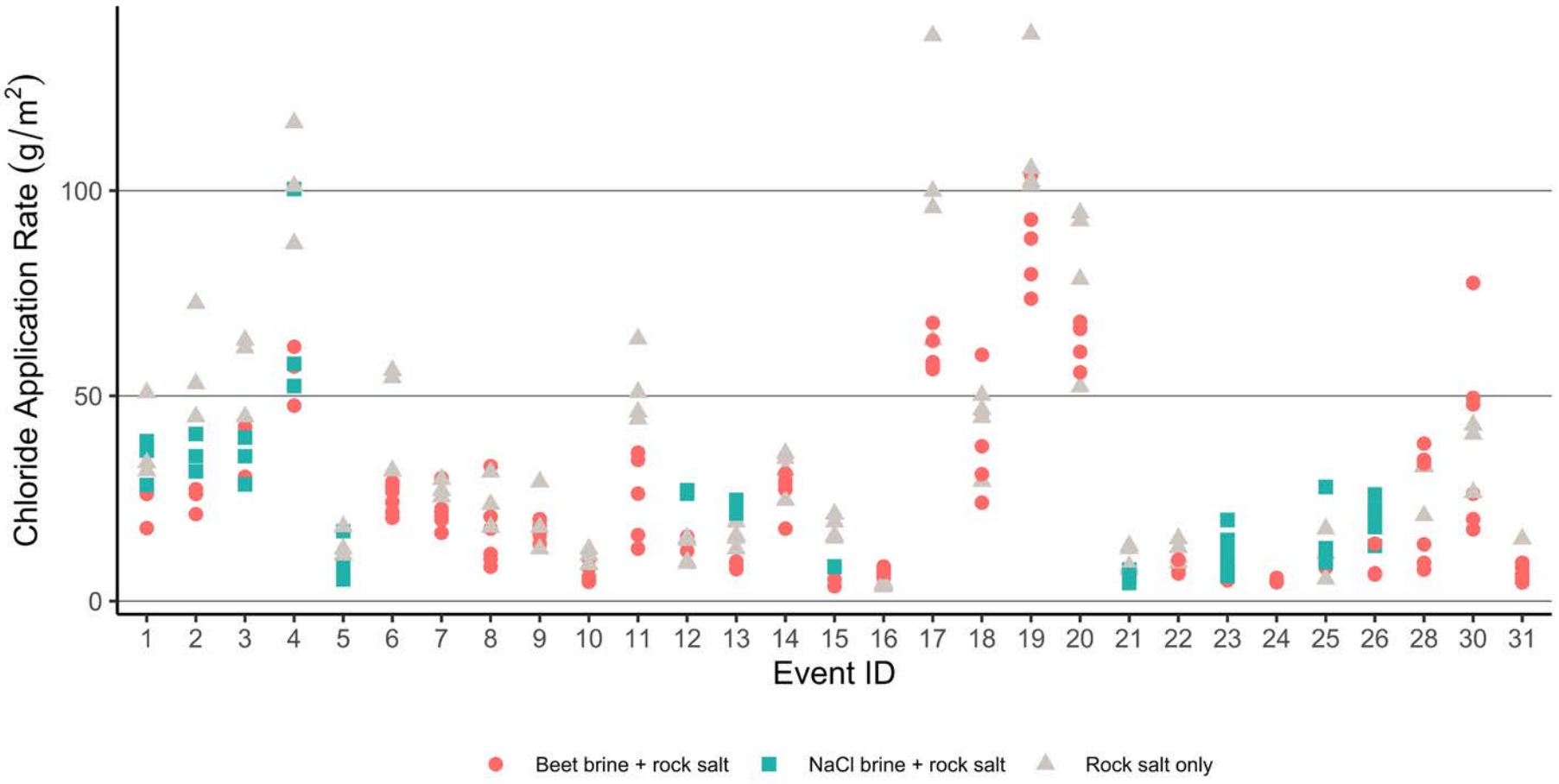
* All rock salt is pre-treated with beet juice product

Study Design

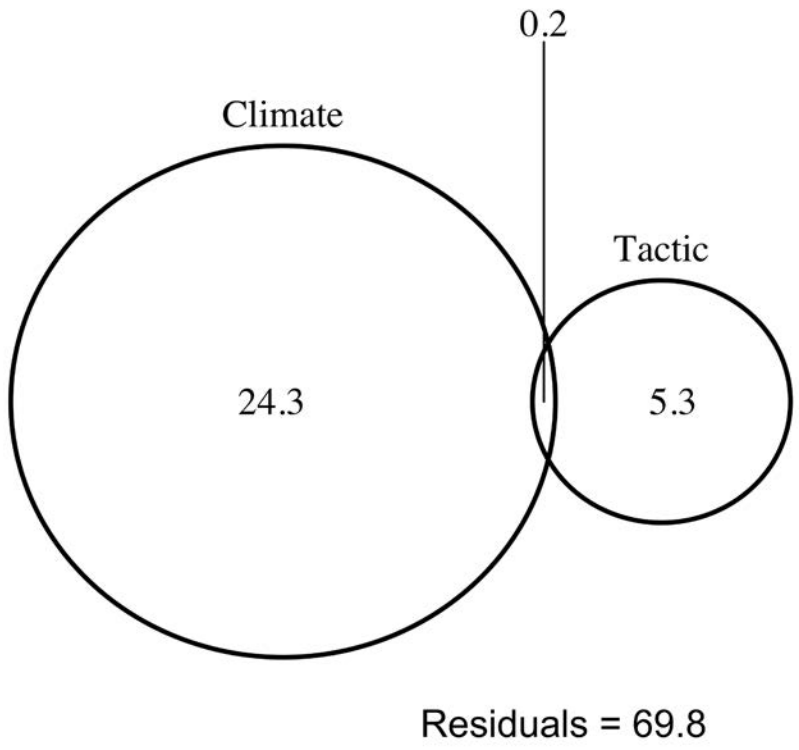
Year	19/20	20/21	21/22
Grp. A	Beet brine	Beet brine	Beet brine
Grp. B	NaCl brine	Rock salt	NaCl brine
Grp. C	Rock salt	NaCl brine	Rock salt

Results

28 events over 3 years


Chloride Application Rate (g/m²)
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 28 30 31
Event ID
Beet brine + rock salt
NaCl brine + rock salt
Rock salt only

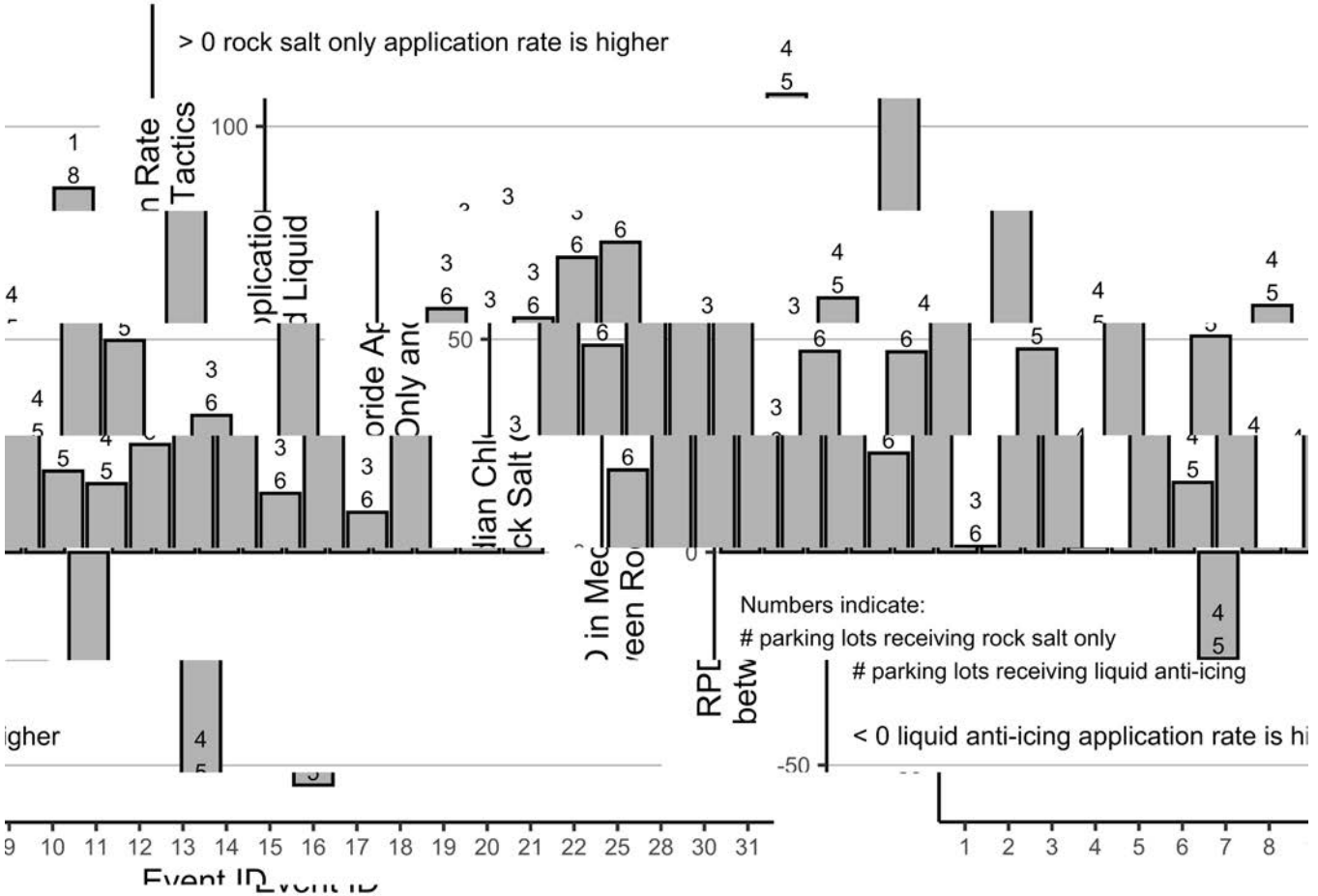
Variance Explained by Weather vs Tactic

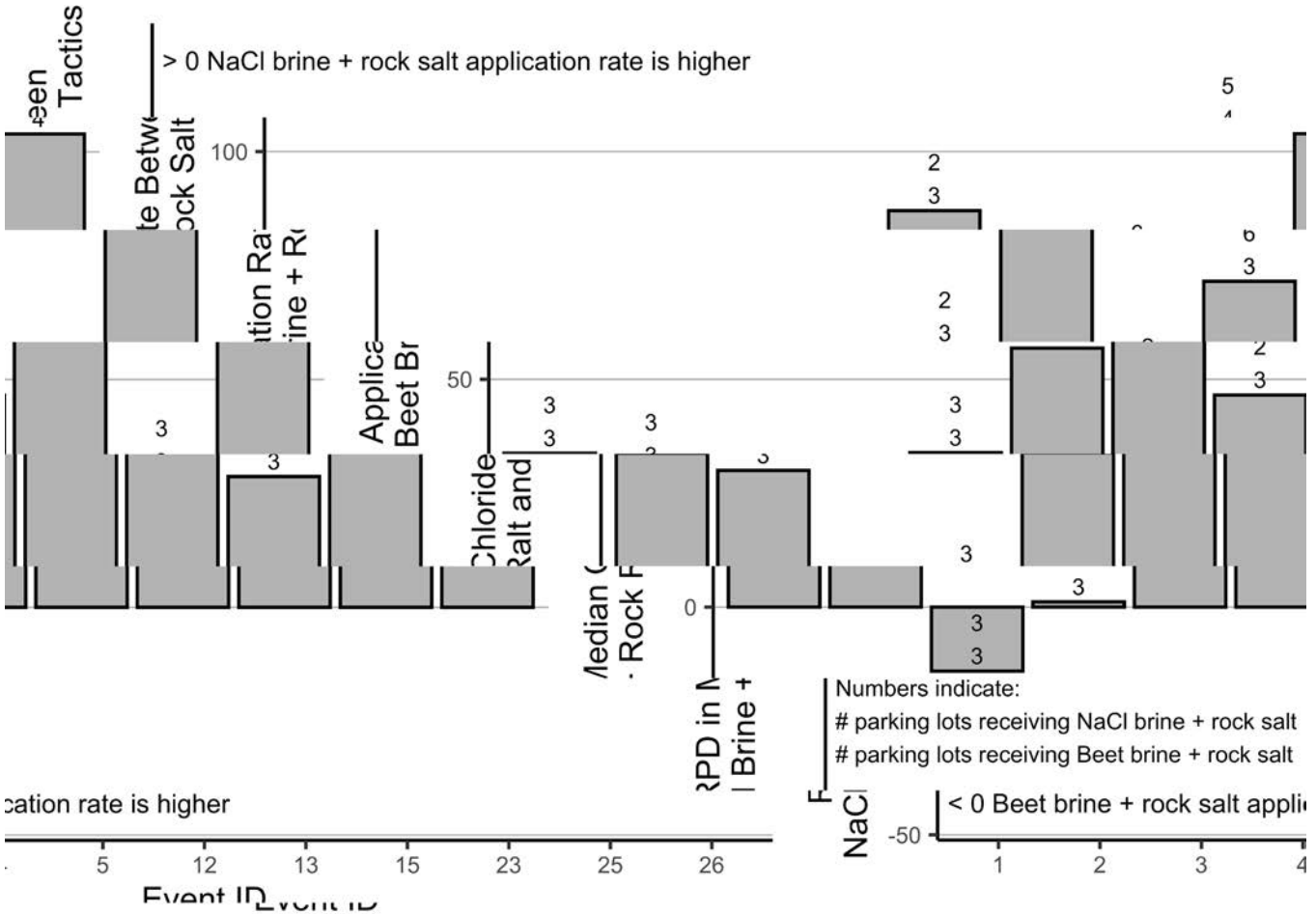


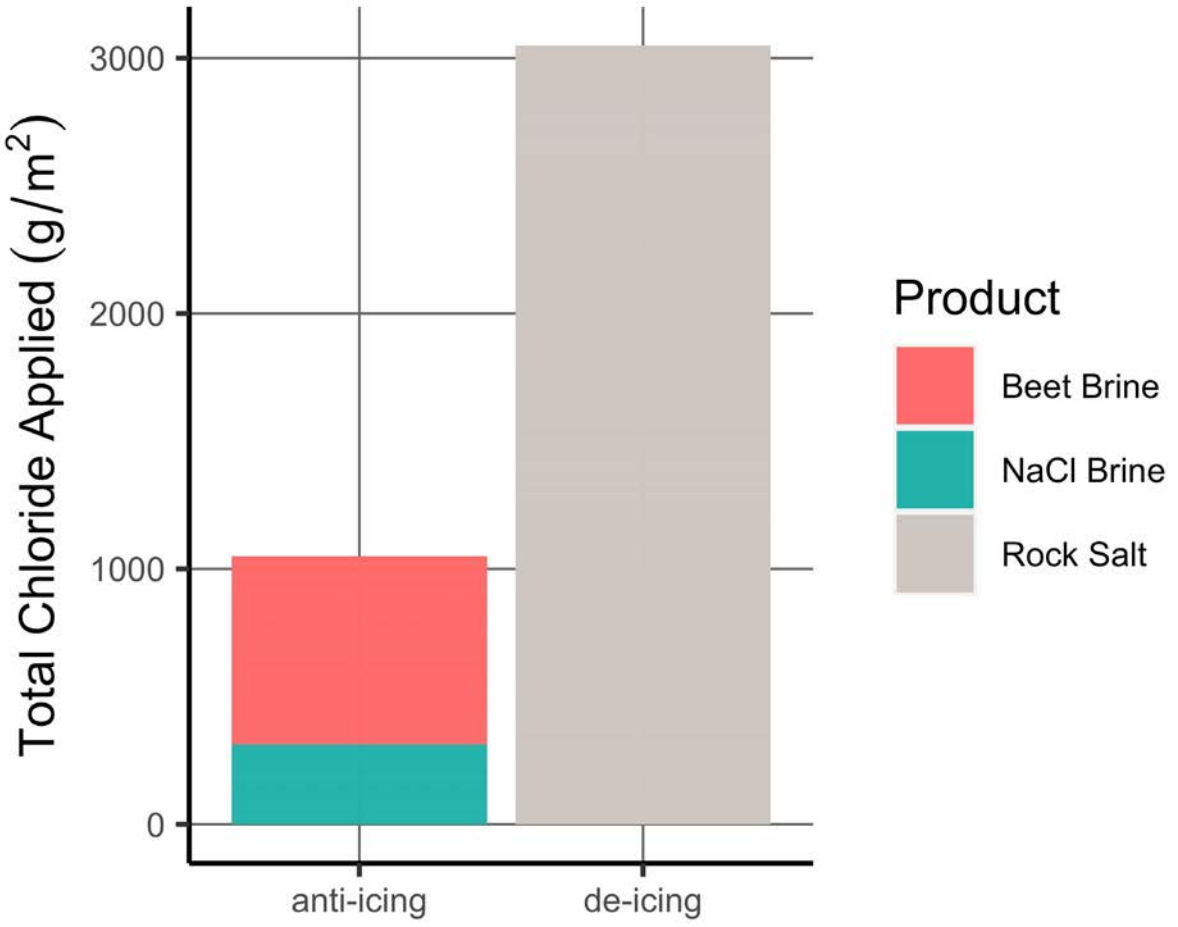
- Percent of variance explained by weather/climate variables and tactic
- weather variables:
  - Min and max temperature
  - Total precipitation
  - Total snowfall
  - Maximum wind gust
- Only 5.3 % explained by tactic

Management Factors

- Client complaints
- Weather forecast uncertainty
- Residual material
- Equipment availability
- Staff training and availability
- Material procurement


> 0 rock salt only application rate is higher
Numbers indicate:
parking lots receiving rock salt only
parking lots receiving liquid anti-icing
< 0 liquid anti-icing application rate is hi
100
50
0
-50
9 10 11 12 13 14 15 16 17 18 19 20 21 22 25 28 30 31
1 2 3 4 5 6 7 8


> 0 NaCl brine + rock salt application rate is higher
100
50
0
Numbers indicate:
parking lots receiving NaCl brine + rock salt
parking lots receiving Beet brine + rock salt
< 0 Beet brine + rock salt appli
-50
5
12
13
15
23
25
26
1
2
3
4


Total Chloride Applied (g/m^2)
3000
2000
1000
0
anti-icing
de-icing
Product
Beet Brine
NaCl Brine
Rock Salt

Credit Valley Conservation Head Office

Implications

- 5.3 % of variance explained by tactic, however within events:
  - Liquid anti-icing: on average 28 % chloride savings over rock salt only
  - Beet juice: on average 31 % chloride savings over NaCl brine
- Beet juice environmental impacts
  - Trade-off beet juice: chloride
- Liquid anti-icing is feasible solution for industry right now
- At CVC liquids alone reduced chloride up to 90 %
- Cost savings from purchasing less salt
- Future guidelines

Questions?

Thank-you!