# Measurements of residual salt on a test track under controlled conditions


- **Göran Blomqvist**
- Researcher, PhD
- VTI, Sweden
- goran.blomqvist@vti.se

Project team: Michel Eram, Skúli Thordarson, Kai Rune Lysbakken, Mats Gustafsson

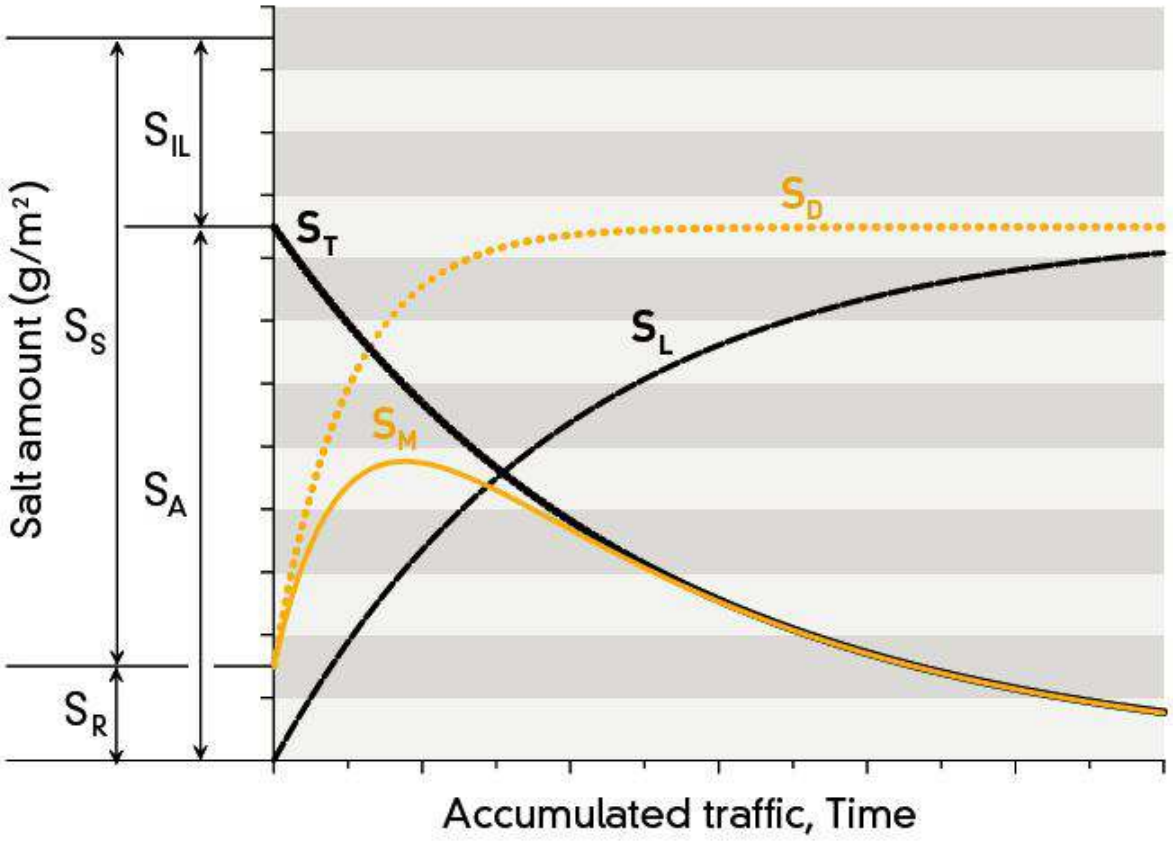
## 0. CONTENT

1. What is residual salt and why should we know about it?
2. The test site in Bygholm, Horsens, Denmark
3. The measurements
4. Our systematic approach
3. Modelling (presented in session 4.12)
4. Next step

## 1. What is residual salt and why should we know about it?

The aim is to study the processes behind salt loss on roads in order to develop a residual salt model that can be used to minimize salt use without compromising traffic safety and road network accessbility

# 1. What is residual salt and why should we know about it?




$S_T$ = Total quantity of salt

$S_L$ = Accumulated quantity of salt loss

$S_S$ = Quantity of salt spread on the road surface

$S_R$ = Residual salt at the time of salt spreading

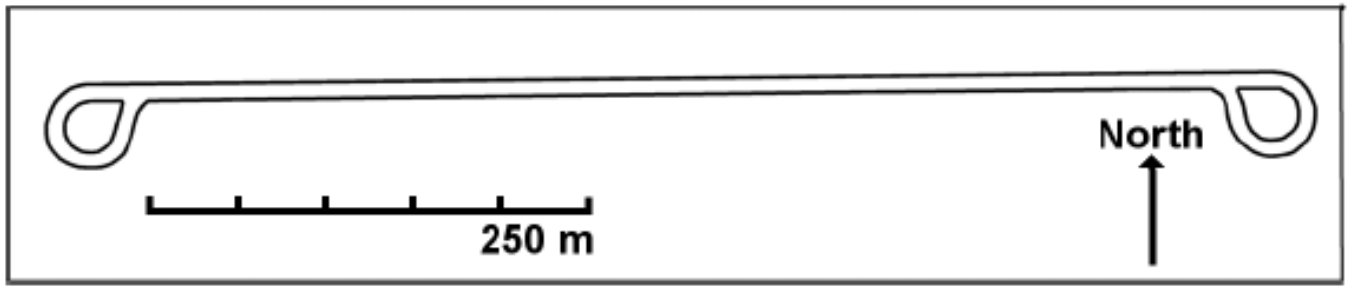
$S_{IL}$ = Initial salt loss during spreading

$S_A$ = Available salt on the road surface after spreading

$S_D$ = Theoretical amount of dissolved salt

$S_M$ = Amount of salt possible to measure

## 2. The field site in Denmark



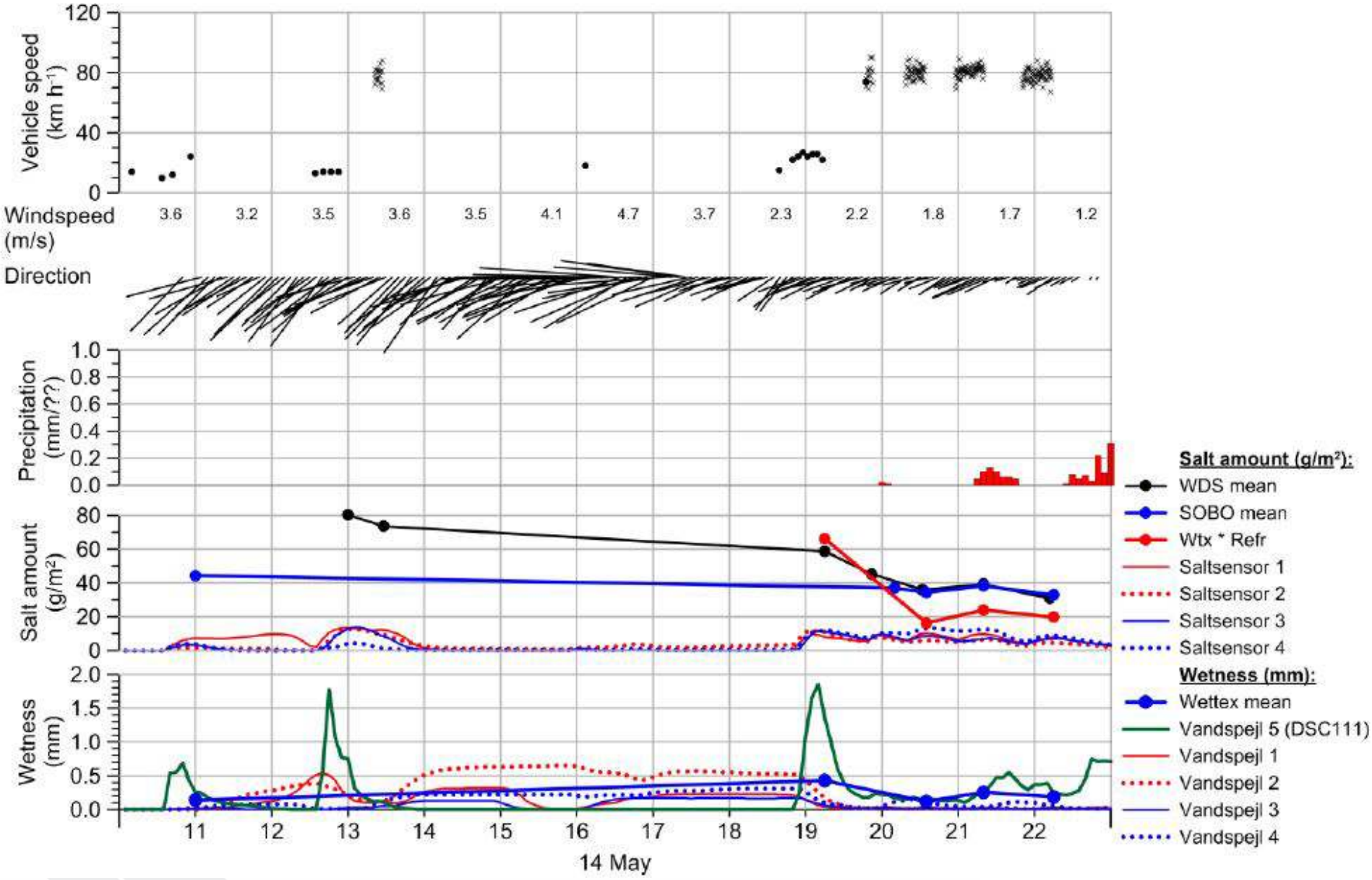

The field site consist of a ca 600 m long, 10 m wide test track with an RWIS-system (VAISALA Rosa) installed in the center position including four salt sensors (wheel tracks and in-between wheel tracks).

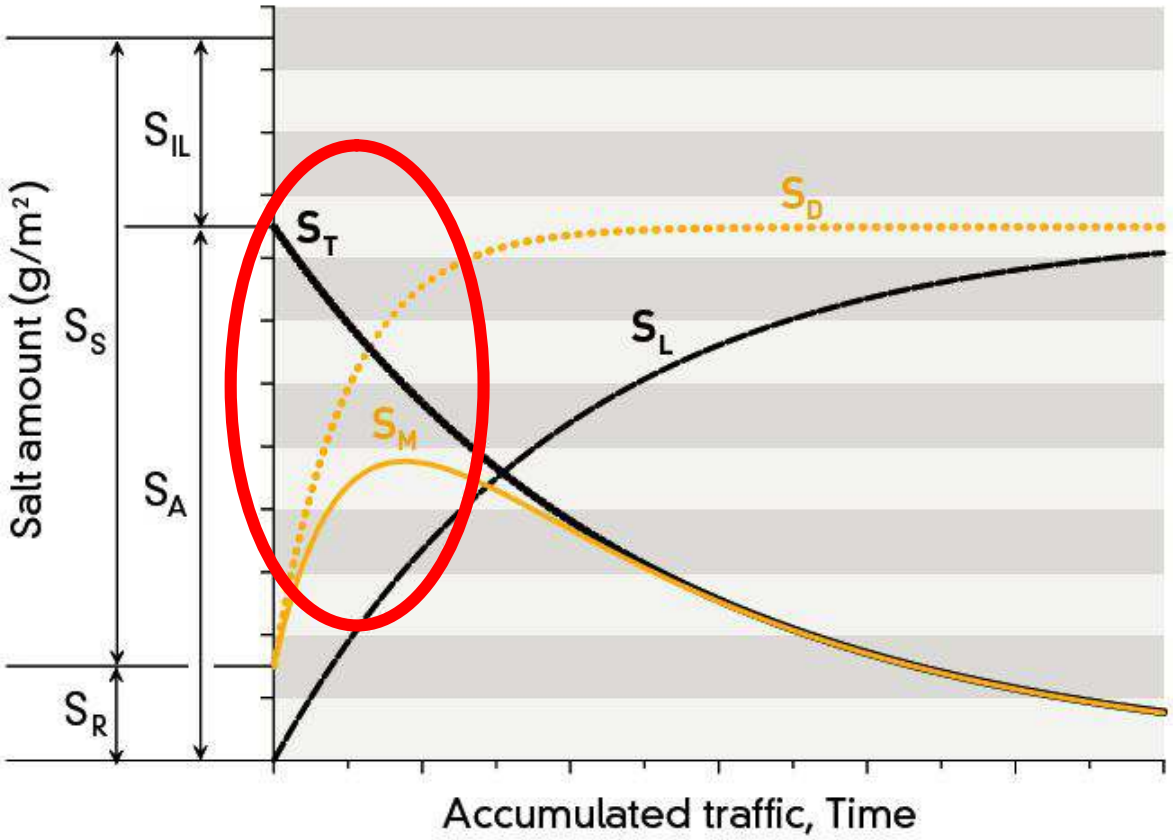
## 3. Automatic RWIS-sensors VAISALA Rosa

1. **Precipitation: Vaisala PWD12**
2. **Air Temperature: Vaisala HMP155**
3. **Air humidity: Vaisala HMP155**
4. **Wetness and salt amount: Vaisala DRS511**
5. **Road surface state (wetness): Vaisala DSC111**

## 3. Manual measurements

1. SOBO 20 (dissolved salt amount up to 45 g/m2)
2. VTI-Wet dust sampler (salt amount)
3. Refractometer (salt concentration)
4. Wettex kitchen cloth (wetness, g/m2, including salt)
5. Petri dishes (splash and spray deposition)


Vehicle speed (km h⁻¹)
120
80
40
0
Windspeed (m/s)
3.6 3.2 3.5 3.6 3.5 4.1 4.7 3.7 2.3 2.2 1.8 1.7 1.2
Direction
Precipitation (mm/??)
1.0 0.8 0.6 0.4 0.2 0.0
Salt amount (g/m²)
80 60 40 20 0
Wetness (mm)
2.0 1.5 1.0 0.5 0.0
11 12 13 14 15 16 17 18 19 20 21 22
14 May
Salt amount (g/m²):
WDS mean
SOBO mean
Wtx * Refr
Saltsensor 1
Saltsensor 2
Saltsensor 3
Saltsensor 4
Wetness (mm):
Wettex mean
Vandspejl 5 (DSC111)
Vandspejl 1
Vandspejl 2
Vandspejl 3
Vandspejl 4




$S_T$ = Total quantity of salt

$S_L$ = Accumulated quantity of salt loss

$S_S$ = Quantity of salt spread on the road surface

$S_R$ = Residual salt at the time of salt spreading

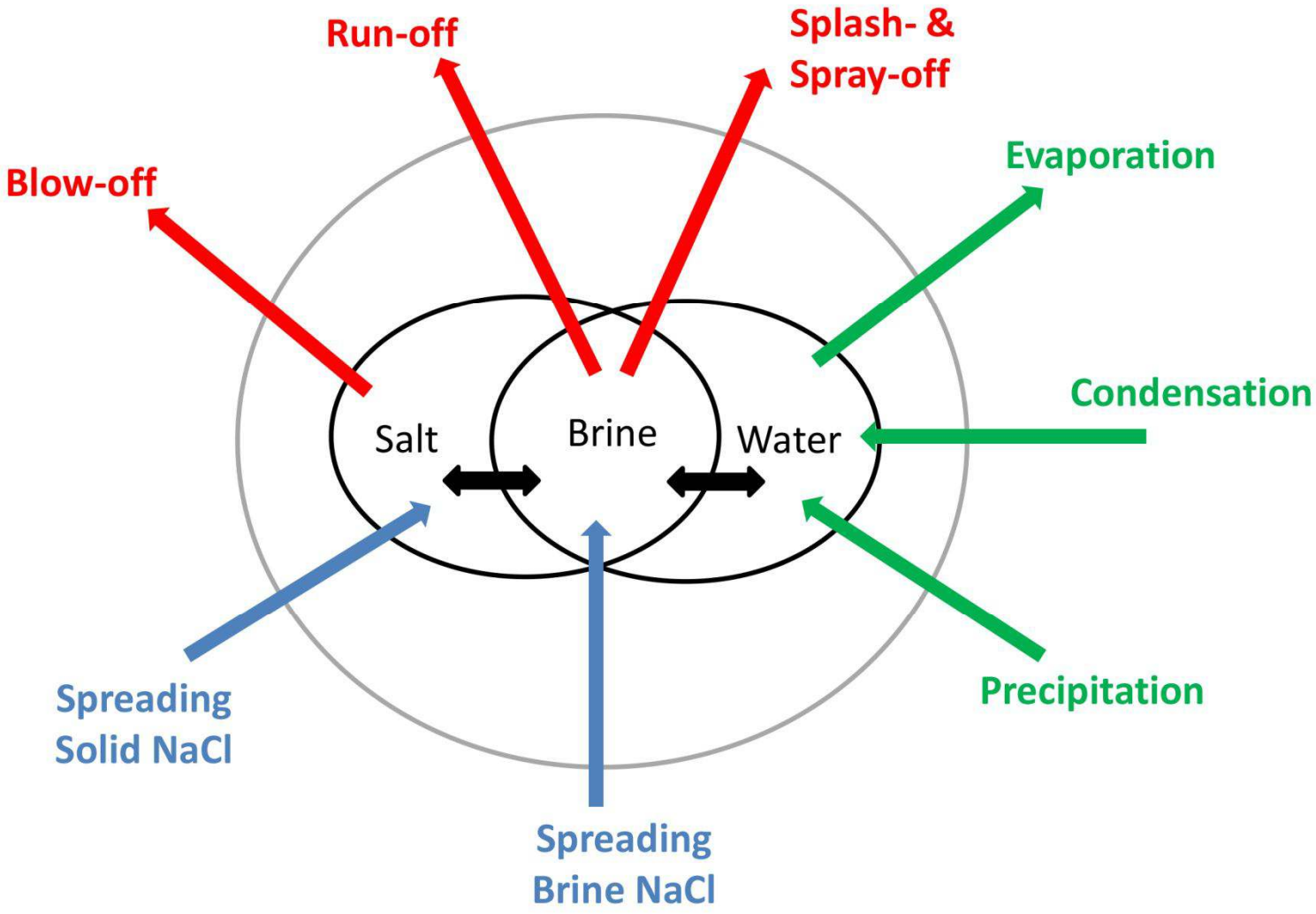
$S_{IL}$ = Initial salt loss during spreading

$S_A$ = Available salt on the road surface after spreading

$S_D$ = Theoretical amount of dissolved salt

$S_M$ = Amount of salt possible to measure

## 3. Our systematic approach



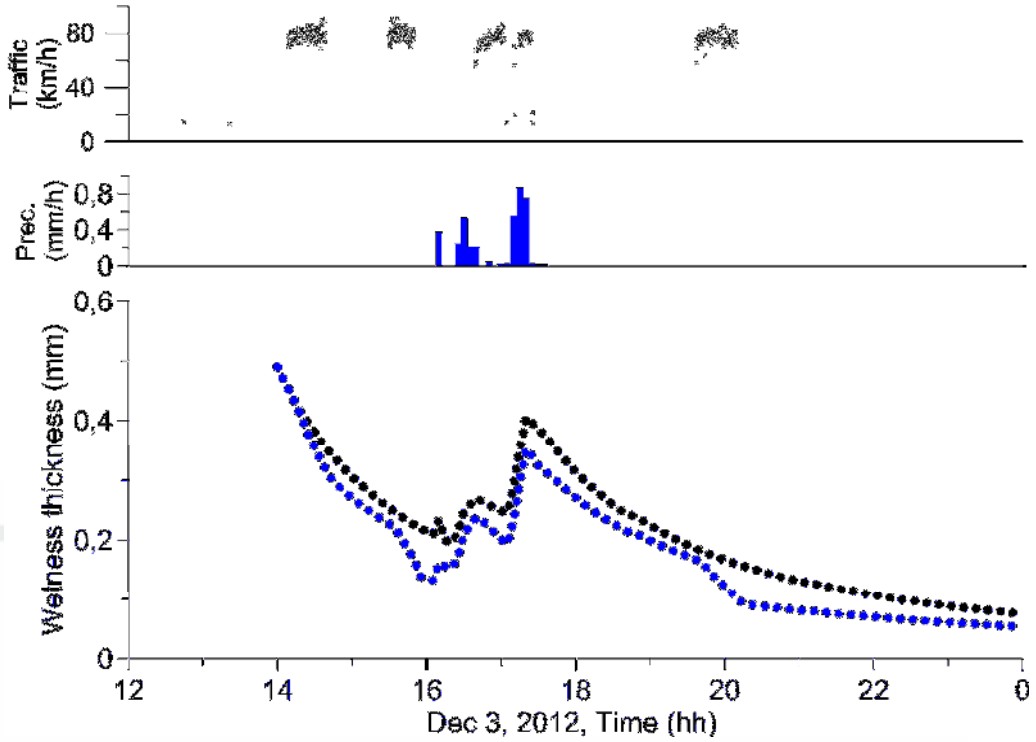
# Measuring splash and spray

## Conclusions so far…

1) The quality of sensor installment in the pavement is crucial for the quality of the data.

2) Run-off is a more important source of salt loss than first believed.

# Modelling results will be presented in session 4-12, this afternoon



# Semi-controlled studies?

## Next step

1) Run-off will be continuously measured by both quantity and quality.
2) Road surface wetness will be optically measured in profiles across the road surface.
3) Field campaigns will be executed during the winter 2013/14 and 2014/15.
4) The model algorithms will be tested on data from “real traffic” road stations.
5) The project group welcomes international cooperation.


Thank you for your attention!
Meet us at the VTI-booth
in the exhibition hall