



ILMATIETEEN LAITOS  
METEOROLOGISKA INSTITUTET  
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# FMI Road Weather Model

CBC GreenIntertraffic 30.1.2019

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Image: Tero Pajukallio



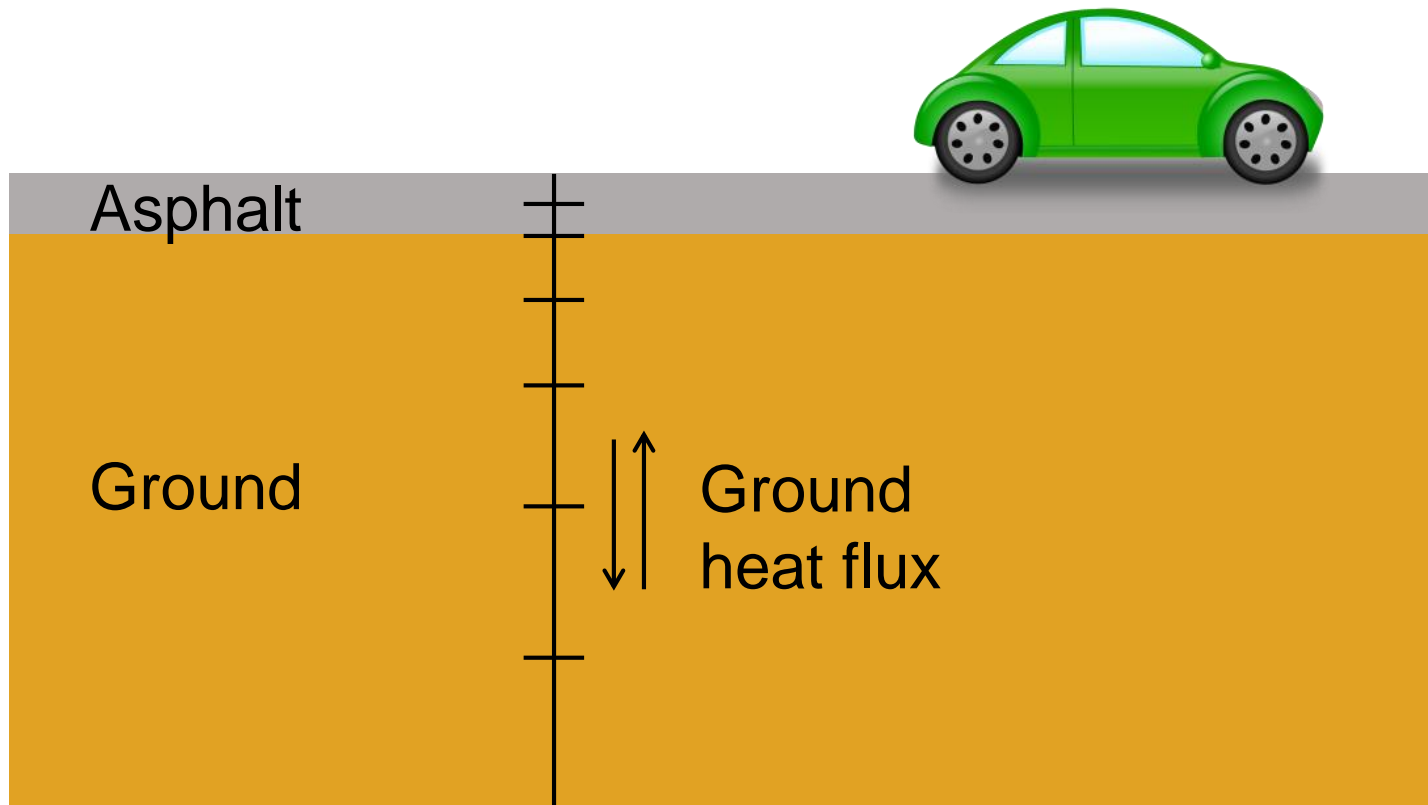
# 1. Introduction

- Road surface temperature modeling activities initiated already in 1979 in FMI
- Road weather model (RWM) of that time was in operational use during the early 1980s
  - Later discontinued
- The current operational RWM in FMI developed in the late 1990s
  - Operational since 2000
- Continuous development
  - Pedestrian model
  - Friction
  - Probability forecasts (incoming)



## 2. Road weather model

- One dimensional heat balance model

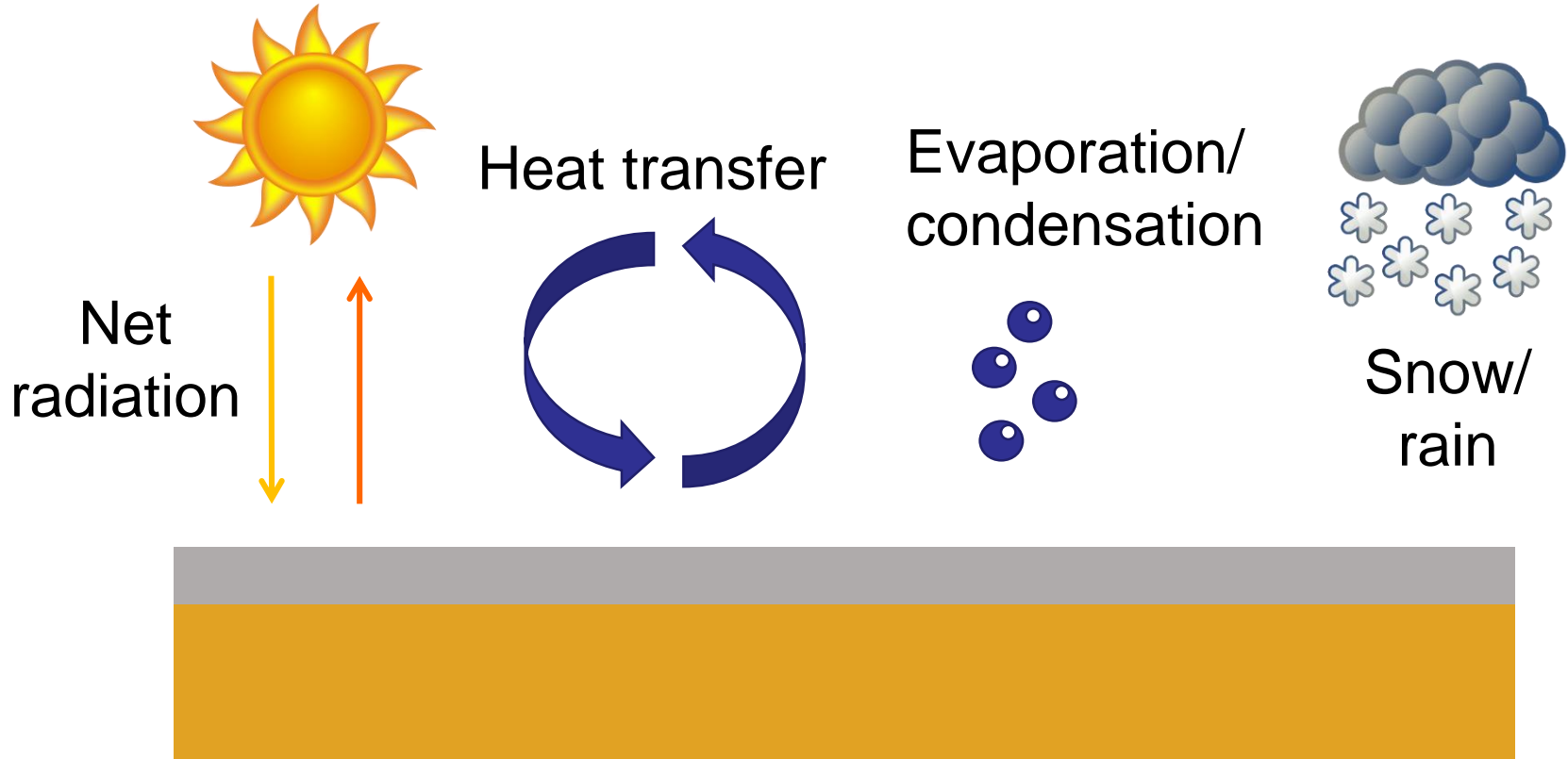


Model input:

- Air temperature
- Humidity
- Wind speed
- Precipitation
- Short & long wave radiation

Optional:

- Precipitation Phase
- Surface temperature observations



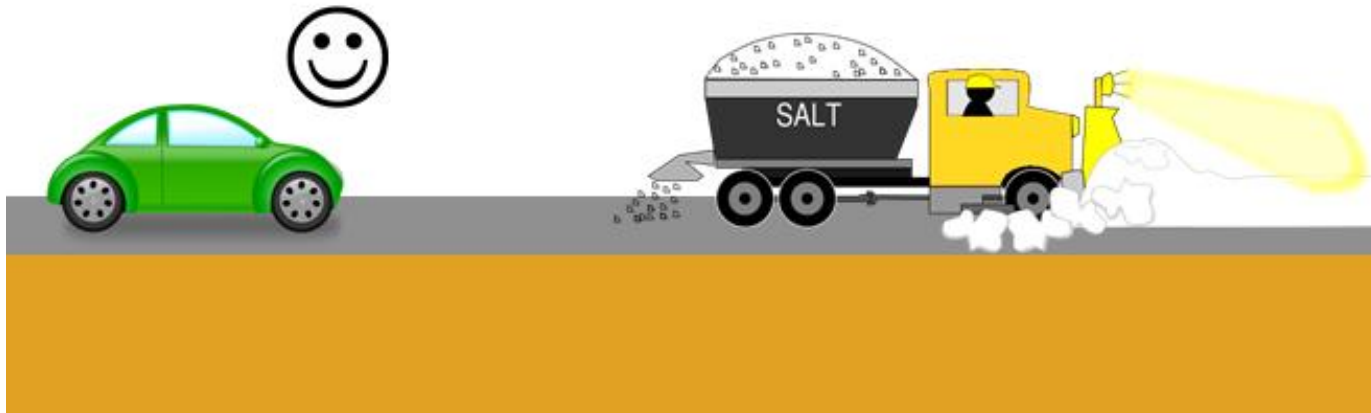
# Output

## Basic outcome:

- Road surface temperature
- Amounts of water, ice, snow and frost on the road

## Deliverables:

- Friction coefficient
- Road condition
  - E.g. wet, icy, snowy
- Traffic Index
  - Normal, difficult, very difficult



# Pedestrian model

5 different slipperiness classes

1. No slipperiness
2. Slippery
3. Packed snow
4. Water above the ice layer
5. Snow above the ice layer

- Warning given in case of classes 4 and 5
  - Normal walking is difficult and the risk of slipping accident increases
- Very slippery days typically 5-15 per winter



# 3. Mobile observations

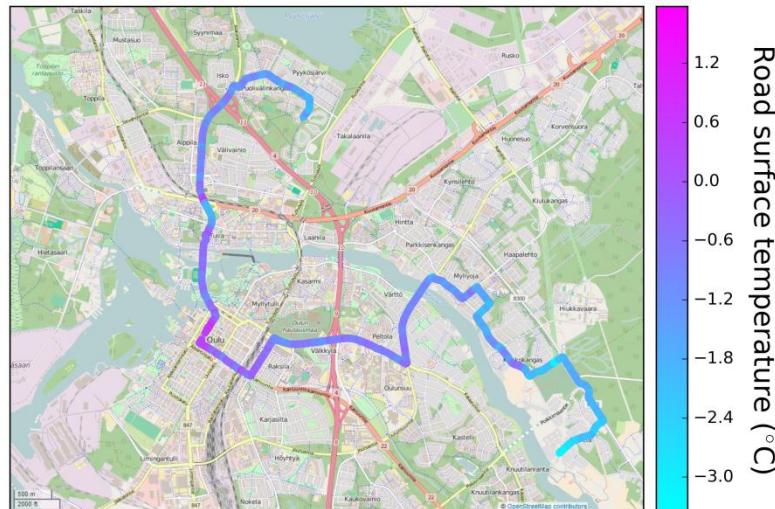
- Modern cars have multiple sensors
- Possible to get weather information
- Data gathered also from additional sensors attached to cars

## Teconer

- Instruments measuring road conditions & surface temperature

## RoadCloud

- Several taxis equipped with data collecting & measurement device



Teconer measurements from the city of Oulu, Finland, 8th December 2015



Teconer RCM411 & RTS411



# Research activities

1. Quality of Teconer surface temperature and RoadCloud air temperature has been studied
  - Measurements compared to road weather stations
2. Mobile surface temperature observations have been used in road weather model
  - Paper presenting verification results submitted to Weather & Forecasting
3. Can air temperature measurements from cars be used in road weather forecasting?
  - Possible to improve interpolated surface temperature values by universal kriging method





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# Thank You!

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