IRWIN
Improved local winter index to assess maintenance needs and adaptation costs in climate change scenarios

IRWIN Seminar 17th November 2009, Helsinki
IRWIN in brief

• ERA-NET Road project IRWIN with three partners from Finland and Sweden
• Foreca Consulting Ltd
• Klimator AB
• University of Gothenburg Regional Climate Group
• Analysing all archived road weather observations from Sweden and Finland
• Downscaling climate scenarios on road network to develop locally accurate winter index, ideal for road maintenance assessments

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Project Steering Group

- Eira Järviluoma /FinnRA (Project Manager)
- Christian Pecharda /Austrian Research Promotion Agency
- Jon Krokeborg /Vägvesen
IRWIN Work Plan

14 months from November 2008 to December 2009

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Global Climate Models

- Models simulate main physical interactions in the atmosphere/ocean system
Climate Scenarios

- Emission levels define the scenarios

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Global warming has NOT been cancelled...

- Global annual mean temperature since 1880 (source: NOAA)
- 100 = 1 degree above normal of 1951-1980 (+14°C)
- Since 1976 no values below normal
Recent months have been record warm

- 100 = 1 degree over 1951-1980 global mean
- Feb 1998, Mar 2002 and Jan 2007 three warmest months
Temperature rise in scenario A1B

- Northern latitudes will be most affected
Downscaling

• Downscaling means that poor resolution climate models are refined with better resolution local data
• Key issue is to find best meteorological observations
• We need as long time series as possible
• Good quality data, uninterrupted, stations on same locations
RWIS-data

RWIS station
Synoptic station

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Advantages of RWIS data

- Measurements close to the road
- Data used by maintenance for decisions
- Frequent measurements (30 minutes)
- High frequency of field stations
Three areas in Sweden

- Gothenburg
- Stockholm
- Sundsvall
Three areas in Finland

FinnRA stations

IRWIN stations and areas

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Details of Finnish data in IRWIN database

- All archived FinnRA’s RWIS data analysed from 1997 to 2008
- Number of stations have increased from 252 to 531
- 49 time series had 10 years of uninterrupted series, good enough for downscaling purposes
- Most important parameters are air temperature, road temperature, air moisture, precipitation, wind speed
- IRWIN Winter months = November – March, to be comparable with Swedish data

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Winter temperature trends in RWIS

• Some stations show clear warming trend during the 12 winters of 1997-2008
More temperature trends in RWIS

- ... some not so clear, e.g. those affected by continental or marine climate

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## Maintenance data

<table>
<thead>
<tr>
<th>Area</th>
<th>Maintenance class</th>
<th>Ploughing of snow and slush</th>
<th>Liquid salting</th>
<th>Salting</th>
<th>Point sanding</th>
<th>Line sanding</th>
<th>Level with planer</th>
<th>Level with truck</th>
<th>Ploumarks and drift fences</th>
<th>Cleaning of traffic signs</th>
<th>Lowering snow banks</th>
<th>Snow removal</th>
<th>Prevent melting snow hazards</th>
<th>Removal of packed ice</th>
<th>Road condition check</th>
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- Maintenance actions collected from AURA database for the study areas
- Data available from 2003 onwards
Salting

01.10.2003 - 30.09.2004

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- AURA database used also to analyse usage of salt

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Winter Index

\[ WI = \sum (A_{\text{ice}} + B_{\text{frost}} + C_{\text{Prec}} + D_{\text{drift}}) \]

- \( A_{\text{ice}} \) – situation with risk of road icing
- \( B_{\text{frost}} \) – situation with risk of hoar frost
- \( C_{\text{prec}} \) – situation with precipitation
- \( D_{\text{drift}} \) – situations with drifting snow

- Index measures need for Salting and Plowing
- Takes into account strong winds, ground frost, extreme precipitation
Method


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Benefits of IRWIN project

• better linkage between weather and maintenance needs
• better understanding of variations to be expected
• better knowledge of impact from climate change on maintenance needs
• better coverage of extreme events
• Final report will summarise results, distributed to interested stakeholders
Advice to Road Owners

• Archive all your RWIS data with good metadata on stations, sensors and formats
• Do not change station numbering or sites
• For climate studies, long and un-interrupted time series required (minimum 10 years)
• Raw data must be interpolated for analysis to regular 30 min intervals
• Questionnaire sent to all ERA-NET countries to analyse how much data is available for similar studies
Contact information

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