



Foreca

**Road weather services
and METRo**

Dr. Pirkko Saarikivi, Managing Director

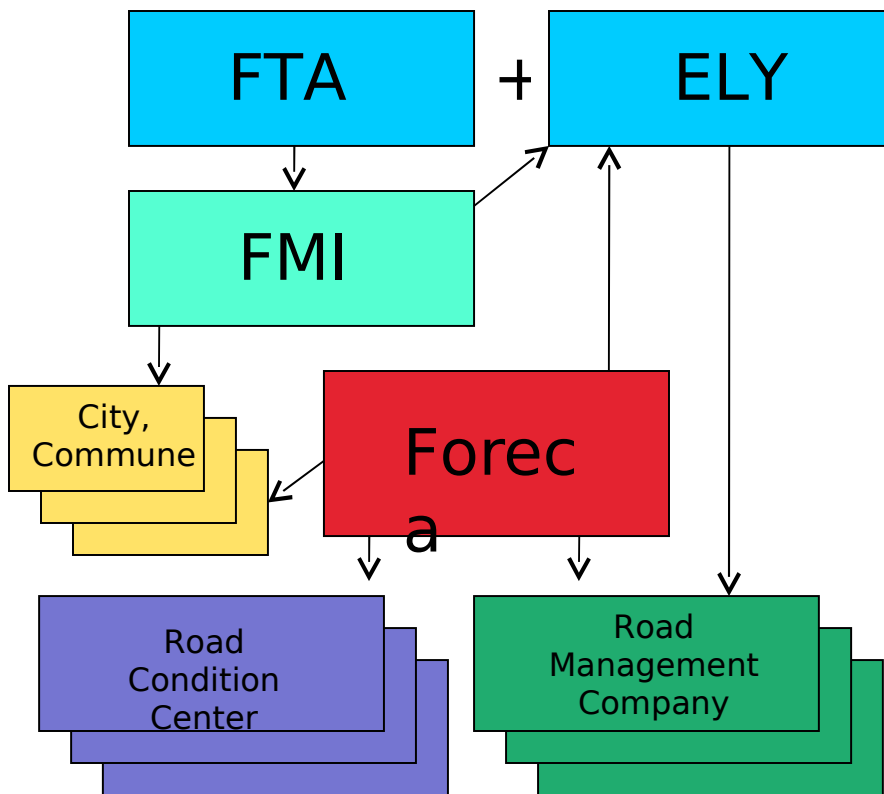
www.forecaconsulting.com

**ROADIDEA-INCO Seminar 24 September 2010 Environment
Canada**



Road Weather Service in Finland

"FinnRA"



Public administration:

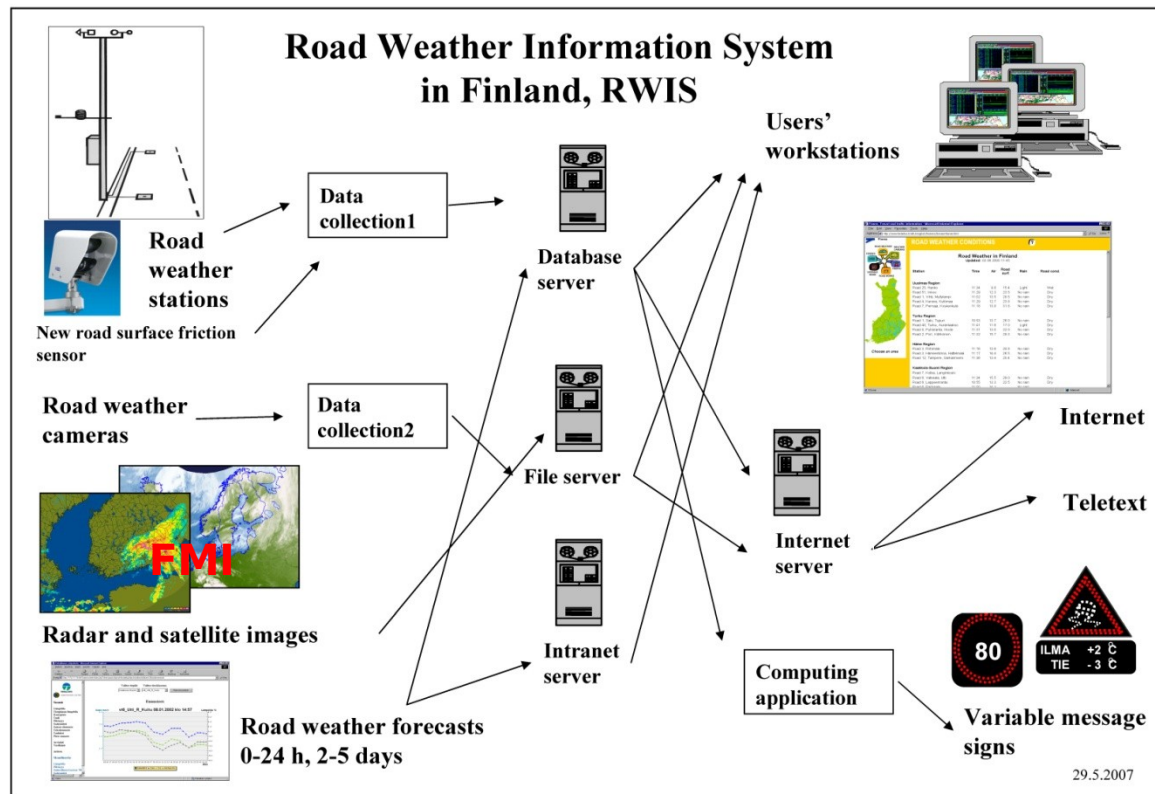
- **FinnRA** = Finnish Transport Agency **FTA** (administration) and **ELY**-Centres (executive) manage the national service
- Finnish Meteorological Institute **FMI** provides national warnings and satellite/radar pictures to FinnRA

Private companies:

- **Foreca** provides national road weather service for FinnRa, which gives the service to FTA information centers, road management and other stake holders
- Private **Road Condition Centers** do the decision making on maintenance actions
- Private **Road Management Companies** take care of winter road maintenance



FinnRA's Road Weather Information System



Foreca provides road weather forecasts and public web



Experts and model resources

- Well trained road weather forecasters
- Forecasting center open 24/7 during winter months
- Programmers well experienced in road weather data and products, latest IT techniques
- Foreca's own model production: **ETA** and **NCEP/WRF** with computing accuracy of 1-10 km. Kalman filtered with synoptic and road weather observations
- **METR_o** Road Condition forecast developed by Environment Canada
- Other available forecasting models (**HIRLAM**, **ECMWF**)



Data and work station resources

- Synoptic surface and upper-air observations via Finnish Met. Institute
- Road weather observations from the Finnish and Swedish and Baltic networks
- Nordic weather radar network NORDRAD, satellite data from METEOSAT and NOAA
- MAPS: Foreca's advanced production and work station system



Road weather forecasts as texts and tables

The screenshot displays the vip.foreca.com website interface. The main content area shows weather forecasts for Finland, including a 24-hour forecast for Helsinki and a 24-48 hour forecast for Lapland. A map of Finland is visible on the left side of the page.

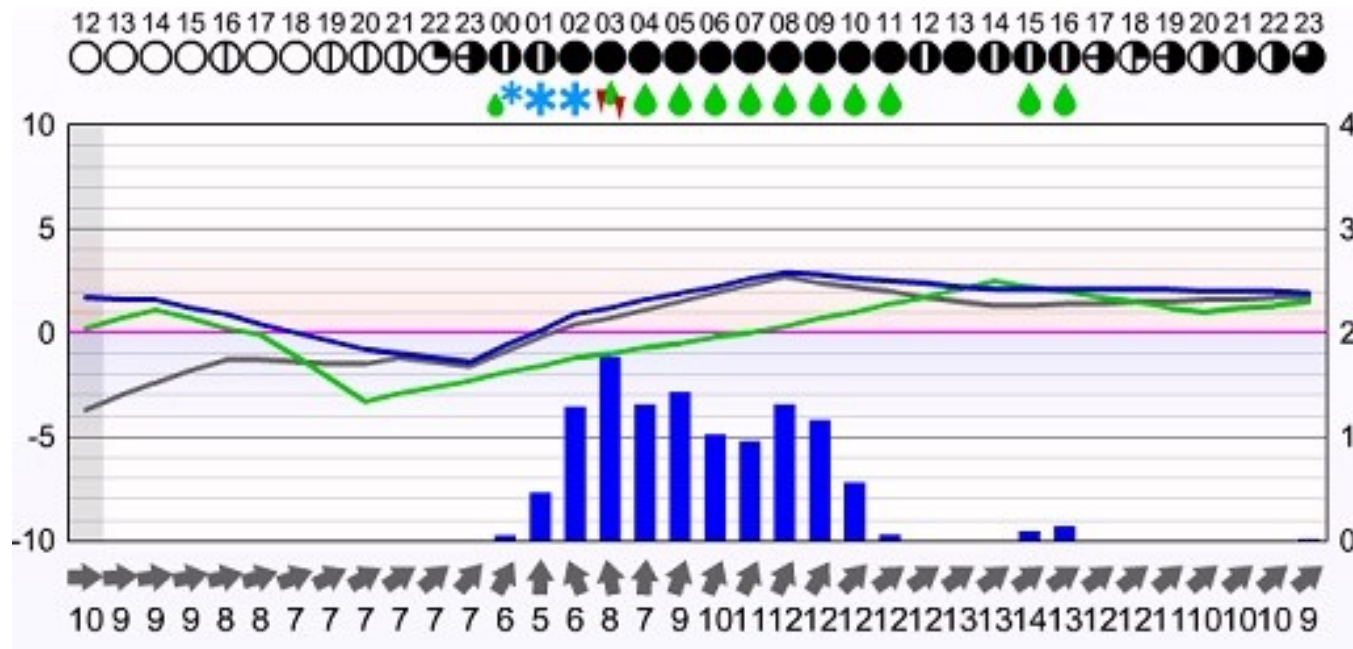
On the right side, there is a detailed weather forecast for the Arctic coast (Pohjois-Pohjanmaan rannikko) presented as a table:

Aika	Ilma [°C]		Tie [°C]		Tie-kastep.		PIN	Sade		Tuuli		Häv. asemia			
	min	max	min	max	min	max		[m/s]	12h	Otom.	max h		tr[%]		
02.10.15:00	8.0	11.1	9.1	12.8	0.2	2.2	-	0.0	0.0	0.0	-	350	0		
02.10.18:00	8.0	11.0	8.8	11.5	-0.1	1.5	8	0.2		V	0.3	54	174	1	
02.10.21:00	6.8	9.1	7.9	10.6	-0.8	2.2	7	0.2		V	0.4	42	136	1	
03.10.00:00	6.3	8.7	6.5	9.3	-0.7	1.2	7	0.5		V	0.5	64	157	1	
03.10.03:00	6.2	8.5	5.8	8.5	-2.2	1.3	7	0.3	1.3		V	0.5	55	135	1
03.10.06:00	5.4	8.6	5.5	7.4	-2.9	1.4	7	0.1			V	0.2	29	127	1
03.10.09:00	6.3	8.5	5.9	8.9	-2.5	2.5	7	0.1			V	0.3	44	135	1
03.10.12:00	7.4	10.4	11.8	14.9	3.9	6.0	6	0.1			V	0.3	49	136	1
03.10.15:00	8.0	9.8	13.8	16.8	5.0	7.8	7	0.2	0.6		V	0.3	60	113	1

Below the table, it states: "Sivu päivitetty ma 02.10.15:18."



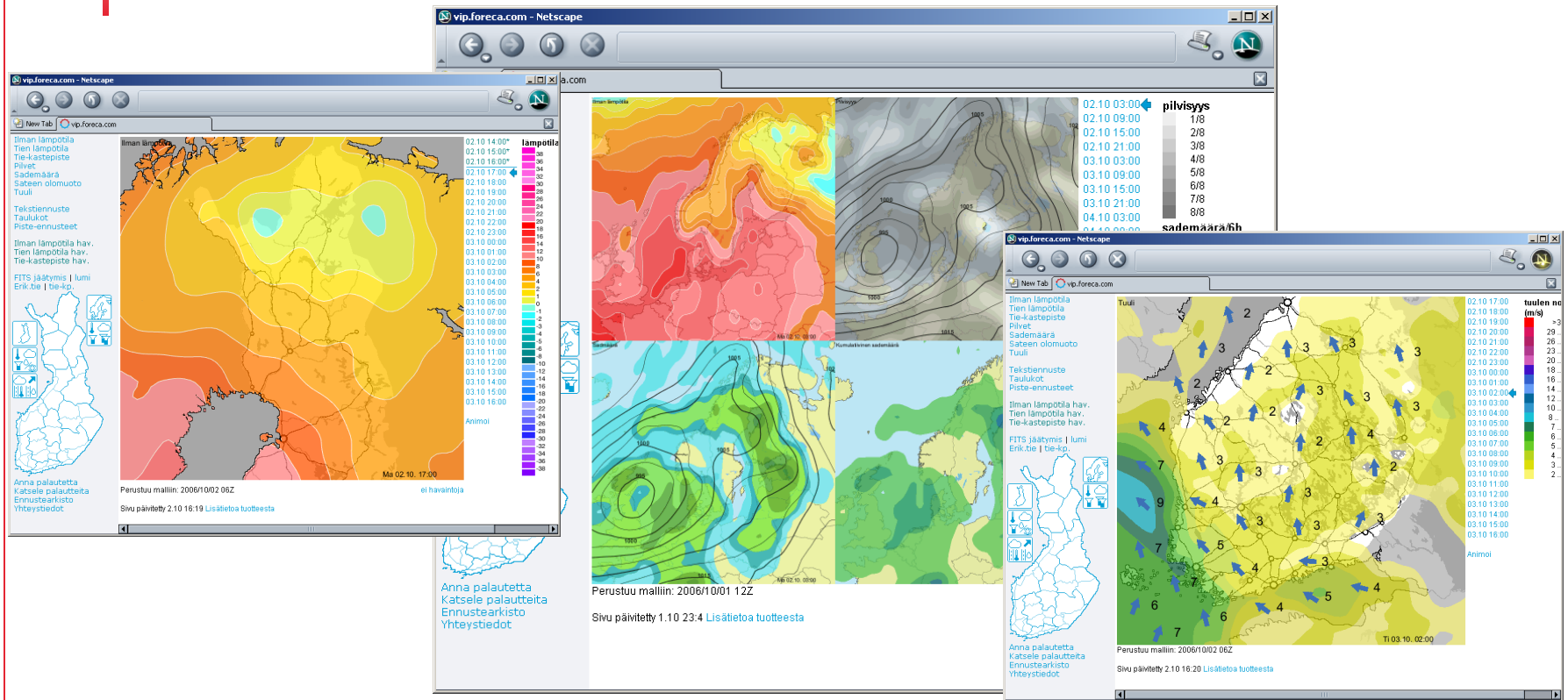
Very accurate point forecasts



- Processed since 2010 with METRo to all over 500 Road Weather Stations



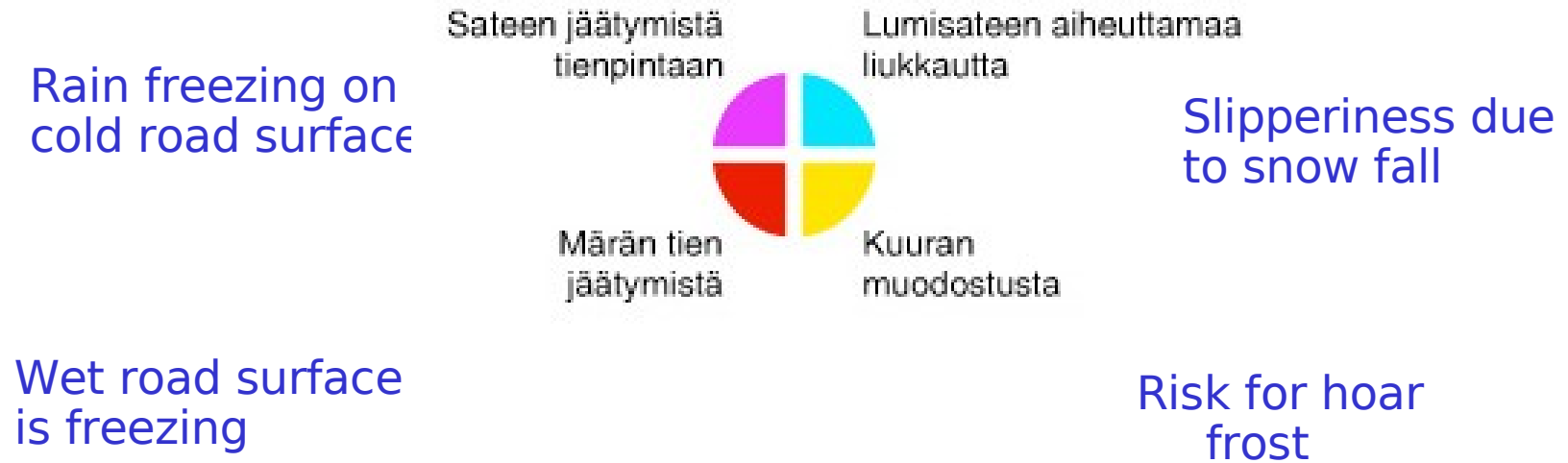
Observation and forecast loops



Weather parameters in various geographic and time scales



Road condition warnings

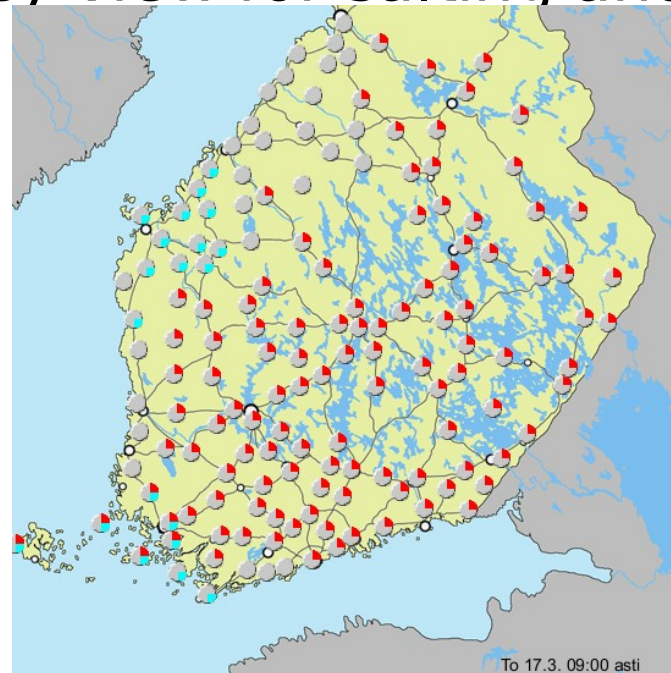
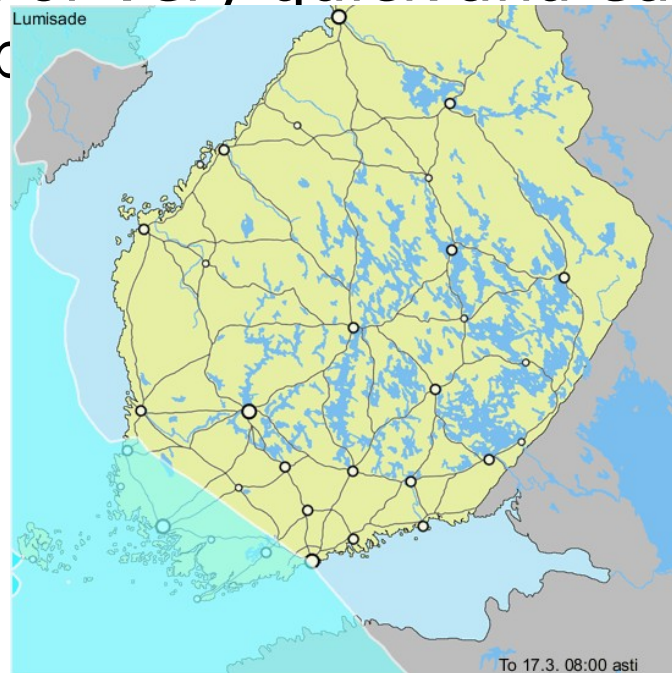


- Colour codes tell if a warning is issued for a two hour period

Risk charts for slipperiness and

snow

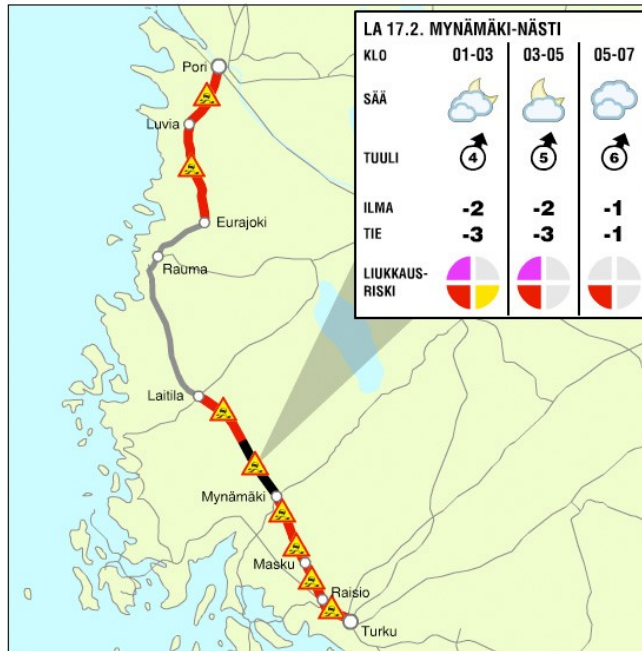
- Developed in national FITS programme in 2002-2003
- For very quick and easy view for salting and





Develop & test future weather services

TIE 8 TURKU - PORI LIUKKAUSRISKIENNUNSTE (PILOTTI)



Kartalla oleva liukkausriskiennuste on ennuste seuraavalle kuudelle tunnille.

Liikuttamalla hiirtä tien päällä saat tarkemman ennusteen, joka sisältää:
 -Sääennusteen [lisätietoa]
 -Ilman lämpötilan [lisätietoa]
 -Tienpinnan lämpötilan [lisätietoa]
 -Tuuliennusteen [lisätietoa]
 -Tarkemman liukkausriskiennusteen

Liukkausriskiennuste kertoo sään muutoksesta johtuvan tien pinnan keliriskin lähitunteina.
 Värien selitteet:

Sateen jäätymistä tienpintaan
 Lumisateen aiheuttamaa liukkausta

 Märän tien jäätymistä
 Kuuran muodostusta

Tien kunnossapitotoimenpiteet vähentävät tai poistavat ennustetun riskin toimenpideajan puitteissa, joka vt 8 välillä Turku - Pori on yksi tunti.

Mobiiliversio löytyy osoitteesta
mobile.foreca.com/vt8

[anna palautetta]



Päivitetty: 17.2.2007 01:37

- Service for 10 km road stretches: weather, road conditions and risk for slipperiness

Low friction slipperiness

FORECA



- Slipperiness is the largest wintertime risk for driving
- But friction may vary considerably across the road or on different roads on a same day
- Measuring and analysing friction on the road network is a very complicated issue!

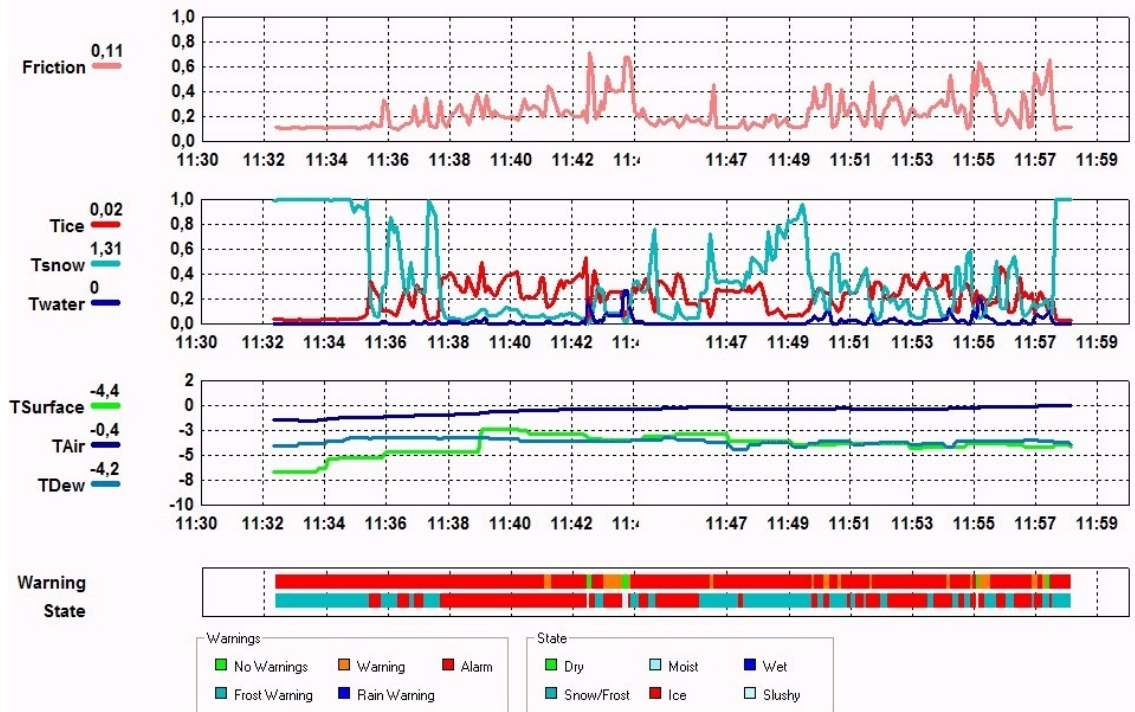
Mobile monitoring of road conditions

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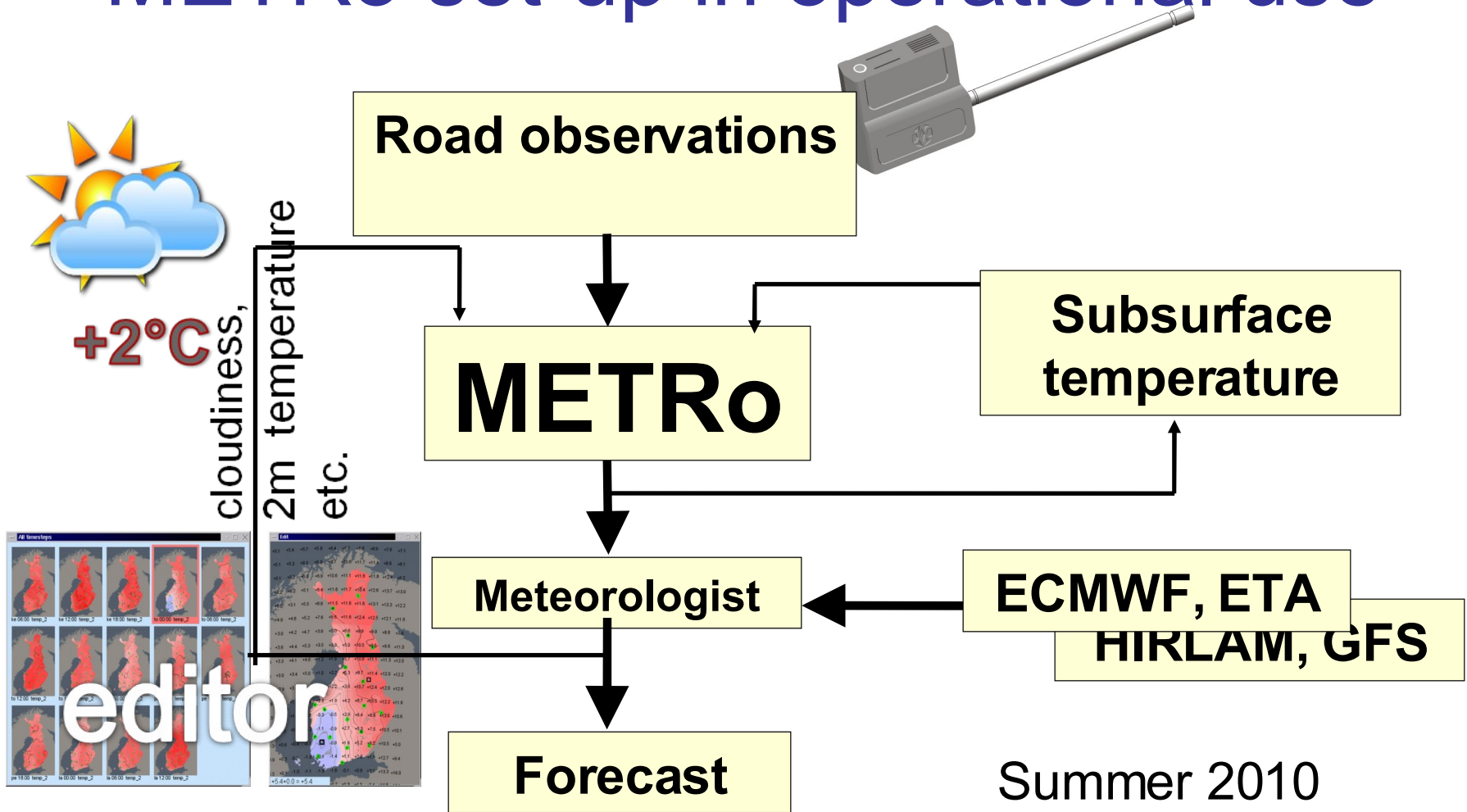
- Vaisala DSC111 and DST111 optical sensors used in a mobile unit mounted on a car
- DSC111 measures amount of water, ice and snow (mm) and calculates friction
- DST111 measures surface temperature and moisture
- Measuring resolution is 3 sec at best (70 m at 80 km/h)
- Very accurate and detailed measurement results

Developing mobile friction observing



- In ColdSpots and ROADIDEA 2006-2010, advanced mobile observations generated automated warnings for slipperiness

METRo set-up in operational use

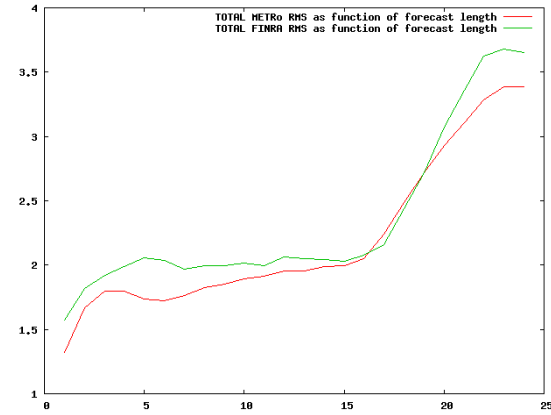
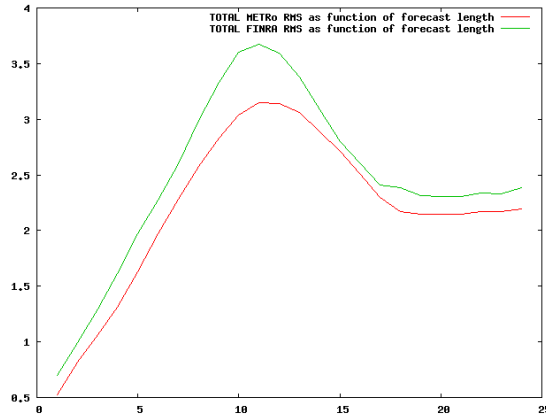


Summer 2010

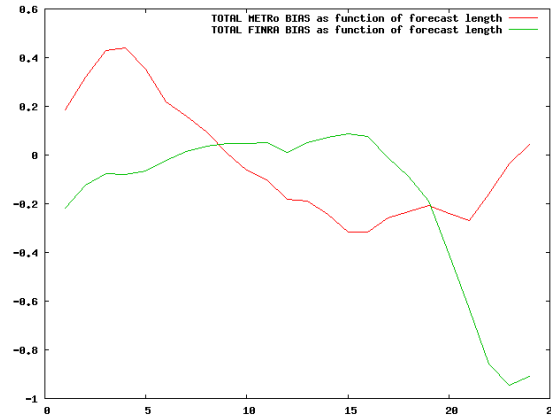
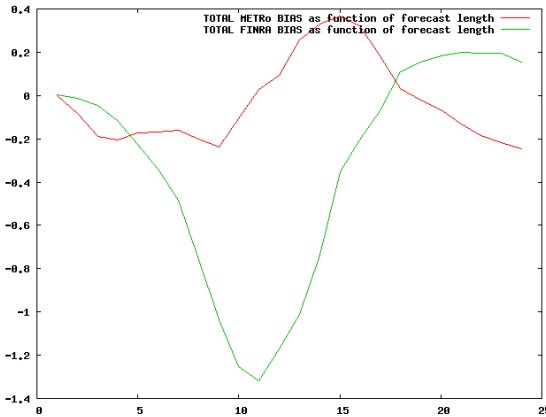


Verifications winter 2009-2010 Sep- May

RMS



Bias



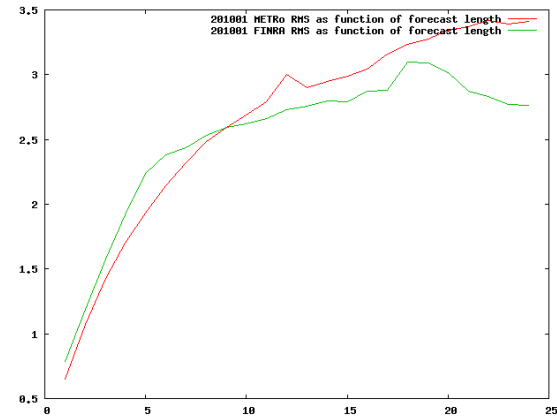
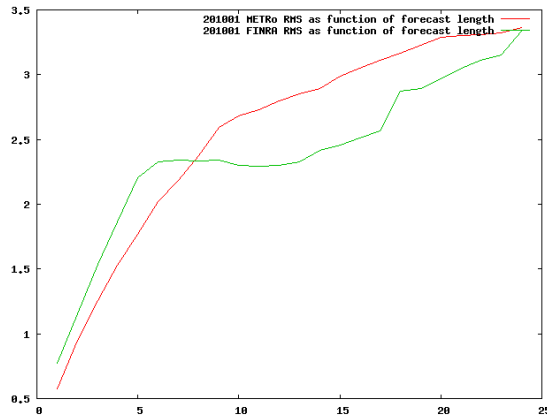
00 UTC analysis

12 UTC analysis

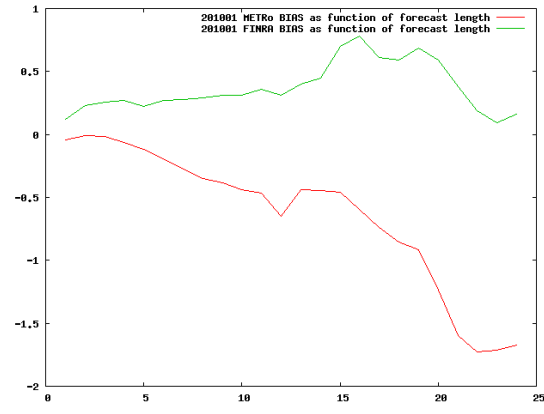
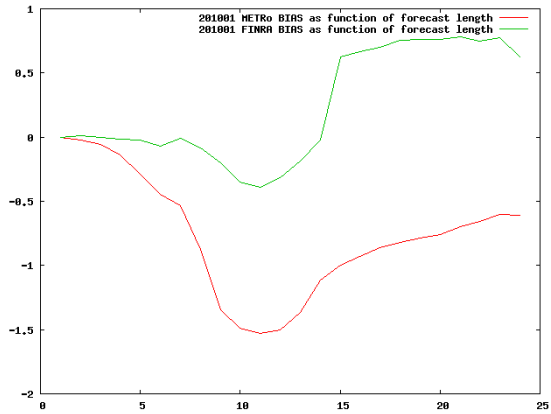


Verifications Jan 2010 (very cold)

RMS



Bias



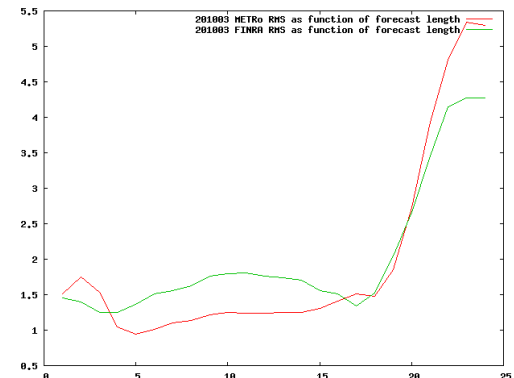
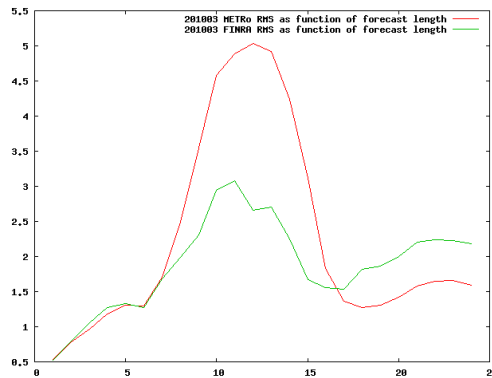
00 UTC analysis

12 UTC analysis

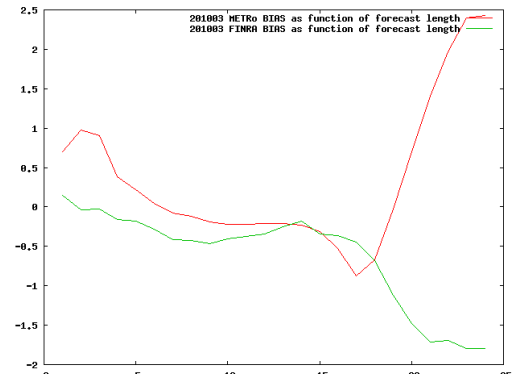
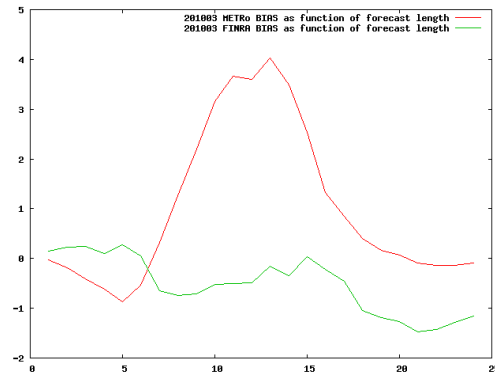


Verifications Mar 2010 (warm)

RMS



Bias



00 UTC analysis

12 UTC analysis

METRo wish list

1. Road maintenance operations into station config: we know the maintenance level of each road segment, which defines:
 1. **Whether salt is used** and how much. Typically salt is used, so maybe just a quick hack: freezing point to -6. But in groundwater preservation areas...
 2. **How soon snow is plowed** and for which snow depth threshold (e.g. within 1h if over 1 cm accumulates)
2. Bedrock or moist soil as a road layer type. 15% to 25% of Finland is swamp, and the rest of the country is rather moist too.
3. Traffic figures into station config: we know the hourly traffic profile for each station. Also forecasts available, so perhaps a traffic parameter in atmospheric forecast file: cars_per_hour

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