ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

SRNWP at FMI

Markku Kangas, Kalle Eerola, Sami Niemelä, Marjo Hippi & Timo Vihma

OPERATIONAL

SRNWP SUITES	HIRLAM v7.4 "RCR"	HARMONIE Cy36h14 "AROME"
Mesh size	7.5 km	2.5 km
Number of grid points	1036 * 816	300 * 600
Number of levels	65	65
Initial times	00/06/12/18 UTC	00/06/12/18 UTC
Upper air analysis	4D-var	3D-var
Surface analysis	Optimal interpolation	Optimal interpolation
Nestor forecast	ECMWF IFS, hh - 6 h	ECMWF IFS, hh - 6 h
LBC frequency	3 h	3 h

COMPUTING RESOURCES

Cray XT5m : 2 identical clusters, each with 1996 cores, 2680 GB shared memory

Peak performance 17.3 TFlop/s for each cluster, ca 35 Tflops/s total

HIRLAM RCR74 –> HARMONIE
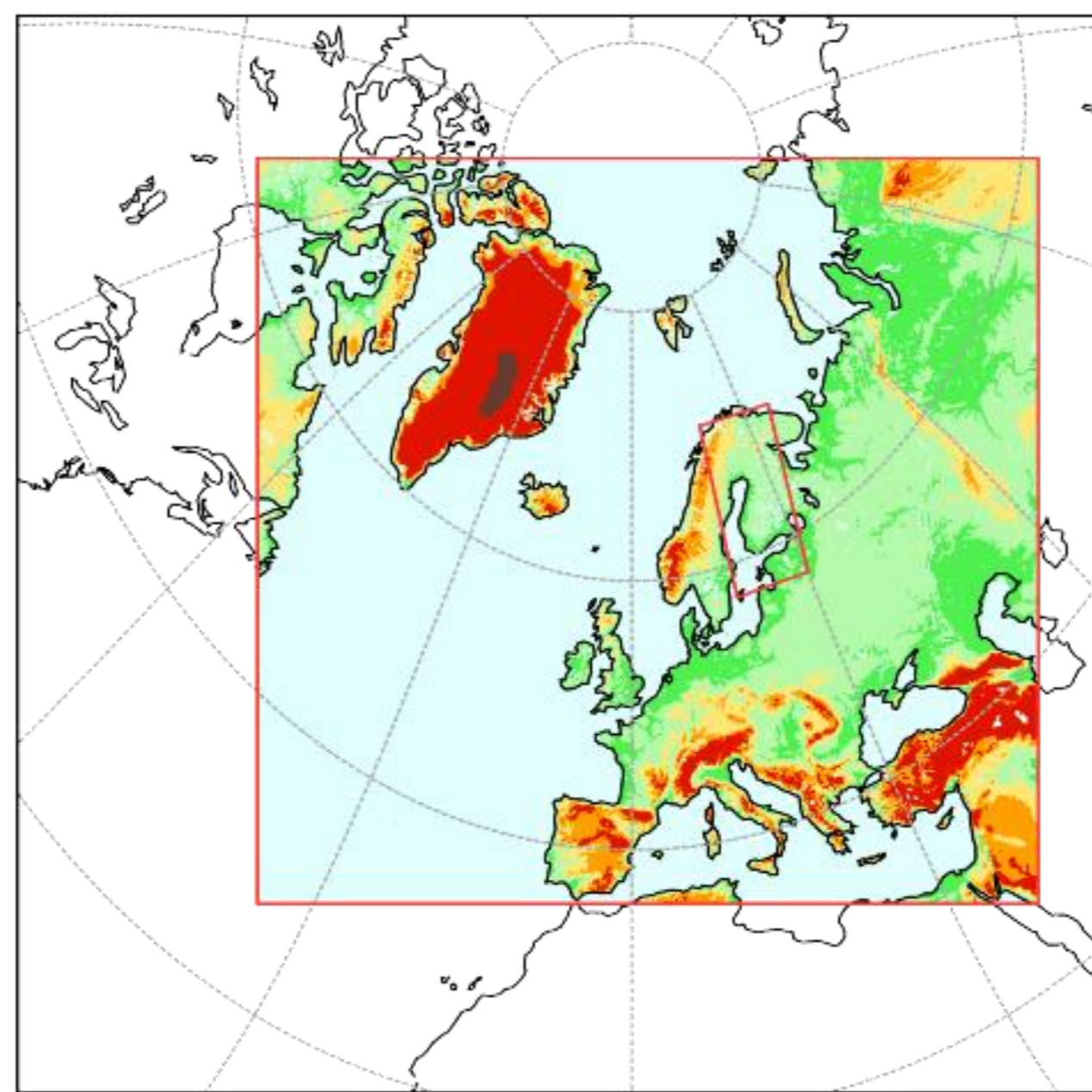
DOWNSTREAM & RELATED APPLICATIONS

SILAM dispersion and CTM model - POLLEN - FAS - DMAT	Particle dispersion, jointly with the Radiation and Nuclear Safety Authority STUK Chemical transport modelling	Nuclear emergency preparedness Forest fires Volcanic ash Long-range pollen transport SO_2, NO, O_3, CO, PM_{10}, $PM_{2.5}$, concentrations and deposition
HILATAR	Eulerian regional transport	SO_x, NO_x, NH_x, toxic metals, dust
Road model	State of road surfaces and pedestrian pavements Intelligent traffic applications	
Marine models	Baltic wave forecasts	WAM
	Sea level at Finnish coast	Wetehinen, Hansen, OAAS
	Baltic ice models	HIGHTSI, Helmi 2d
	Baltic circulations models	MITgcm, HBM, NEMO
Hydrological models	Managed by Finland's environmental administration SYKE	
LAPS	Analysis & prediction system	In test use with Harmonie

MODEL VERIFICATION
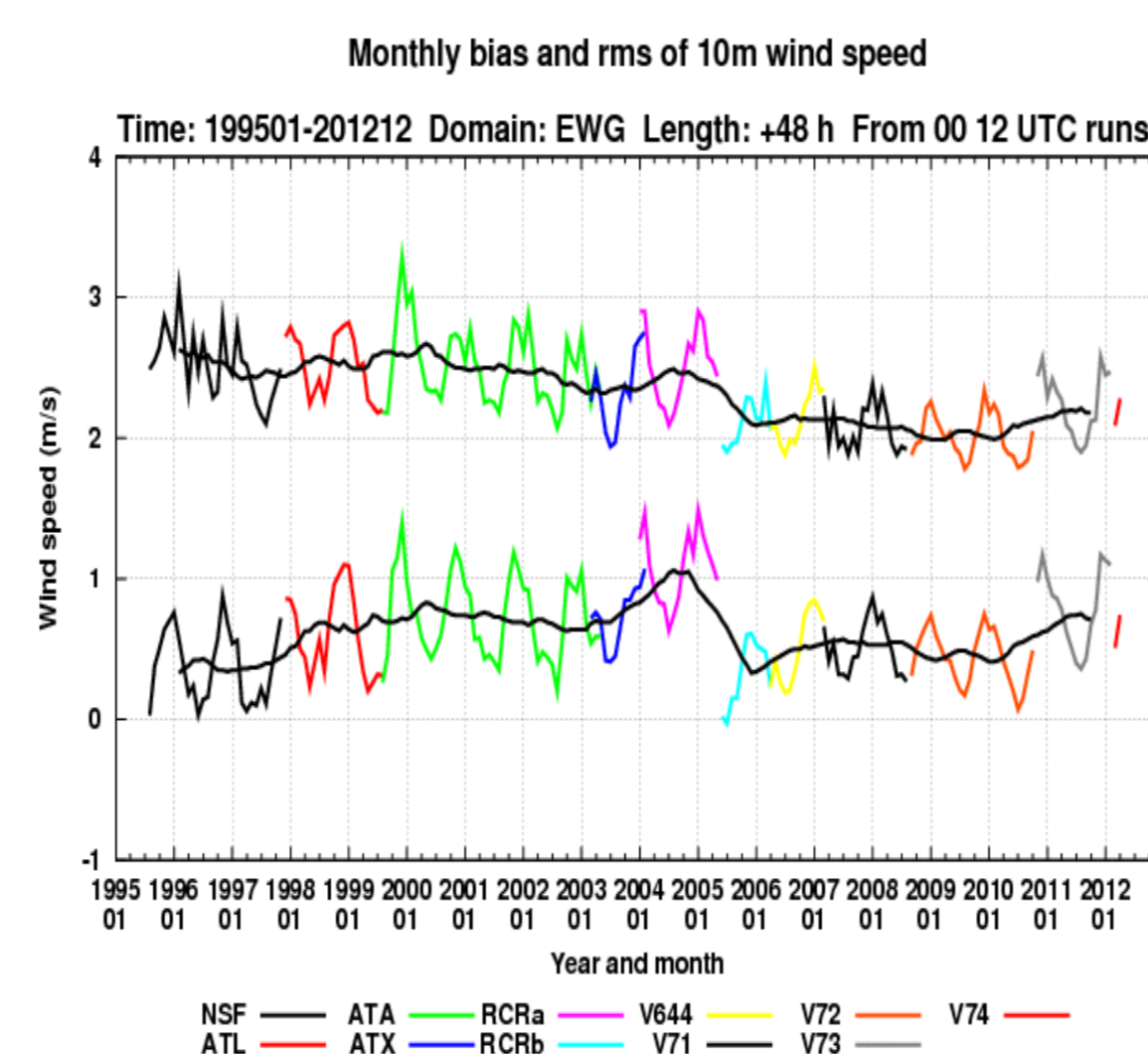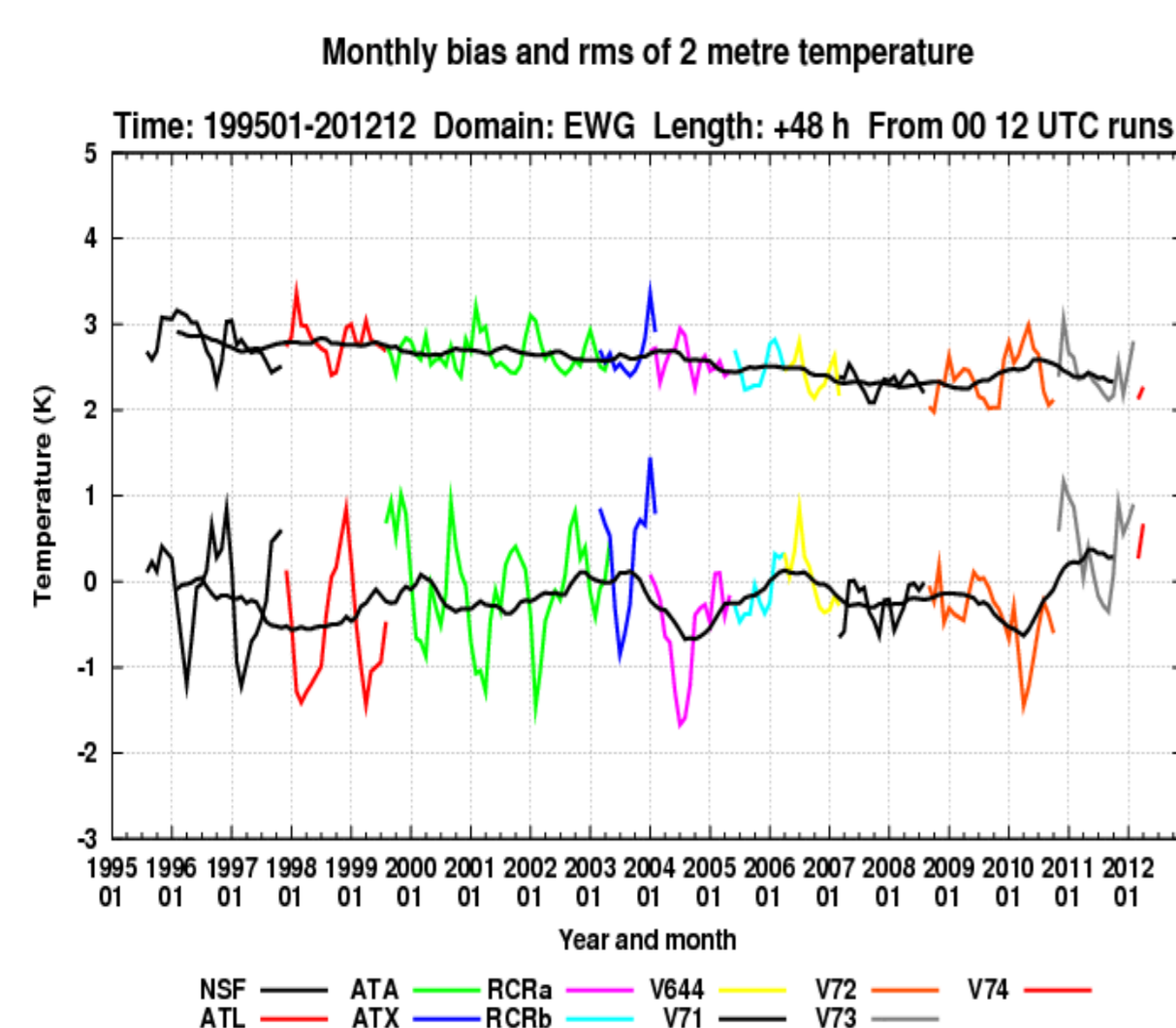
HIRLAM long-term verification for T_{2m} and V_{10m} years 1995 - 2012
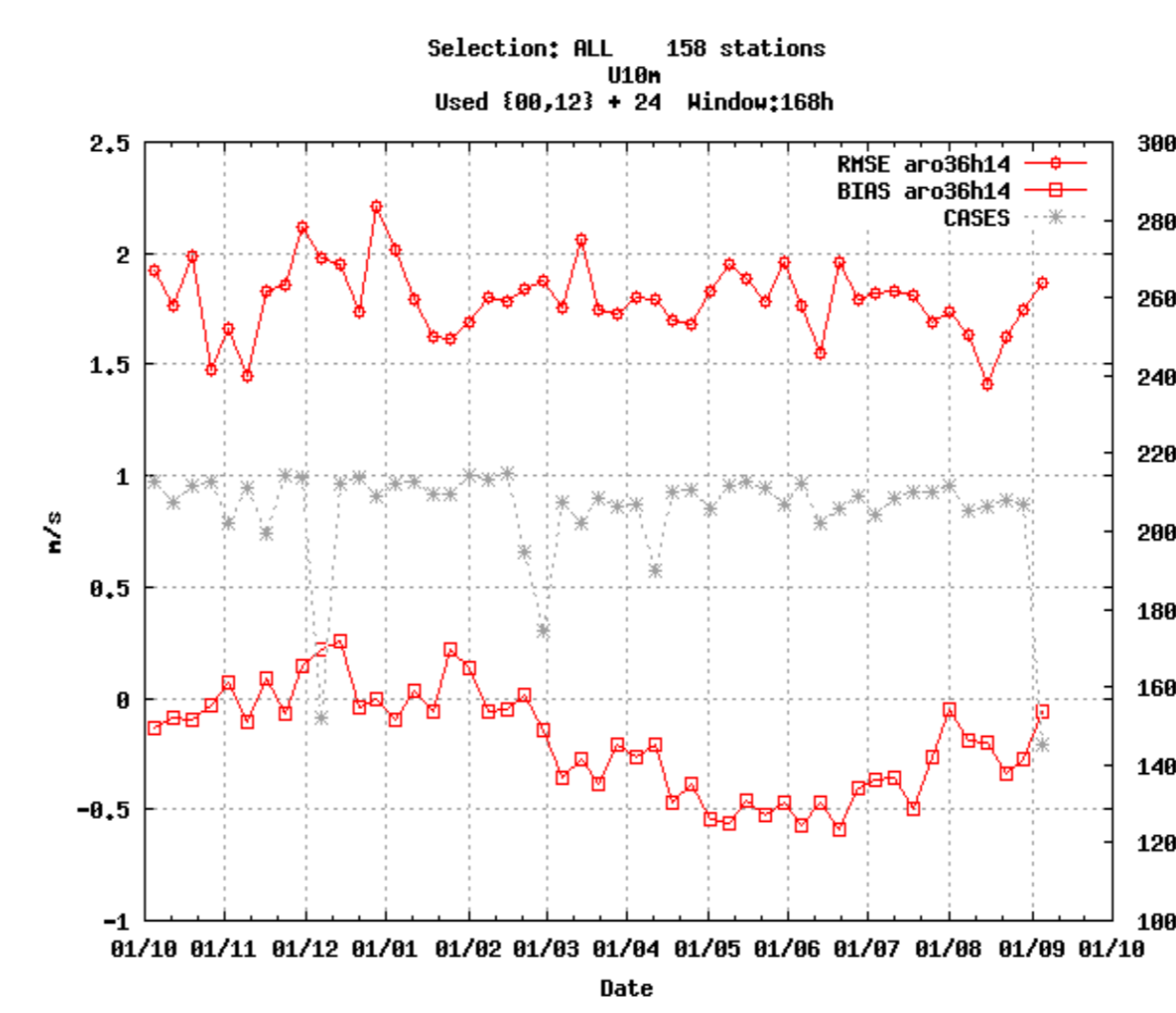
HARMONIE (cy36h14) verification for T_{2m} and V_{10m} 10/2011 – 9/2012
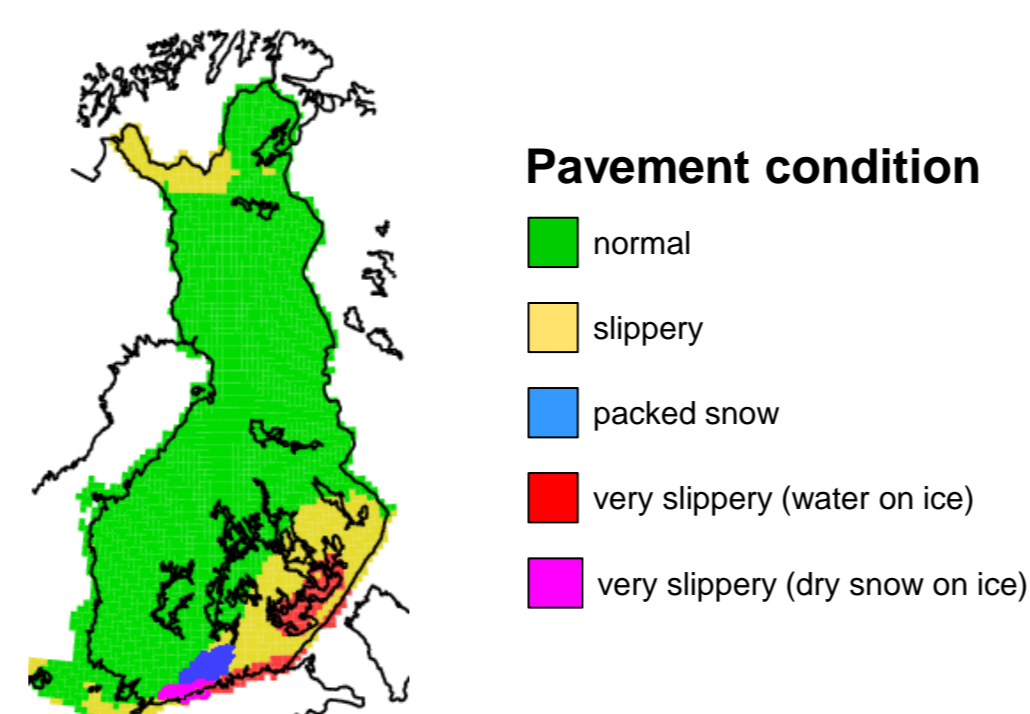
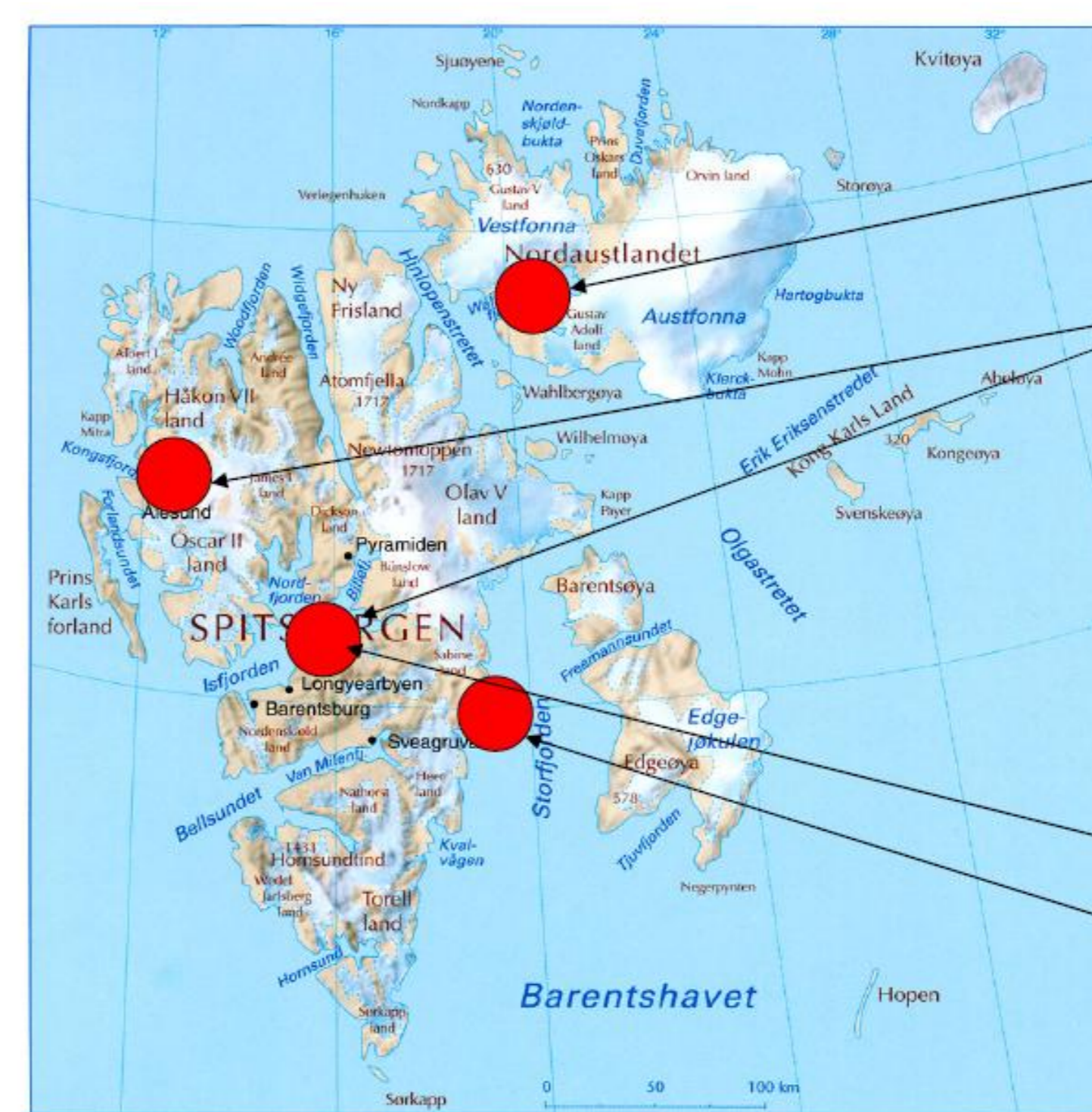## HIGHLIGHTS

Pedestrian sidewalk condition modeling

- Predicting pedestrian sidewalk surface conditions from the viewpoint of pedestrians during winter
- Slippery pavements significant health issue => need for warnings
  - 70 000 people a year injured in Finland
  - economic losses estimated at € 2400 million (Technical Research Centre study)
- Based on the FMI Road Weather Model
  - Surface condition interpretation tuned to meet pedestrian needs

THE MOST SLIPPERY CASES FOR PEDESTRIANS
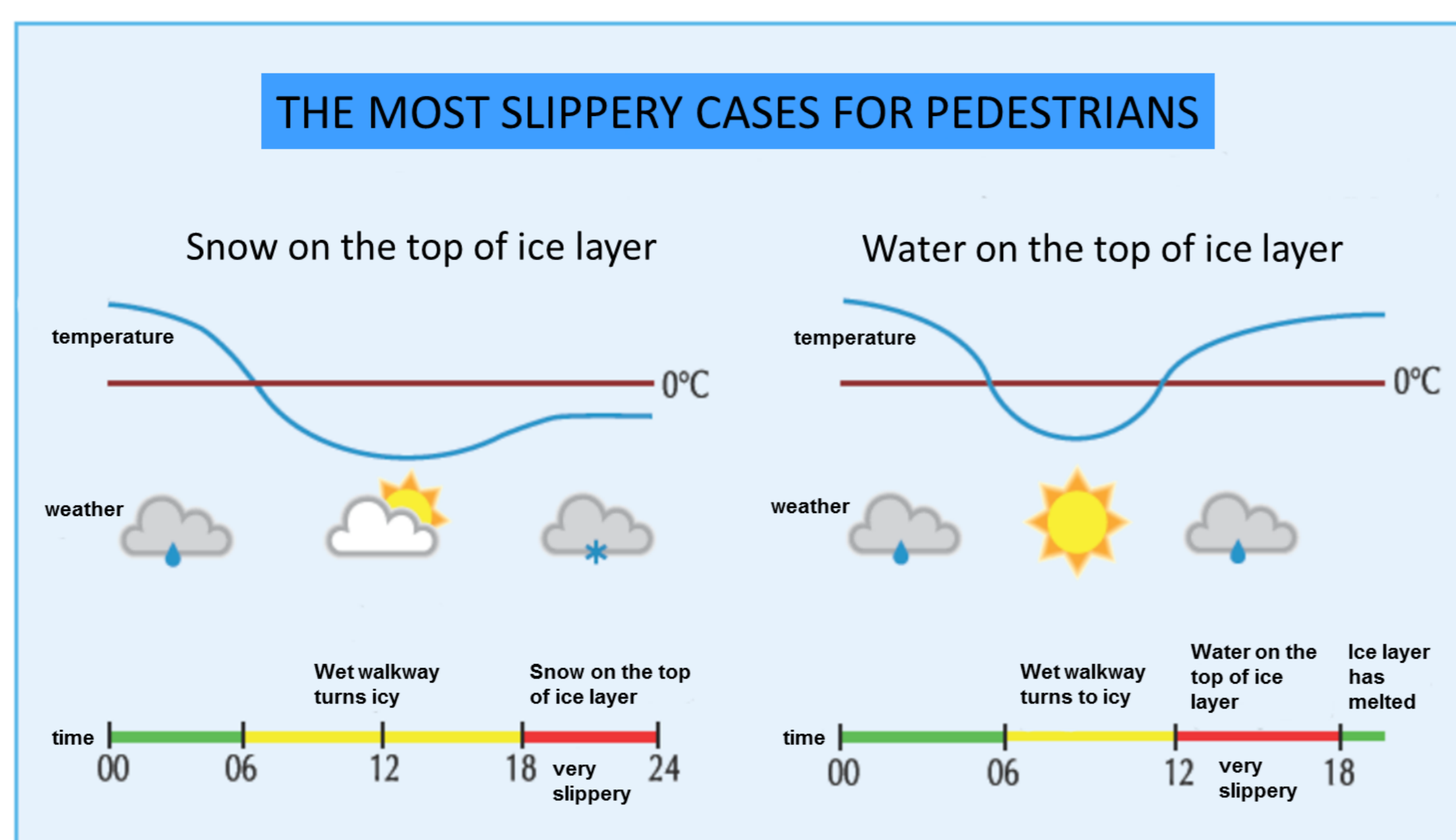
- 5-valued surface condition classification
- In operational use since 2003
- Used as an aid when issuing sidewalk slipperiness warnings by FMI

Pavement condition
- normal
- slippery
- packed snow
- very slippery (water on ice)
- very slippery (dry snow on ice)

Arctic and Antarctic modeling

Wahlenbergfjorden, 2006, 2007: surface fluxes and topographic effects on the ABL (Mäkiranta et al., 2011)

Kongsfjorden and Isfjorden 2009: ABL structure: temperature inversion and low-level jets; observations and modelling (Vihma et al., 2011; Kilpeläinen et al., 2012)

All Svalbard: Modelling of spatial variability and topographic effects over fjords (Kilpeläinen et al., 2011)

Isfjorden 2010

Srorfjorden, 2008-2009

Next: participation in research aircraft campaigns in 2013 with AWI and BAS

Collaboration between FMI, UNIS and University of Tartu

Antarctic studies

- Wintertime stable boundary layer in the Antarctic: Polar WRF experiments (Tastula et al., 2011)
- Convective ABL over an Antarctic coastal polynya
- Surface energy budget, temperature inversions, and low-level jets over Antarctic sea ice (Tastula et al., 2012)
- Gravity waves generated by Antarctic nunataks (Valkonen et al., 2010)