

Verification of different precipitation forecasts during extended winter-season in Estonia

Aarne Männik Estonian Meteorological Hydrological Institute,
University of Tartu

Merike Merilain Estonian Meteorological Hydrological Institute

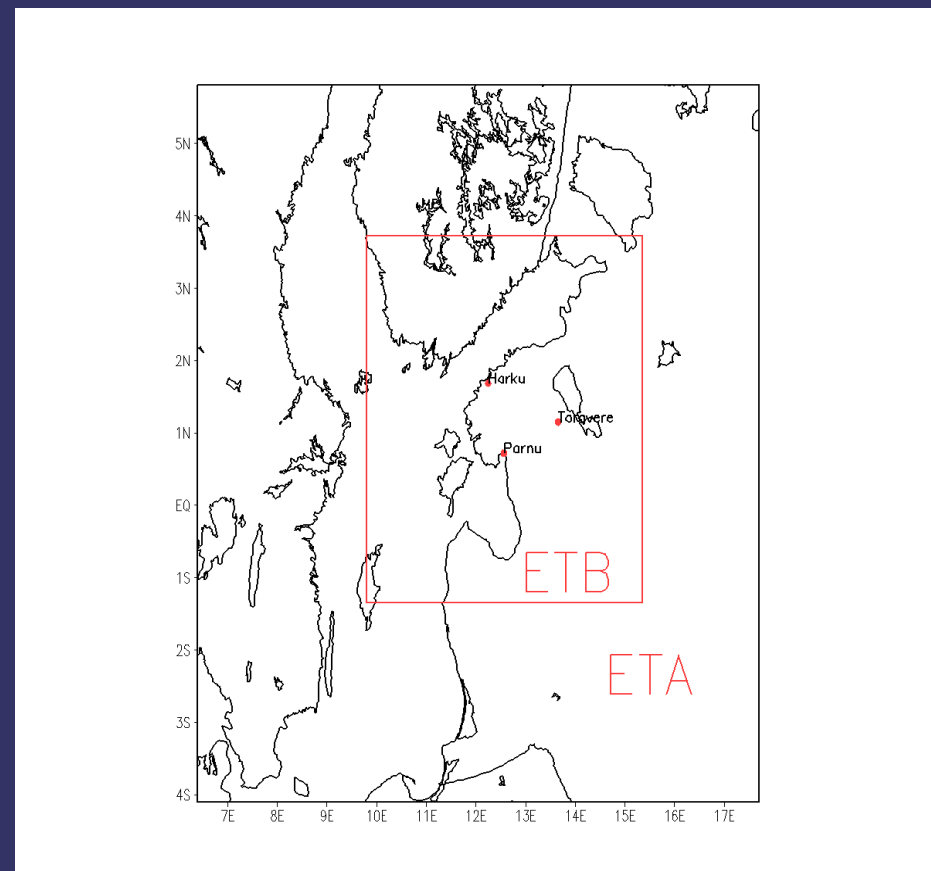
Method

- ⇒ Verification period is from 1. November 2006 to 31. March 2007
- ⇒ Precipitation amounts $< 0,1$ mm/12h are classified as no precipitation
- ⇒ 00 GMT forecasts from ECMWF and HIRLAM
- ⇒ 06 and 18 GMT accumulated precipitation observations (12h)
- ⇒ Duty forecast for national TV in the evening (night and tomorrow day)
- ⇒ 3 stations Tõravere, Harku and Pärnu

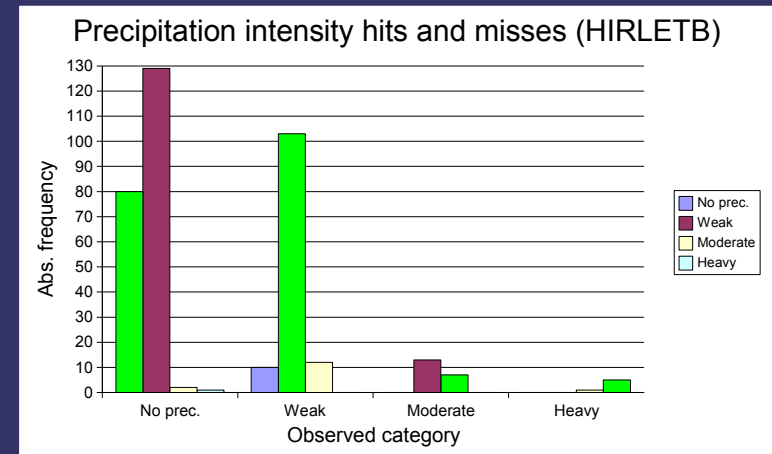
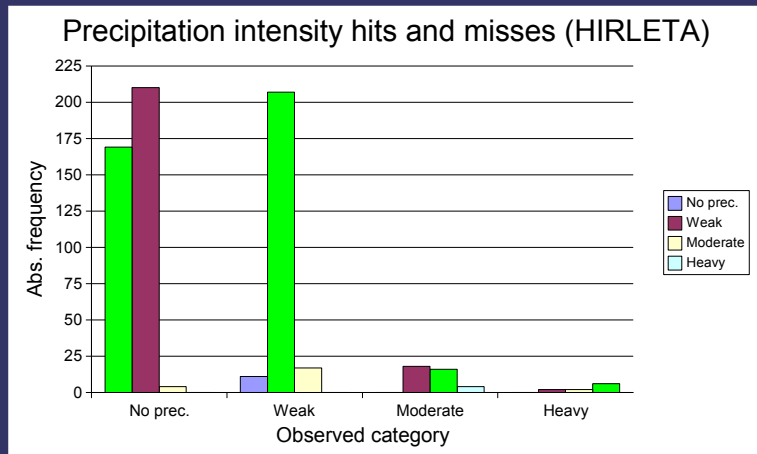
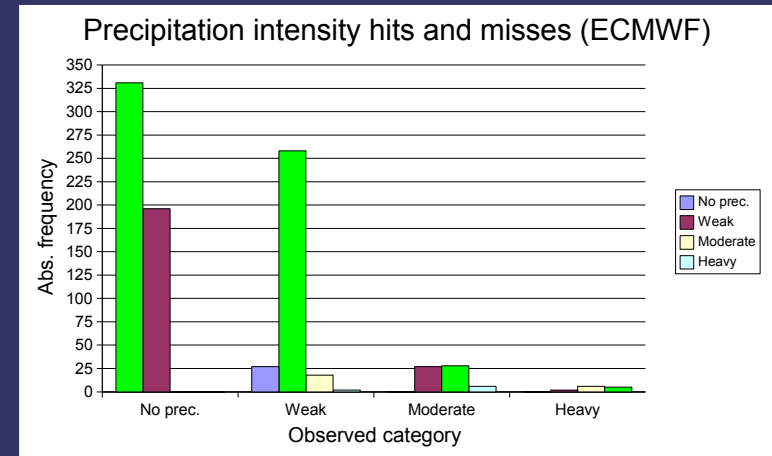
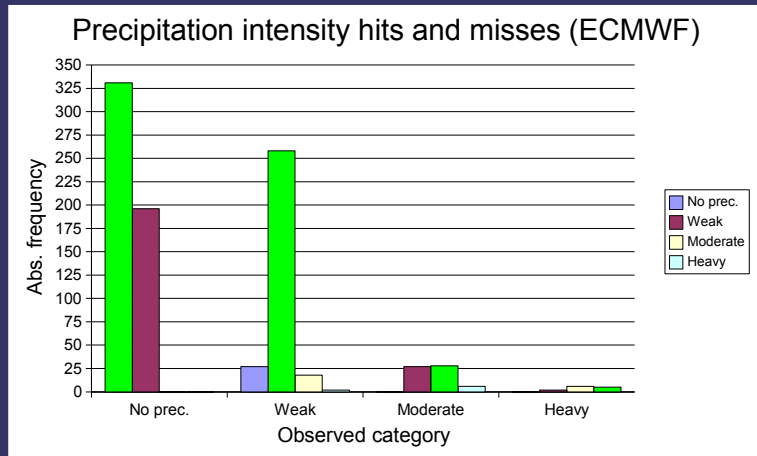
	Weak (mm/12h)	Moderate (mm/12h)	Heavy (mm/12h)
Rain	0 - 4	$4 < x < 15$	≥ 15
Sleet	0 - 3	$3 < x < 7$	≥ 7
Snow	0 - 3	$3 < x < 7$	≥ 7

HIRLAM areas in EMHI

- ➔ ETA 114×100×40
 - 11.1 km resolution
 - HS SISL $\Delta t=400s$
 - 54h 4 times a day
- ➔ ETB 186×170×40
 - 3.3 km resolution
 - NH SISL $\Delta t=120s$
 - Continuous 36h forecasts at 00 and 012 GMT + 6h forecasts to maintain analysis cycle
- ➔ HIRLAM 6.4.0 (since October 2005)
 - 3DVAR
 - NMI
 - STRACO, CBR, Savijärvi radiation

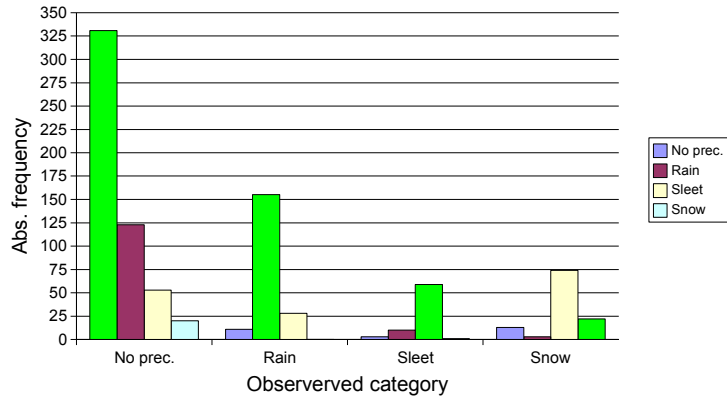


Precipitation intensity hits/misses

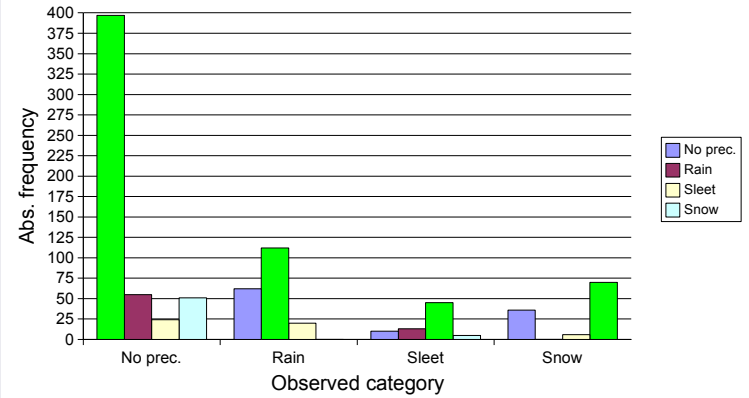


Precipitation phase hits/misses

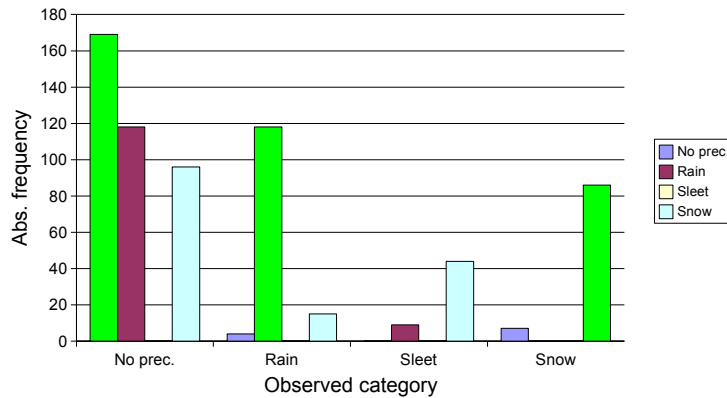
Precipitation phase hits and misses (ECMWF)



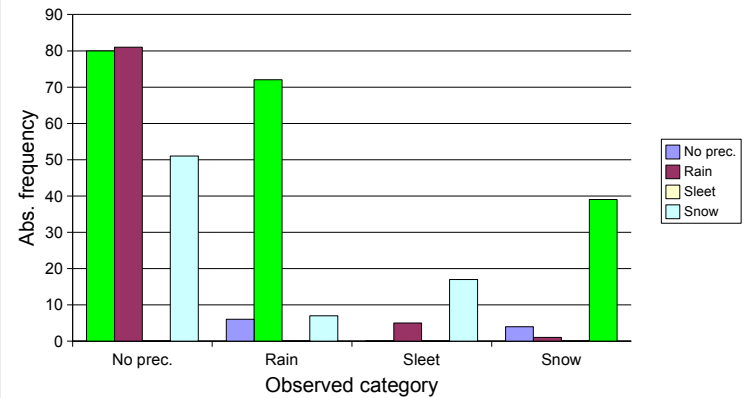
Precipitation phase hits and misses (SYNOPT)



Precipitation phase hits and misses (HIRLETA)

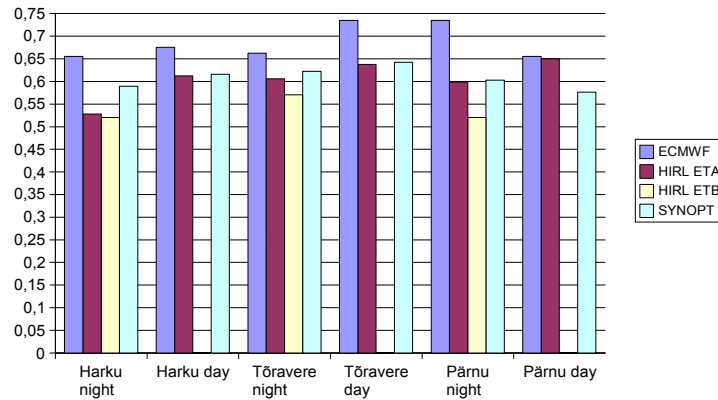


Precipitation phase hits and misses (HIRLETB)

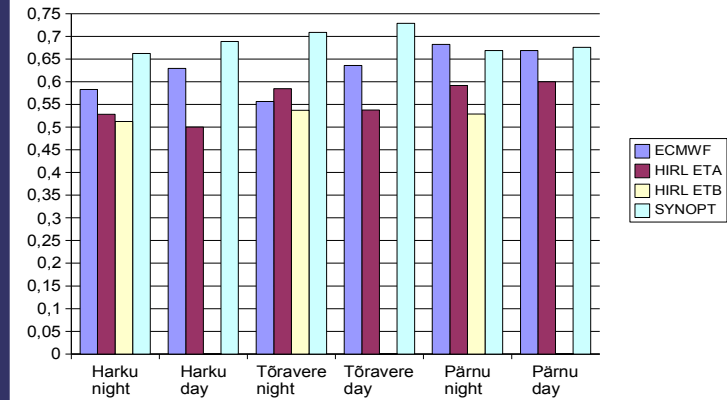


Verification scores

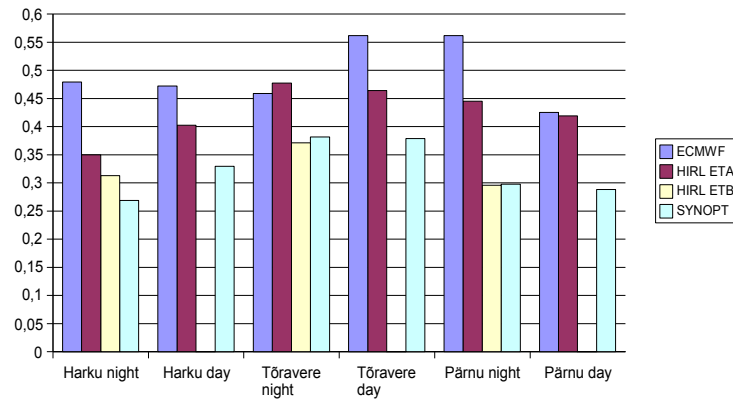
Proportion correct for precipitation intensity



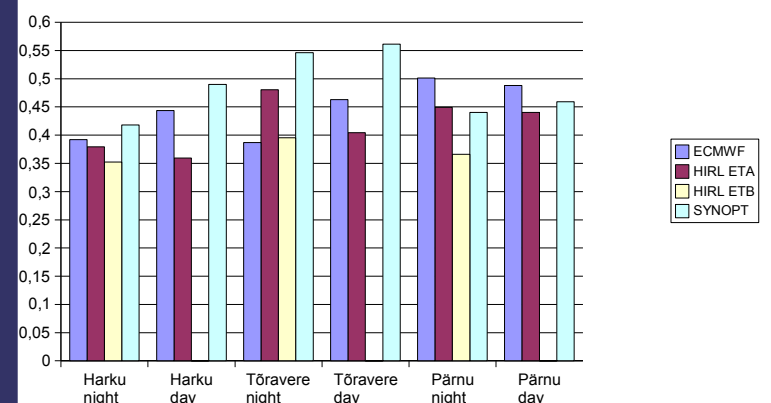
Proportion correct for precipitation phase



KSS of precipitation intensity



KSS of precipitation phase



Scores for heavy precipitation intensity

	POD	FAR	ETS	Nr. of events
ECMWF	0,38	0,72	0,23	13
Duty forecaster	0	1	0	13
HIRLAM ETA	0,6	0,4	0,42	10
NHHIRLAM ETB	0,83	0,17	0,71	6

Conclusions (I)

- ➔ Percentage of correct forecasts for precipitation intensity and phase is approximately 69 %.
- ➔ Duty forecasters add value to precipitation phase forecast.
- ➔ According to KSS numbers all models outperform duty forecasters when precipitation intensity is evaluated. Which is not the case when PC score is used.
- ➔ Models do not have adequate built in framework to distinguish sleet from snow and rain. ECMWF models over-predicts significantly sleet at the expense of snow forecast. HIRLAM has capability only to separate snow and rain.
- ➔ Usage of a diagnostic scheme to NWP output should be evaluated to better separate different precipitation phases.
- ➔ HIRLAM heavily over-predicts precipitation intensity for no precipitation events. Heavy precipitation events were captured very well.

Conclusions (II)

- ⇒ High resolution model NHHIRLAM suffers from the same problems as lower resolution HIRLAM and even in greater extent.
- ⇒ Duty forecasters under-predict weak precipitation ranges preferring to use moderate or no precipitation categories.
- ⇒ Duty forecasters tend to neglect heavy precipitation ranges.