



PNOWWA* project and Engage Challenge 3 **

* = Probabilistic Nowcasting of Winter Weather for Airports

** = **Efficient provision and use of meteorological information in ATM**

Heikki Juntti
Finnish Meteorological Institute (FMI)

2018



Founding Members



PNOWWA = Probabilistic Nowcasting of Winter Weather for Airports



Finnish
Meteorological
Institute

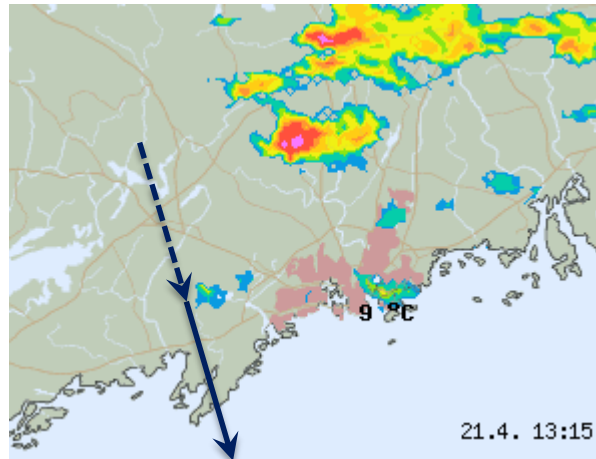
Austrocontrol

Deutsches Zentrum
für Luft- und
Raumfahrt (DLR)

Nowcasting with extrapolation of radar images in PNOWWA

Comparing three approaches:

- Andersson
- RAVAKE
- STEPS



Common principle:

Time= distance/speed

Example:

storm 75 km away,

moving 50 km/h

arrives in 90 minutes

15	30	45	60	75	90	105	120	135	150	165

.....dry..... snow...maybe

Weather radar echoes extrapolations gives value to ATM, but there is still needed development to further improve methods

PNOWWA Scientific demo 2017-2018



- On line service with automatic update at 15 min period
- Tailored products to:
 - Runway maintenance
 - De-icing agents
 - Tower
- Forecasted probability of snow and freezing for next 3 hours at 15 min interval

conclusion

It is possible to produce probabilistic nowcast of winter weather, but how it could be used efficiently at airport procedures of different stakeholders?
COMMON PROJECTS BETWEEN MET AND ATM NEEDED

FMI Ilmanet Finavian testikäyttäjä

Winter weather forecast for airports

EFHK EFRO

Kaikki SESAR-2020 PNOWWA -projektissa kehitetty tieto ja tuotteet on kehitetty peikostaan tieteelliseen tutkimustarkoitukseen, eikä niitä pidä käyttää missään olosuhteissa operatiiviseen palveluun. Näitä tietoja ei ole validoitu tai hyväksytty sellaiseen käyttöön. Palvelun ja tiedon tuottajat eivät ole missään vastuussa palvelun sopimattomasta tai luottamusta käyttämisestä tai niiden aiheuttamista asioista.

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RUNWAY MAINTENANCE (UPDATED 2017-02-22 16:15:00 UTC)

accumulation% dry snow, mm/15min	0-15 min	15-30 min	30-45 min	45-60 min	60-75 min	75-90 min	90-105 min	105-120 min	120-135 min	135-150 min	150-165 min	165-180 min	180-195 min
over 10 mm	0	0	0	0	0	0	0	0	0	0	0	0	0
5-10 mm	60	10	0	0	0	0	0	0	0	0	0	0	0
1-5 mm	40	90	100	70	30	40	40	50	40	40	40	40	30
less than 1 mm	0	0	0	40	70	60	60	50	60	70	70	70	70

accumulation% wet snow, mm/15min

	0-15 min	15-30 min	30-45 min	45-60 min	60-75 min	75-90 min	90-105 min	105-120 min	120-135 min	135-150 min	150-165 min	165-180 min	180-195 min
over 5 mm	0	0	0	0	0	0	0	0	0	0	0	0	0
3-5 mm	0	0	0	0	0	0	0	0	0	0	0	0	0
1-2 mm	0	0	0	0	0	0	0	0	0	0	0	0	0
less than 1 mm	100	100	100	100	100	100	100	100	100	100	100	100	100

prob of freezing rain

	0-15 min	15-30 min	30-45 min	45-60 min	60-75 min	75-90 min	90-105 min	105-120 min	120-135 min	135-150 min	150-165 min	165-180 min	180-195 min
prob	0	0	0	0	0	0	0	0	0	0	0	0	0

prob of freezing wet runway

	0-15 min	15-30 min	30-45 min	45-60 min	60-75 min	75-90 min	90-105 min	105-120 min	120-135 min	135-150 min	150-165 min	165-180 min	180-195 min
prob	0	0	0	0	0	0	0	0	0	0	0	0	0

DE-ICING AGENTS (UPDATED 2017-02-22 16:15:00 UTC)

DIW class %	0-15 min	15-30 min	30-45 min	45-60 min	60-75 min	75-90 min	90-105 min	105-120 min	120-135 min	135-150 min	150-165 min	165-180 min	180-195 min
3	60	10	0	0	0	0	0	0	0	0	0	0	0
2	40	90	100	70	30	40	40	50	40	40	40	40	30
1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	40	70	60	60	50	60	70	70	70	70

prob of freezing wet runway

	0-15 min	15-30 min	30-45 min	45-60 min	60-75 min	75-90 min	90-105 min	105-120 min	120-135 min	135-150 min	150-165 min	165-180 min	180-195 min
prob	0	0	0	0	0	0	0	0	0	0	0	0	0

TOWER (UPDATED 2017-02-22 16:15:00 UTC)

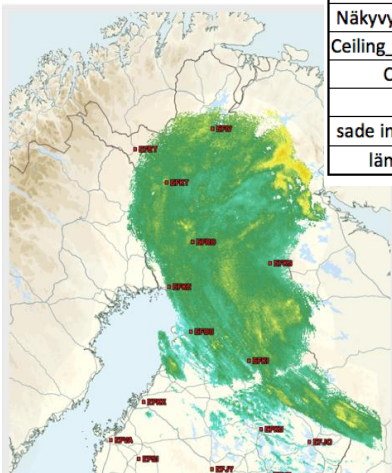
VIS decreased by snow	0-15 min	15-30 min	30-45 min	45-60 min	60-75 min	75-90 min	90-105 min	105-120 min	120-135 min	135-150 min	150-165 min	165-180 min	180-195 min
VIS less than 600 m	0	0	0	0	0	0	0	0	0	0	0	0	0
VIS 600-1500 m	60	10	0	0	0	0	0	0	0	0	0	0	0
VIS 1500-3000 m	40	90	100	70	30	40	40	50	40	40	40	40	30
VIS over 3000 m	0	0	0	40	70	60	60	50	60	70	70	70	70

Separate MET products to humans and machines

1. Visualization of product is a key issue when human is using the product
2. Machine-to-machine products shall be numerical

EFRO RCR Hirlam 03.04. 12:03Z

UTC	12	13	14	15	16	17	18	19	20	21	22	23	00
WD	320	300	300	300	290	290	290	290	280	280	270	270	260
WS	5	6	6	6	6	6	6	6	5	5	4	4	4
WS alin_mp	9	10	10	10	10	10	10	10	10	9	8	7	7
Gust	18	20	20	21	22	22	22	22	19	16	14	14	13
Näkyvyys(Himan)	2700	2300	2300	2700	3400	7900	40km	30km	20km	40km	40km	40km	40km
Ceiling_ft(Himan)	2900	2800	3200	3000	>5kft	>5kft	2500	>5kft	-	-	-	-	-
CbTcu	TCU	TCU	TCU	-	-	-	-	-	-	-	-	-	-
sää	-SN	-SN	-SN	-SN	-SN	-SN	-	-	-	-	-	-	-
sade intensiteetti	0.4	0.5	0.5	0.4	0.3	0.1	-	-	-	-	-	-	-
lämpötila	0.3	0.8	0.8	0.6	0.4	0.1	0	-0.3	-0.8	-1.8	-3	-4	-4

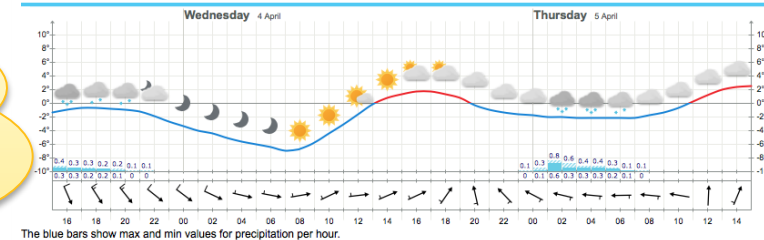


Salamaus
 Lentokentät



Rovaniemi: Tie 4 Tie 4 – 2 – Kemiin

Meteogram, next 48 hours



Today and tonight, 03 April 2018

Time	Forecast	Temp.	Precip.	Wind
Tuesday 15:00	☁	-1°	0.3 – 0.4 mm	Moderate breeze, 6 m/s from north-northwest
Tuesday 16:00	☁	-1°	0.3 mm	Moderate breeze, 6 m/s from north-northwest
Tuesday 17:00	☁	-1°	0.2 – 0.3 mm	Moderate breeze, 6 m/s from north-northwest
Tuesday 18:00	☁	-1°	0.2 mm	Moderate breeze, 7 m/s from north-northwest
Tuesday 19:00	☁	-1°	0.1 – 0.2 mm	Moderate breeze, 6 m/s from north-northwest
Tuesday 20:00	☁	-1°	0 – 0.1 mm	Moderate breeze, 6 m/s from north-northwest
Tuesday 21:00	☁	-1°	0 – 0.1 mm	Gentle breeze, 5 m/s from north-northwest
Tuesday 22:00	☁	-2°	0 mm	Gentle breeze, 5 m/s from north-northwest
Tuesday 23:00	☁	-3°	0 mm	Gentle breeze, 5 m/s from north-northwest
Wednesday 00:00	☁	-3°	0 mm	Gentle breeze, 4 m/s from north-northwest
Wednesday 01:00	☁	-4°	0 mm	Gentle breeze, 4 m/s from north-northwest
Wednesday 02:00	☁	-4°	0 mm	Gentle breeze, 4 m/s from north-northwest
Wednesday 03:00	☁	-5°	0 mm	Gentle breeze, 4 m/s from north-northwest
Wednesday 04:00	☁	-6°	0 mm	Gentle breeze, 4 m/s from north-northwest
Wednesday 05:00	☁	-6°	0 mm	Light breeze, 3 m/s from west

Tomorrow, 04 April 2018

Time	Forecast	Temp.	Precip.	Wind
Wednesday 06:00	☁	-6°	0 mm	Light breeze, 3 m/s from west
Wednesday 07:00	☁	-7°	0 mm	Light breeze, 3 m/s from west
Wednesday 08:00	☁	-7°	0 mm	Light breeze, 3 m/s from west-southwest
Wednesday 09:00	☁	-6°	0 mm	Light breeze, 3 m/s from west-southwest
Wednesday 10:00	☁	-4°	0 mm	Light breeze, 3 m/s from west-southwest
Wednesday 11:00	☁	-3°	0 mm	Light breeze, 3 m/s from west
Wednesday 12:00	☁	-2°	0 mm	Light breeze, 3 m/s from west-southwest
Wednesday 13:00	☁	0°	0 mm	Gentle breeze, 4 m/s from west-southwest
Wednesday 14:00	☁	1°	0 mm	Gentle breeze, 4 m/s from west-southwest
Wednesday 15:00	☁	1°	0 mm	Light breeze, 3 m/s from west-southwest
Wednesday 16:00	☁	2°	0 mm	Light breeze, 3 m/s from west-southwest
Wednesday 17:00	☁	2°	0 mm	Light breeze, 2 m/s from south-southwest
Wednesday 18:00	☁	1°	0 mm	Light breeze, 2 m/s from south-southwest
Wednesday 19:00	☁	1°	0 mm	Light breeze, 2 m/s from south-southwest
Wednesday 20:00	☁	0°	0 mm	Light breeze, 2 m/s from south-southwest
Wednesday 21:00	☁	-1°	0 mm	Light breeze, 2 m/s from south-southwest
Wednesday 22:00	☁	-1°	0 mm	Light breeze, 2 m/s from south-southwest
Wednesday 23:00	☁	-2°	0 – 0.1 mm	Light breeze, 2 m/s from east-southeast

Ideas for an efficient provision and use of meteorological information in ATM



In PNOWWA we have limited us so far to **airport operations** and **winter weather**.

It could be considered to involve also

- **Convective weather (thunderstorms)**
- **En-route**
- **Network planning**

By **MET data fusion** (Radar, Numerical Weather Prediction Models, Annex 3 products) it would be possible to produce consolidated seamless MET information to ATM.



Synthesis of user needs for Probabilistic Nowcasting of Snow at the Airports

Thank you very much for your attention!



This project has received funding from the SESAR Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No [number]



Founding Members



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