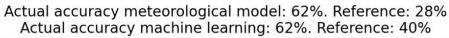
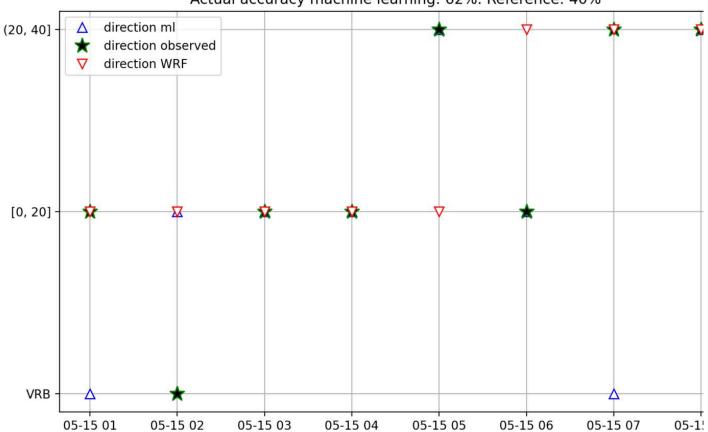
Metars

metar_o	dir_o	spd_o	gust_o	visibility_o	wxcodes_o	skyc1_o	skyl1
LEVA TOUZOUZ U40UZKT CAVOK TZ/TU QTUZZ TVOSIO	40.00	۷	IVI	9994	IVI	IVI	IVI
LEVX 150300Z 01006KT 350V050 CAVOK 12/10 Q1022 NOSIG	10.00	6	М	9994	М	М	М
LEVX 150330Z 03005KT 350V060 CAVOK 11/10 Q1022 NOSIG	30.00	5	М	9994	М	М	М
LEVX 150400Z 02006KT CAVOK 12/10 Q1022 NOSIG	20.00	6	М	9994	М	М	М
LEVX 150430Z 03005KT 350V070 9999 SCT054 12/10 Q1022 NOSIG	30.00	5	М	9994	М	SCT	5400.
LEVX 150500Z 03004KT 350V080 9999 SCT054 12/10 Q1022 NOSIG	30.00	4	М	9994	М	SCT	5400.
LEVX 150530Z 04003KT 310V110 9999 FEW054 12/10 Q1022 NOSIG	40.00	3	М	9994	М	FEW	5400.
LEVX 150600Z 02003KT 330V080 9999 FEW053 12/10 Q1022 NOSIG	20.00	3	М	9994	М	FEW	5300.
LEVX 150630Z 07004KT 020V110 9999 FEW025 12/11 Q1022 NOSIG	70.00	4	М	9994	М	FEW	2500.
LEVX 150700Z 03006KT 330V120 CAVOK 14/09 Q1022 NOSIG	30.00	6	М	9994	М	М	М
LEVX 150730Z 06005KT 010V120 CAVOK 15/11 Q1022 NOSIG	60.00	5	М	9994	М	М	М
LEVX 150800Z 03007KT 330V100 CAVOK 15/10 Q1022 NOSIG	30.00	7	М	9994	М	М	М
LEVX 150830Z 03008KT 350V070 CAVOK 16/10 Q1022 NOSIG	30.00	8	М	9994	М	М	М
◆							

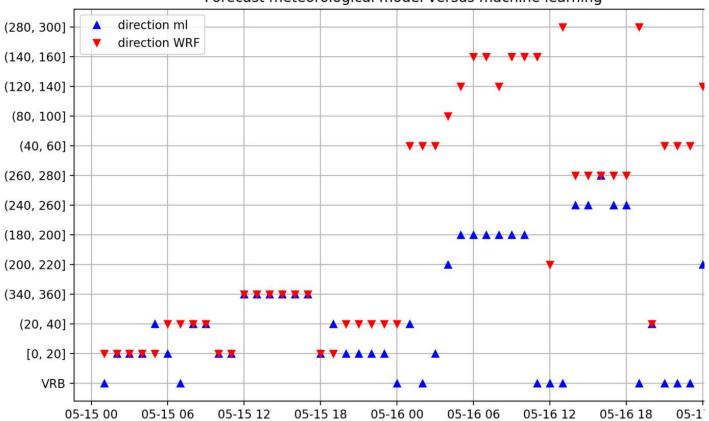
Wind direction





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Forecast meteorological model versus machine learning



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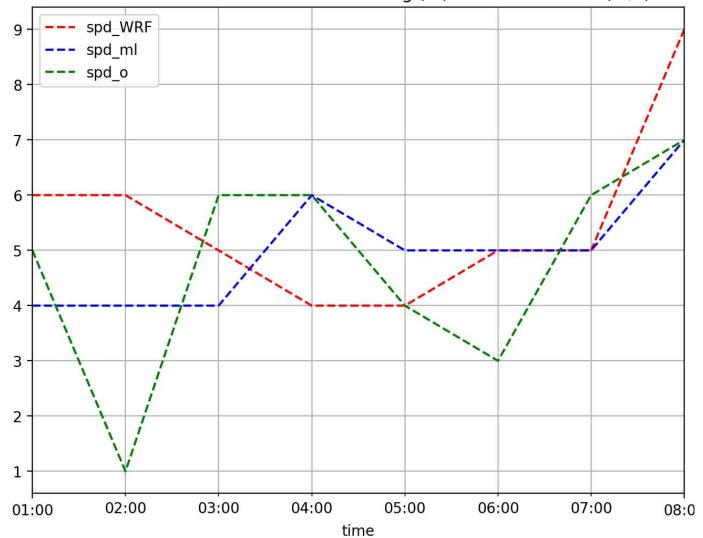
Probabilities wind direction more than 5%

May 15 01:00 Z -	57%	24%	12%	0%	0%	0%	0%	1%	0%	0%	0%	4%
	37%	48%	10%	1%	0%	0%	0%	0%	0%	0%	0%	3%
May 15 03:00 Z -	21%	50%	16%	6%	0%	0%	0%	0%	0%	0%	0%	4%
May 15 05:00 Z -	9% 21%	48% 32%	36% 35%	5% 0%	0% 0%	0% 0%	0% 0%	0% 2%	0% 0%	0% 1%	0% 0%	1% 7%
	33%	41%	18%	1%	0%	0%	0%	1%	0%	0%	1%	2%
May 15 07:00 Z -	54%	19% 17%	10% 46%	4% 13%	0% 0%	4% 0%	4% 0%	1% 0%	0% 0%	0% 0%	0% 0%	3% 1%
May 15 09:00 Z -	18%	24%	41%	16%	0%	0%	0%	0%	0%	0%	0%	1%
May 15 11:00 Z -	19% 9%	56% 62%	21% 25%	2% 1%	0% 0%	0% 0%	0% 0%	0% 0%	0% 0%	0% 0%	0% 0%	2% 3%
	2%	22%	24%	0%	0%	0%	0%	0%	0%	0%	1%	49%
May 15 13:00 Z -	4% 5%	7%	7%	1% 0%	0% 0%	0%	0%	0% 0%	0%	0%	4% 3%	76%
May 15 15:00 Z -	1%	7% 13%	6% 2%	0%	0%	0% 0%	0% 0%	0%	0% 0%	0% 0%	2%	76% 81%
May 15 17:00 Z -	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	89%
	0% 5%	5% 45%	1% 12%	0% 0%	0% 0%	0% 0%	0% 1%	0% 0%	0% 0%	0% 0%	2% 1%	91% 34%
May 15 19:00 Z -	5%	24%	57%	1%	0%	1%	1%	0%	0%	0%	1%	10%
May 15 21:00 Z -	16% 28%	44% 32%	16% 15%	1% 2%	0% 0%	1% 1%	7% 5%	2% 2%	0% 0%	0% 0%	1% 6%	10% 6%
	20%	38%	11%	2%	0%	10%	6%	1%	0%	0%	4%	7%
May 15 23:00 Z -	29% 70%	33% 11%	7% 4%	5% 2%	0% 0%	1% 1%	6% 2%	1% 1%	0% 1%	0% 0%	3% 1%	11% 5%
May 16 01:00 Z -	29%	11%	35%	4%	0%	3%	1%	7%	8%	1%	1%	0%
V-	26% 21%	25%	13% 7%	0%	0%	6%	2% 2%	12% 19%	13% 7%	1%	0%	0%
,	20%	32% 6%	4%	3% 2%	0% 0%	6% 12%	5%	39%	11%	2% 2%	0% 0%	0% 0%
May 16 05:00 Z -	10%	4%	0%	0%	0%	7%	32%	30%	15%	1%	0%	0%
May 16 07:00 Z -		3% 0%	0% 0%	0% 0%	0% 0%	4% 12%	53% 65%	20% 7%	10% 6%	3% 4%	0% 0%	0% 0%
	5%	0%	0%	2%	0%	21%	60%	6%	4%	1%	0%	0%
May 16 09:00 Z -	14% 35%	1% 1%	0% 0%	2% 1%	14% 0%	6% 5%	55% 45%	6% 3%	2% 9%	1% 1%	0% 1%	0% 0%
May 16 11:00 Z -	76%	0%	1%	0%	0%	2%	13%	5%	2%	1%	0%	0%
May 16 13:00 Z -	71% 80%	0% 0%	0% 1%	0% 0%	0% 0%	1% 0%	16% 2%	1% 1%	8% 1%	4% 8%	0% 4%	0% 0%
	35%	0%	0%	0%	0%	0%	4%	1%	2%	36%	20%	0%
May 16 15:00 Z -	11%	0%	2%	0%	0%	0%	1%	0%	7%	65%	14%	0%
May 16 17:00 Z -	2% 9%	0% 1%	0% 0%	0% 1%	0% 0%	0% 0%	0% 0%	0% 0%	9% 14%	27% 40%	61% 33%	0% 0%
	12%	1%	1%	0%	0%	0%	0%	1%	5%	44%	35%	.0%
- '보다' (1917년 1일 전 - 1918년 1	38% 17%	24% 4%	3% 75%	0% 1%	0% 0%	0% 2%	2% 0%	1% 1%	5% 0%	19% 0%	6% 0%	0% 0%
May 16 21:00 Z -	65%	6%	11%	2%	0%	9%	1%	3%	1%	0%	0%	0%
May 16 23:00 Z -	60%	17% 12%	3% 7%	1% 0%	0% 0%	10% 3%	1% 2%	4% 5%	2% 1%	1% 1%	0% 0%	0% 0%
11ay 10 25100 Z	15%	3%	0%	0%	0%	11%	19%	34%	14%	3%	0%	0%
										- 1	- 11	1
	VRB	20]	40]	[09	0	180]	200]	0	240]	0	0	0
	\exists	7	4		09	∞	0	220	4	260	80	360
		[0,	Ć,	Ć.	\vdash	$\overline{}$			7	7	7	m
		\subseteq	(20,	(40,	40,	160,	180,	200,	220,	240,	60,	Ò,
				ت	4	9	$\widetilde{\infty}$	ŏ	2(4	9	340,
					\vdash	П	_	7	7	7	7	\sim

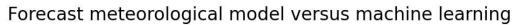
Wind intensity knots

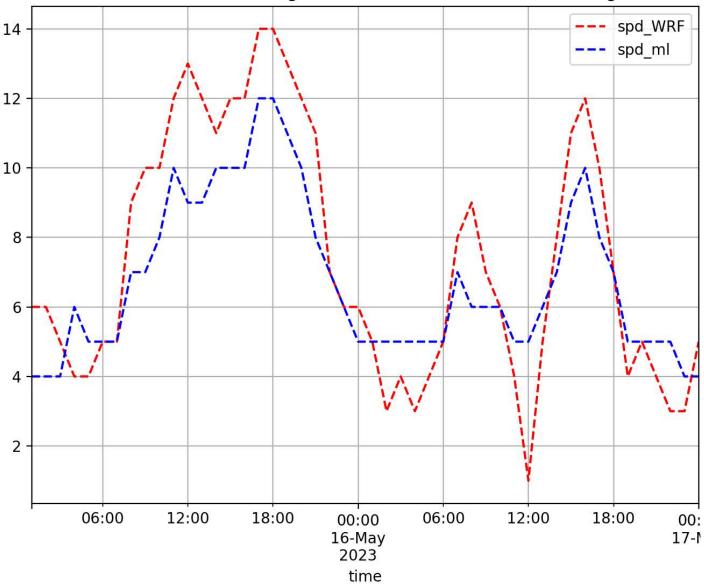
https://levx-ml.streamlit.app 3/24

Actual mean absolute error meteorological model (kt): 1.75. Reference (m/s): 1. Actual mean absolute error machine learning (kt): 1.25. Reference (m/s): 0.89



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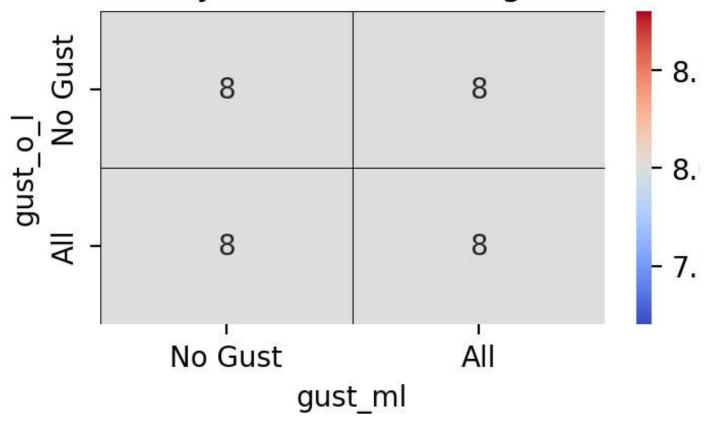




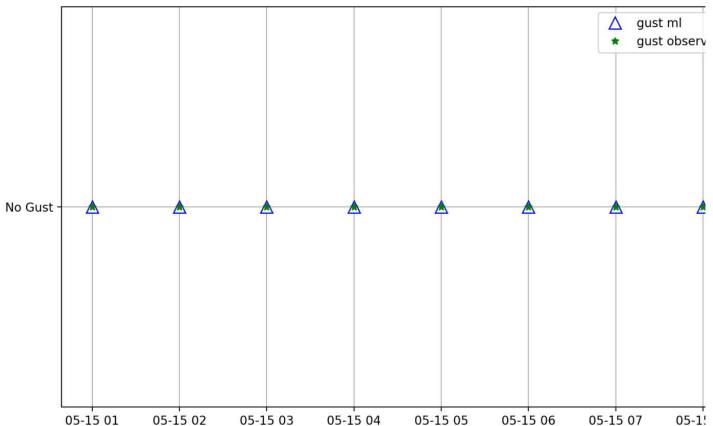
Wind gust

https://levx-ml.streamlit.app 5/24

Confusion matrix Accuracy machine learning: 100%

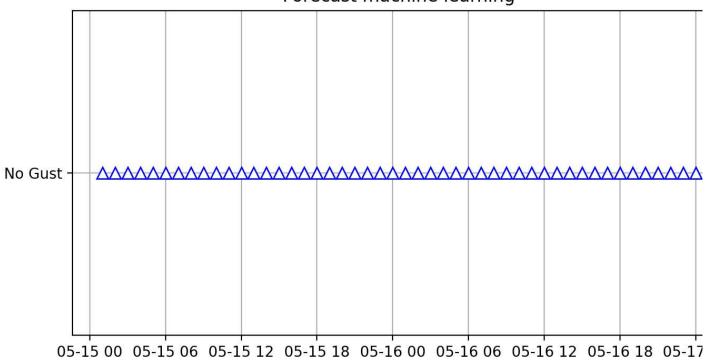




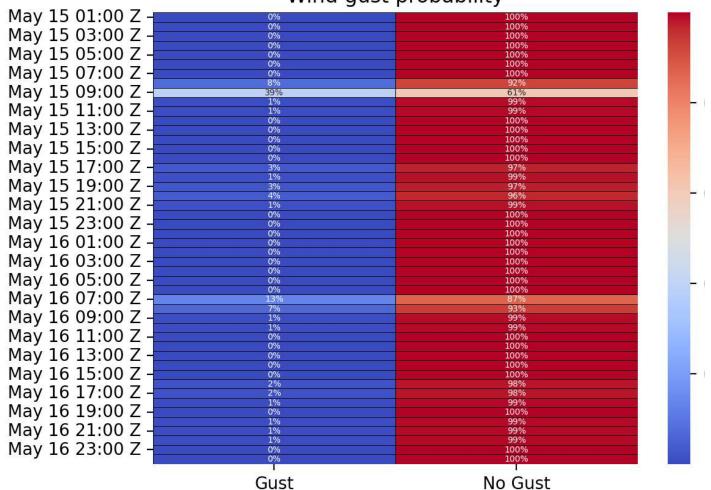


https://levx-ml.streamlit.app 6/24





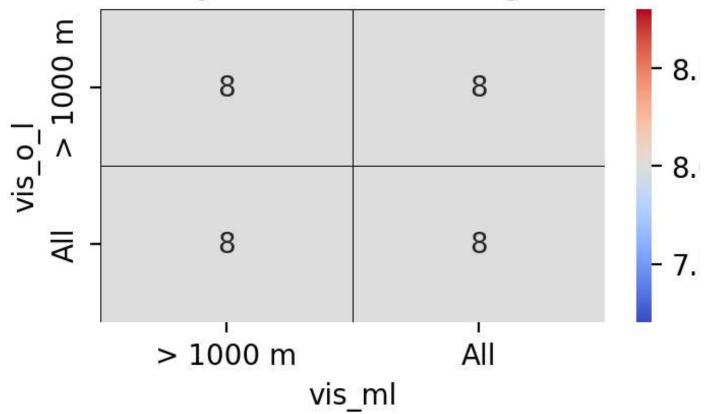
Wind gust probability



Horizontal visibility

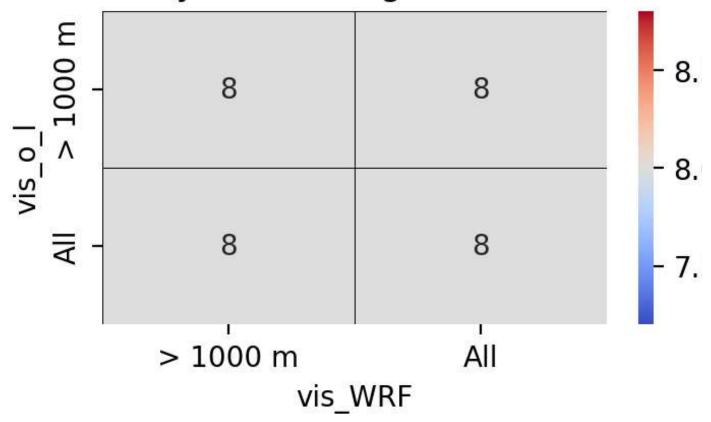
https://levx-ml.streamlit.app 7/24

Confusion matrix Accuracy machine learning: 100%

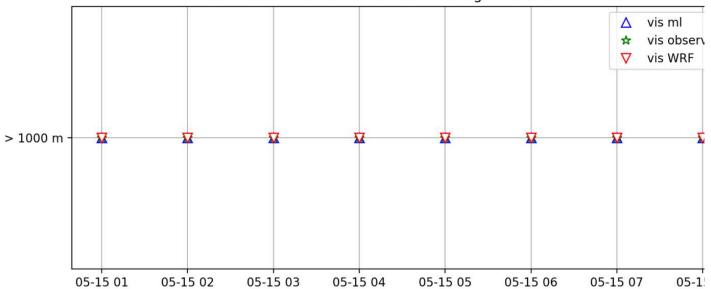


https://levx-ml.streamlit.app 8/24

Confusion matrix Accuracy meteorologic model: 100%

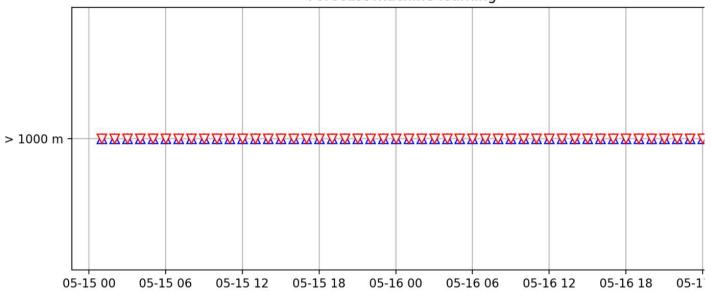


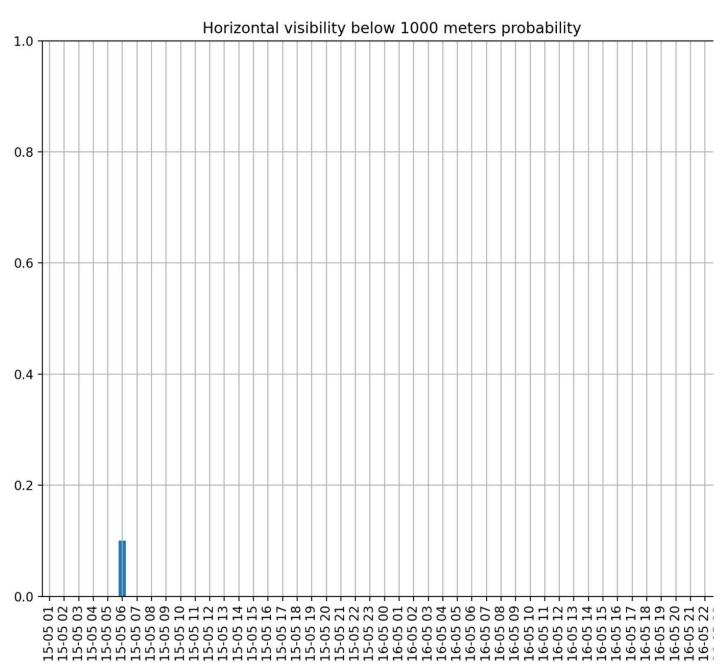




https://levx-ml.streamlit.app 9/24





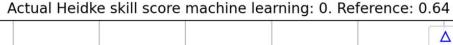


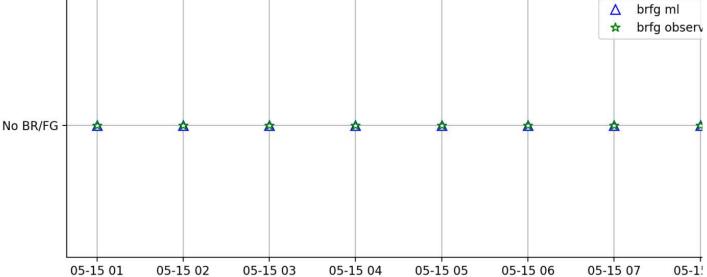
BR or FG

https://levx-ml.streamlit.app 10/24

Confusion matrix Accuracy machine learning: 100%

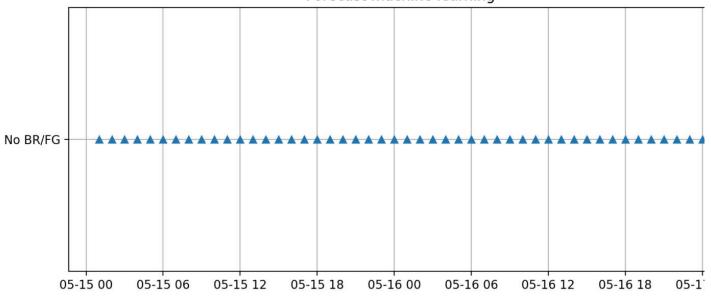


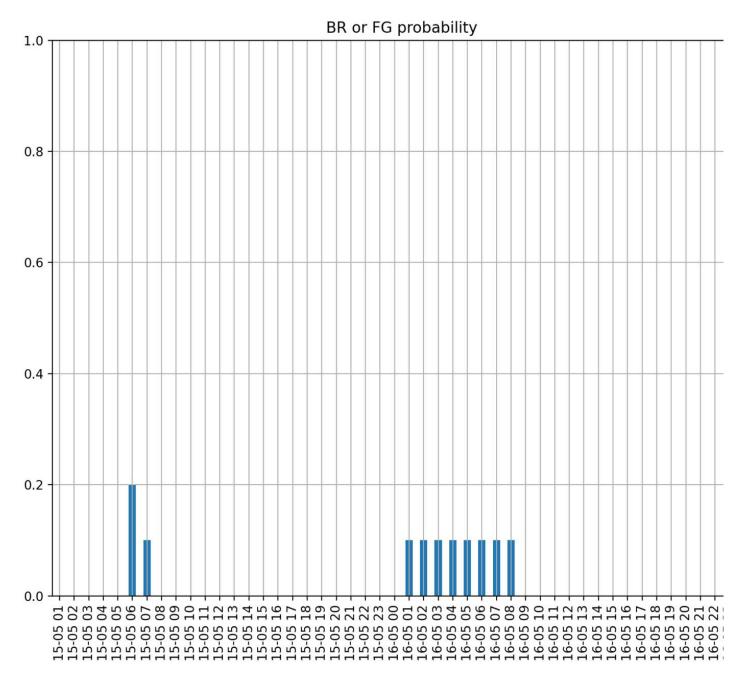




https://levx-ml.streamlit.app 11/24

Forecast machine learning

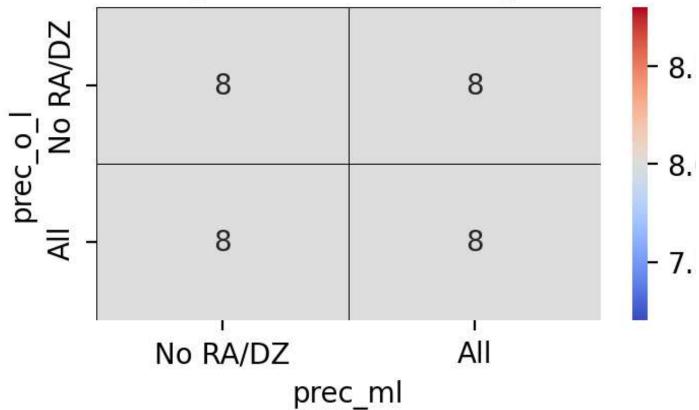




Precipitation

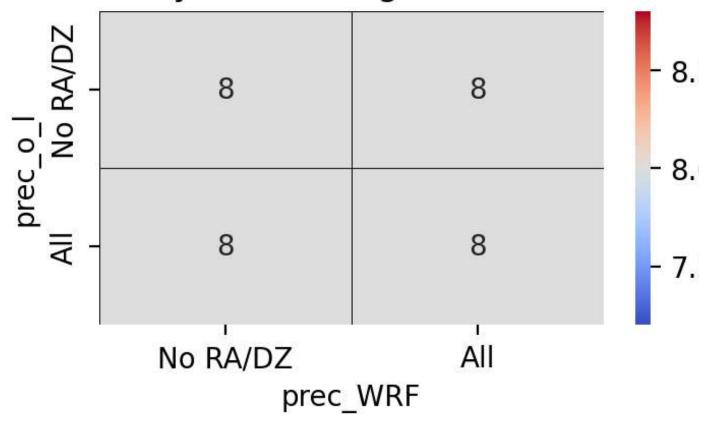
https://levx-ml.streamlit.app 12/24

Confusion matrix Accuracy machine learning: 100%

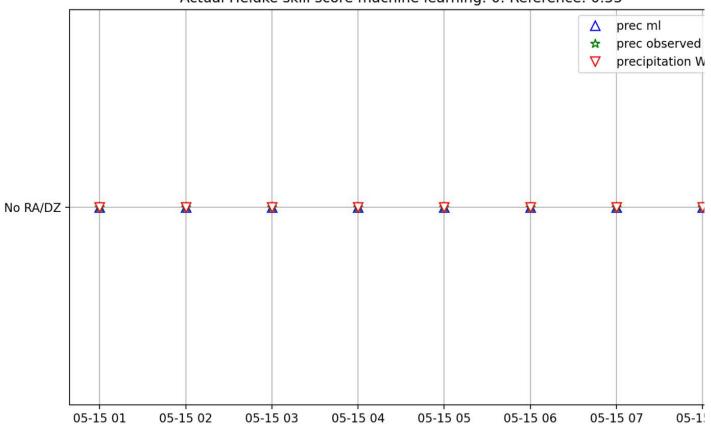


https://lew-ml.streamlit.app 13/24

Confusion matrix Accuracy meteorologic model: 100%

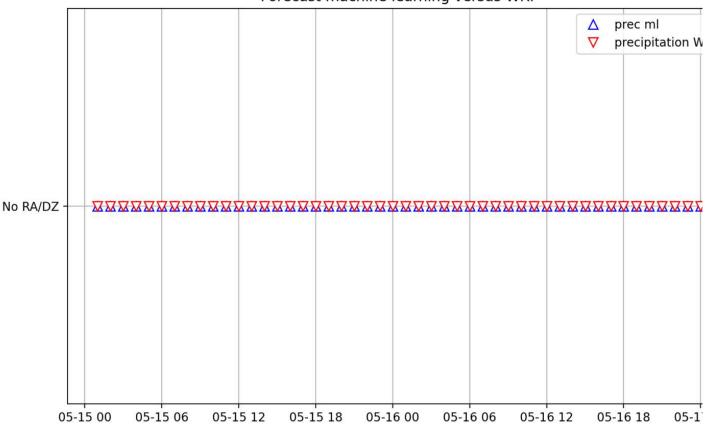


Actual Heidke skill score meteorological model: 0. Reference: 0.43 Actual Heidke skill score machine learning: 0. Reference: 0.55

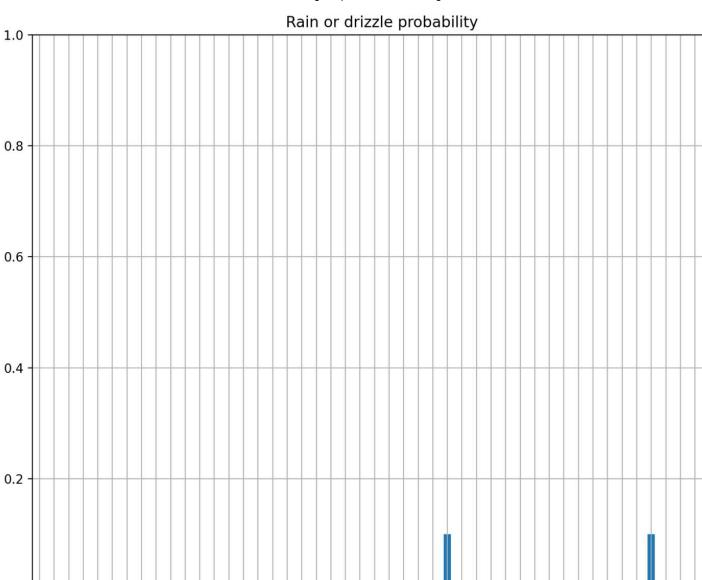


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Forecast machine learning versus WRF



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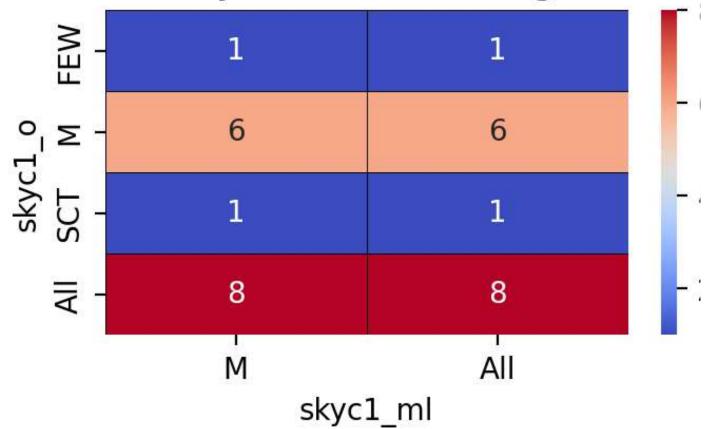
15-05 01 15-05 02 15-05 03 15-05 03 15-05 03 15-05 04 15-05 11 15-05 12 15-05 12 15-05 12 15-05 12 16-05 03 16-05 03 16-05 03 16-05 03 16-05 03 16-05 03 16-05 11 16-05 12 16-05 13 16-05

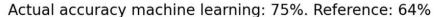
Cloud cover level 1

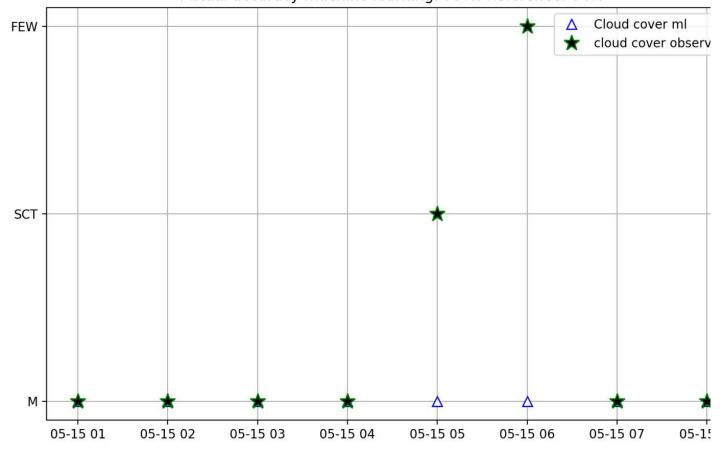
0.0

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Confusion matrix Accuracy machine learning: 75%

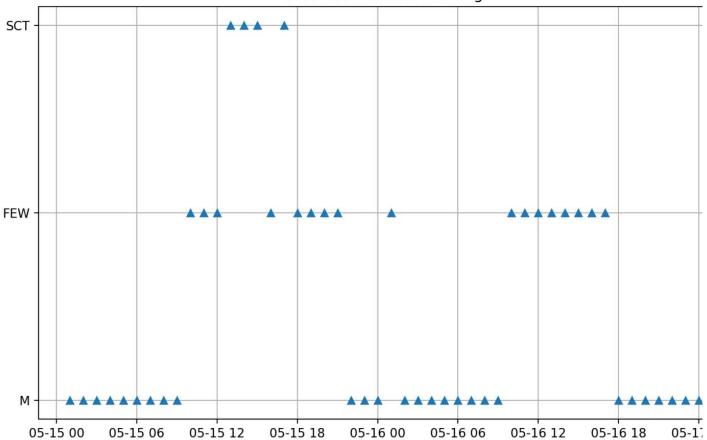






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Forecast machine learning



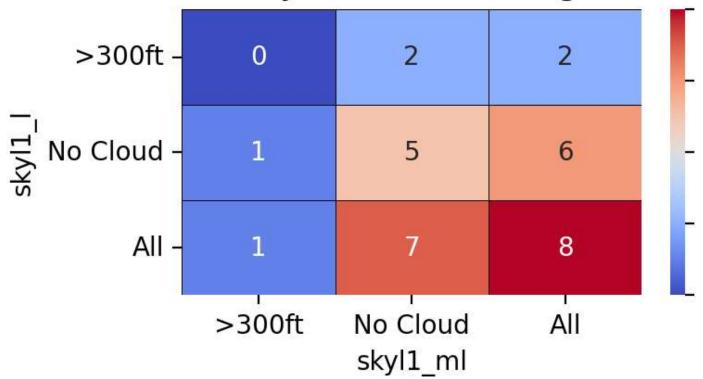
Probabilistic results

BKN	↓ FE	М	SCT	time
0.01	0.94	0.02	0.02	15/05/2023 10:00
0.02	0.89	0.06	0.04	16/05/2023 13:00
0.02	0.88	0.03	0.07	16/05/2023 15:00
0.02	0.86	0.05	0.07	16/05/2023 14:00
0.01	0.8	0.16	0.03	16/05/2023 11:00
0.02	0.74	0.14	0.09	16/05/2023 12:00
0.02	0.72	0.09	0.17	16/05/2023 16:00
0.02	0.63	0.02	0.34	15/05/2023 11:00
0.01	0.62	0.26	0.11	16/05/2023 17:00
0.1	0.61	0.26	0.03	15/05/2023 19:00
0.03	0.59	0.27	0.1	16/05/2023 10:00
0.16	0.57	0.13	0.13	15/05/2023 21:00
0.01	0.55	0	0.44	15/05/2023 16:00

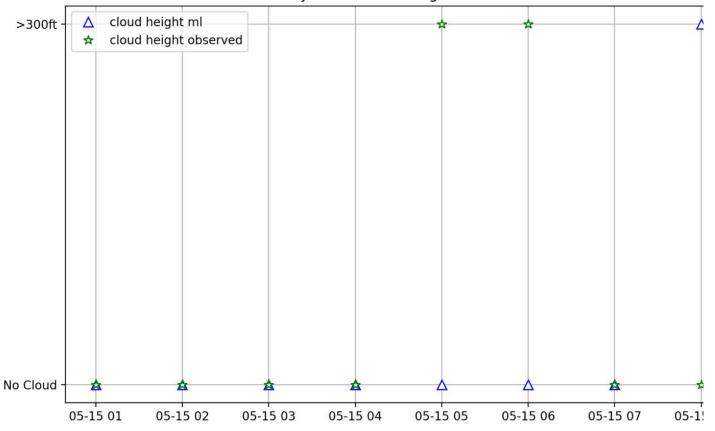
Cloud height level 1

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Confusion matrix Accuracy machine learning: 62%

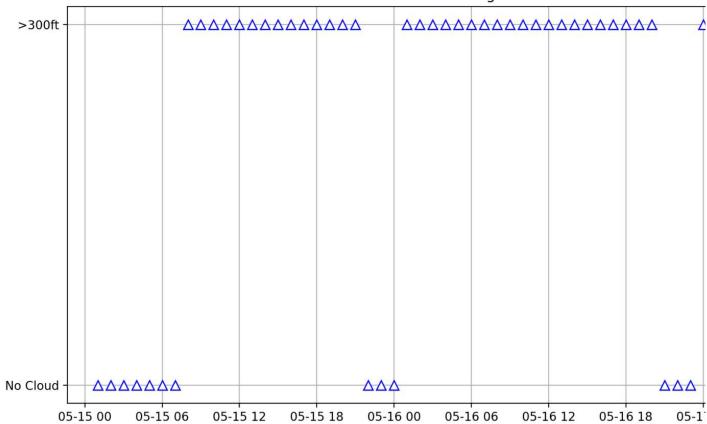






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Forecast machine learning



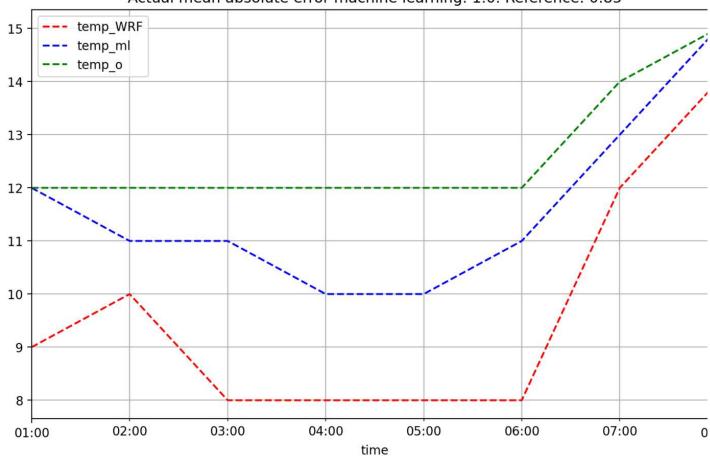
Probabilistic results

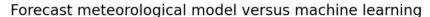
<=300ft	>300ft	No Cloud	time
0	0.04	0.96	15/05/2023 01:00
0	0.03	0.97	15/05/2023 02:00
0	0.04	0.96	15/05/2023 03:00
0	0.04	0.96	15/05/2023 04:00
0.01	0.05	0.94	15/05/2023 05:00
0	0.01	0.98	15/05/2023 06:00
0.01	0.05	0.94	15/05/2023 07:00
0	0.75	0.24	15/05/2023 08:00
0	0.59	0.41	15/05/2023 09:00
0	0.97	0.03	15/05/2023 10:00
0	0.98	0.02	15/05/2023 11:00
0	1	0	15/05/2023 12:00
0	1	0	15/05/2023 13:00

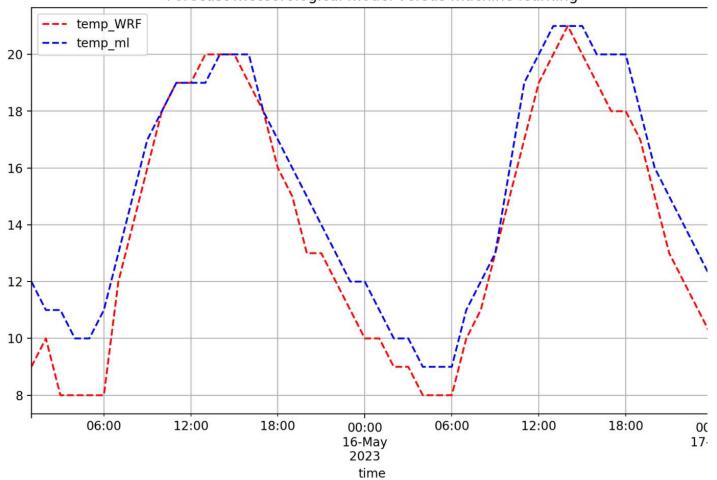
Temperature Celsius

https://levx-ml.streamlit.app 20/24

Actual mean absolute error meteorological model: 3.0. Reference: 1.44 Actual mean absolute error machine learning: 1.0. Reference: 0.85



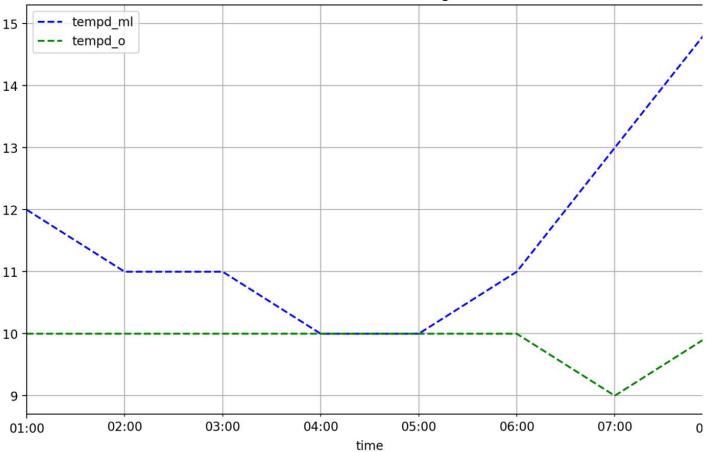


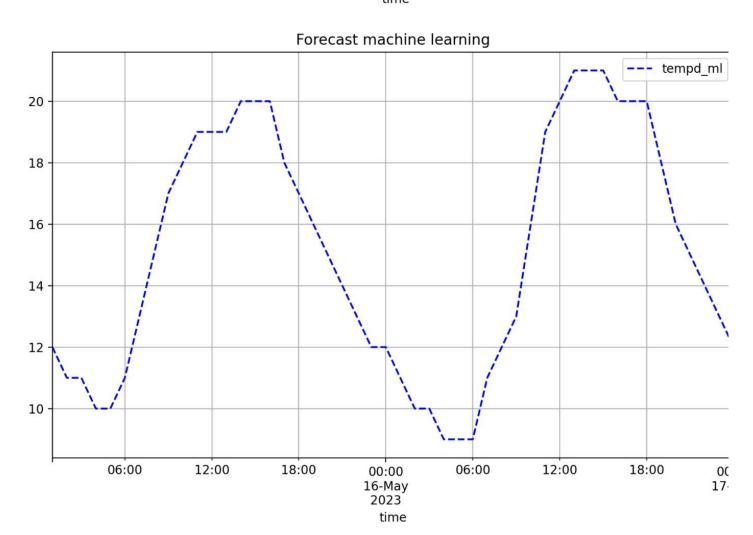


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Dew temperature Celsius







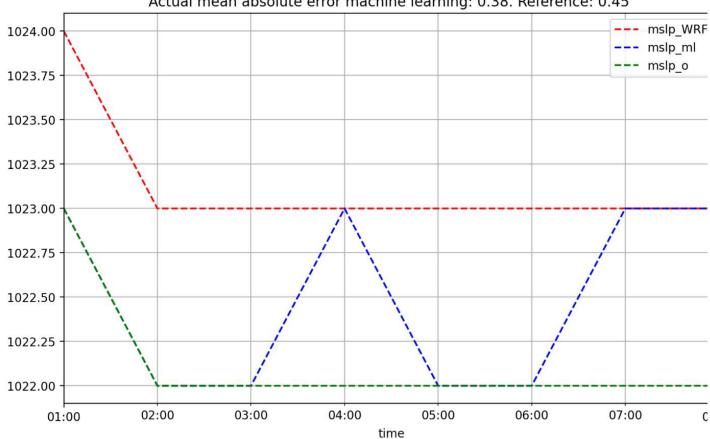
https://levx-ml.streamlit.app 22/24

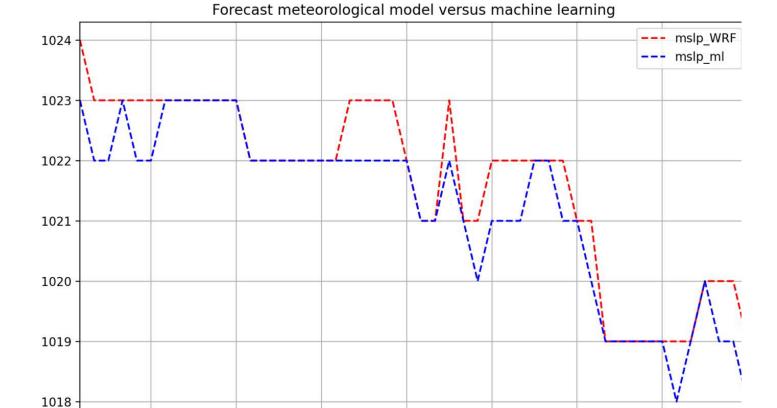
Pressure hectopascals

06:00

12:00







https://levx-ml.streamlit.app 23/24

00:00 16-May

2023 time

06:00

12:00

18:00

00

17

18:00

Global results

Better meteorological model outcome: 0

• []

Better machine learning outcome: 3

```
0: "wind speed"
1: "temperature"
2: "pressure"
```

Project <u>link</u>

Made with Streamlit

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