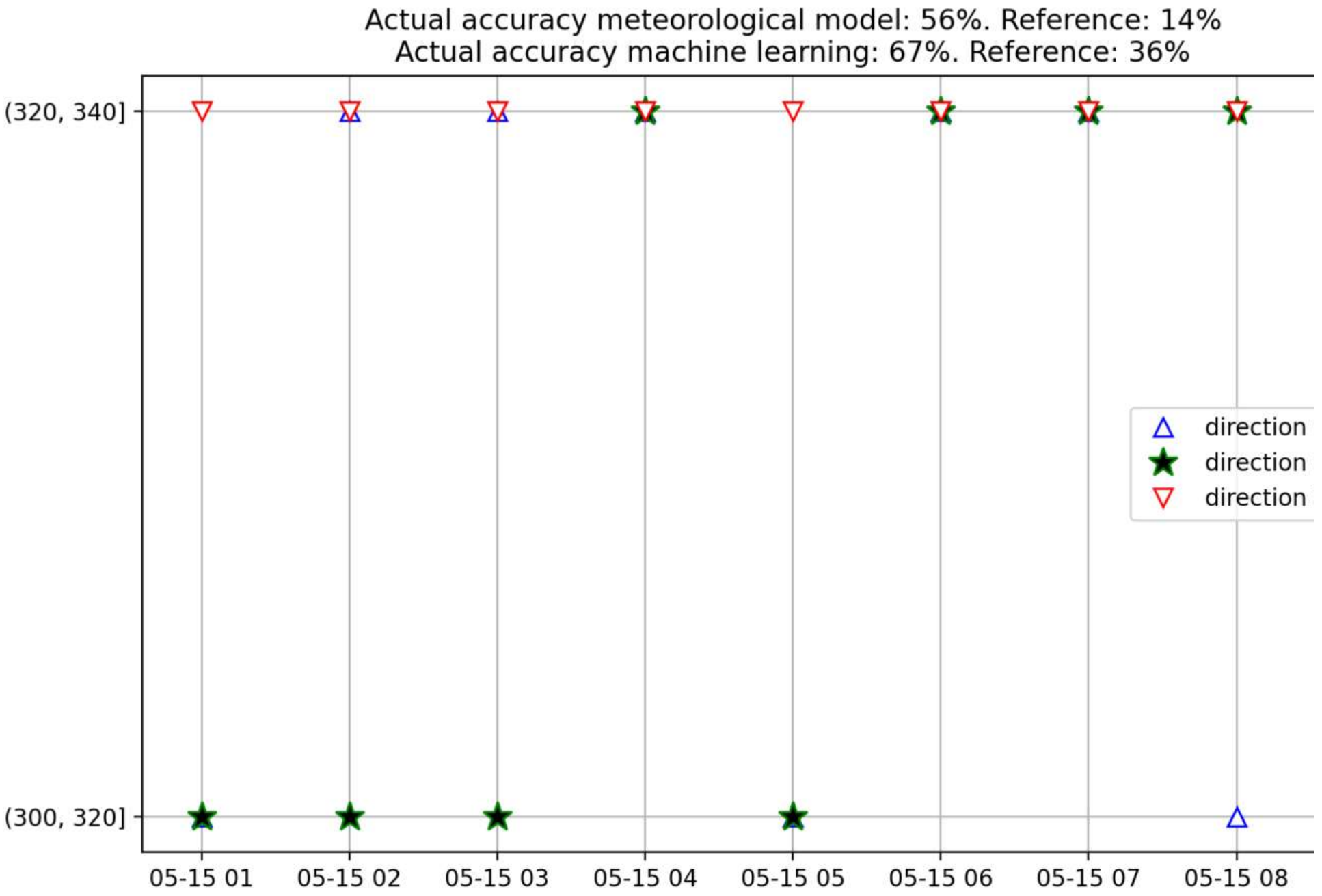
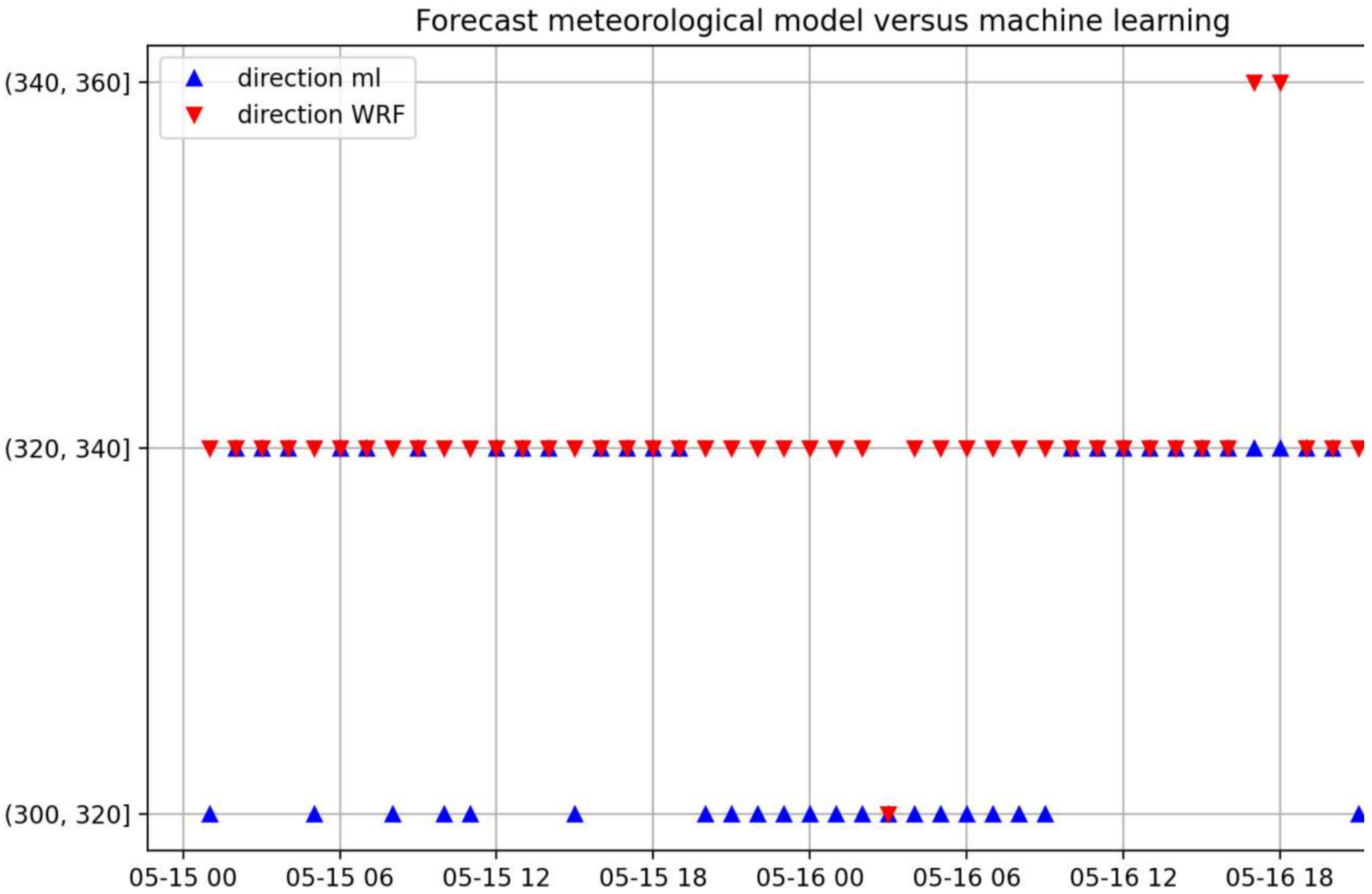
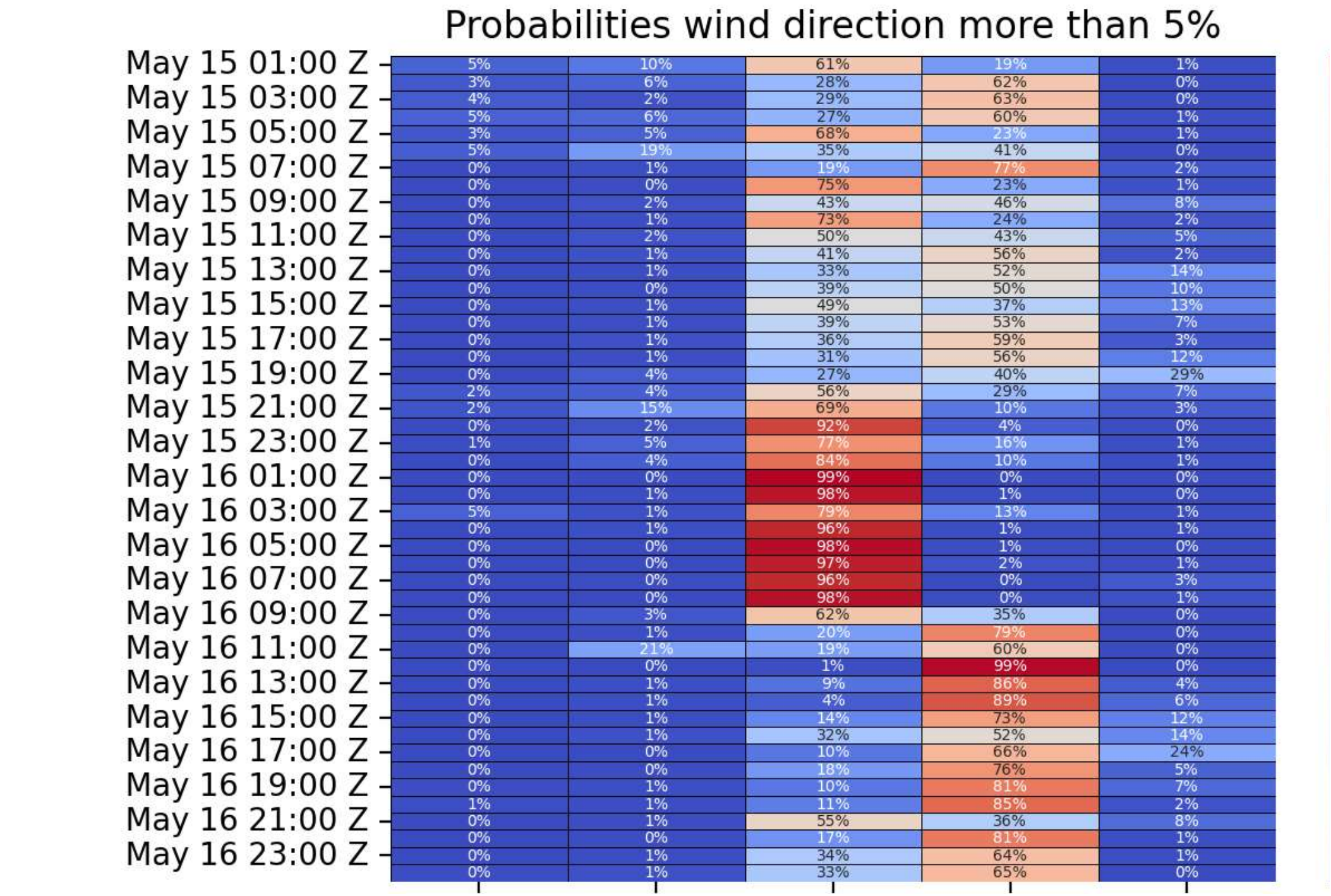
Metars

metar_o	dir_o	spd_o	gust_o	visibility_o	wxcodes_o	sky
LEPP 150000Z AUTO 31006KT 280V340 9999 SCT023 BKN036 10/08 Q1022	310	6	M	9994	M	SCT
LEPP 150030Z AUTO 30004KT 260V330 9999 SCT017 BKN037 10/08 Q1021	300	4	M	9994	M	SCT
LEPP 150100Z AUTO 32008KT 9999 SCT023 BKN037 OVC055 10/07 Q1021	320	8	M	9994	M	SCT
LEPP 150130Z AUTO 31007KT 9999 FEW023 BKN041 OVC049 10/07 Q1021	310	7	M	9994	M	FEW
LEPP 150200Z AUTO 32007KT 9999 FEW037 BKN045 10/07 Q1021	320	7	M	9994	M	FEW
LEPP 150230Z AUTO 31004KT 280V350 9999 BKN033 BKN043 10/07 Q1021	310	4	M	9994	M	BKN
LEPP 150300Z AUTO 32007KT 9999 FEW034 BKN041 10/07 Q1020	320	7	M	9994	M	FEW
LEPP 150330Z 33008KT 9999 FEW030 09/07 Q1020	330	8	M	9994	M	FEW
LEPP 150400Z 33008KT 9999 SCT034 09/07 Q1020	330	8	M	9994	M	SCT
LEPP 150430Z 34008KT 300V360 9999 FEW017 SCT020 10/07 Q1020	340	8	M	9994	M	FEW
LEPP 150500Z 32005KT 9999 FEW017 SCT022 10/07 Q1020	320	5	M	9994	M	FEW
LEPP 150530Z 32007KT 9999 FEW017 SCT020 BKN026 10/07 Q1020	320	7	M	9994	M	FEW

Wind direction

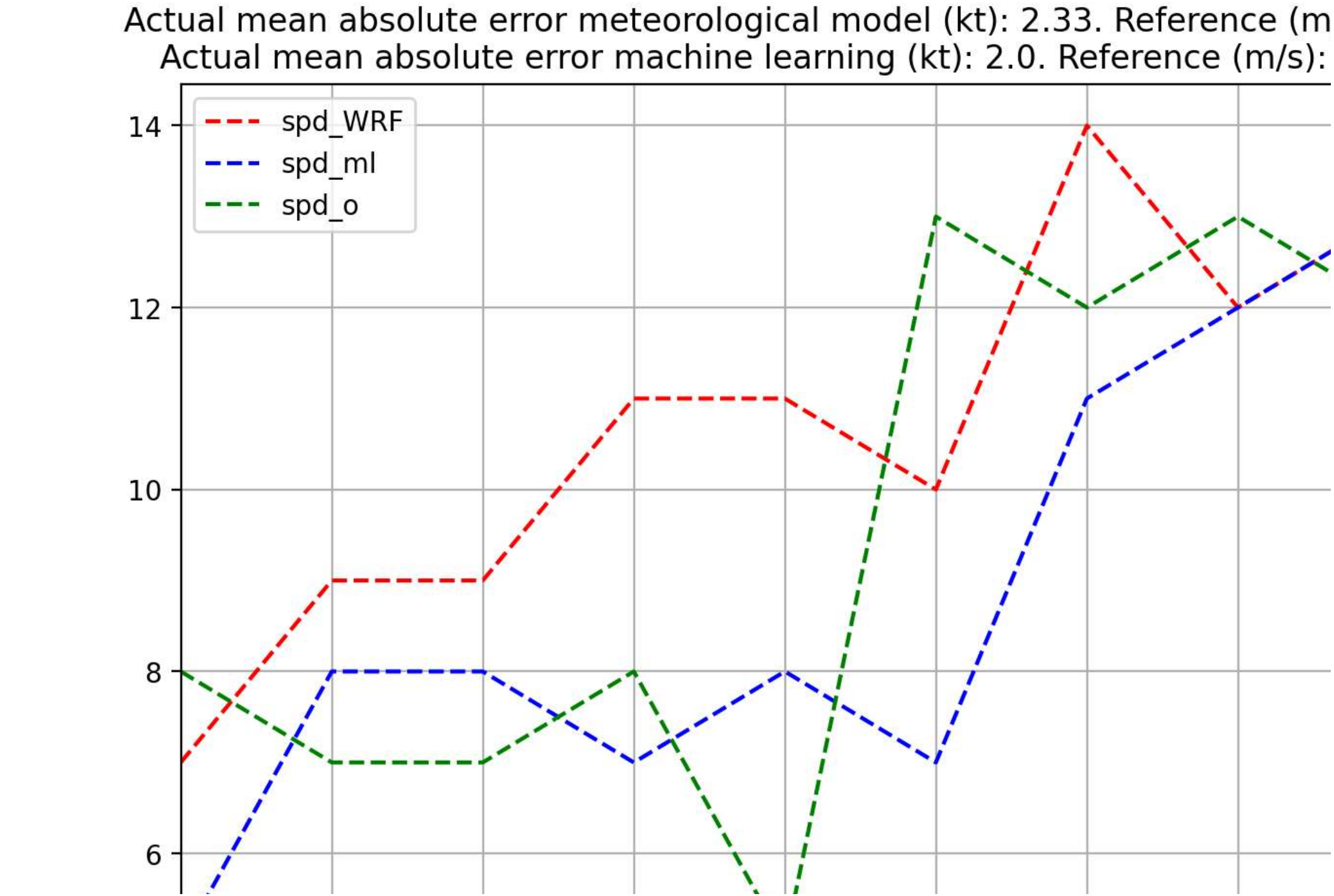

Actual accuracy meteorological model: 56%. Reference: 14%
Actual accuracy machine learning: 67%. Reference: 36%
(320, 340]
(300, 320]
direction
direction
direction
05-15 01
05-15 02
05-15 03
05-15 04
05-15 05
05-15 06
05-15 07
05-15 08

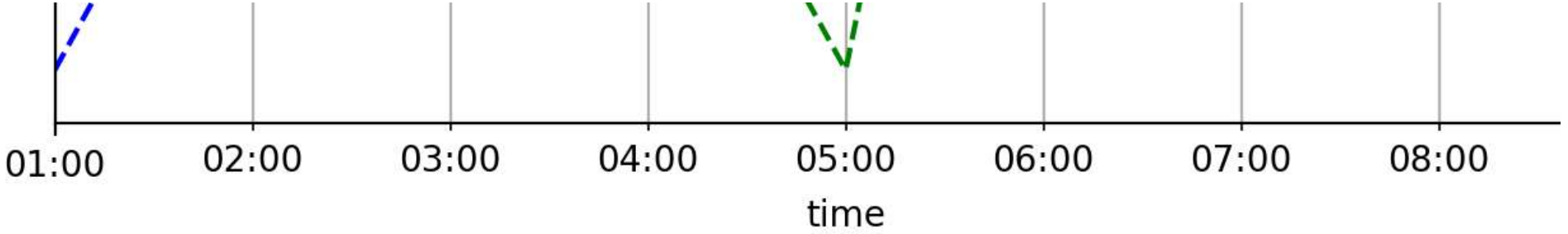

Forecast meteorological model versus machine learning
direction ml
direction WRF
(340, 360]
(320, 340]
(300, 320]
05-15 00
05-15 06
05-15 12
05-15 18
05-16 00
05-16 06
05-16 12
05-16 18

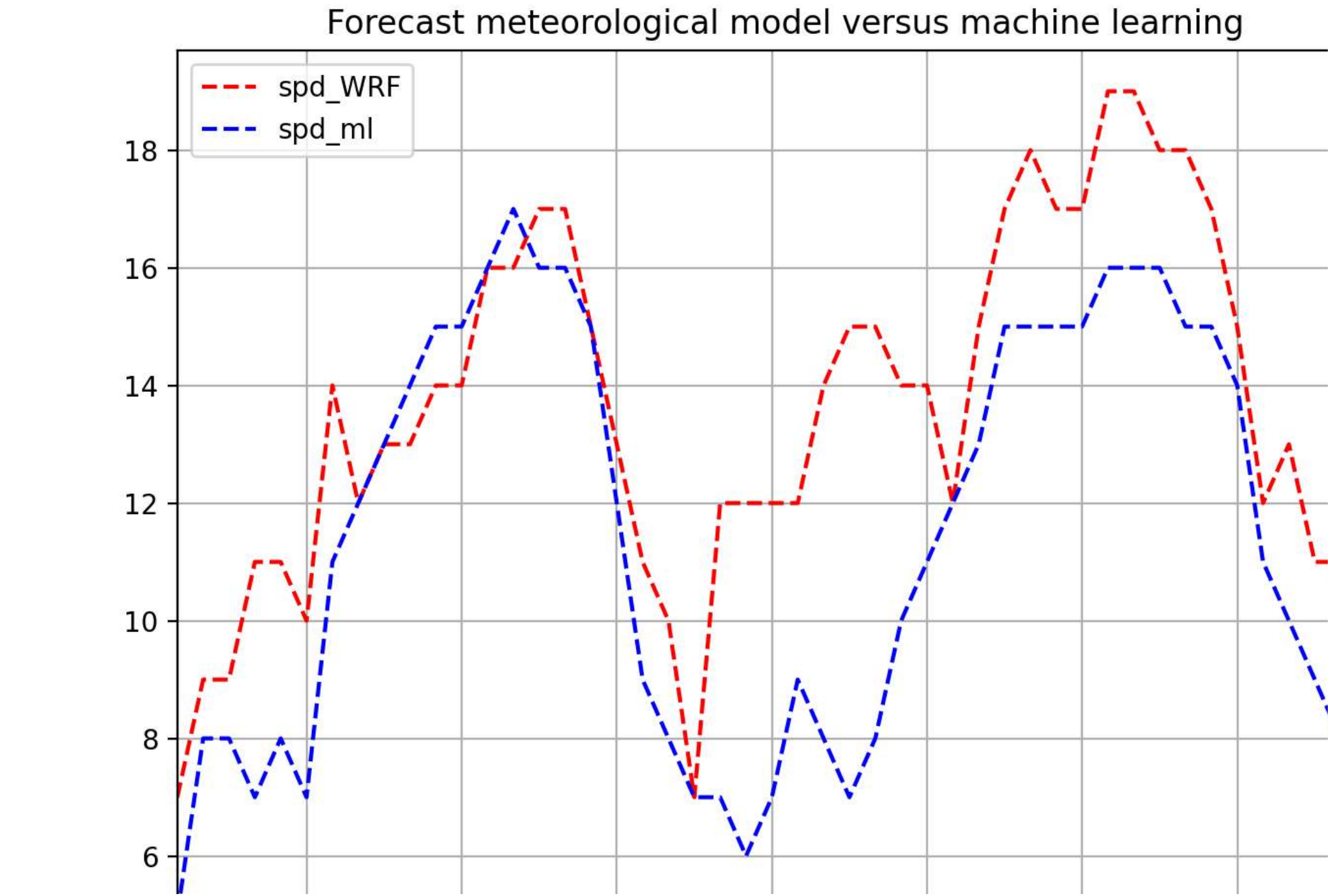

Probabilities wind direction more than 5%
May 15 01:00 Z 5% 10% 61% 19% 1%
May 15 03:00 Z 3% 6% 28% 62% 0%
May 15 05:00 Z 4% 2% 29% 63% 0%
May 15 07:00 Z 5% 6% 27% 60% 1%
May 15 09:00 Z 3% 5% 68% 23% 1%
May 15 11:00 Z 5% 19% 35% 41% 0%
May 15 13:00 Z 0% 1% 19% 77% 2%
May 15 15:00 Z 0% 0% 75% 23% 1%
May 15 17:00 Z 0% 2% 43% 46% 8%
May 15 19:00 Z 0% 1% 73% 24% 2%
May 15 21:00 Z 0% 2% 50% 43% 5%
May 15 23:00 Z 0% 1% 41% 56% 2%
May 16 01:00 Z 0% 1% 33% 52% 14%
May 16 03:00 Z 0% 0% 39% 50% 10%
May 16 05:00 Z 0% 1% 49% 37% 13%
May 16 07:00 Z 0% 1% 39% 53% 7%
May 16 09:00 Z 0% 1% 36% 59% 3%
May 16 11:00 Z 0% 1% 31% 56% 12%
May 16 13:00 Z 0% 4% 27% 40% 29%
May 16 15:00 Z 2% 4% 56% 29% 7%
May 16 17:00 Z 2% 15% 69% 10% 3%
May 16 19:00 Z 0% 2% 92% 4% 0%
May 16 21:00 Z 1% 5% 77% 16% 1%
May 16 23:00 Z 0% 4% 84% 10% 1%
0% 0% 99% 0% 0%
0% 1% 98% 1% 0%
5% 1% 79% 13% 1%
0% 1% 96% 1% 1%
0% 0% 98% 1% 0%
0% 0% 97% 2% 1%
0% 0% 96% 0% 3%
0% 0% 98% 0% 1%
0% 3% 62% 35% 0%
0% 1% 20% 79% 0%
0% 21% 19% 60% 0%
0% 0% 1% 99% 0%
0% 1% 9% 86% 4%
0% 1% 4% 89% 6%
0% 1% 14% 73% 12%
0% 1% 32% 52% 14%
0% 0% 10% 66% 24%
0% 0% 18% 76% 5%
0% 1% 10% 81% 7%
1% 1% 11% 85% 2%
0% 1% 55% 36% 8%
0% 0% 17% 81% 1%
0% 1% 34% 64% 1%
0% 1% 33% 65% 0%

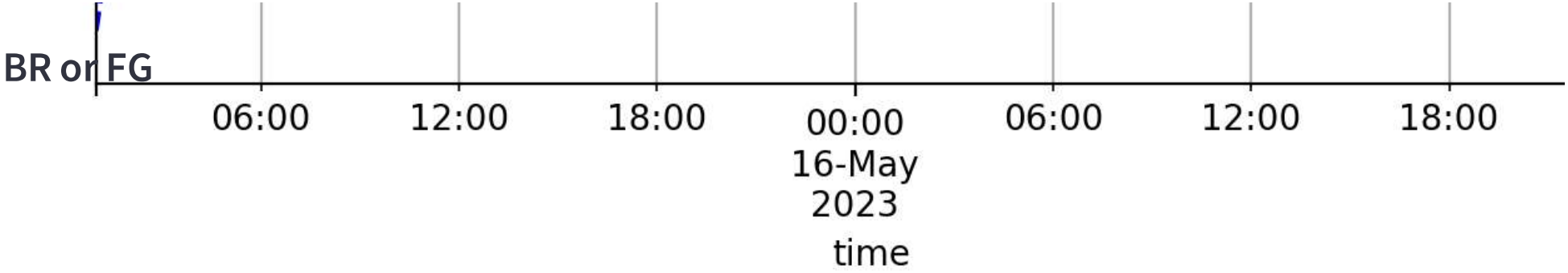
VRB (280, 300] (300, 320] (320, 340] (340, 360]

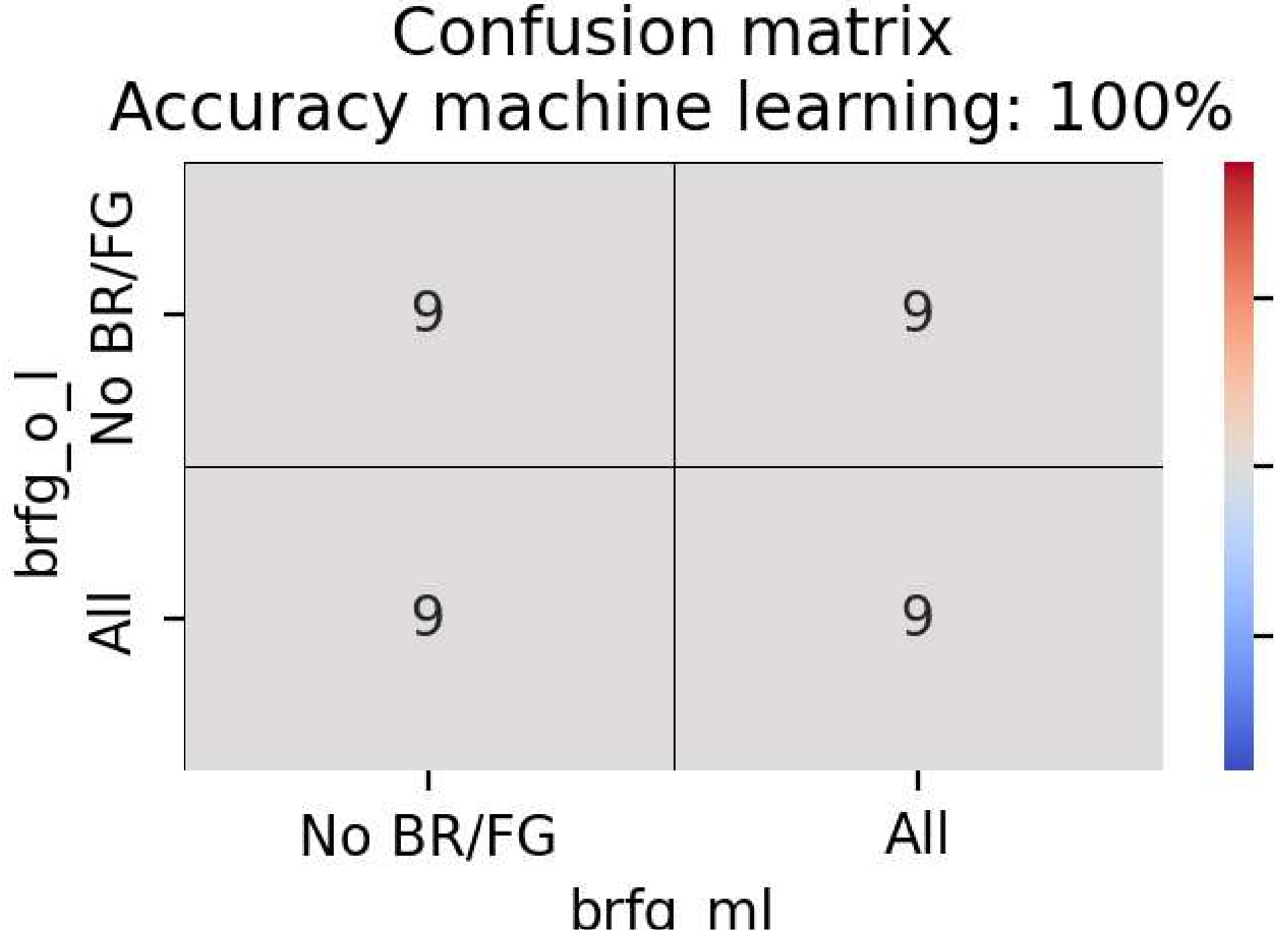
Wind intensity knots

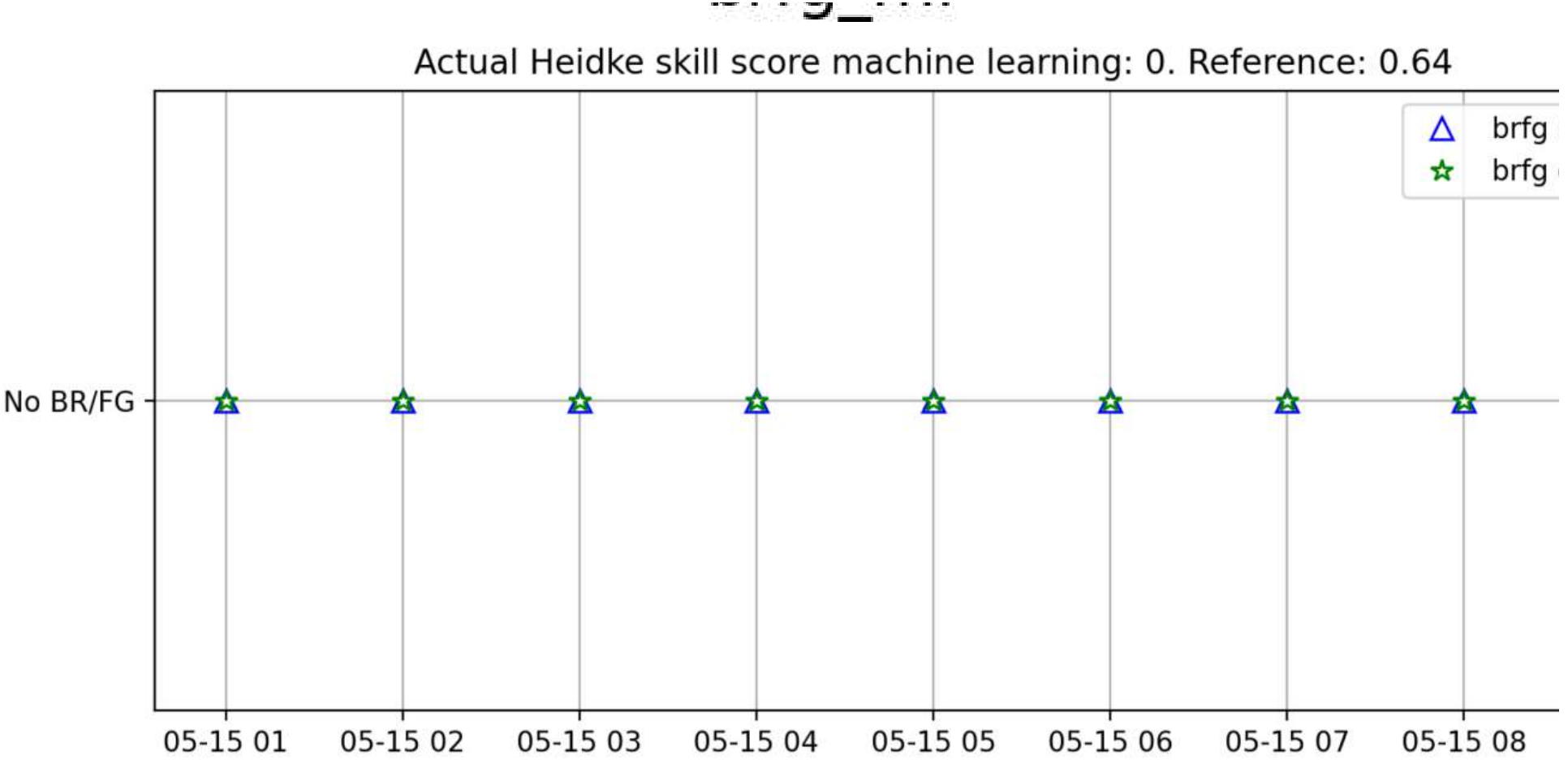

Actual mean absolute error meteorological model (kt): 2.33. Reference (m
Actual mean absolute error machine learning (kt): 2.0. Reference (m/s):
spd_WRF
spd_ml
spd_o
14
12
10
8
6

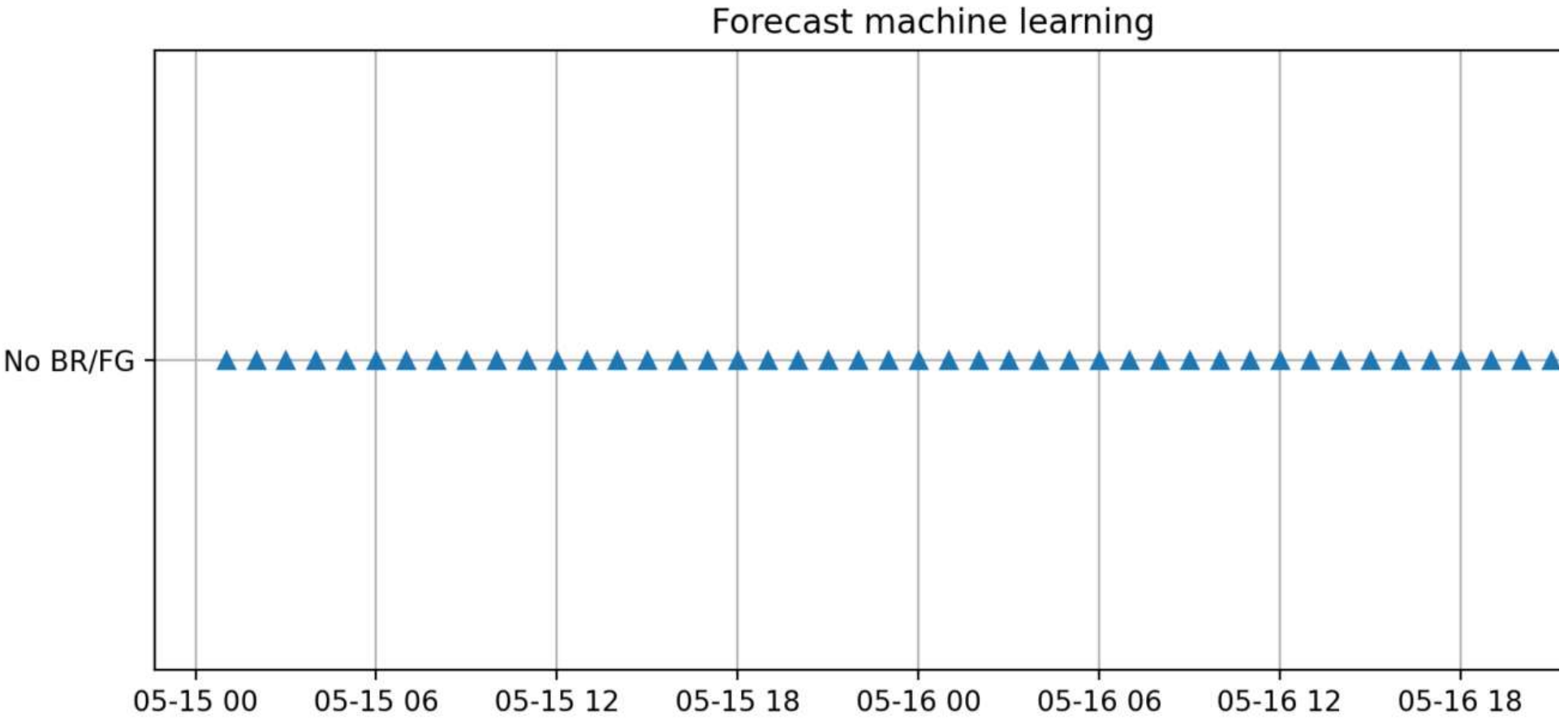

01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
time

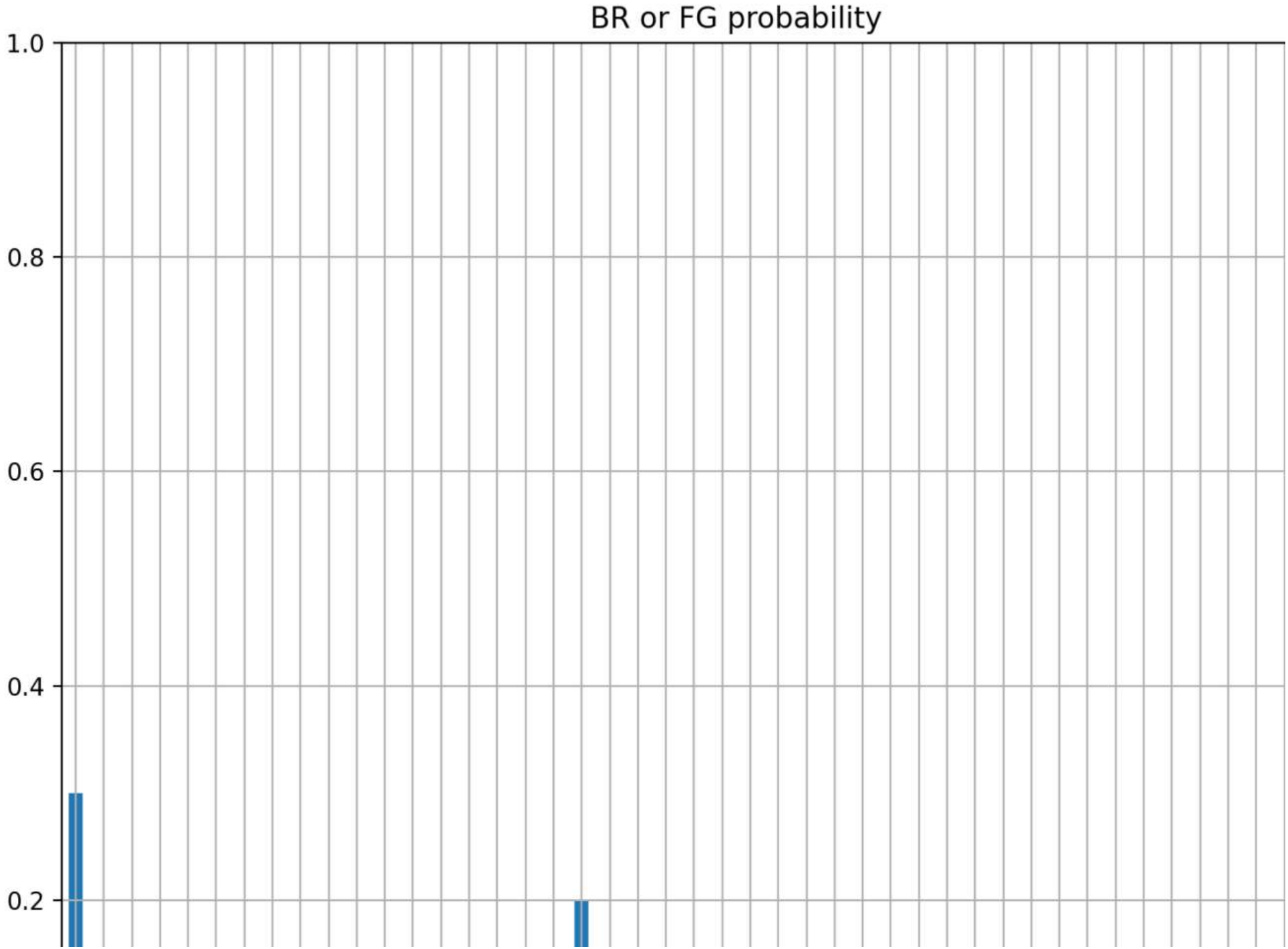

Forecast meteorological model versus machine learning
spd_WRF
spd_ml
18
16
14
12
10
8
6

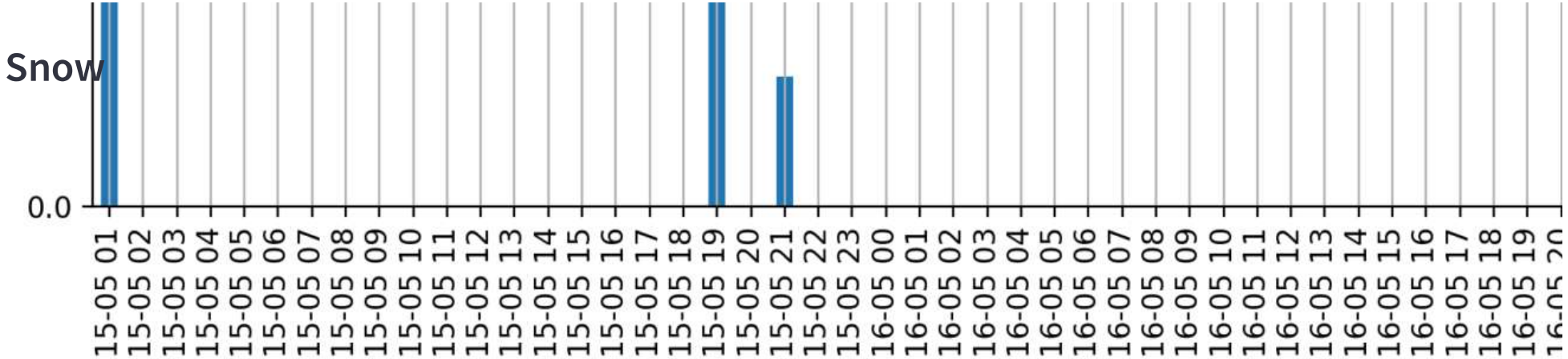

BR or FG
06:00
12:00
18:00
00:00
16-May
2023
06:00
12:00
18:00
time

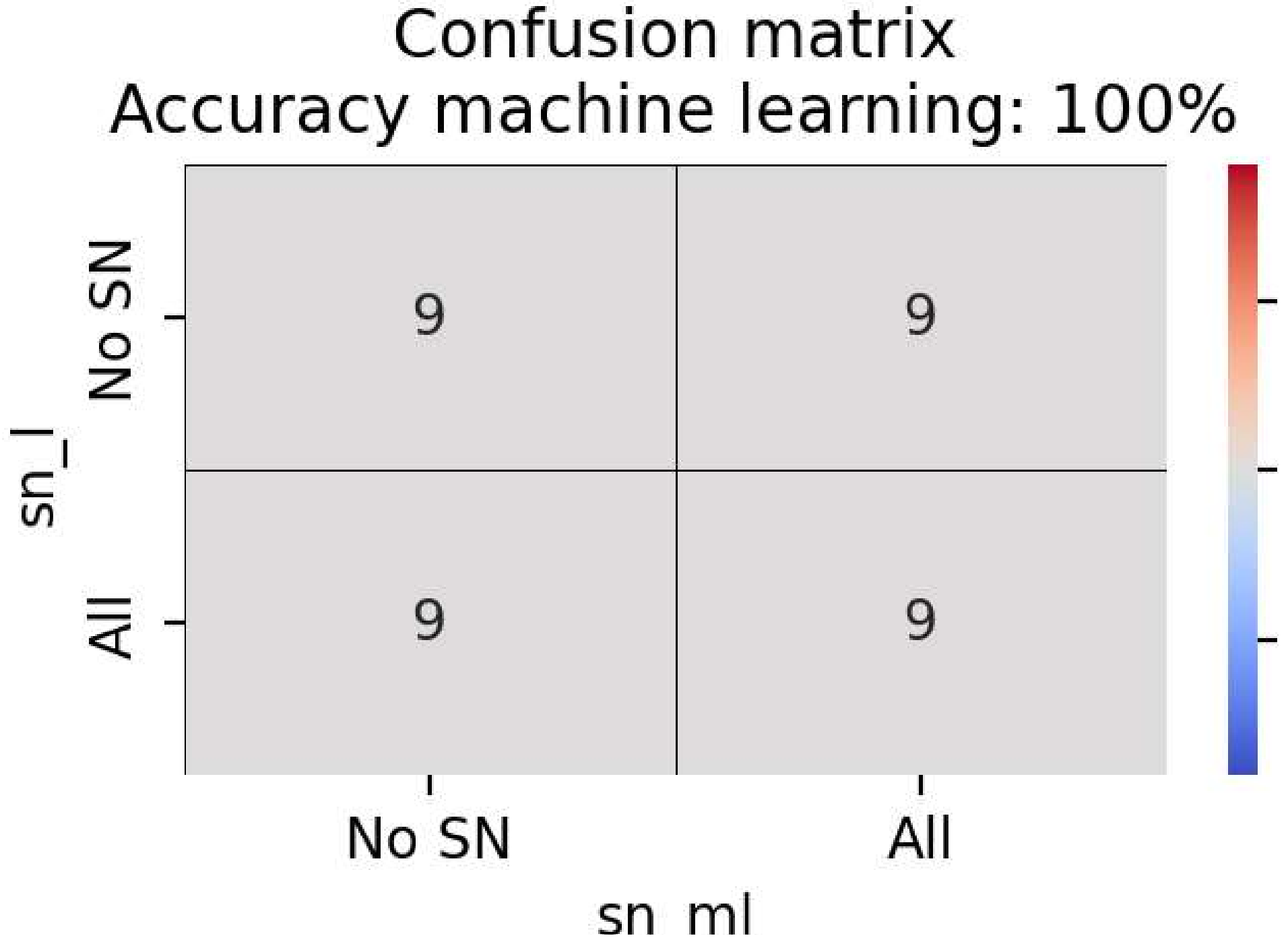

Confusion matrix
Accuracy machine learning: 100%
brfg_o_l
No BR/FG
All
9
9
9
9
No BR/FG
All
brfg_ml

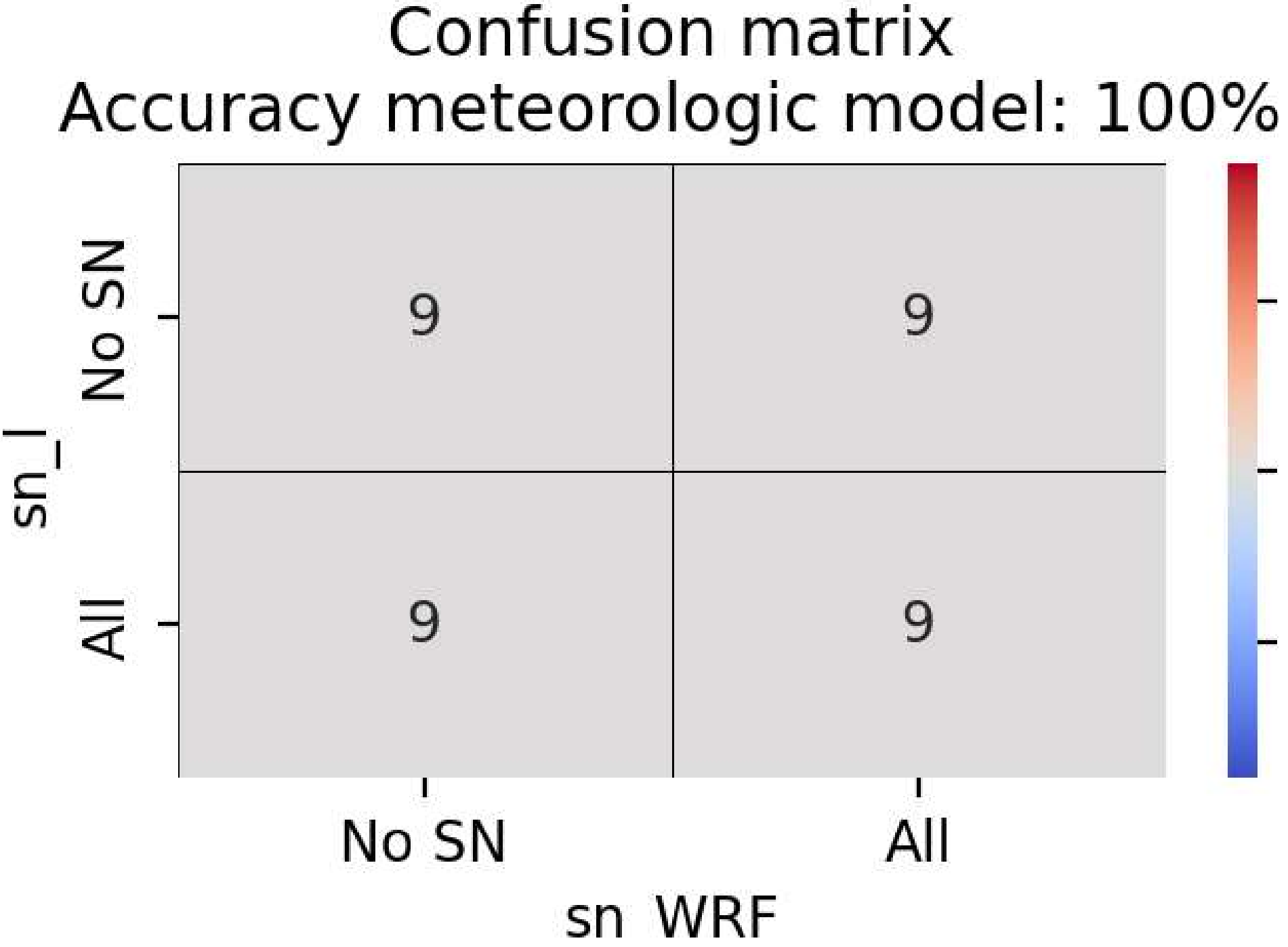

Actual Heidke skill score machine learning: 0. Reference: 0.64
brfg
brfg
No BR/FG
05-15 01
05-15 02
05-15 03
05-15 04
05-15 05
05-15 06
05-15 07
05-15 08

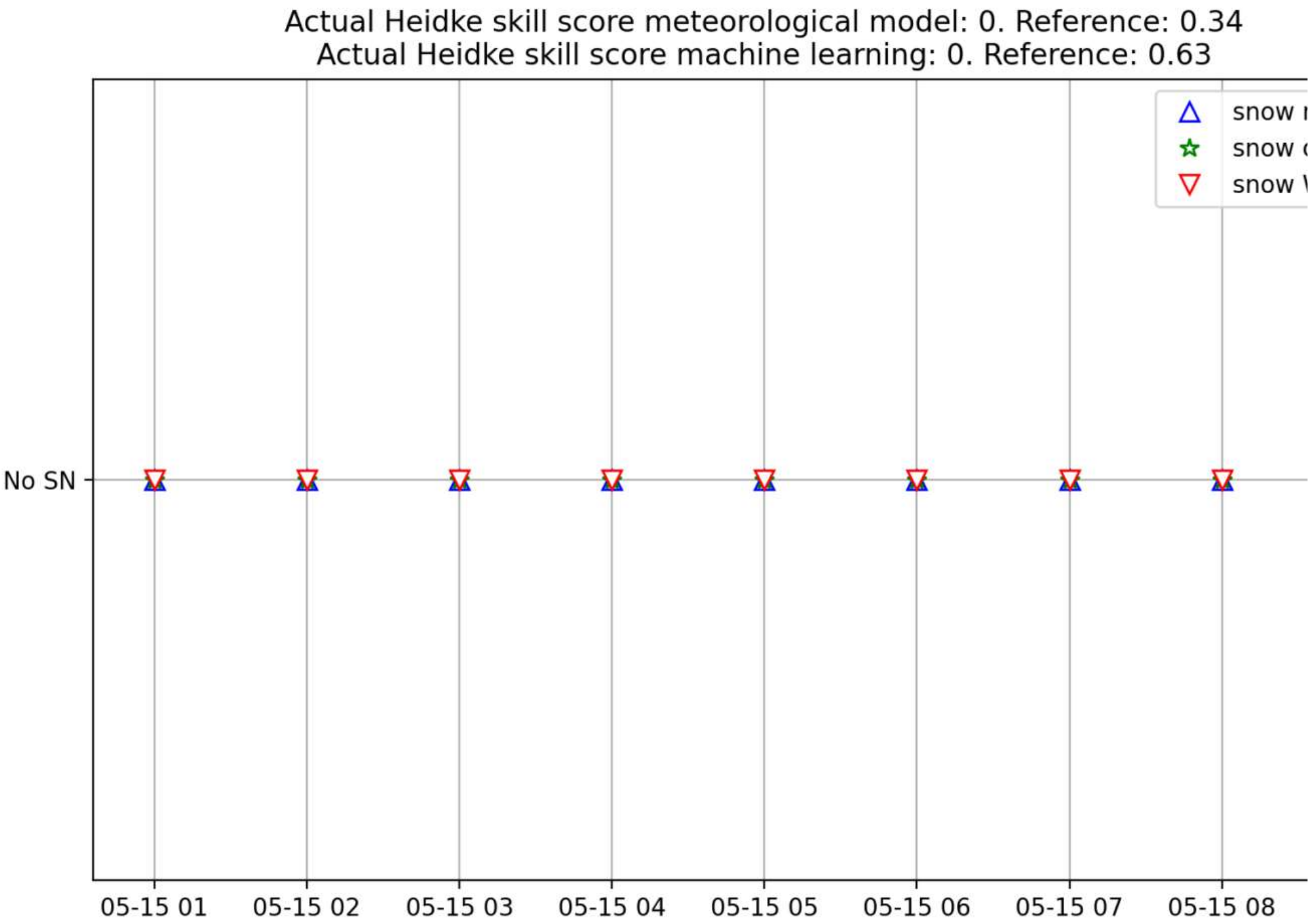

Forecast machine learning
No BR/FG
05-15 00
05-15 06
05-15 12
05-15 18
05-16 00
05-16 06
05-16 12
05-16 18

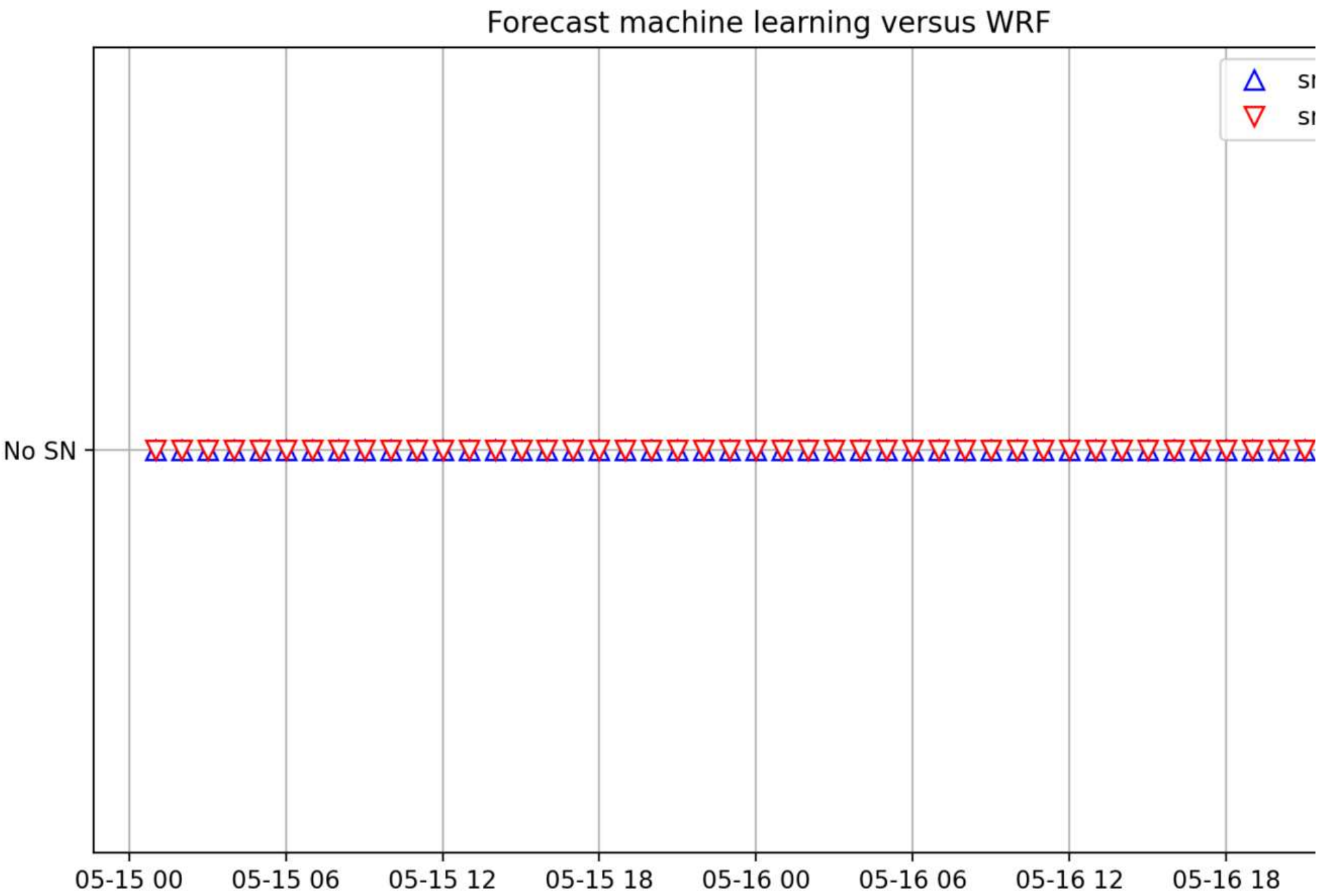

BR or FG probability
1.0
0.8
0.6
0.4
0.2

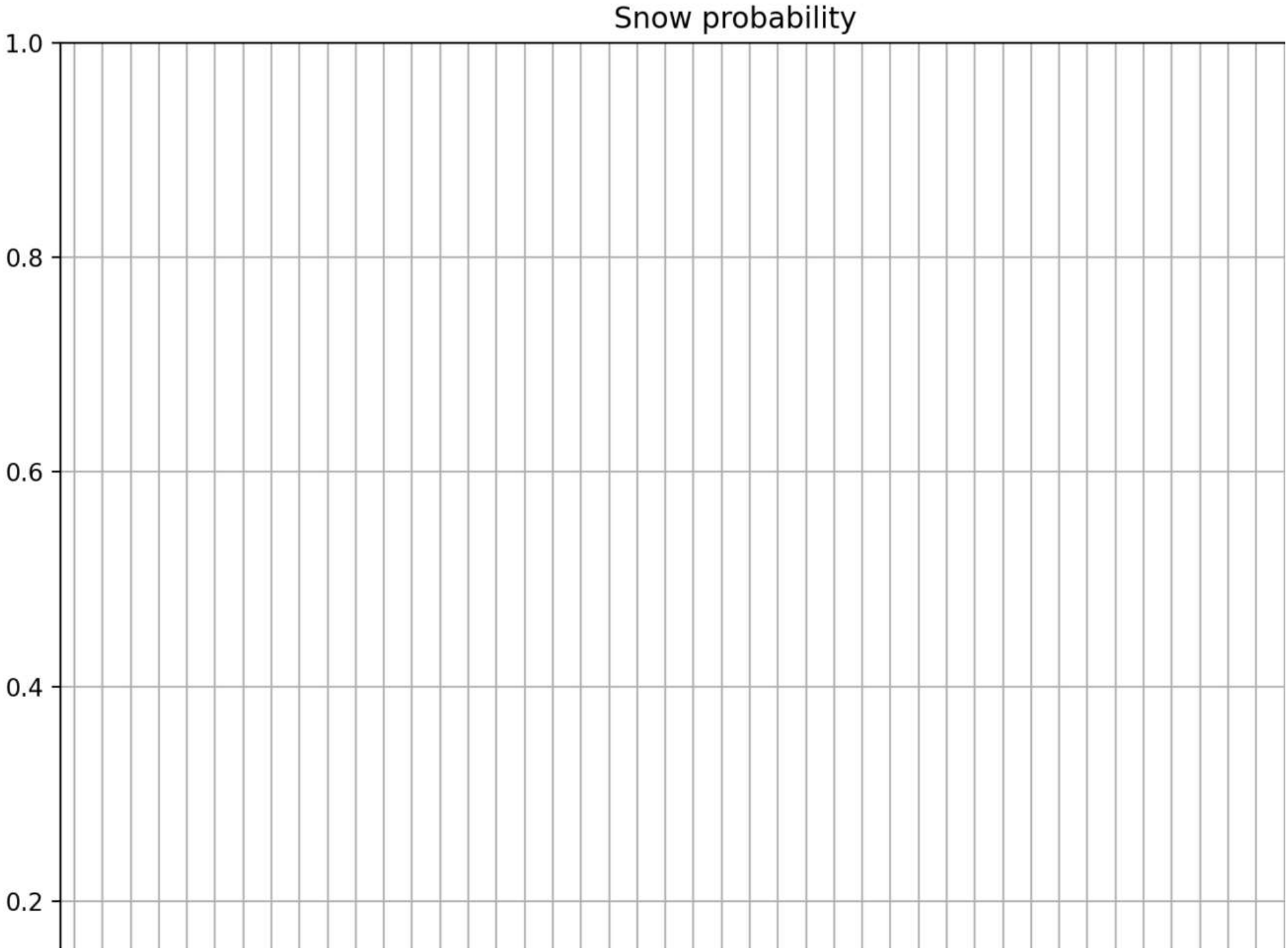

Snow
0.0
15-05 01
15-05 02
15-05 03
15-05 04
15-05 05
15-05 06
15-05 07
15-05 08
15-05 09
15-05 10
15-05 11
15-05 12
15-05 13
15-05 14
15-05 15
15-05 16
15-05 17
15-05 18
15-05 19
15-05 20
15-05 21
15-05 22
15-05 23
16-05 00
16-05 01
16-05 02
16-05 03
16-05 04
16-05 05
16-05 06
16-05 07
16-05 08
16-05 09
16-05 10
16-05 11
16-05 12
16-05 13
16-05 14
16-05 15
16-05 16
16-05 17
16-05 18
16-05 19

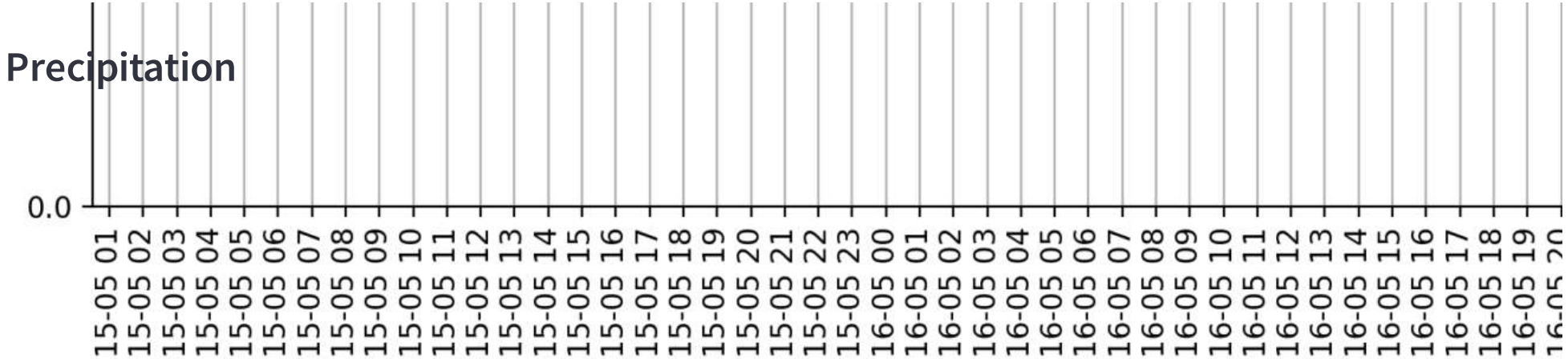

Confusion matrix
Accuracy machine learning: 100%
sn_l
No SN
All
9
9
9
9
No SN
All
sn_ml

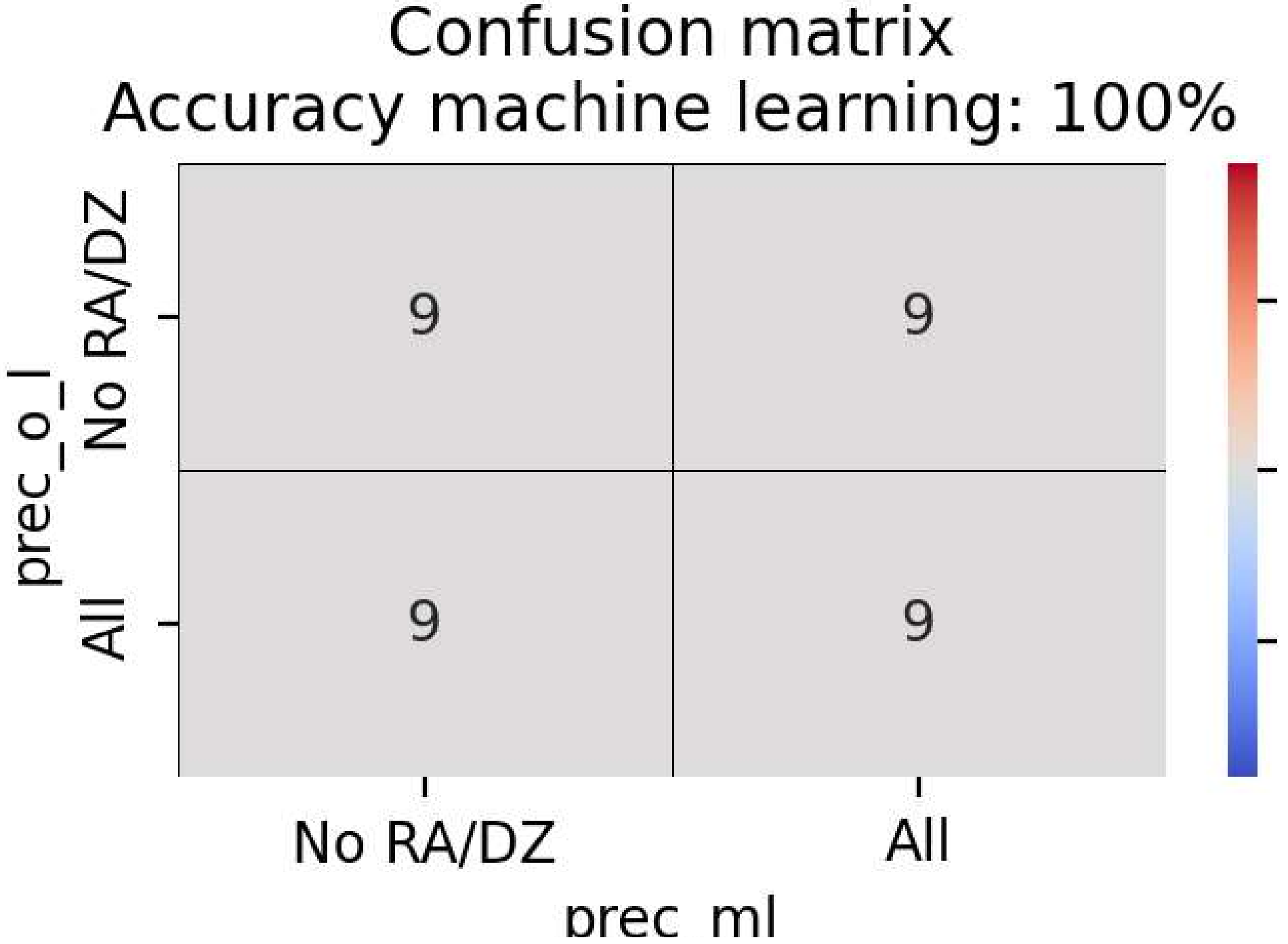

Confusion matrix
Accuracy meteorologic model: 100%
sn_l
No SN
All
9
9
9
9
No SN
All
sn WRF

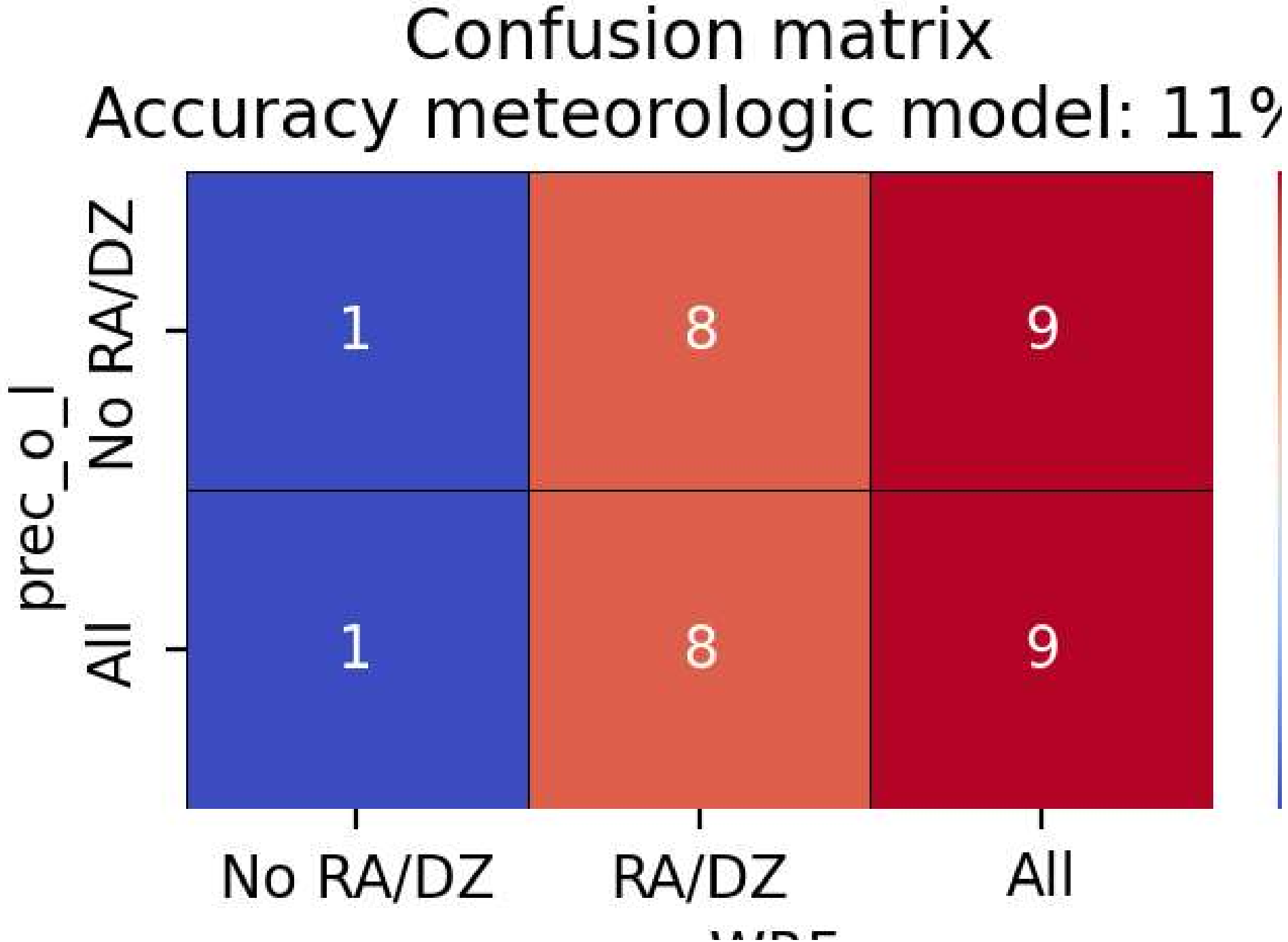

Actual Heidke skill score meteorological model: 0. Reference: 0.34
Actual Heidke skill score machine learning: 0. Reference: 0.63
snow
snow
snow
No SN
05-15 01
05-15 02
05-15 03
05-15 04
05-15 05
05-15 06
05-15 07
05-15 08

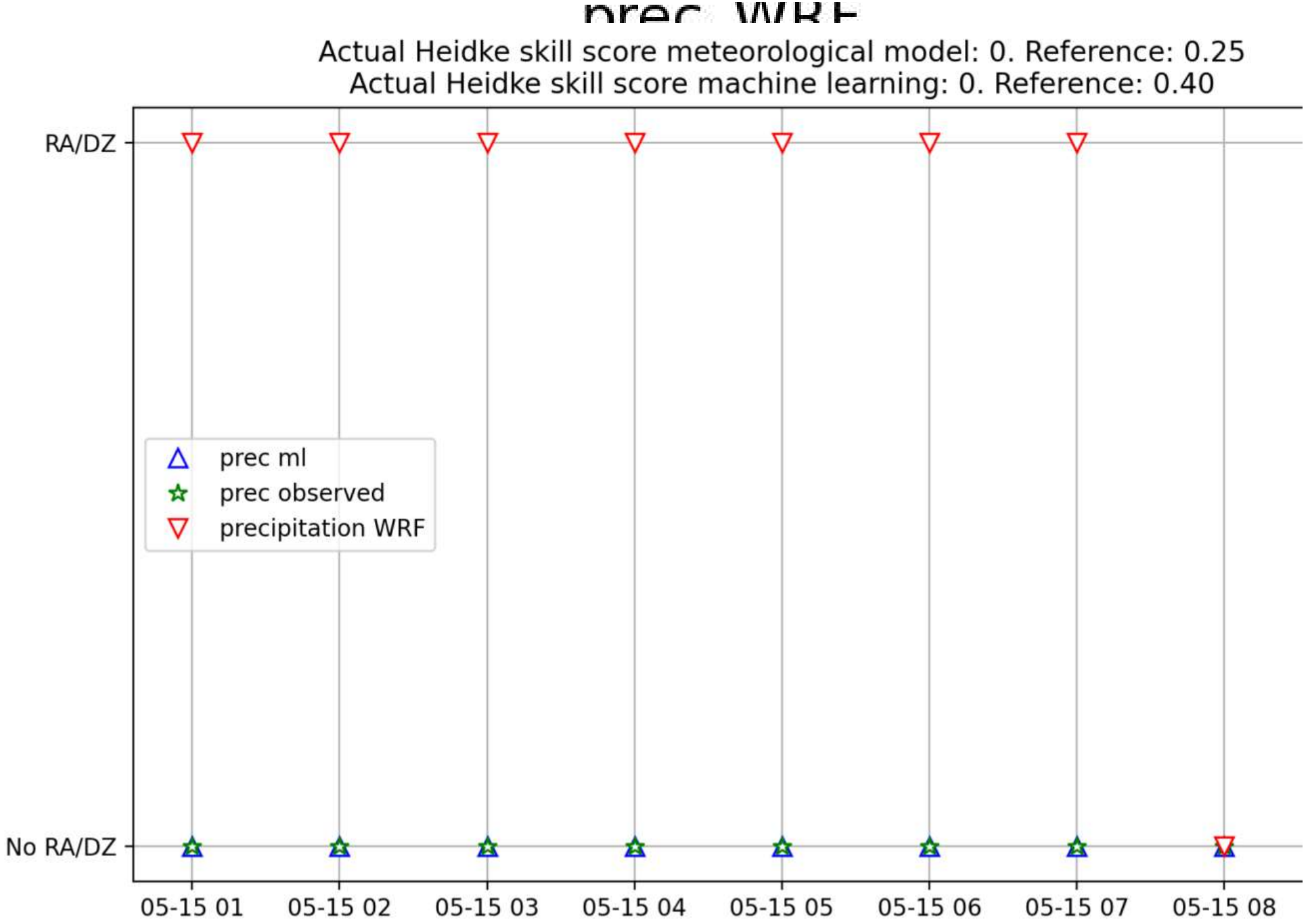

Forecast machine learning versus WRF
No SN
05-15 00
05-15 06
05-15 12
05-15 18
05-16 00
05-16 06
05-16 12
05-16 18

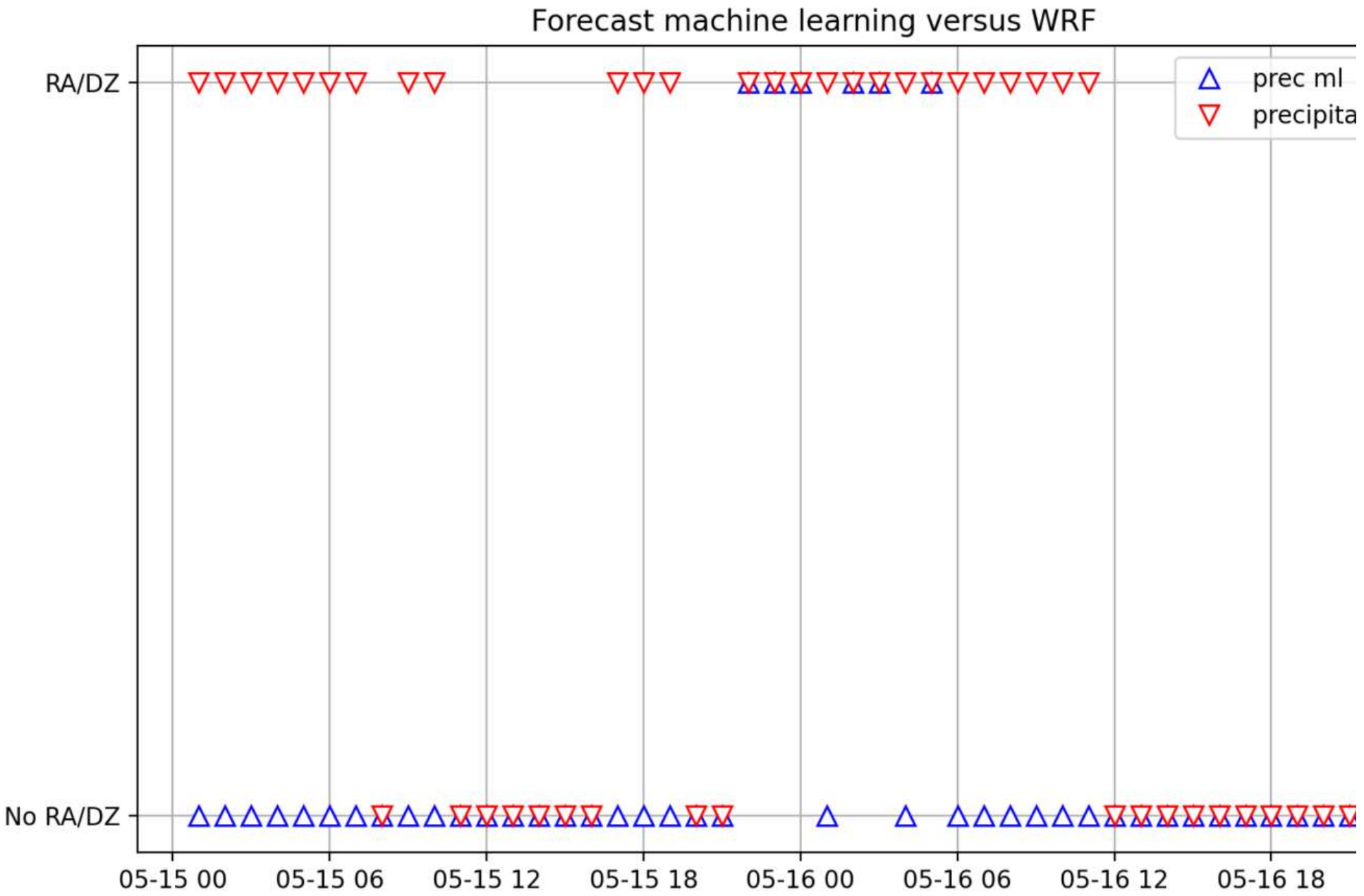

Snow probability
1.0
0.8
0.6
0.4
0.2

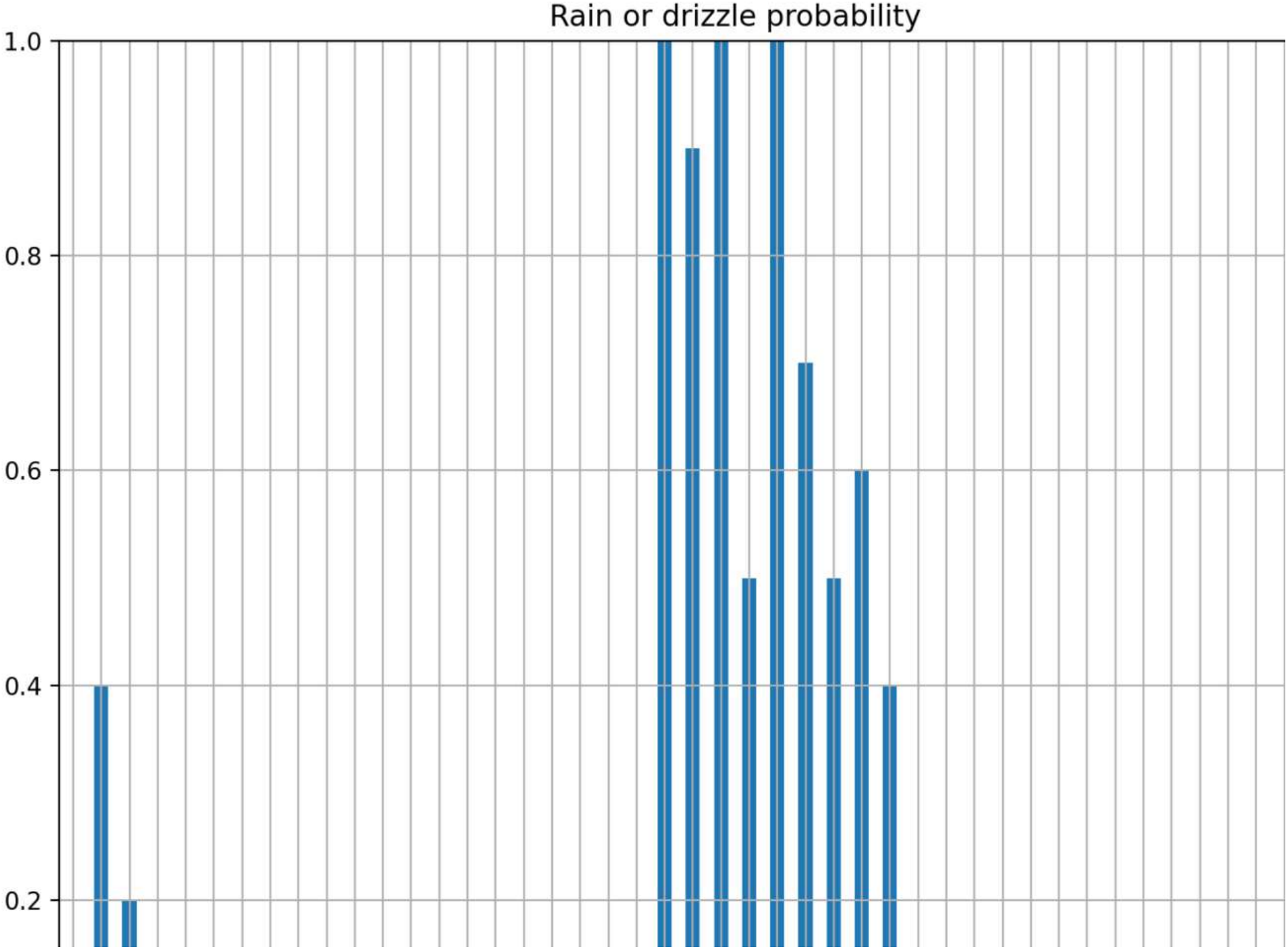

Precipitation
0.0
15-05 01
15-05 02
15-05 03
15-05 04
15-05 05
15-05 06
15-05 07
15-05 08
15-05 09
15-05 10
15-05 11
15-05 12
15-05 13
15-05 14
15-05 15
15-05 16
15-05 17
15-05 18
15-05 19
15-05 20
15-05 21
15-05 22
15-05 23
16-05 00
16-05 01
16-05 02
16-05 03
16-05 04
16-05 05
16-05 06
16-05 07
16-05 08
16-05 09
16-05 10
16-05 11
16-05 12
16-05 13
16-05 14
16-05 15
16-05 16
16-05 17
16-05 18
16-05 19

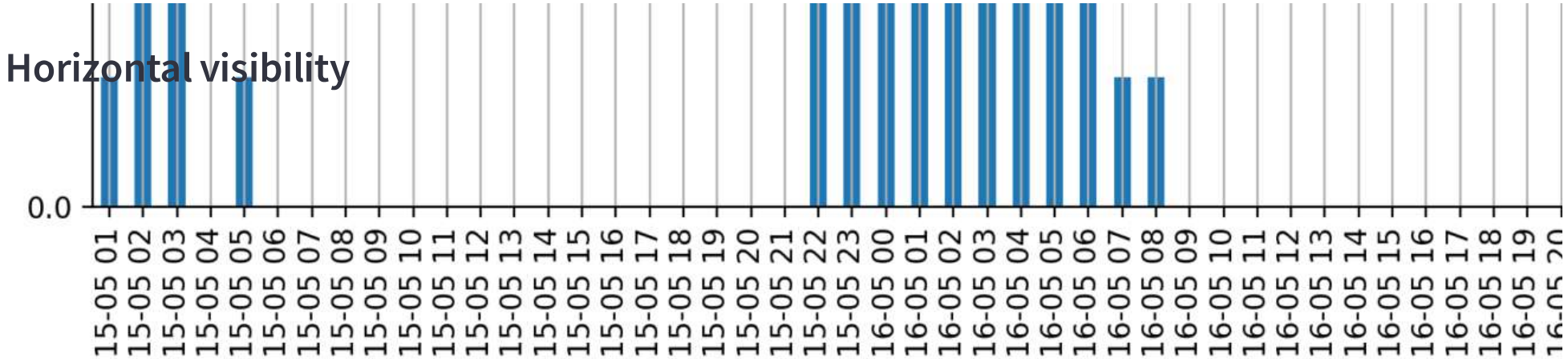

Confusion matrix
Accuracy machine learning: 100%
prec_o_l
No RA/DZ
All
9
9
9
9
No RA/DZ
All
prec_ml


Confusion matrix
Accuracy meteorologic model: 11%
prec_o_l
No RA/DZ
All
1
8
9
1
8
9
No RA/DZ
RA/DZ
All


prec WRF
Actual Heidke skill score meteorological model: 0. Reference: 0.25
Actual Heidke skill score machine learning: 0. Reference: 0.40
RA/DZ
No RA/DZ
prec ml
prec observed
precipitation WRF
05-15 01
05-15 02
05-15 03
05-15 04
05-15 05
05-15 06
05-15 07
05-15 08


Forecast machine learning versus WRF
RA/DZ
No RA/DZ
prec ml
precipita
05-15 00
05-15 06
05-15 12
05-15 18
05-16 00
05-16 06
05-16 12
05-16 18


Rain or drizzle probability
1.0
0.8
0.6
0.4
0.2


Horizontal visibility
0.0
15-05 01
15-05 02
15-05 03
15-05 04
15-05 05
15-05 06
15-05 07
15-05 08
15-05 09
15-05 10
15-05 11
15-05 12
15-05 13
15-05 14
15-05 15
15-05 16
15-05 17
15-05 18
15-05 19
15-05 20
15-05 21
15-05 22
15-05 23
16-05 00
16-05 01
16-05 02
16-05 03
16-05 04
16-05 05
16-05 06
16-05 07
16-05 08
16-05 09
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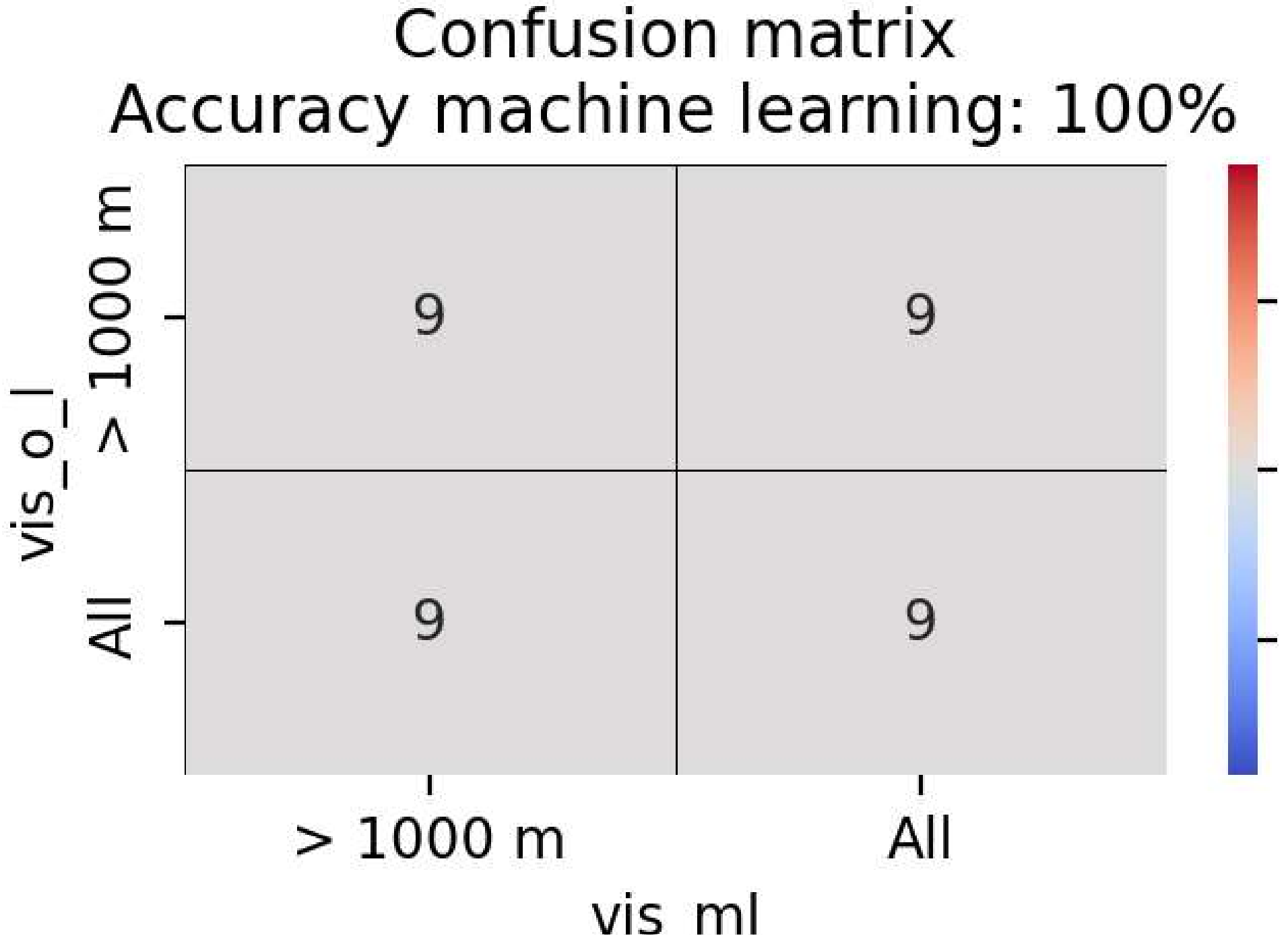
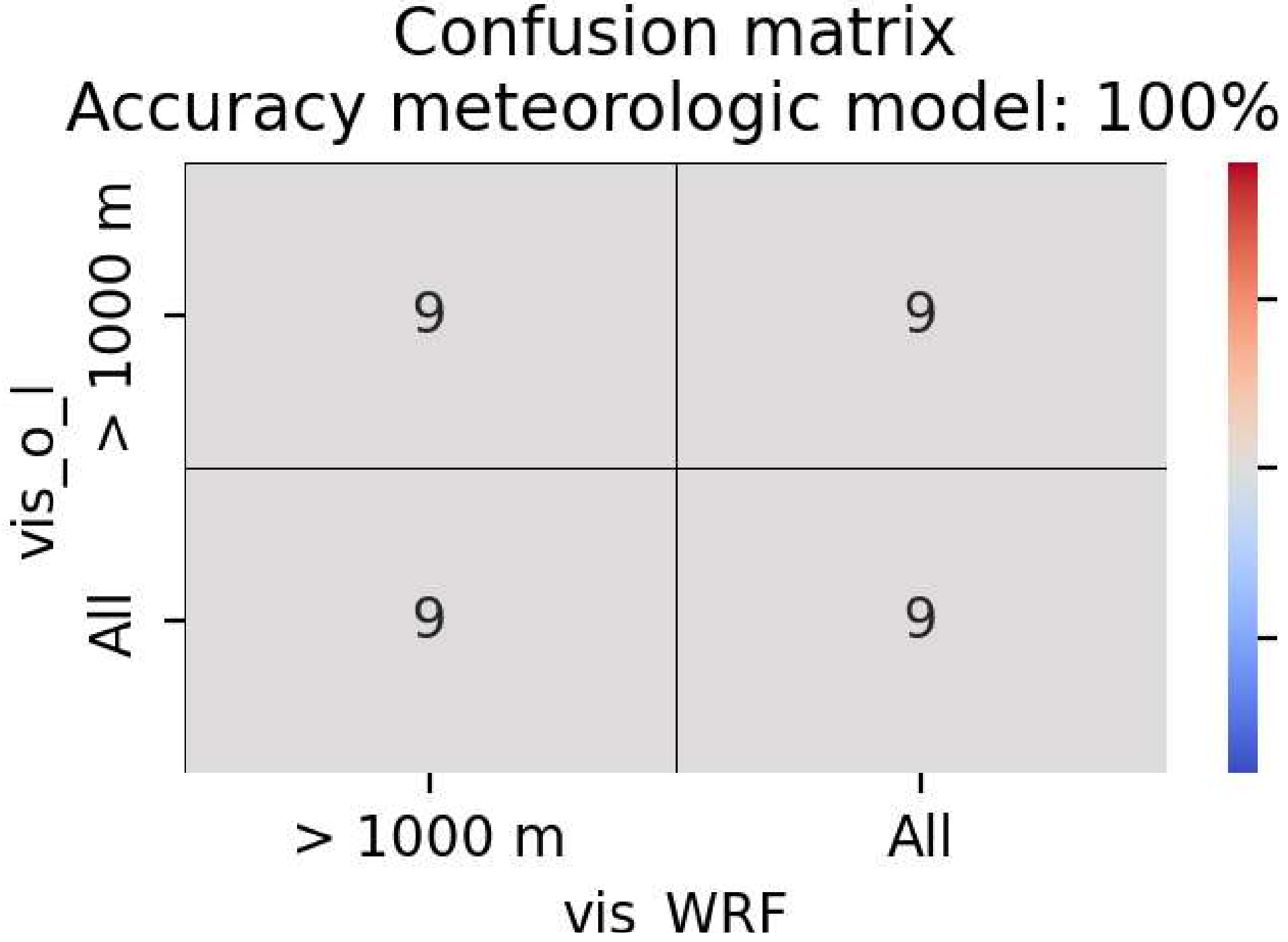
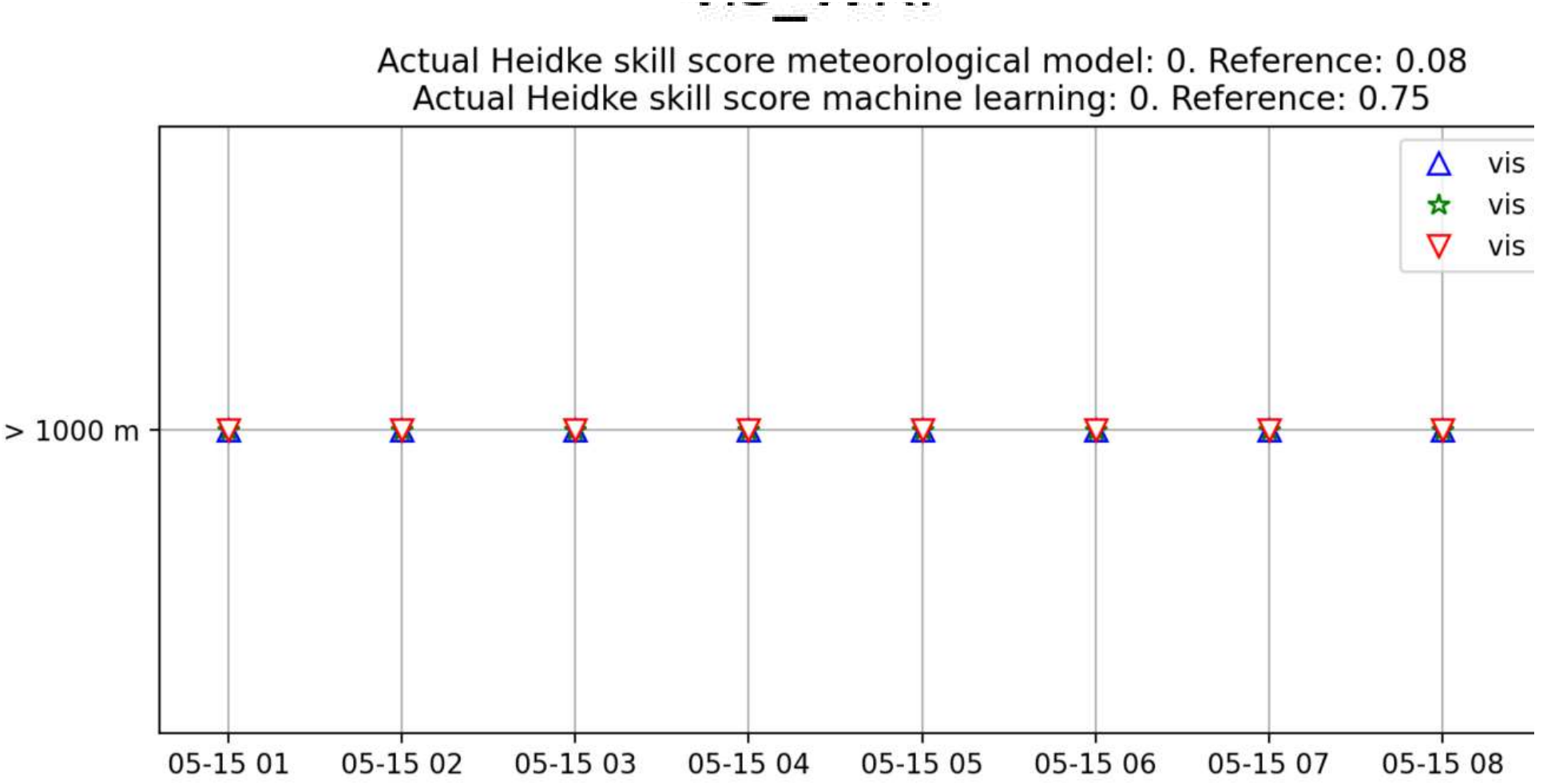
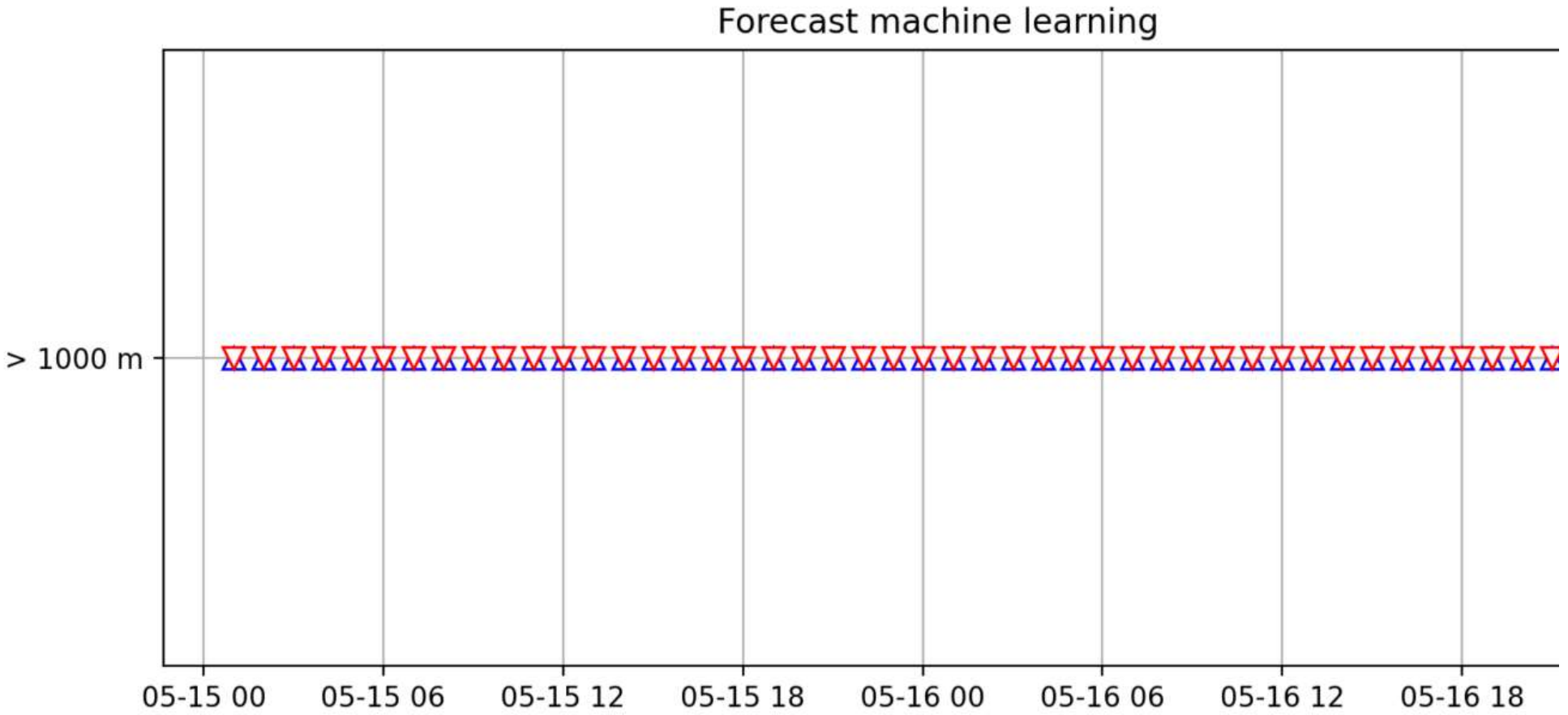
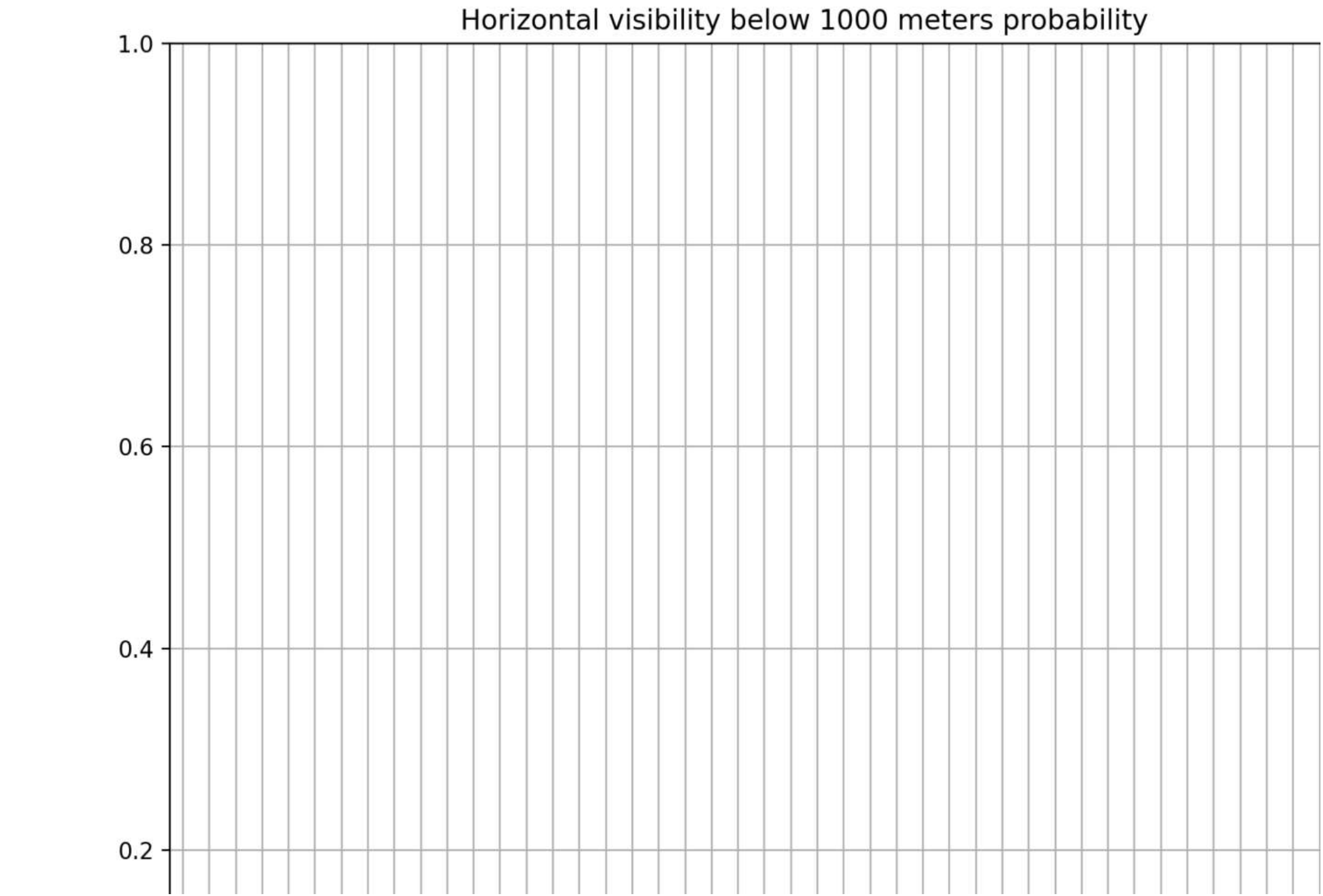
16-05 15
16-05 16
16-05 17
16-05 18
16-05 19

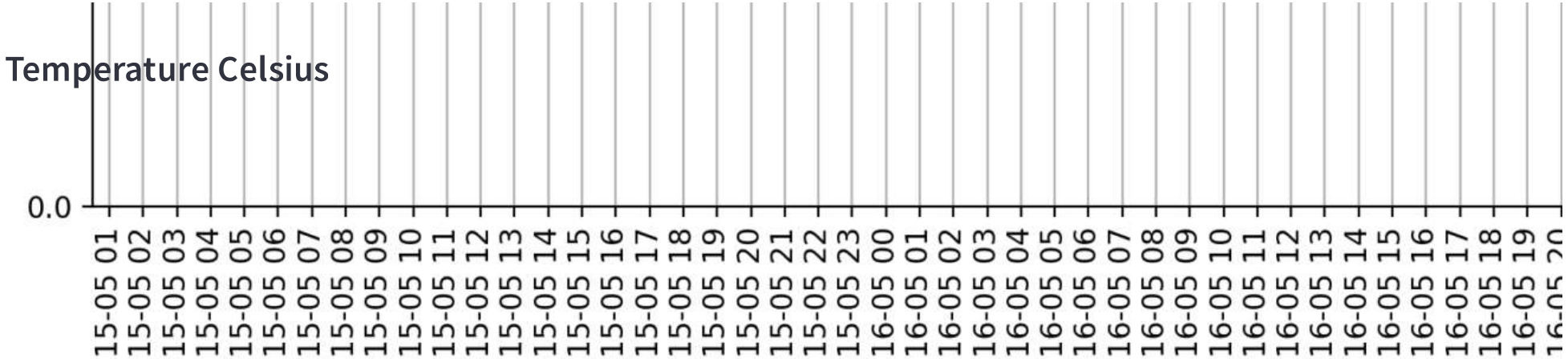

Confusion matrix
Accuracy machine learning: 100%
vis_o_l
> 1000 m
All
9
9
9
9
> 1000 m
All
vis_ml

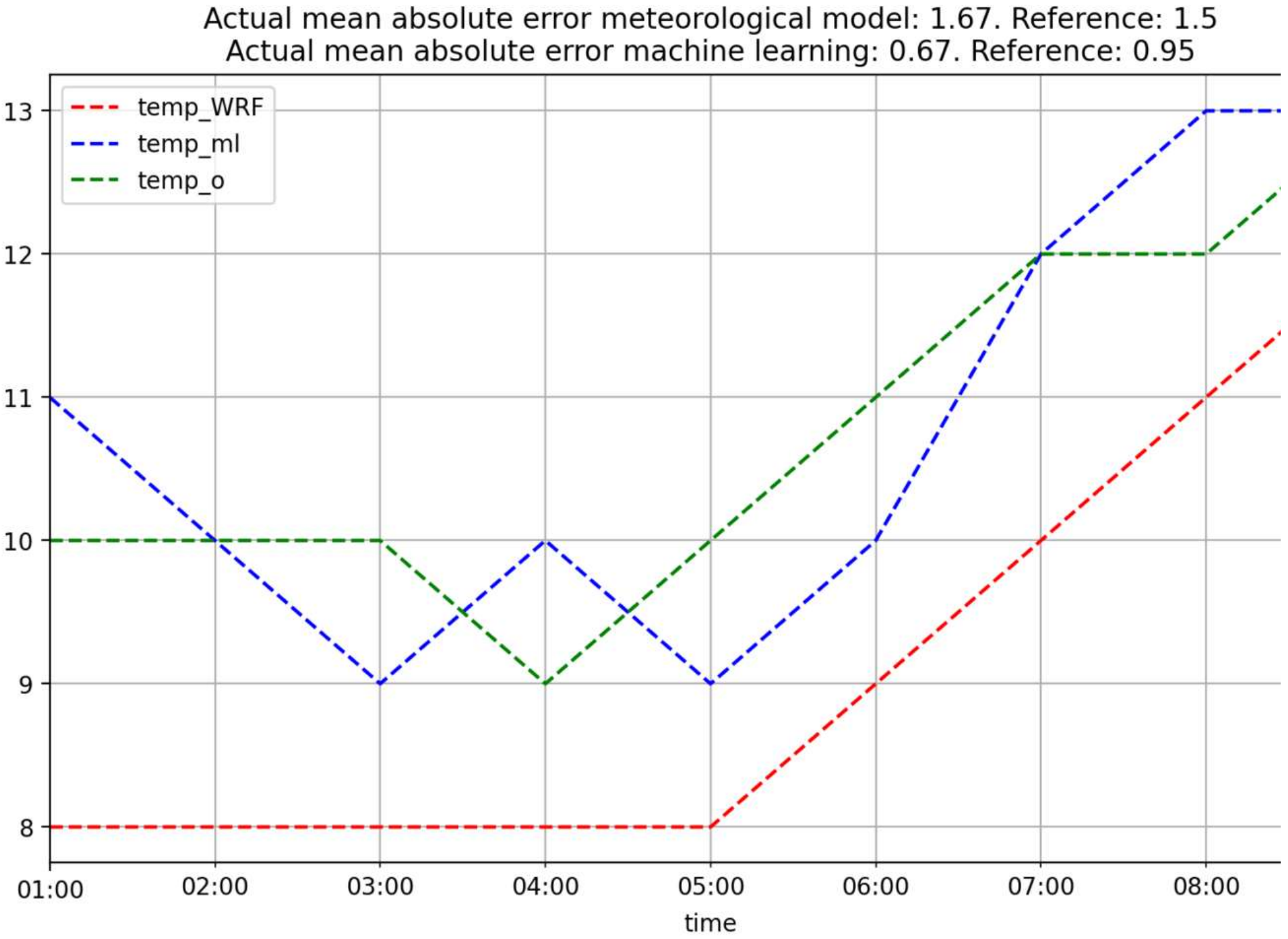

Confusion matrix
Accuracy meteorologic model: 100%
vis_o_l
> 1000 m
All
9
9
9
9
> 1000 m
All
vis WRF

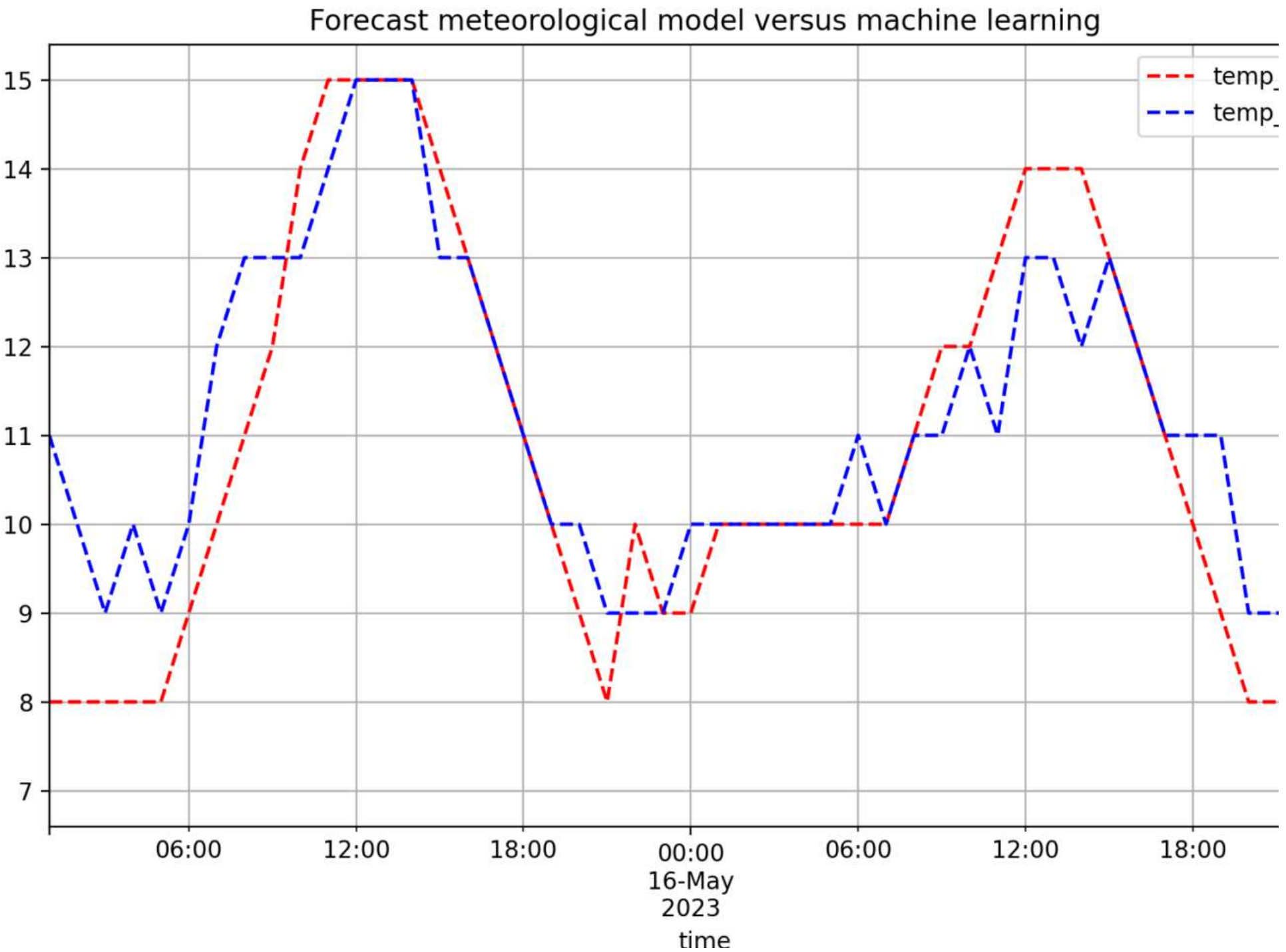

Actual Heidke skill score meteorological model: 0. Reference: 0.08
Actual Heidke skill score machine learning: 0. Reference: 0.75
vis
vis
vis
> 1000 m
05-15 01
05-15 02
05-15 03
05-15 04
05-15 05
05-15 06
05-15 07
05-15 08


Forecast machine learning
> 1000 m
05-15 00
05-15 06
05-15 12
05-15 18
05-16 00
05-16 06
05-16 12
05-16 18

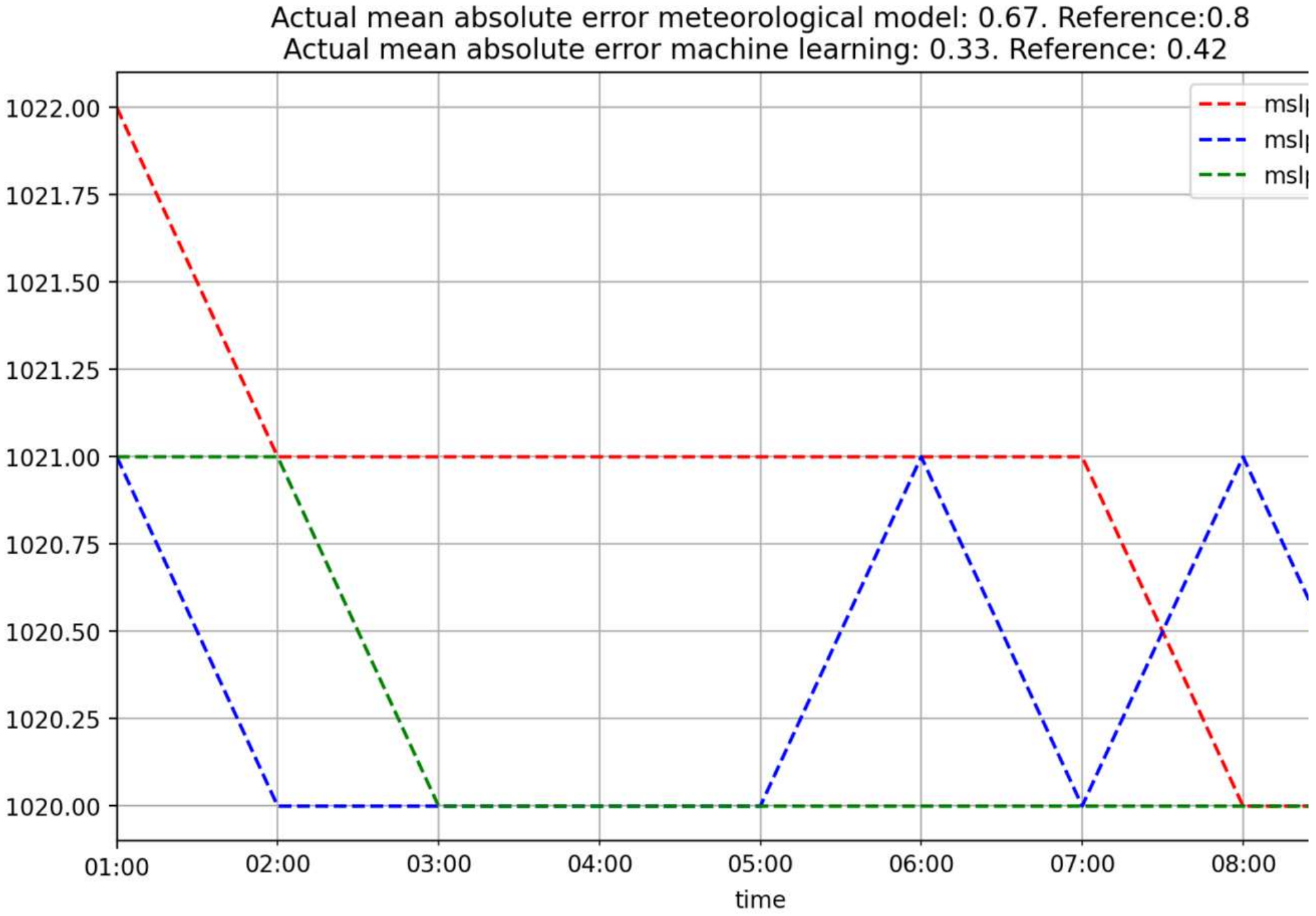

Horizontal visibility below 1000 meters probability
1.0
0.8
0.6
0.4
0.2

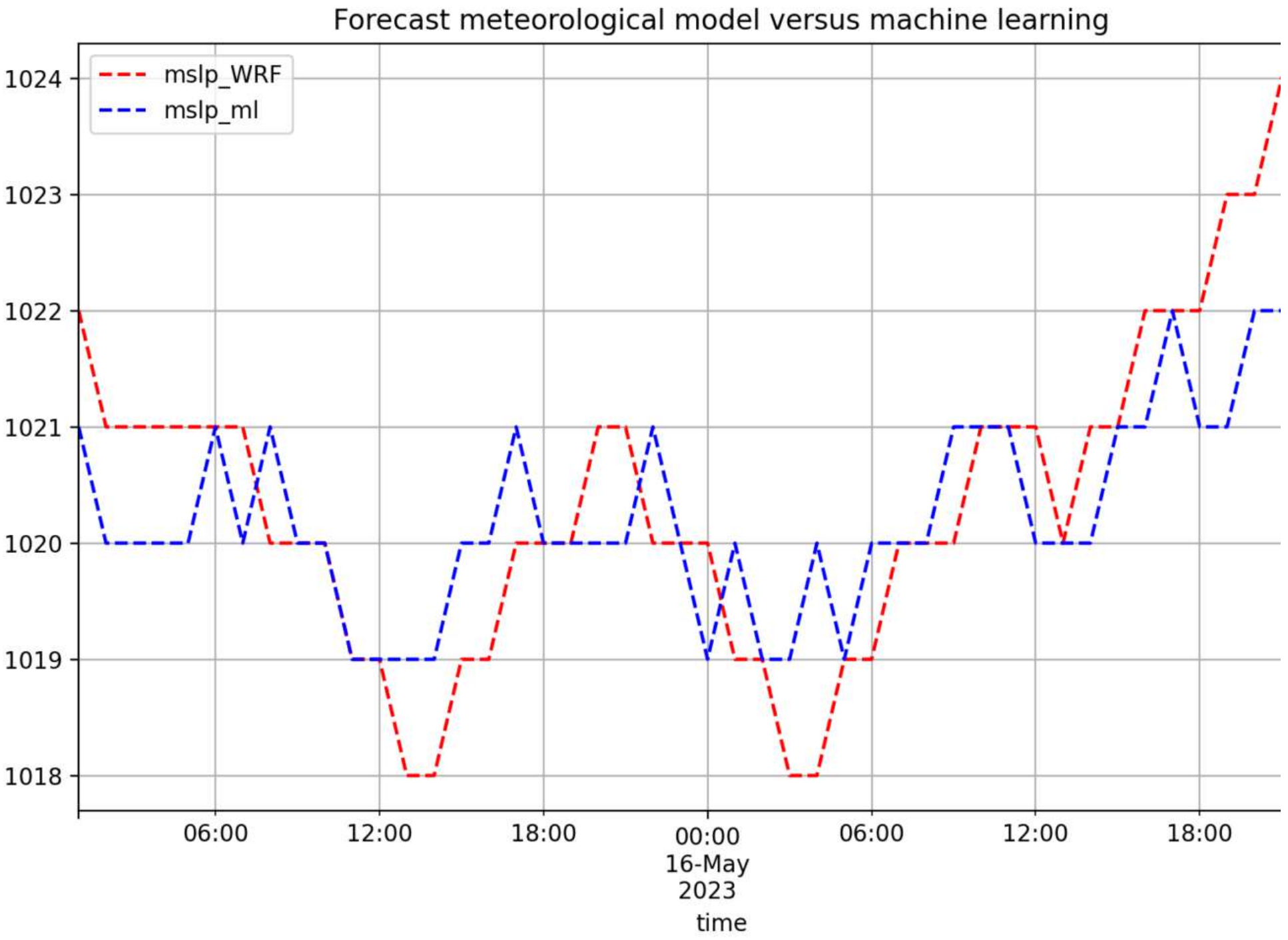

Temperature Celsius
0.0
15-05 01
15-05 02
15-05 03
15-05 04
15-05 05
15-05 06
15-05 07
15-05 08
15-05 09
15-05 10
15-05 11
15-05 12
15-05 13
15-05 14
15-05 15
15-05 16
15-05 17
15-05 18
15-05 19
15-05 20
15-05 21
15-05 22
15-05 23
16-05 00
16-05 01
16-05 02
16-05 03
16-05 04
16-05 05
16-05 06
16-05 07
16-05 08
16-05 09
16-05 10
16-05 11
16-05 12
16-05 13
16-05 14
16-05 15
16-05 16
16-05 17
16-05 18
16-05 19


Actual mean absolute error meteorological model: 1.67. Reference: 1.5
Actual mean absolute error machine learning: 0.67. Reference: 0.95
temp_WRF
temp_ml
temp_o
13
12
11
10
9
8
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
time


Forecast meteorological model versus machine learning
temp_
temp_
15
14
13
12
11
10
9
8
7
06:00
12:00
18:00
00:00
16-May
2023
06:00
12:00
18:00
time

Pressure hectopascals


Actual mean absolute error meteorological model: 0.67. Reference:0.8
Actual mean absolute error machine learning: 0.33. Reference: 0.42
1022.00
1021.75
1021.50
1021.25
1021.00
1020.75
1020.50
1020.25
1020.00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
time


Forecast meteorological model versus machine learning
mslp_WRF
mslp_ml
1024
1023
1022
1021
1020
1019
1018
06:00
12:00
18:00
00:00
16-May
2023
06:00
12:00
18:00
time

Global results

Better meteorological model outcome: 0


```
[]
```


Better machine learning outcome: 5


```
[
  0 : "wind direction"
  1 : "wind speed"
  2 : "precipitation"
  3 : "temperature"
  4 : "pressure"
]
```


Project link

Made with Streamlit