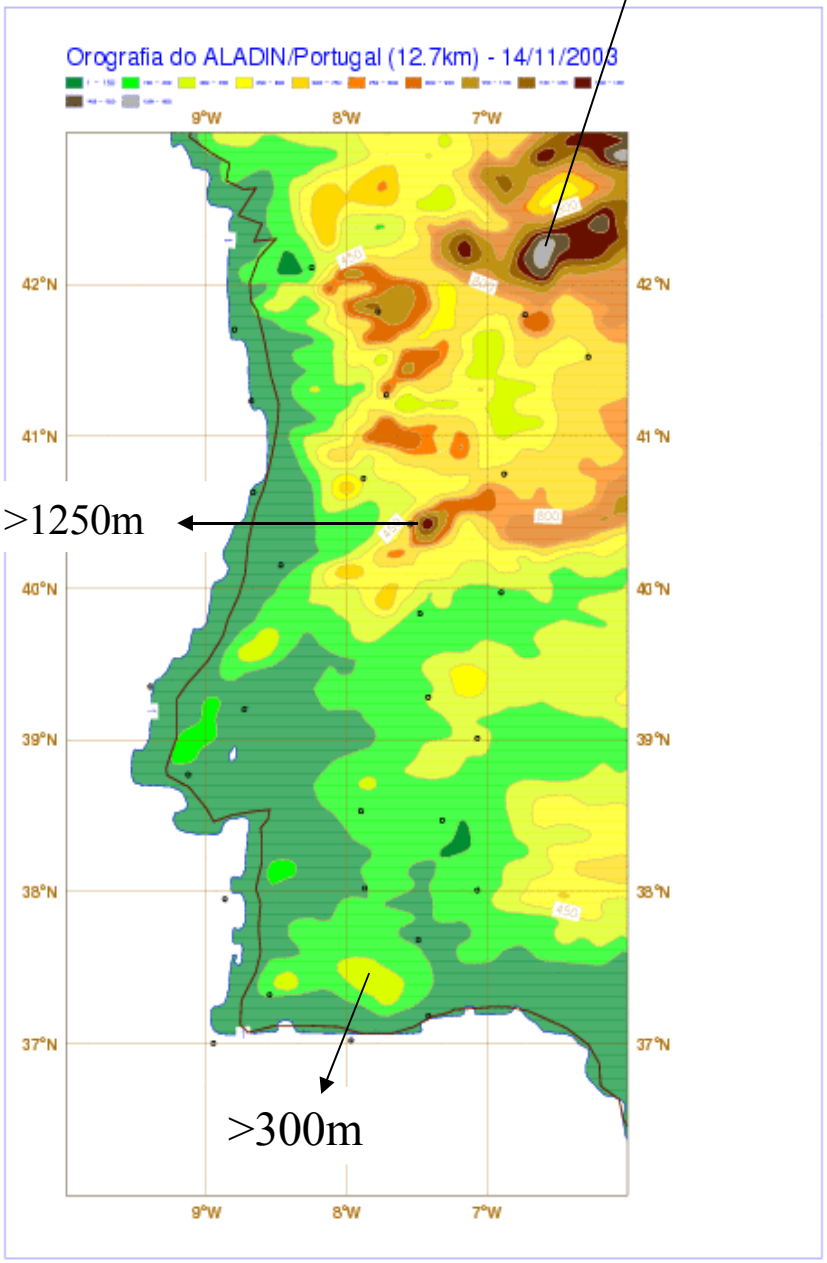
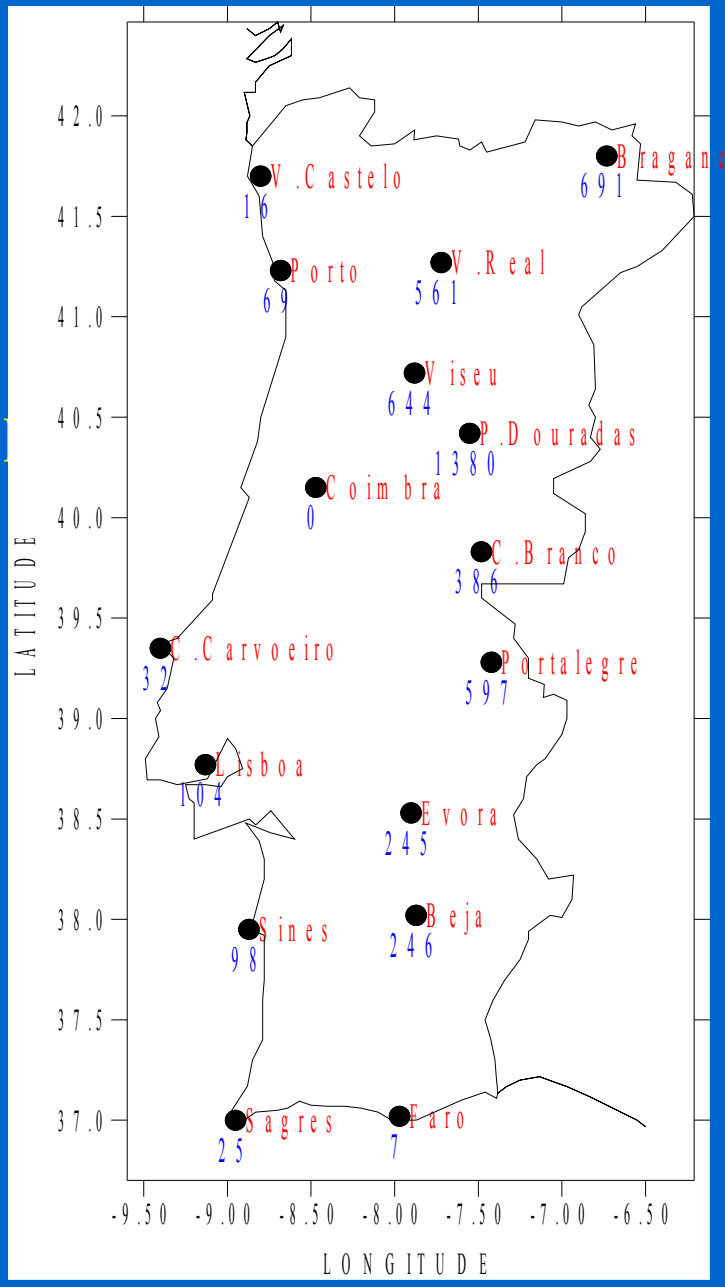
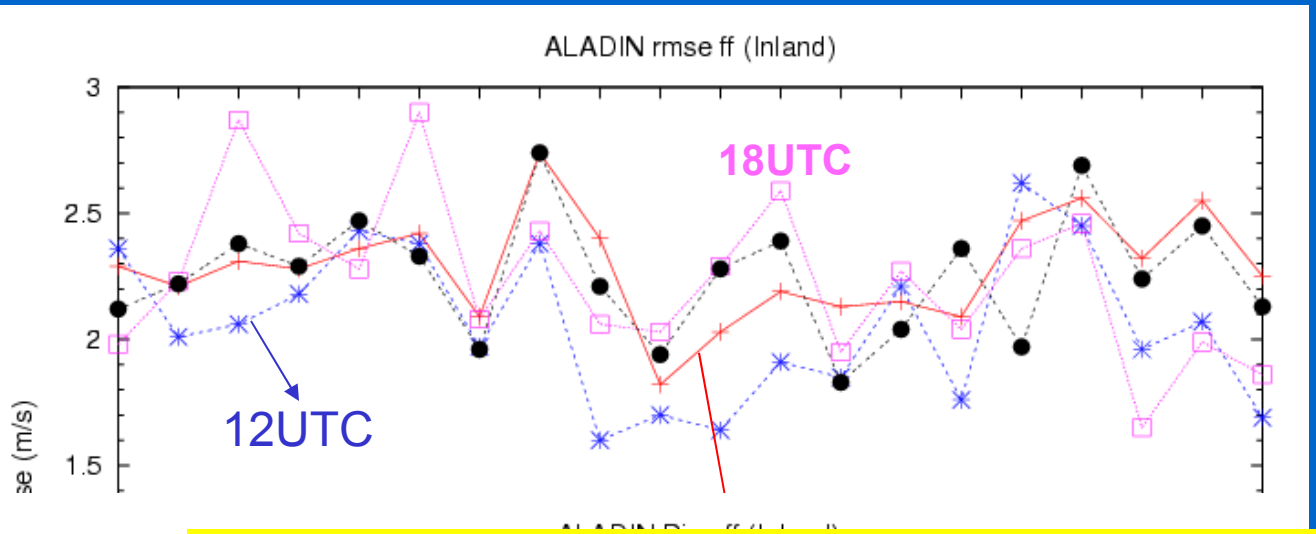
Verification of ALADIN/Portugal forecasts

Margarida Belo
(Instituto de Meteorologia, Portugal)


Orografia do ALADIN/Portugal (12.7km) - 14/11/2003
9°W
8°W
7°W
42°N
41°N
40°N
39°N
38°N
37°N
>1550m
>1250m
>300m


V.Castelo
16
Braganca
691
Porto
69
V.Real
561
Viseu
644
P.Douradas
1380
Coimbra
0
C.Branco
386
C.Carvoeiro
32
Portalegre
597
Lisboa
104
Evora
245
Sines
98
Beja
246
Sagres
25
Faro
7
42.0
41.5
41.0
40.5
40.0
39.5
39.0
38.5
38.0
37.5
37.0
LATITUDE
-9.50
-9.00
-8.50
-8.00
-7.50
-7.00
-6.50
LONGITUDE

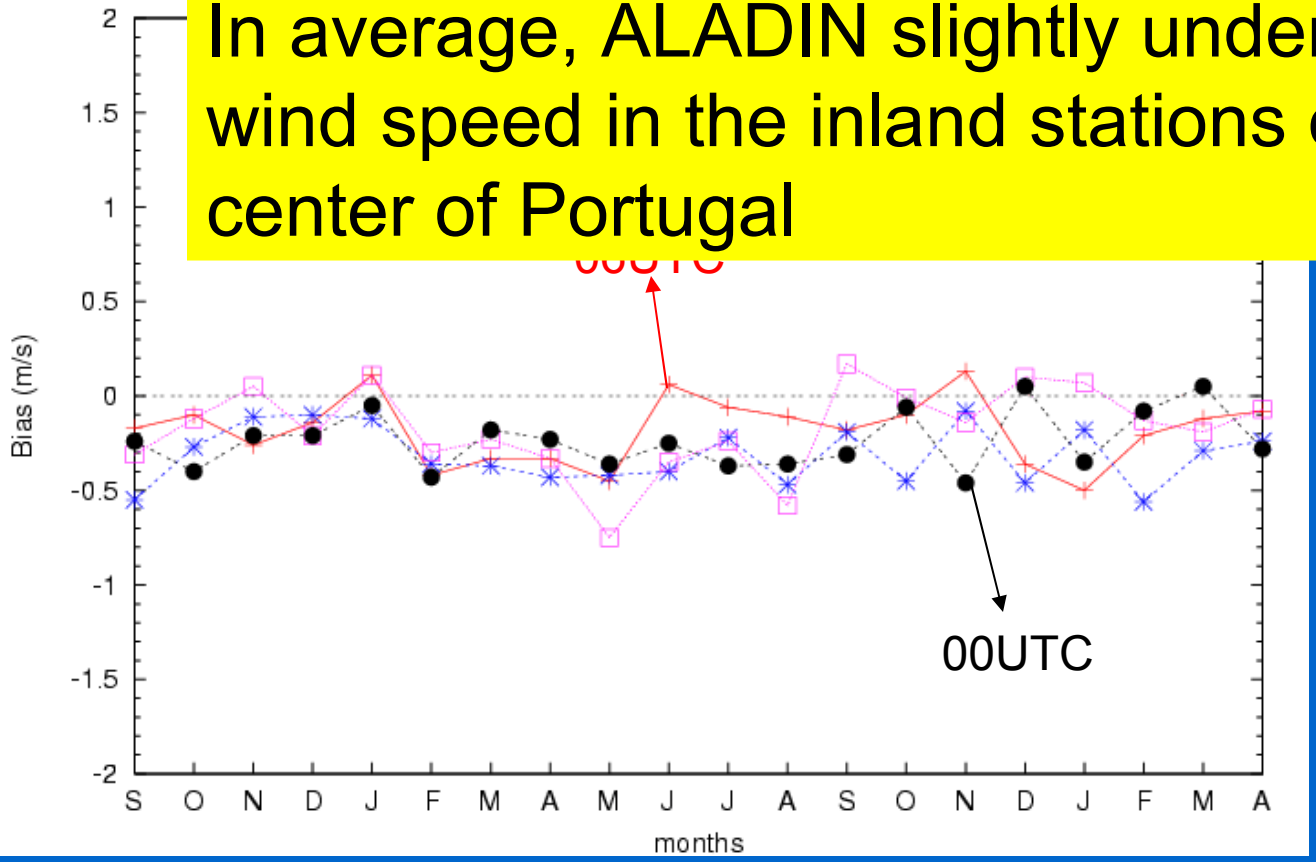
Wind speed (10m)



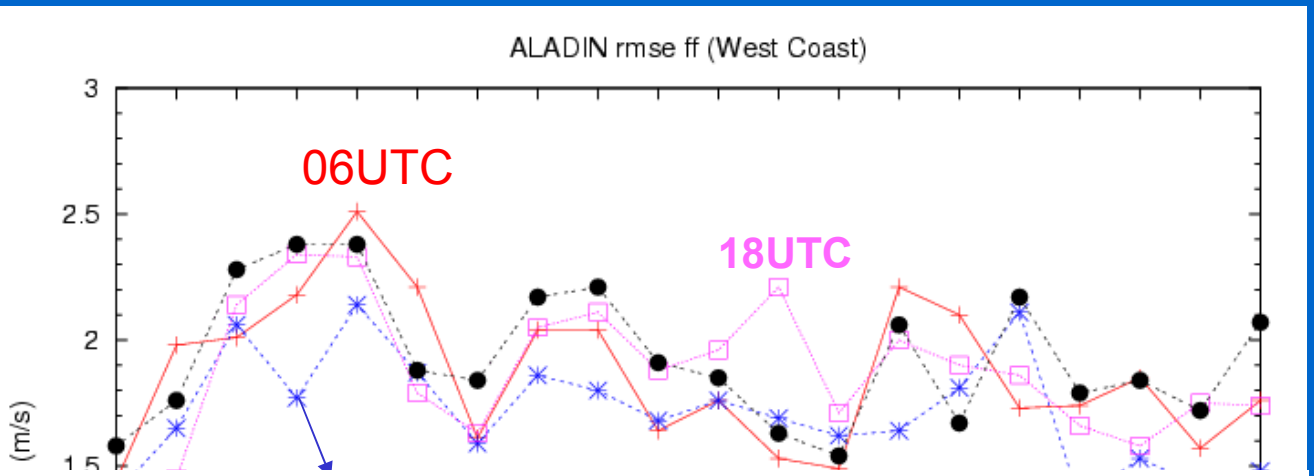
RMSE

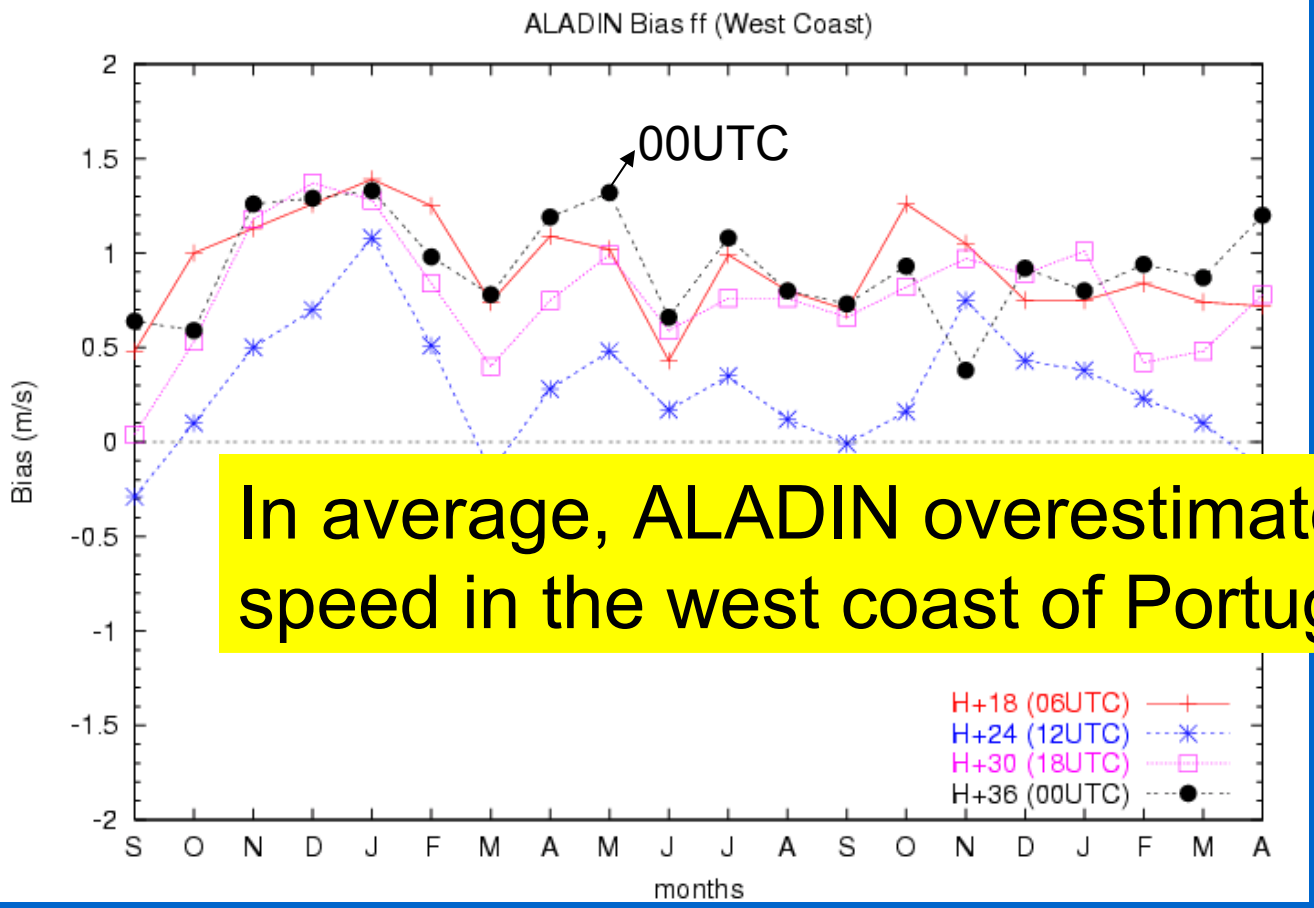
Inland (north and center of Portugal)

In average, ALADIN slightly underestimate the wind speed in the inland stations of north and center of Portugal



BIAS



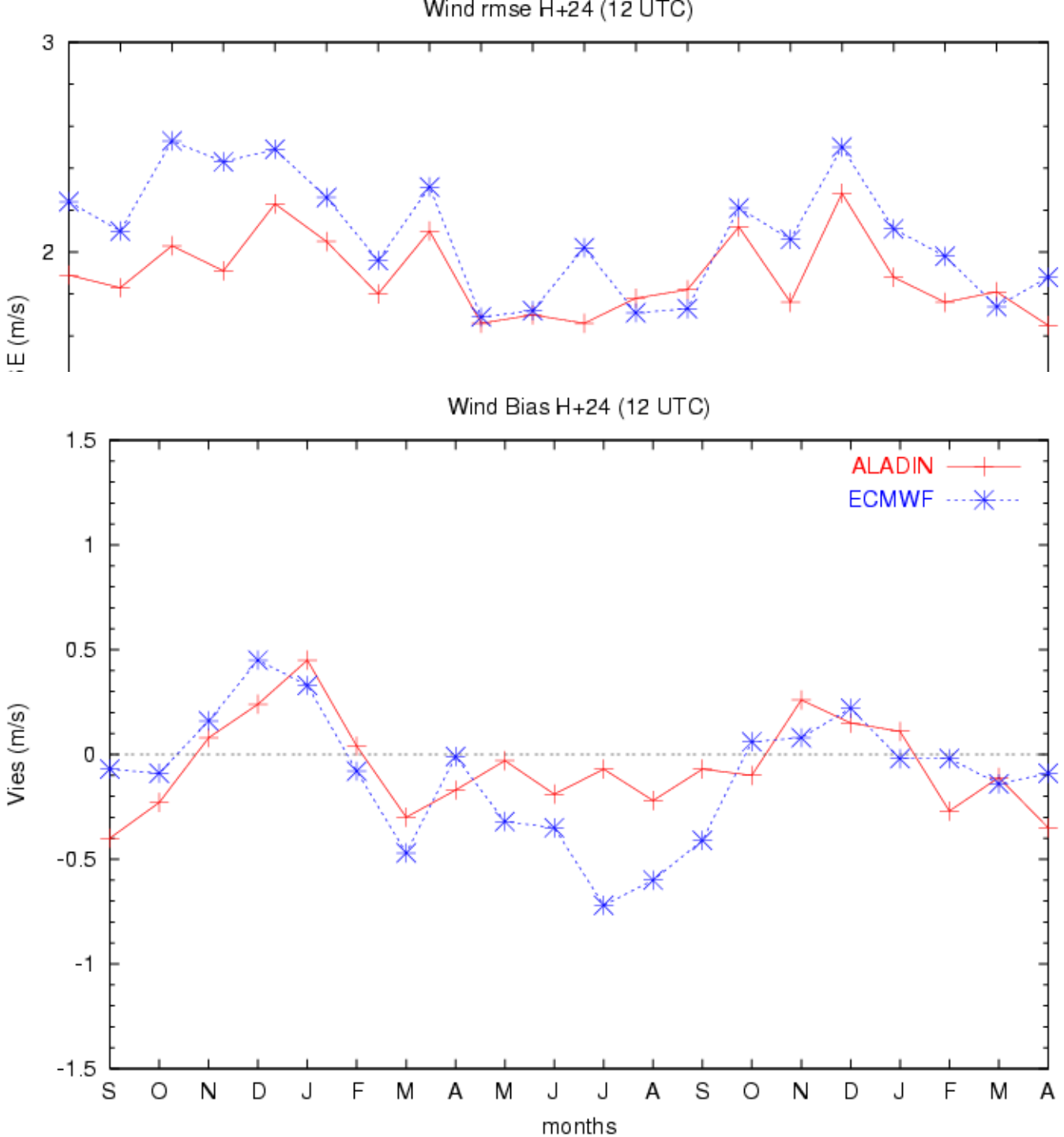


RMSE

West coast

Wind speed

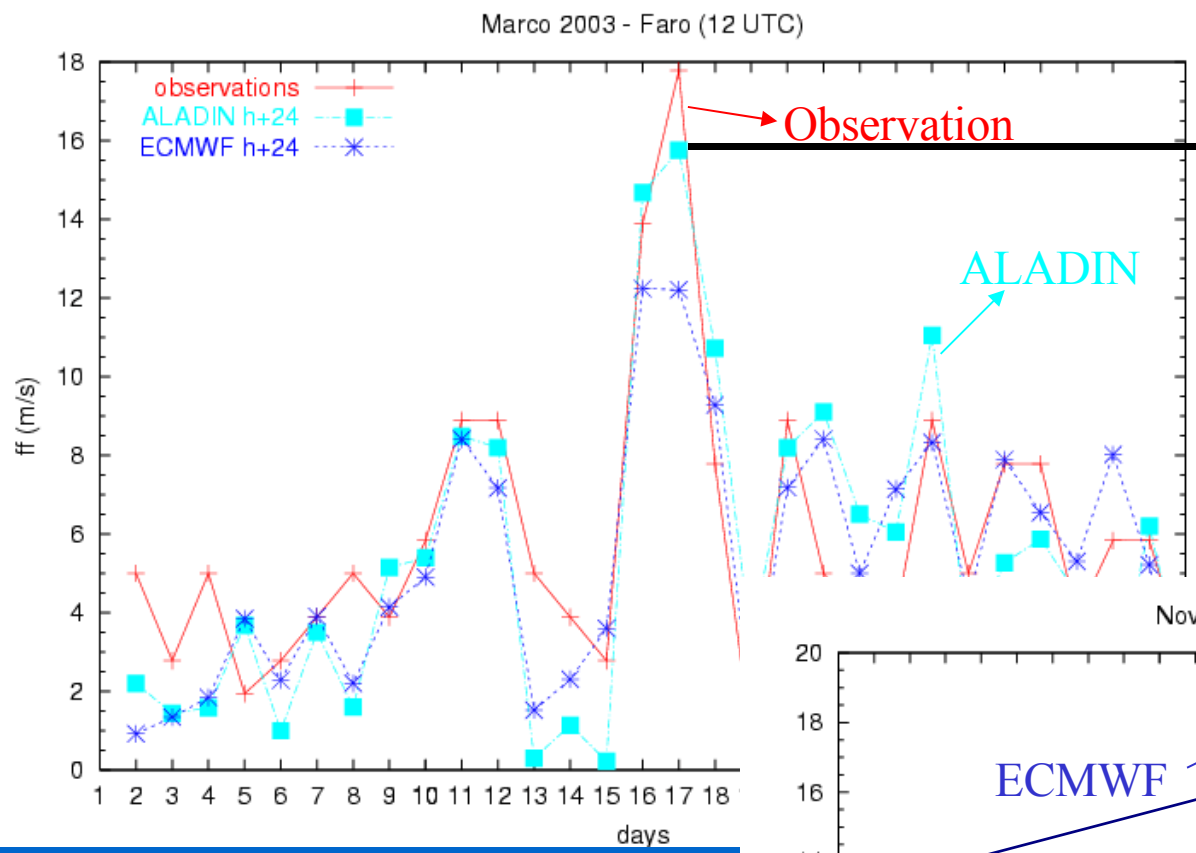
In average, ALADIN overestimate the wind speed in the west coast of Portugal


Wind rmse H+24 (12 UTC)
3
2
E (m/s)
Wind Bias H+24 (12 UTC)
1.5
1
0.5
0
-0.5
-1
-1.5
Vies (m/s)
ALADIN
ECMWF
S O N D J F M A M J J A S O N D J F M A
months

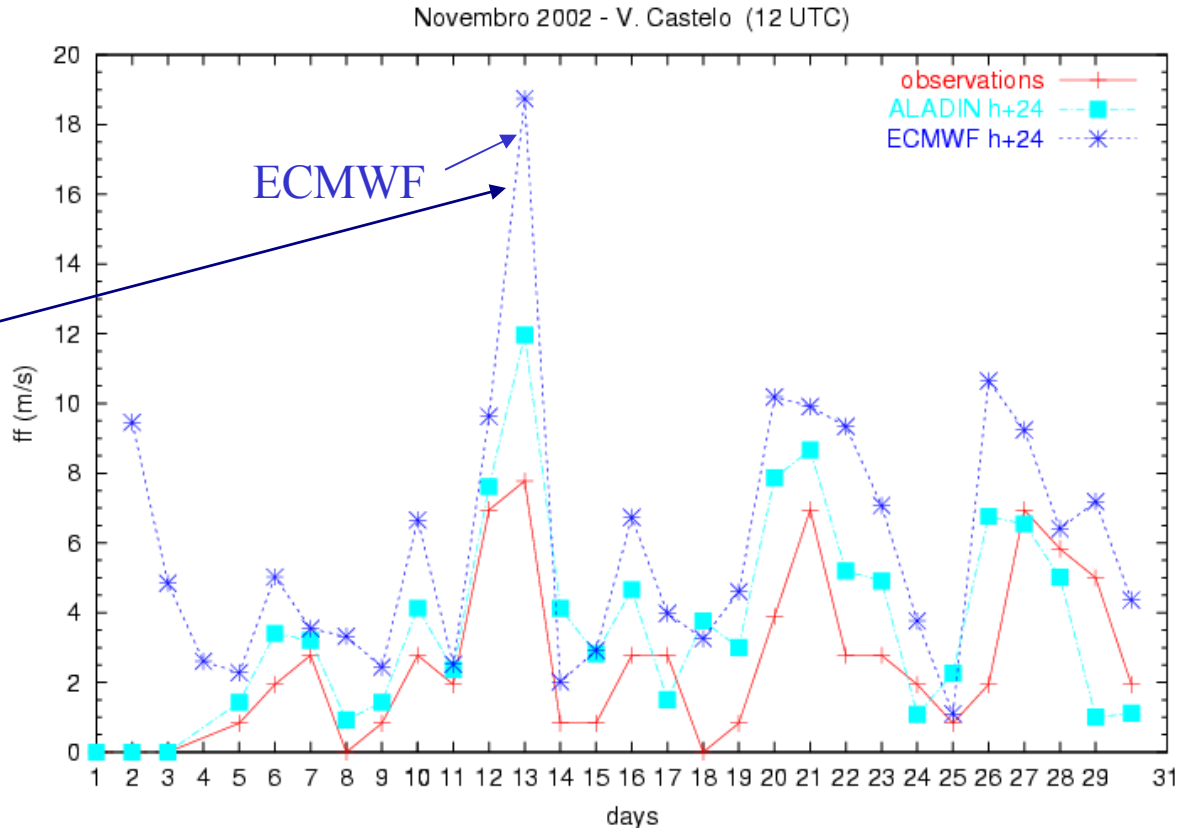
RMSE

WF)

BIAS

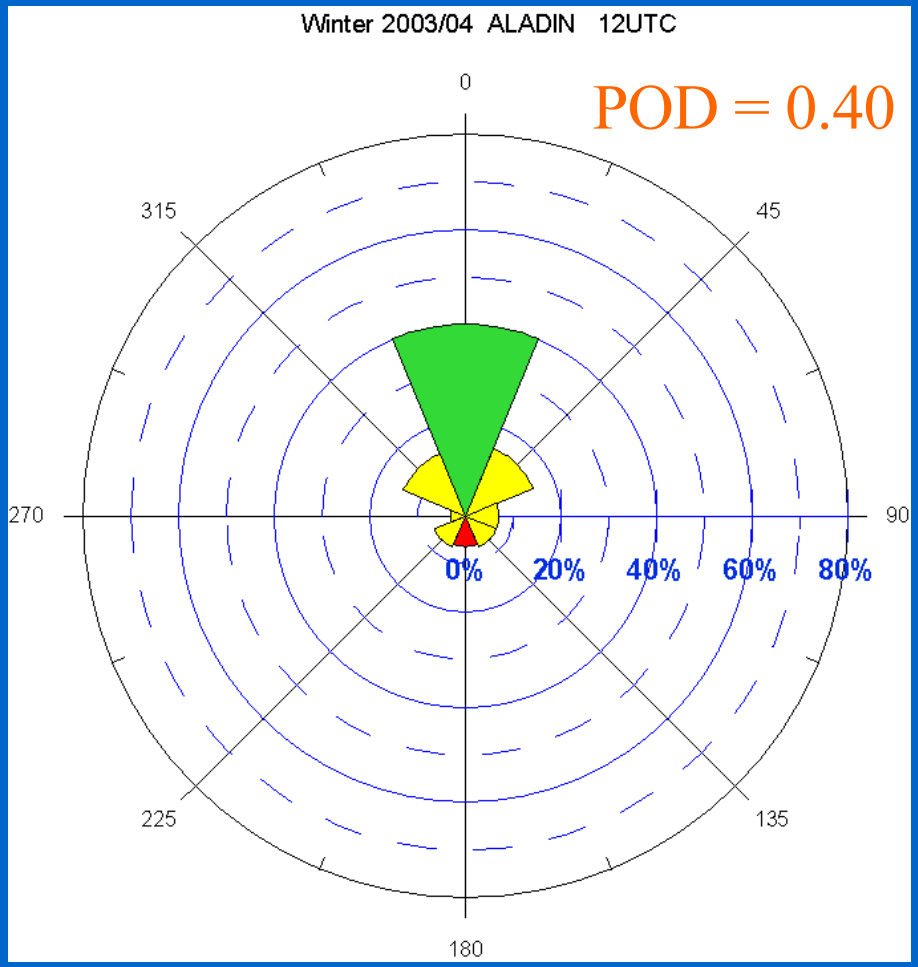


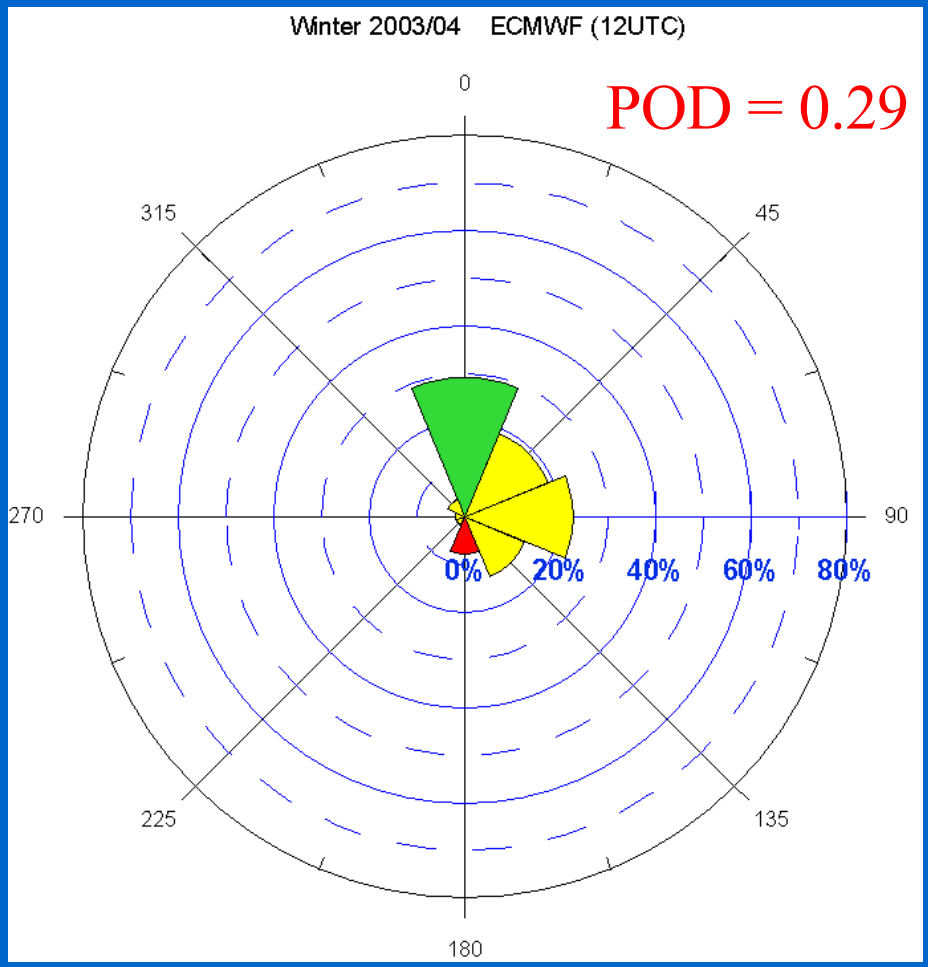
ALADIN exceeds the alert value (15.3m/s) for the Civil Agency



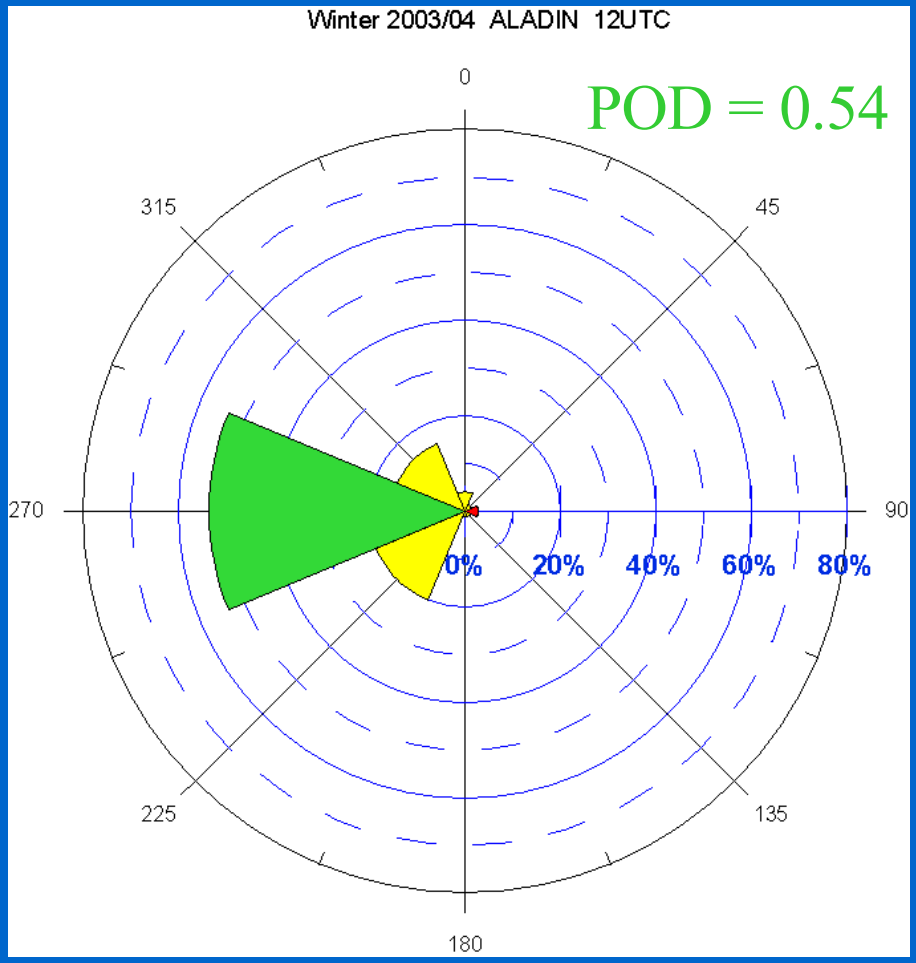
ECMWF gives a false alarm

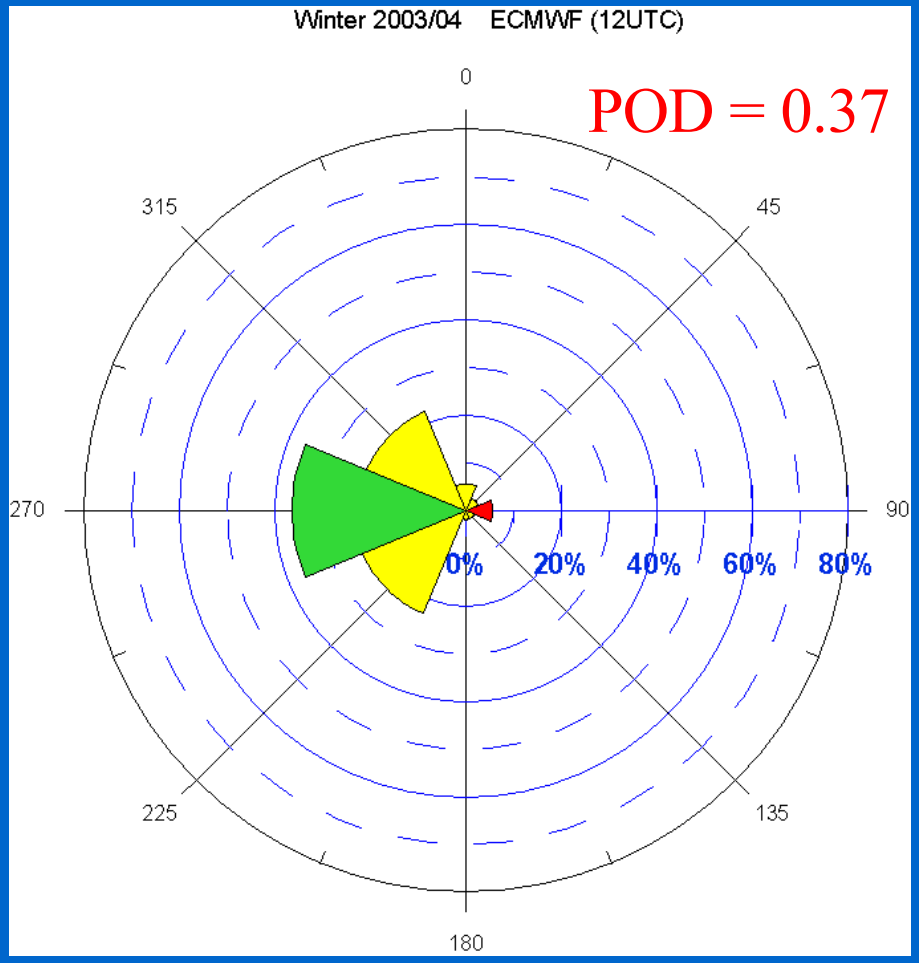
Observed event: wind from N



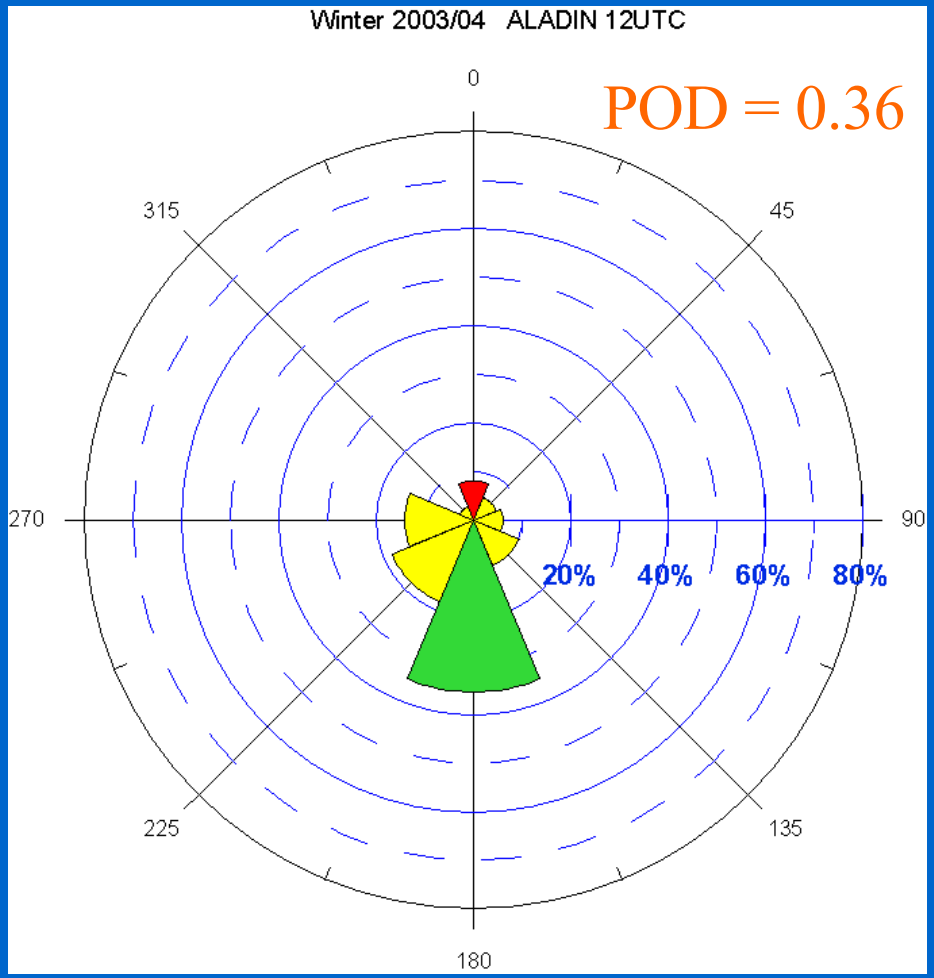


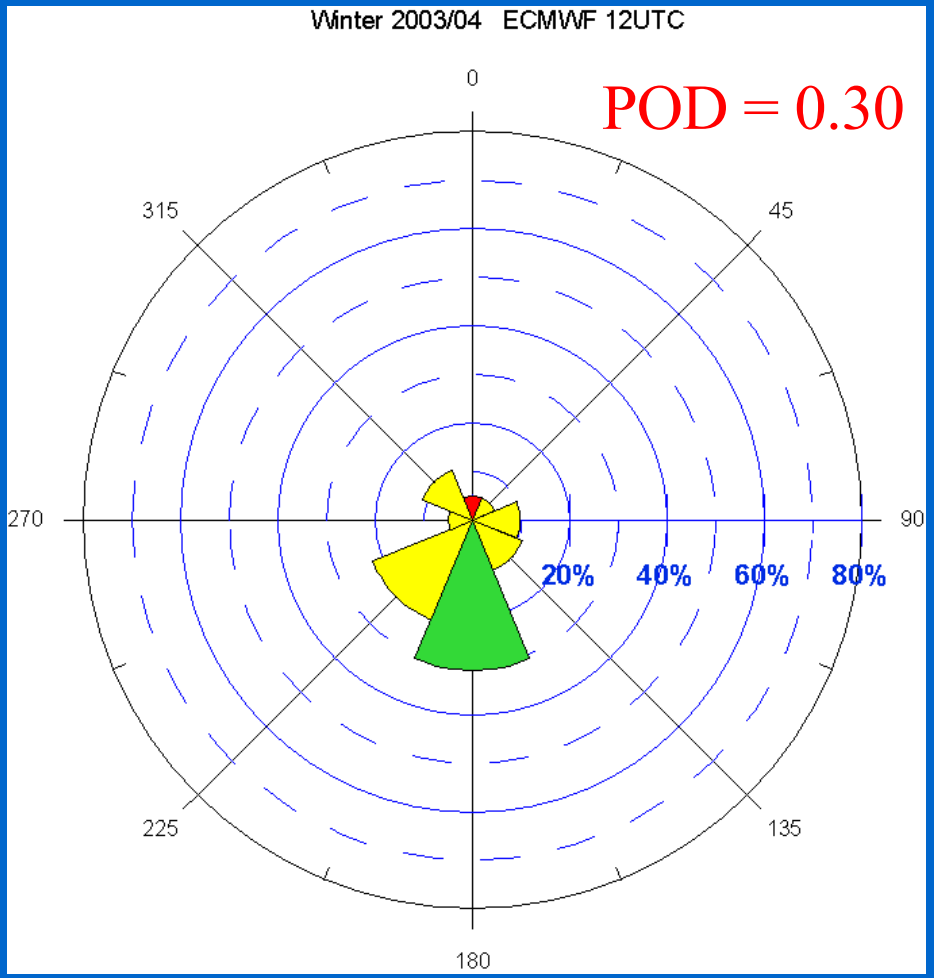
Observed event: wind from W



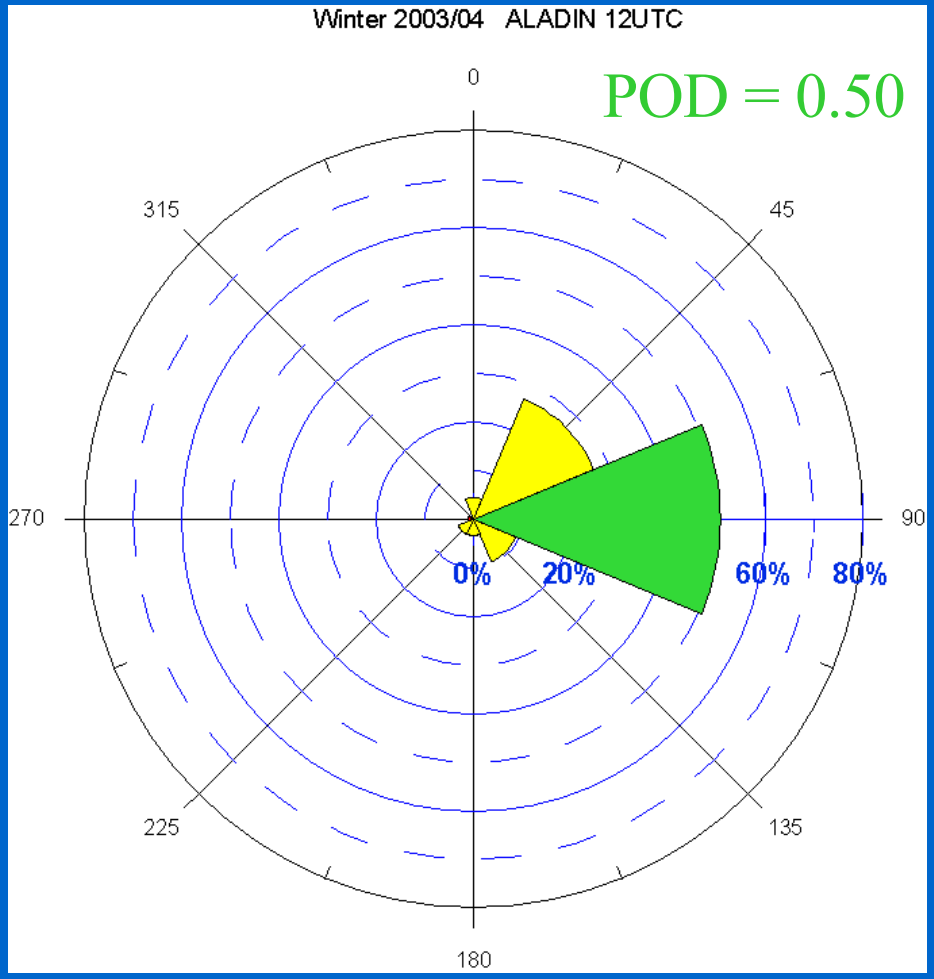


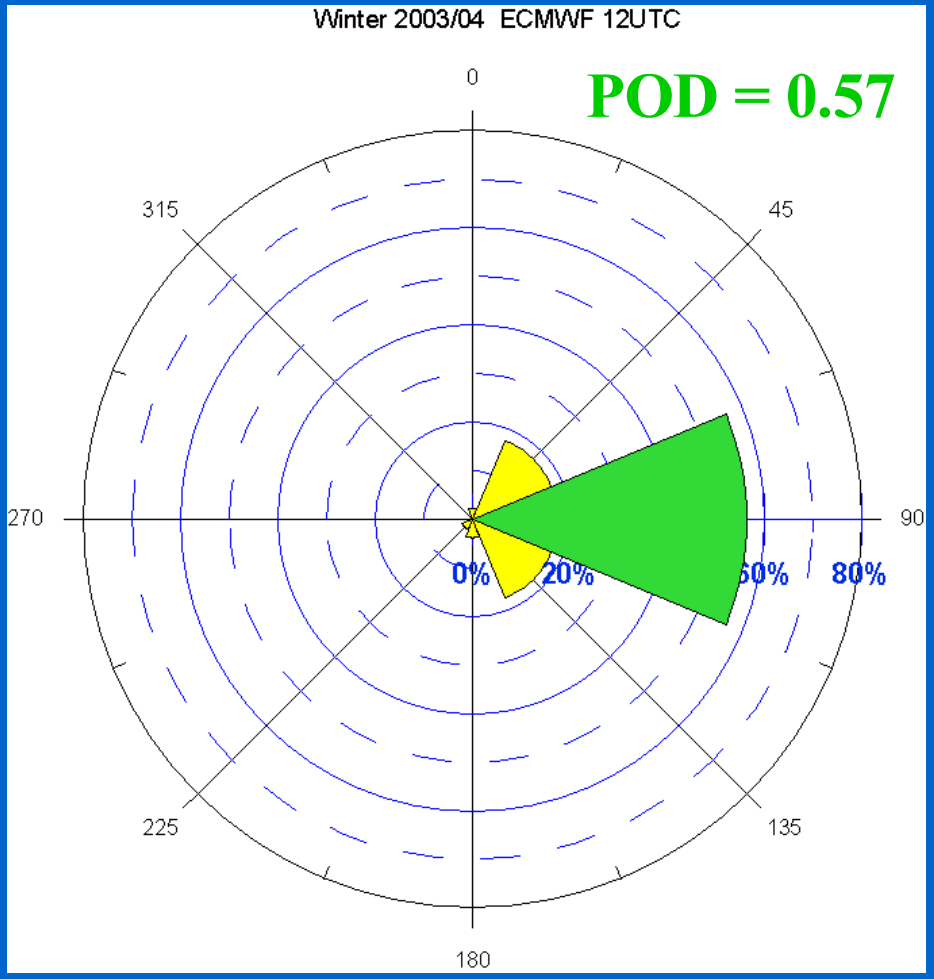
Observed event: wind from S





Observed event: wind from E

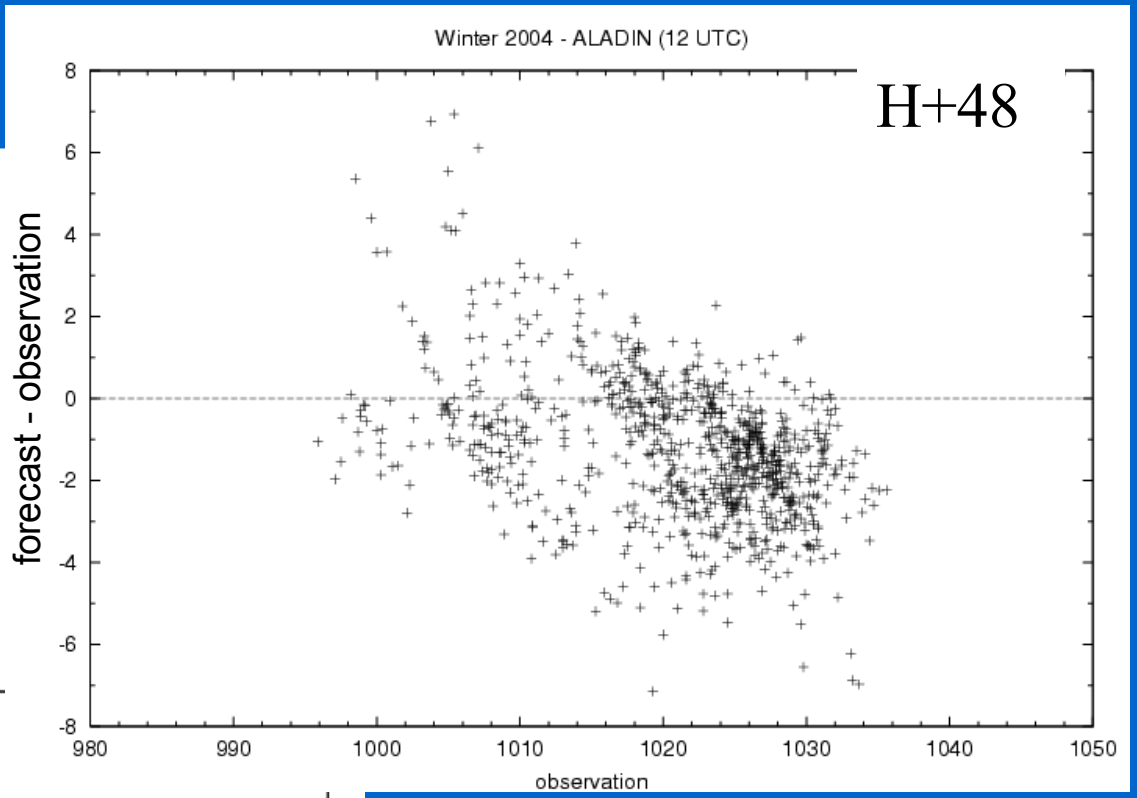


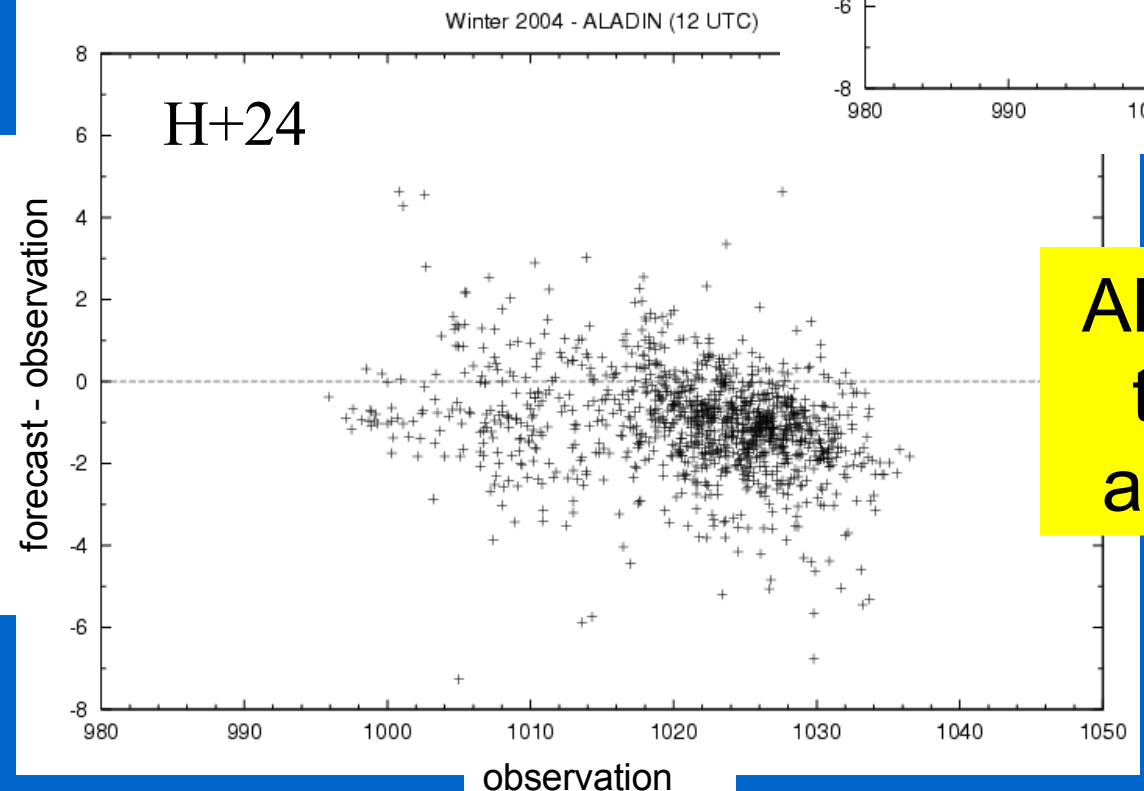


Mean sea level pressure

Scatterplot: MSLP

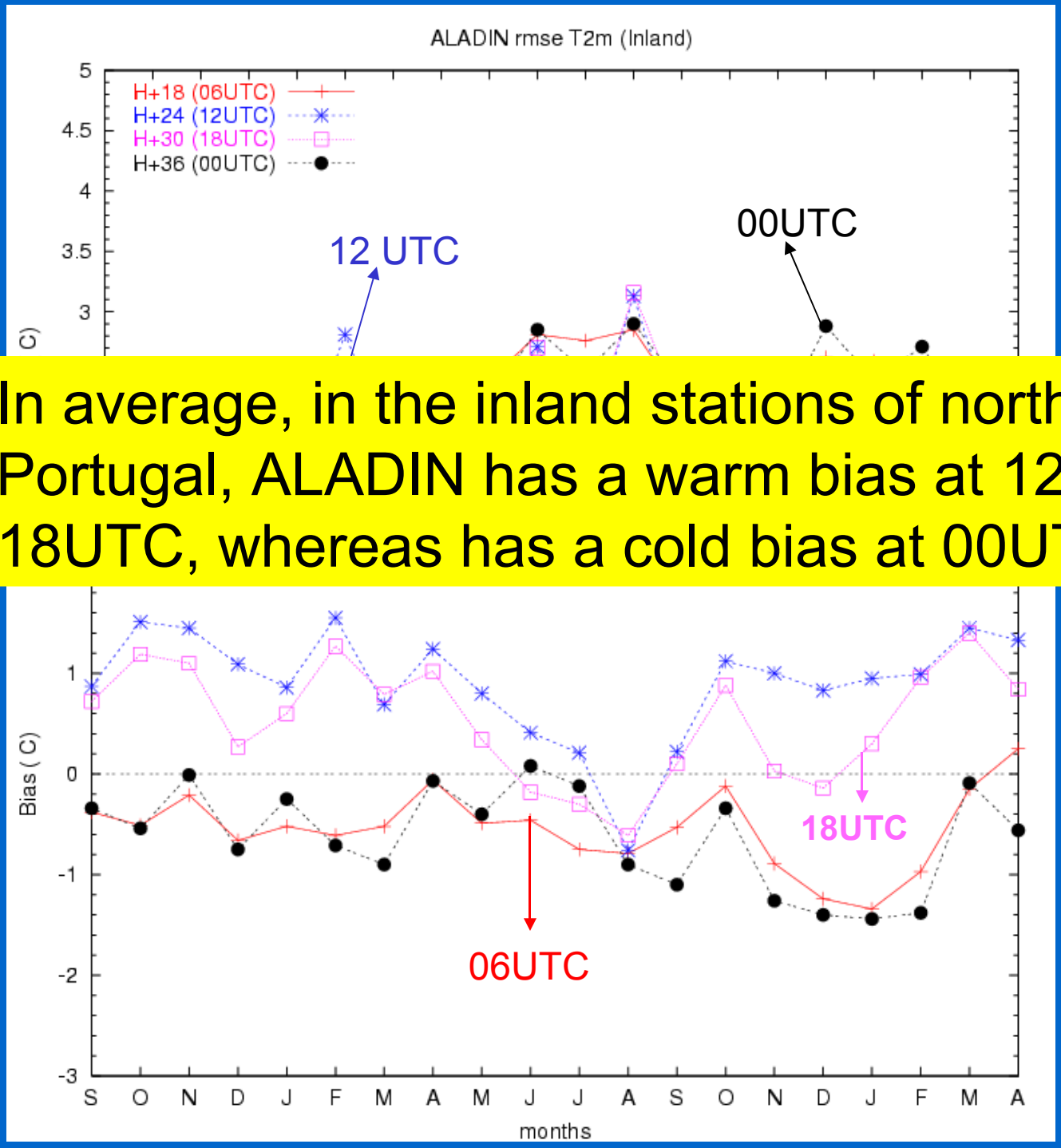
Winter 2004





ALADIN underestimate the MSLP, mainly in anticyclonic situations

Temperature (2m)



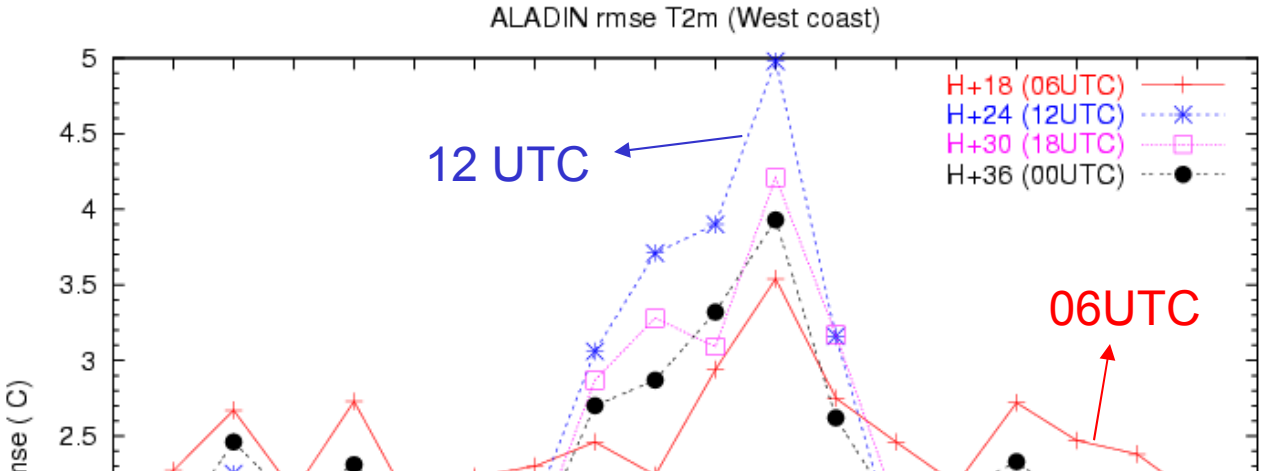
RMSE

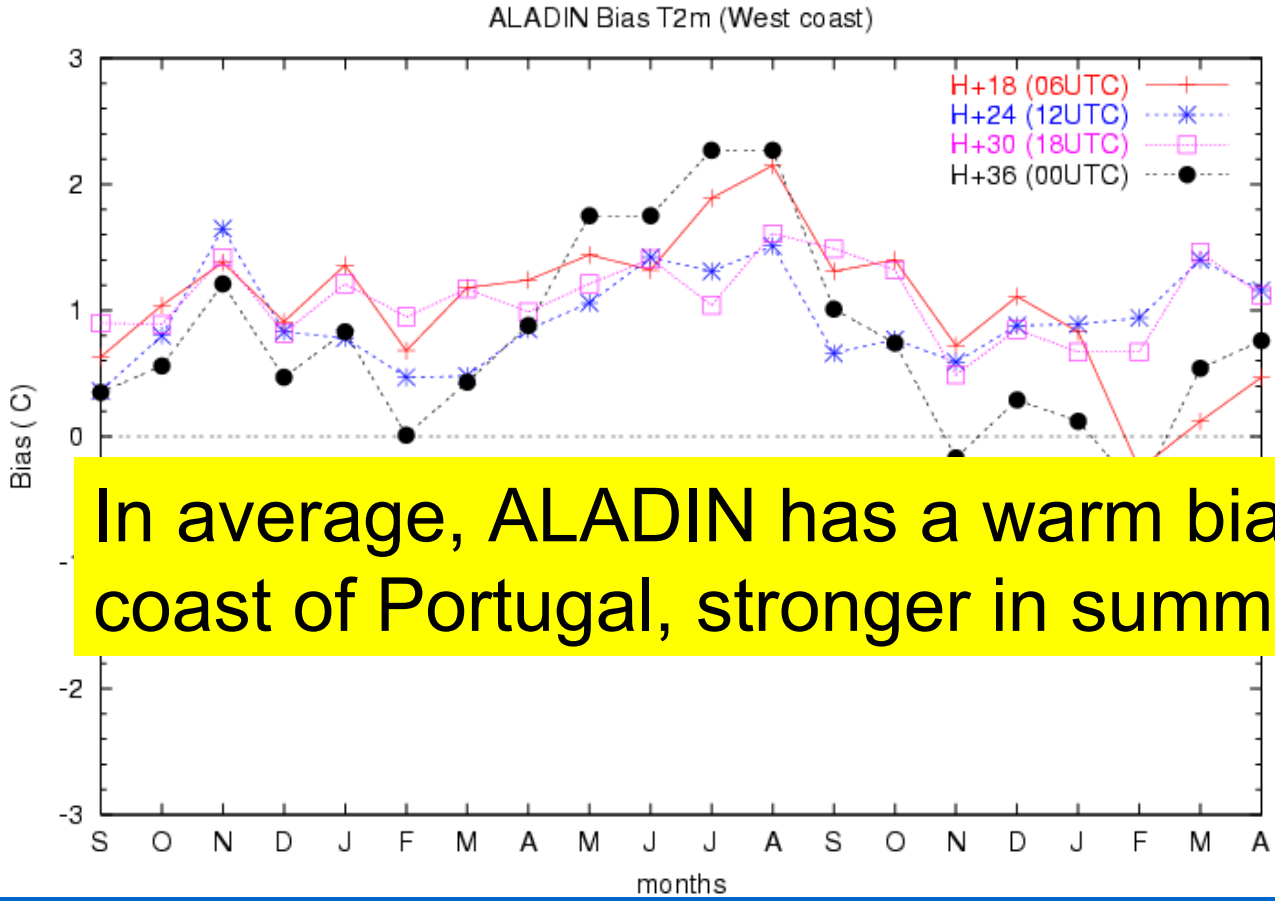
Inland
(north and center of

temperature

In average, in the inland stations of north and center of Portugal, ALADIN has a warm bias at 12UTC and 18UTC, whereas has a cold bias at 00UTC and 06UTC.

BIAS



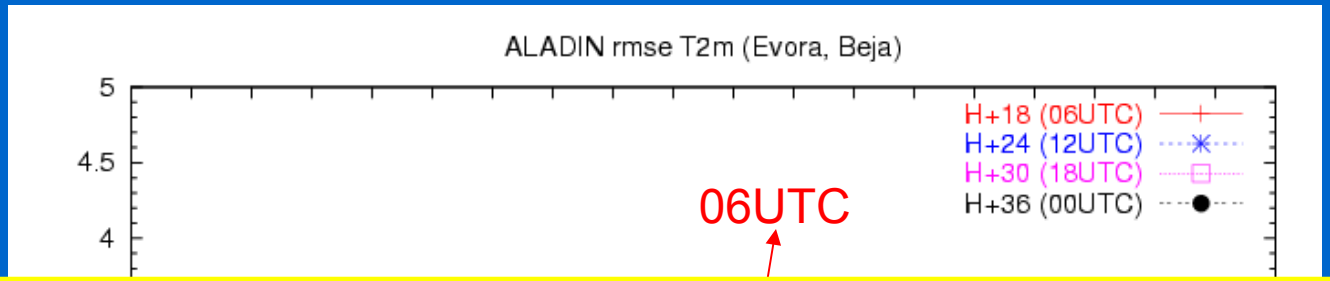


RMSE

West coast

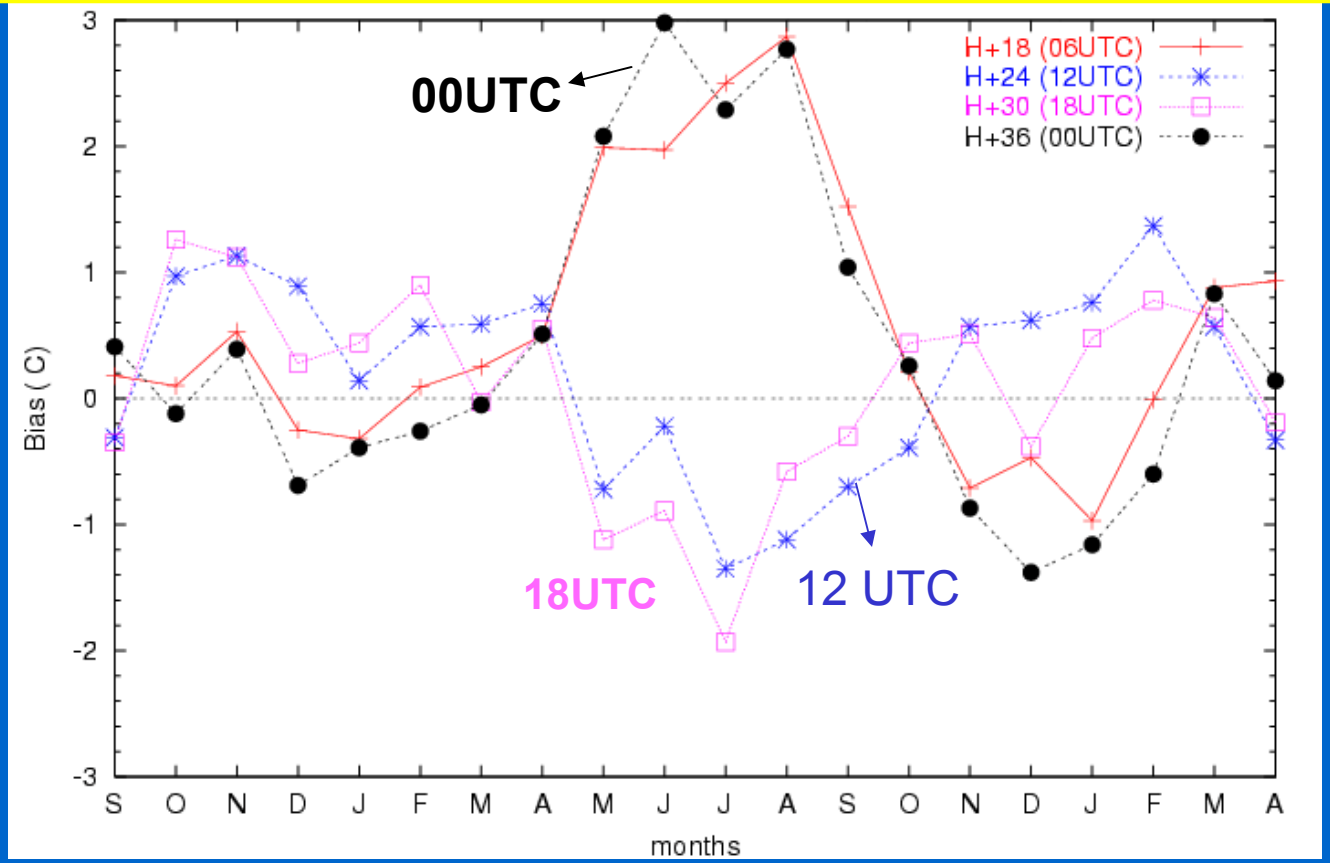
2m temperature

In average, ALADIN has a warm bias in the west coast of Portugal, stronger in summer months



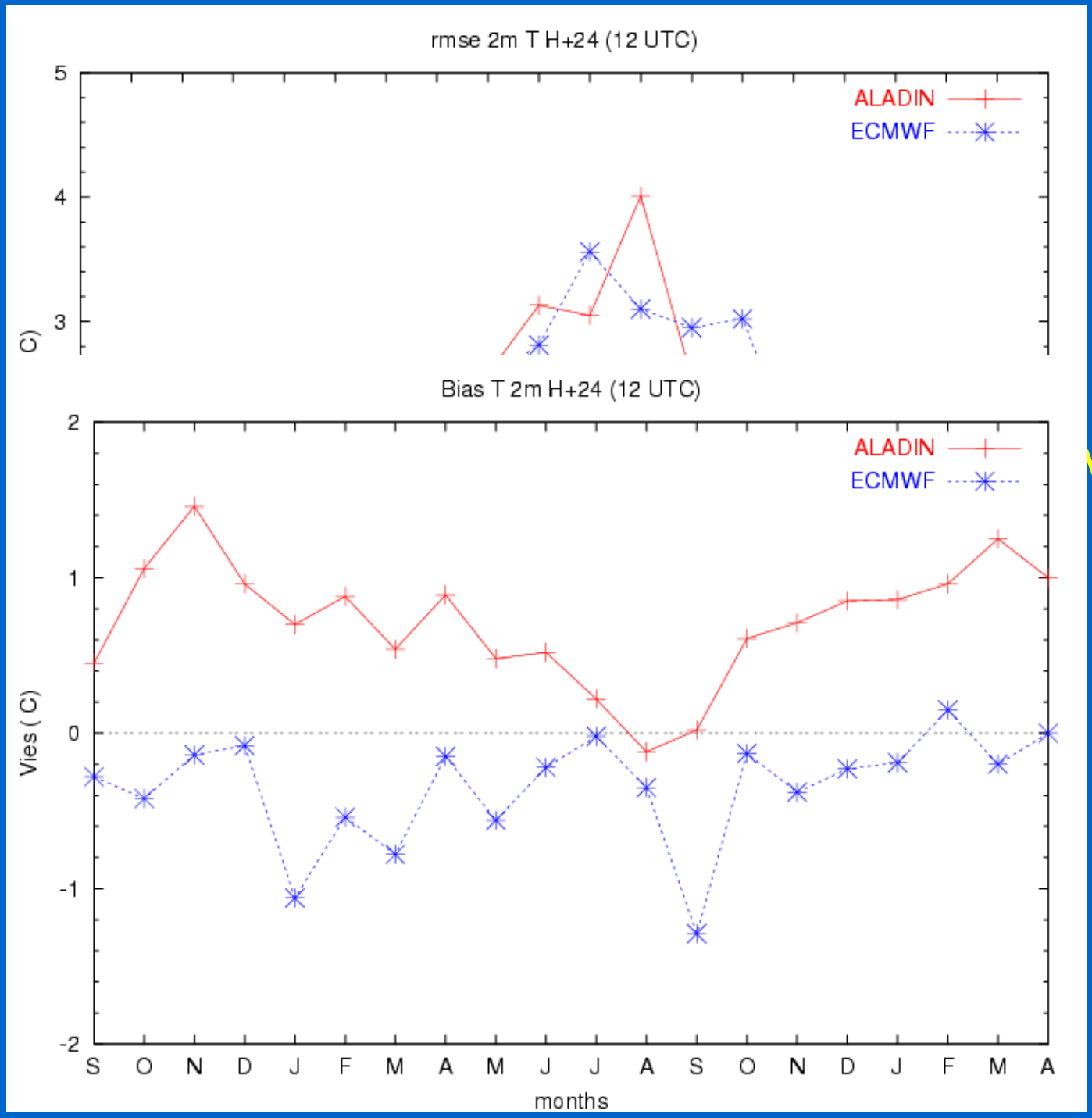
RMSE

In average, in the inland stations of south of Portugal, ALADIN has a warm bias at 00UTC and 06UTC, whereas has a cold bias at 12UTC and 18UTC.



2m temperature

BIAS



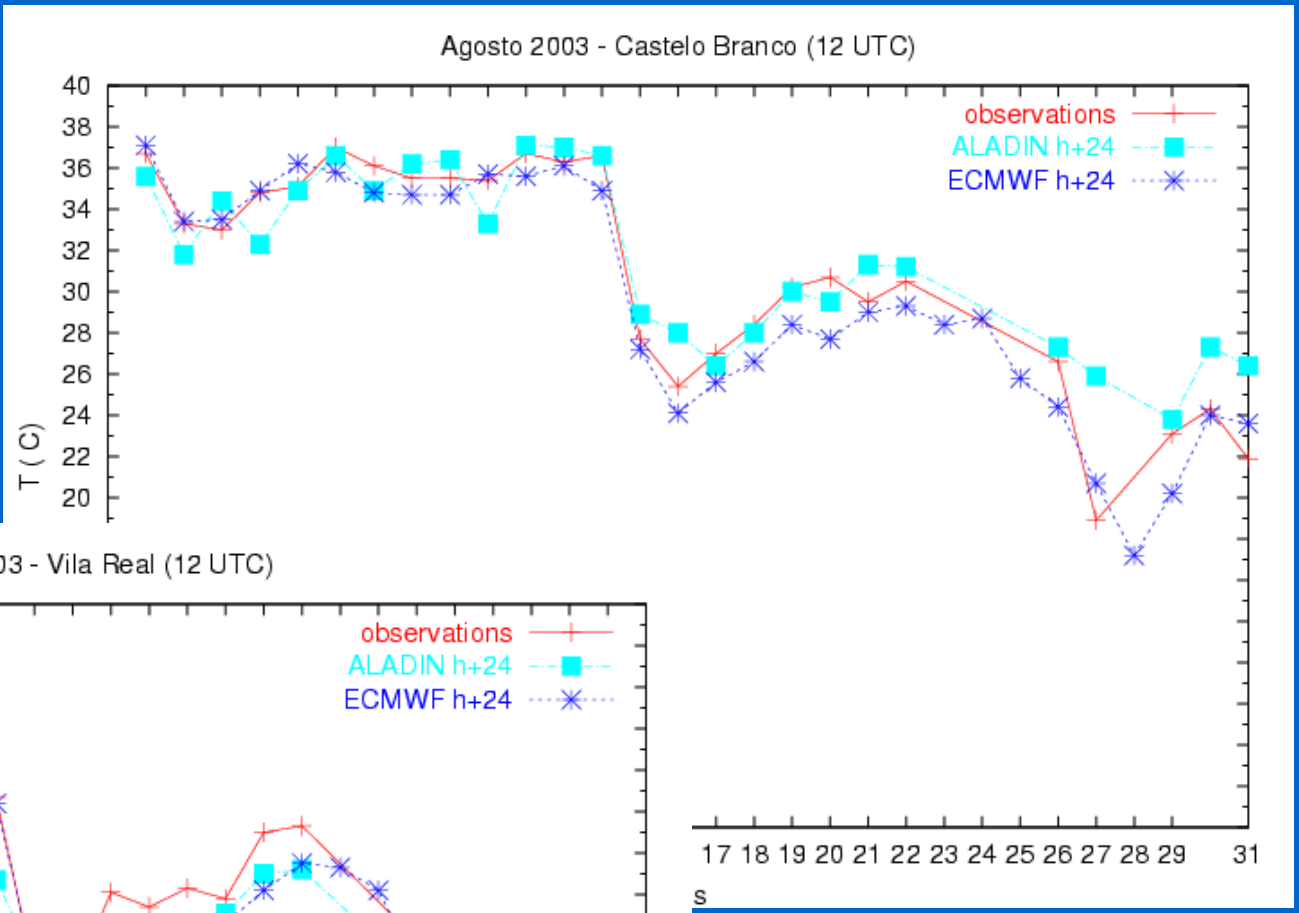
RMSE

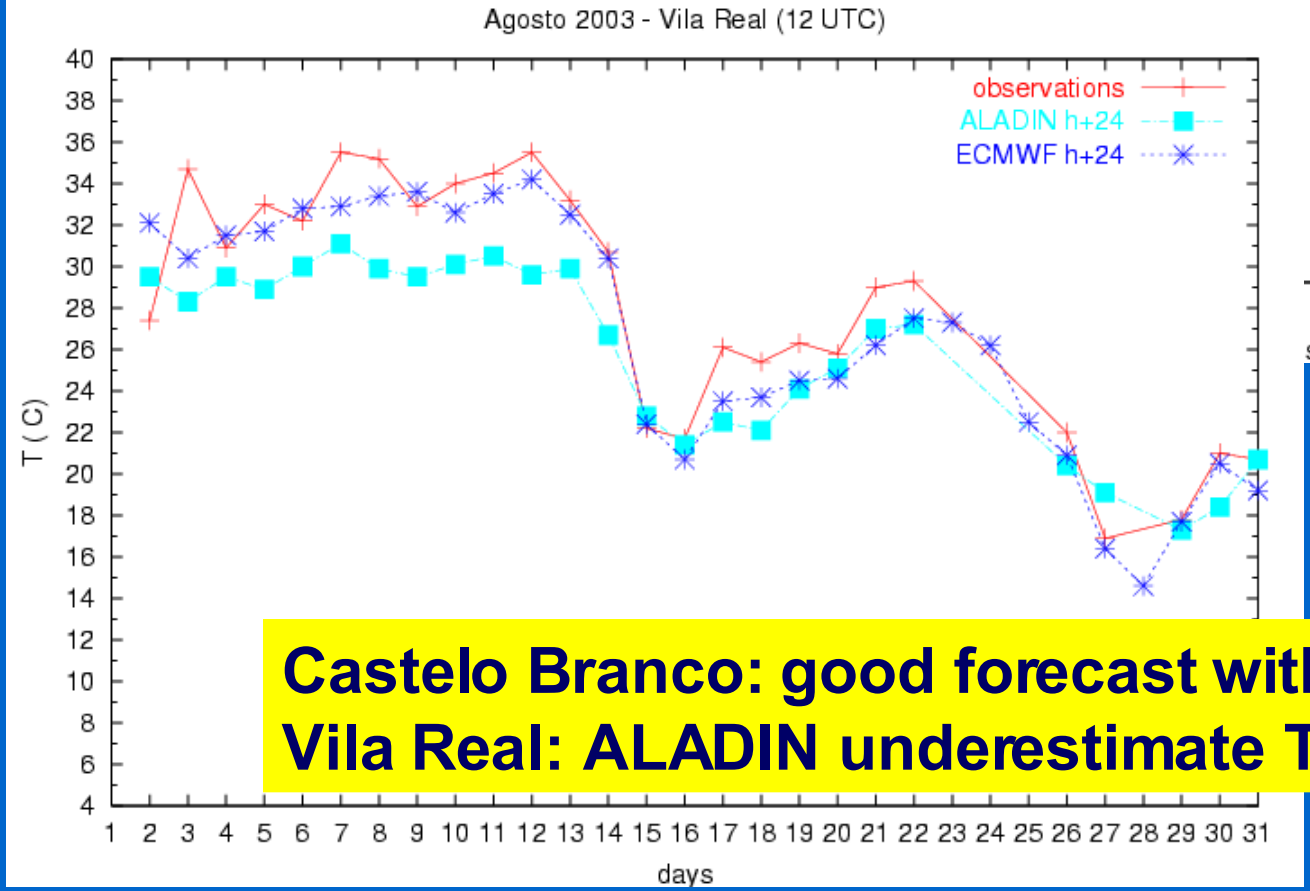
MWF)

BIAS

Series

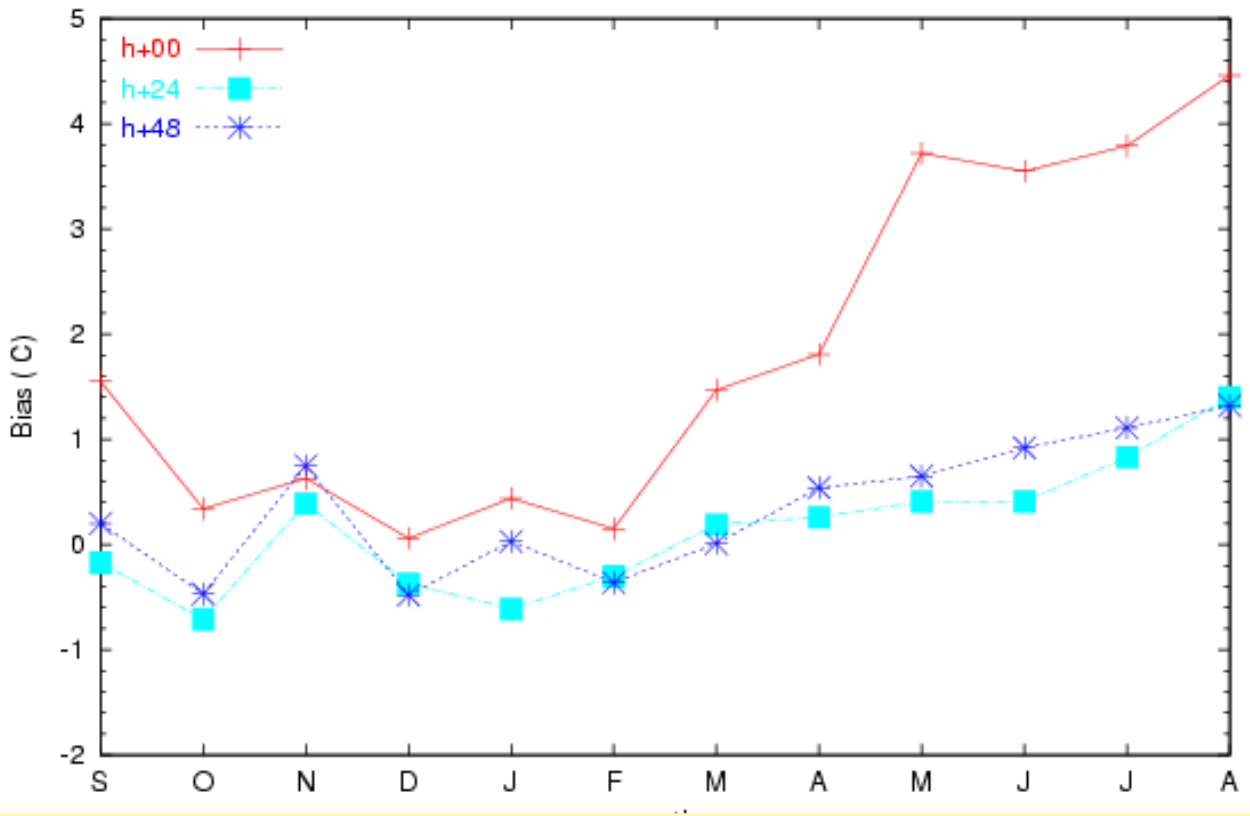
August 2003



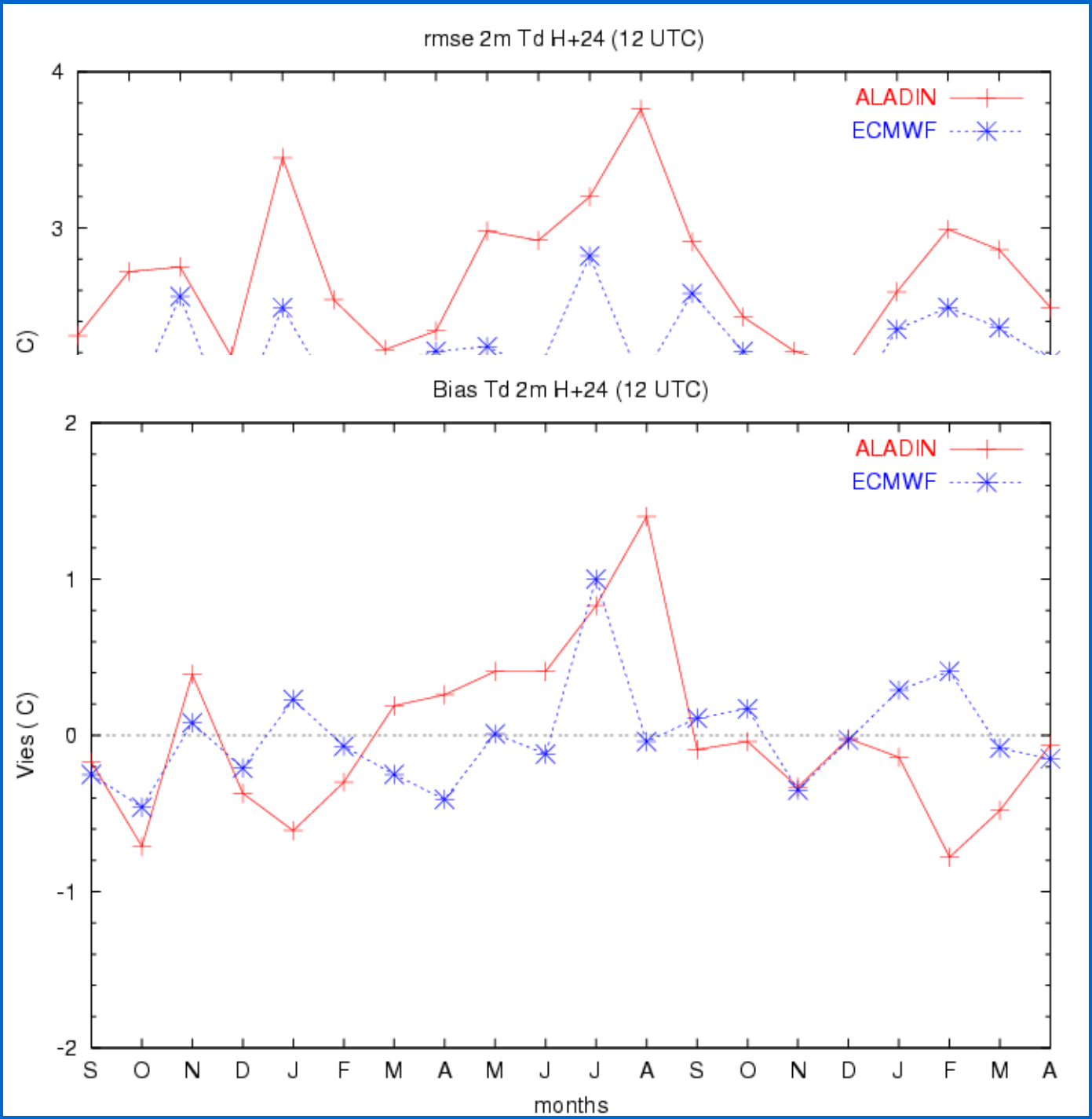


Castelo Branco: good forecast with both models.
Vila Real: ALADIN underestimate T2m.

Bias Td (2m) - ALADIN



After March 2003, ALADIN is too moist in the beginning of the integration


rmse 2m Td H+24 (12 UTC)
ALADIN
ECMWF
C)
4
3
Bias Td 2m H+24 (12 UTC)
ALADIN
ECMWF
Vies (C)
2
1
0
-1
-2
S O N D J F M A M J J A S O N D J F M A
months

RMSE

BIAS

Winter 2002/03

Accumulated precipitation (PA) in 6-hours (12-18UTC)

C1 - PA $\leq$ 0.3 mm/6 h (no rain),

C2 - 0.3 mm/6 h < PA $\leq$ 2.0 mm/6 h (light rain),

C3 – 2 mm/6 h < PA $\leq$ 10.0 mm/6 h (moderate rain),

C4 – PA > 10.0 mm/6 h (heavy rain),

Scores for contingency tables

$$PC = \frac{correct\ forecasts}{all\ cases}$$

$$Bias = \frac{number\ of\ times\ that\ an\ event\ was\ forecasted}{number\ of\ times\ this\ event\ was\ observed}$$

Critical Success Index

$$CSI = \frac{correct\ forecasts - correct\ forecasts\ of\ "no\ rain"\ event}{total\ cases - correct\ forecasts\ of\ "no\ rain"\ event}$$

Probability of detection

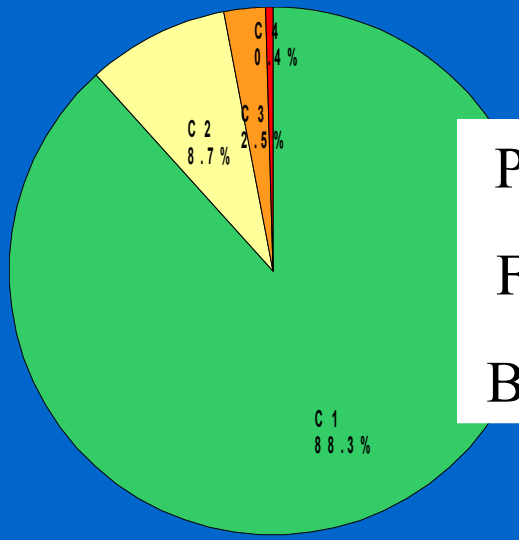
$$POD = \frac{correct\ forecast\ of\ one\ event}{times\ that\ this\ event\ was\ observed}$$

False Alarm Ratio

$$FAR = \frac{numero\ de\ vezes\ que\ um\ evento\ nao\ foi\ observado\ mas\ foi\ previsto}{numero\ de\ vezes\ que\ esse\ evento\ foi\ previsto}$$

ALADIN **Winter 2002/03** **ECMWF**

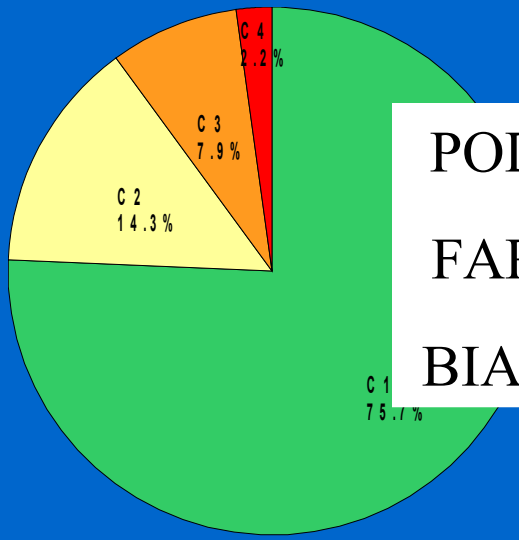
Observed event: no rain (C1)



POD = 0.88

FAR = 0.16

BIAS = 0.91

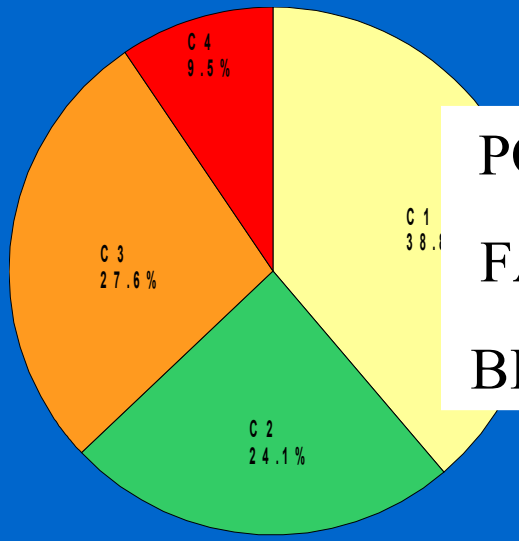


POD = 0.76

FAR = 0.15

BIAS = 0.89

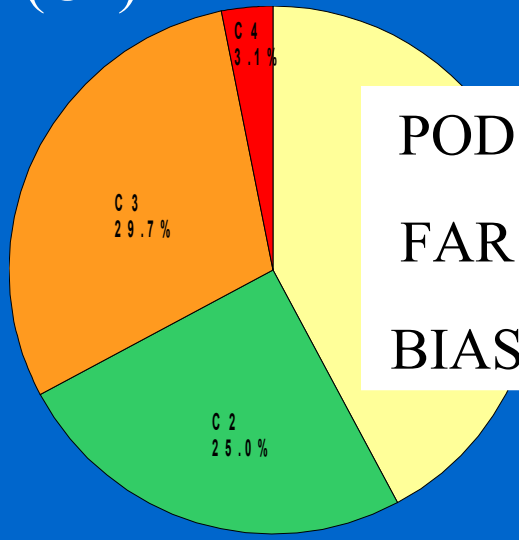
Observed event: light rain (C2)



POD = 0.24

FAR = 0.83

BIAS = 1.39



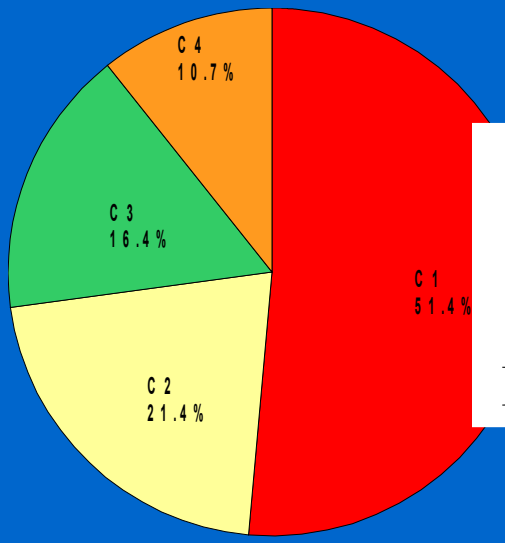
POD = 0.25

FAR = 0.87

BIAS = 1.89

ALADIN **Winter 2002/03** **ECMWF**

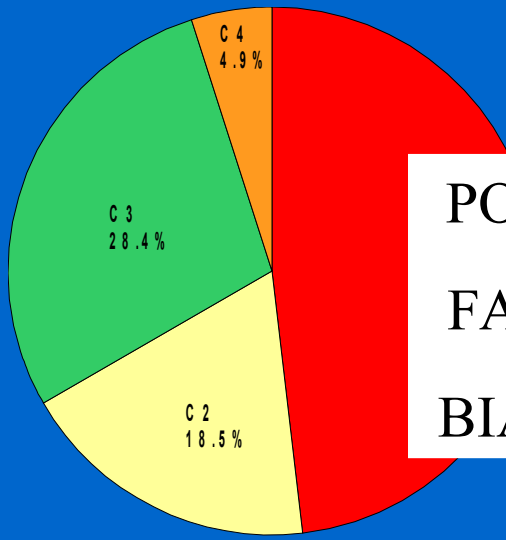
Observed event: moderate rain (C3)



POD = 0.16

FAR = 0.84

BIAS = 1.04

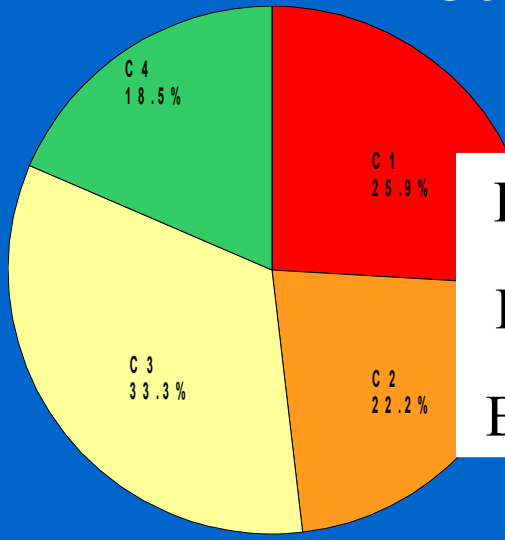


POD = 0.28

FAR = 0.75

BIAS = 1.12

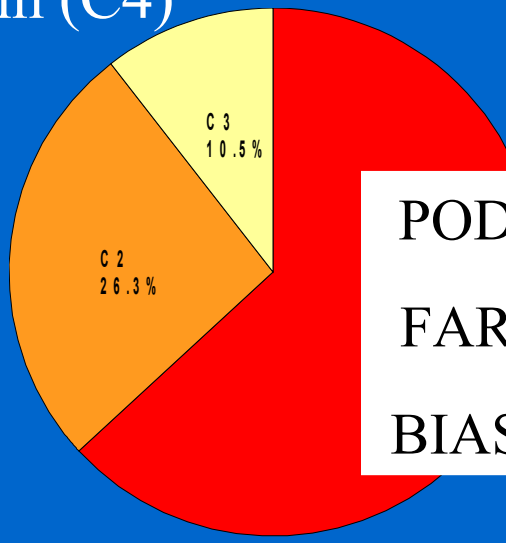
Observed event: heavy rain (C4)



POD = 0.19

FAR = 0.90

BIAS = 1.85



POD = 0.00

FAR = 1.00

BIAS = 1.00

Summary 1

- In average, ALADIN slightly underestimate the wind speed in the inland stations of north and center of Portugal.
- In average, ALADIN overestimate the wind speed in the west coast of Portugal.
- ALADIN underestimate the MSLP, mainly in anticyclonic situations.

Summary 2

- In average, in the inland stations of north and center of Portugal, ALADIN has a warm bias at 12UTC and 18UTC, whereas has a cold bias at 00UTC and 06UTC.
- In average, ALADIN has a warm bias in the west coast of Portugal, stronger in summer months.
- In average, in the inland stations of south of Portugal, ALADIN has a warm bias at 00UTC and 06UTC, whereas has a cold bias at 12UTC and 18UTC.