CT3|Forecast hackaton

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University of Aveiro

26 May 2021

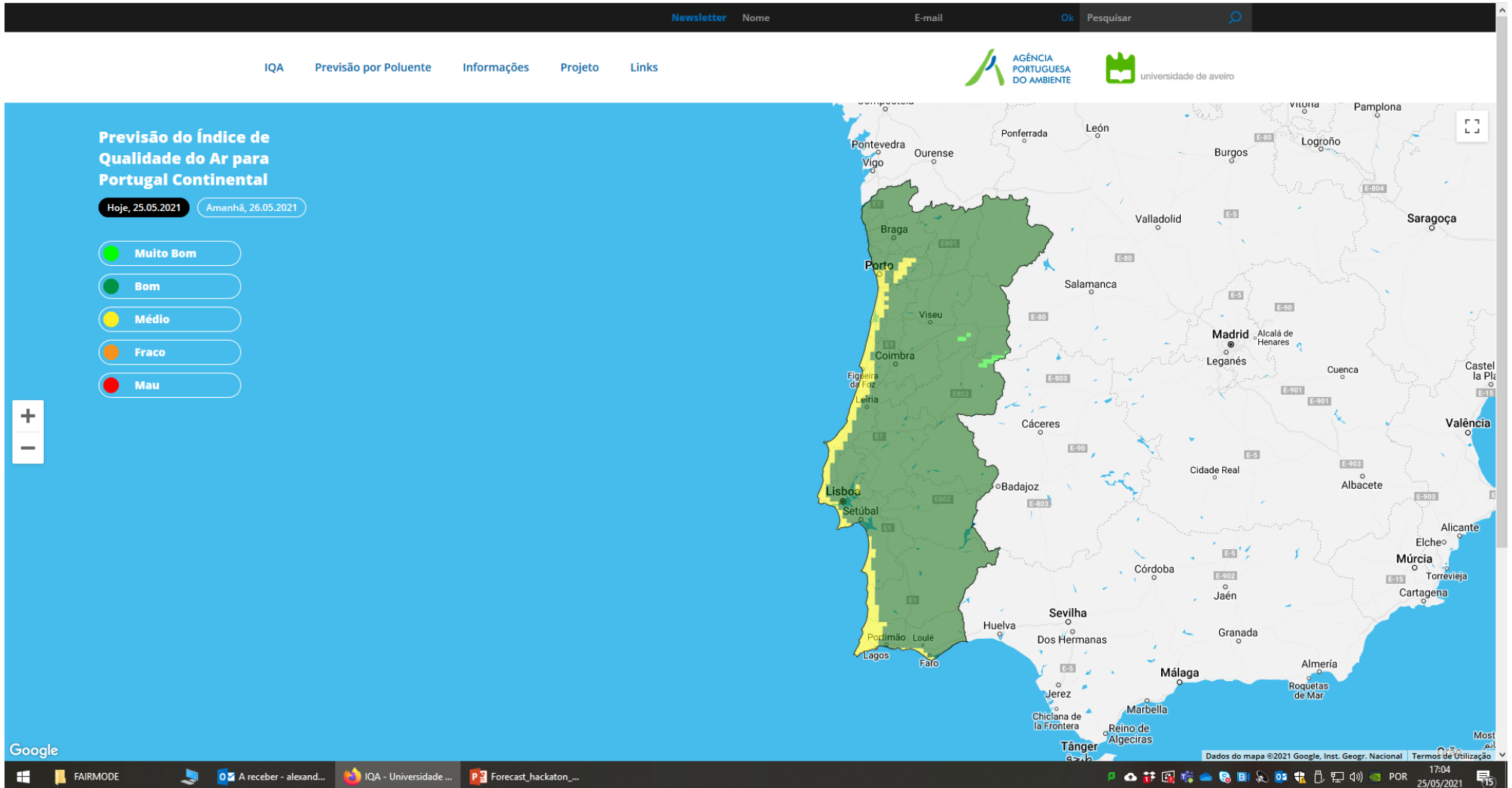
universidade de aveiro
dao departamento de ambiente e ordenamento

CESAM
centro de estudos do ambiente e do mar

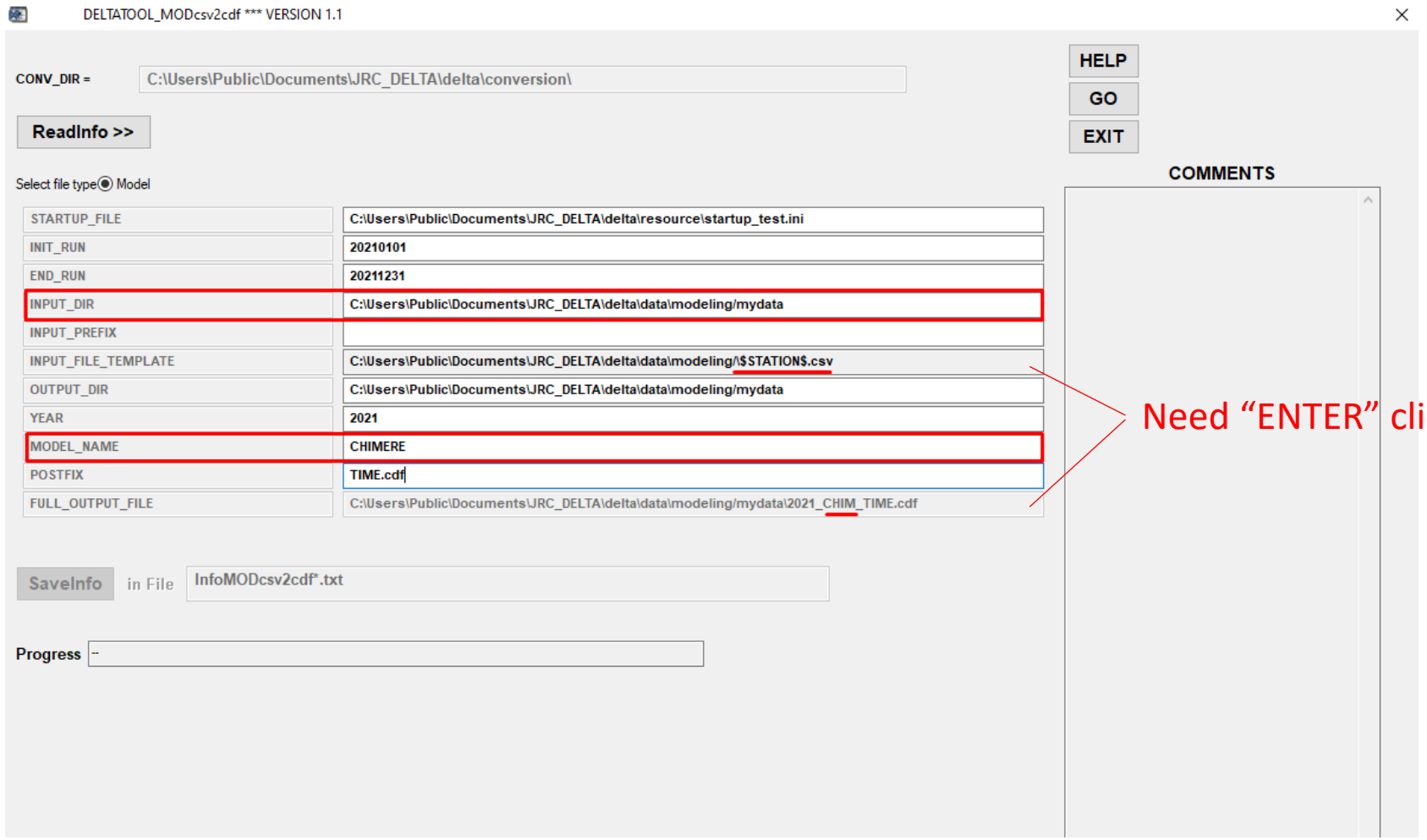
universidade
de aveiro

Our air quality forecast system

http://previsao-qar.web.ua.pt/

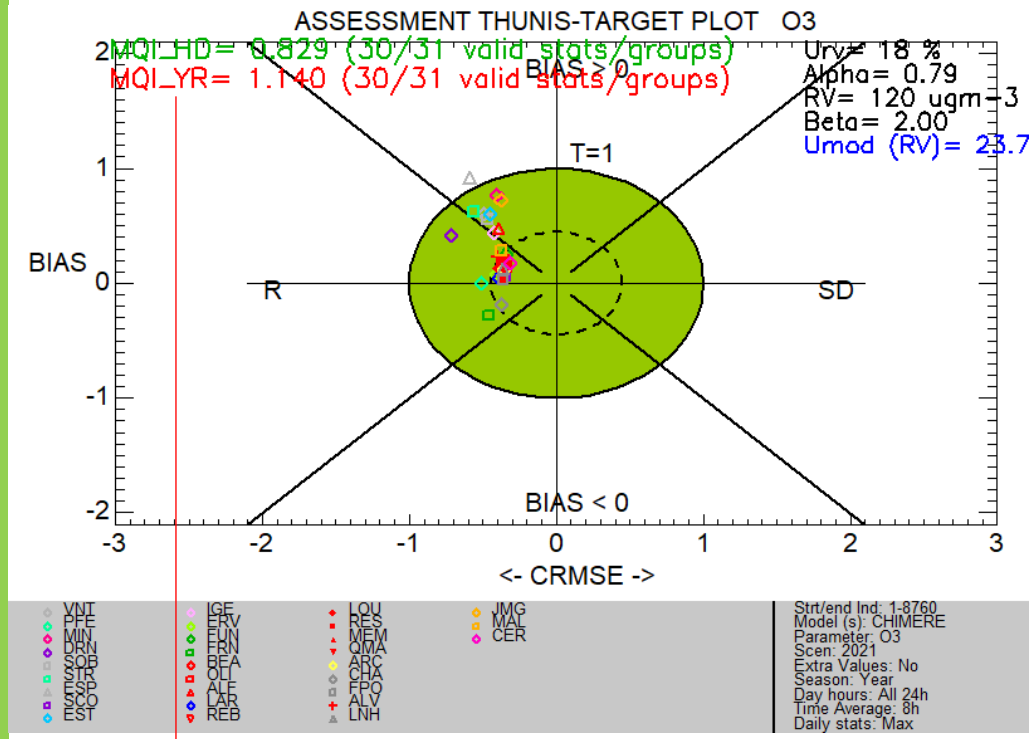


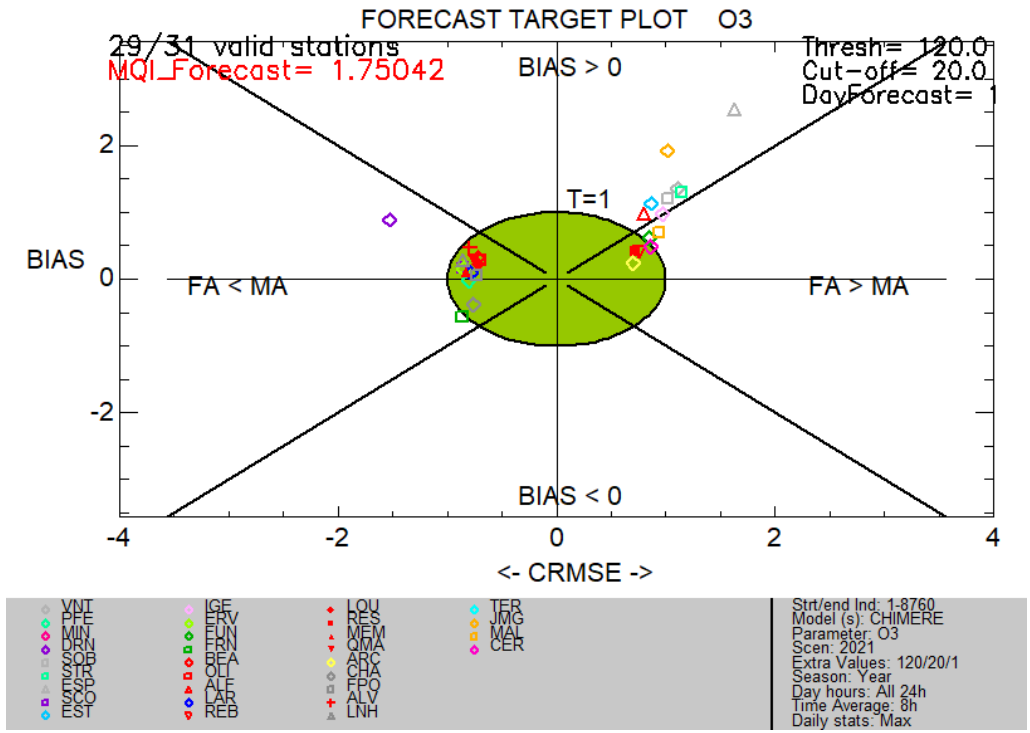
Some DT feedback/suggestions



O_3

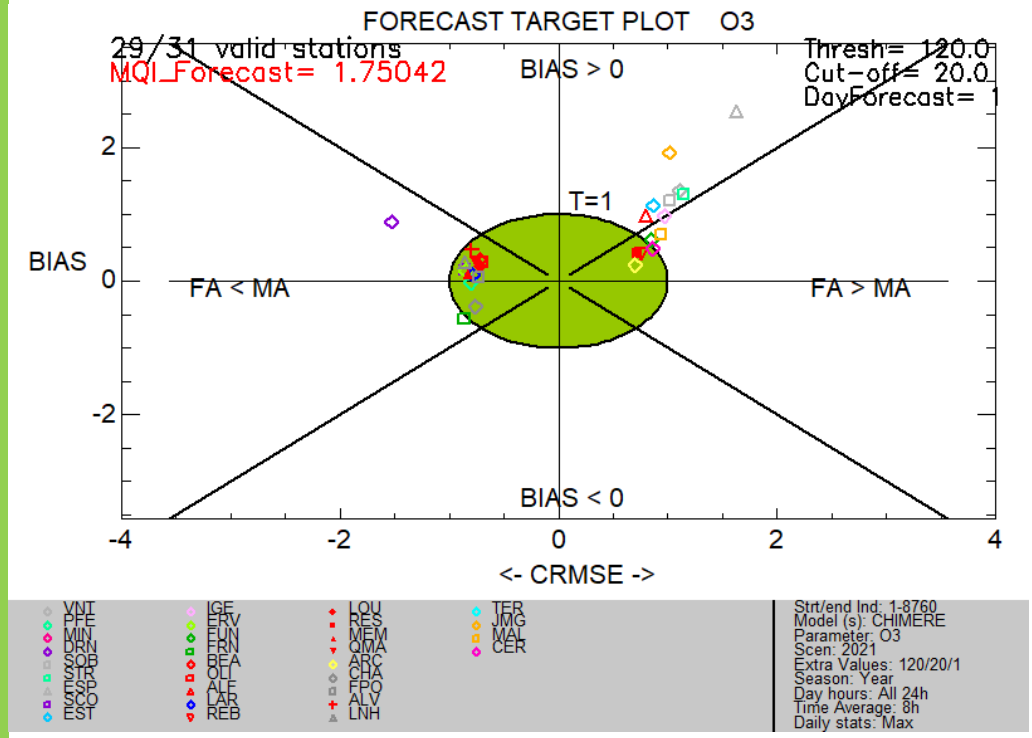
ASSESSMENT vs FORECAST

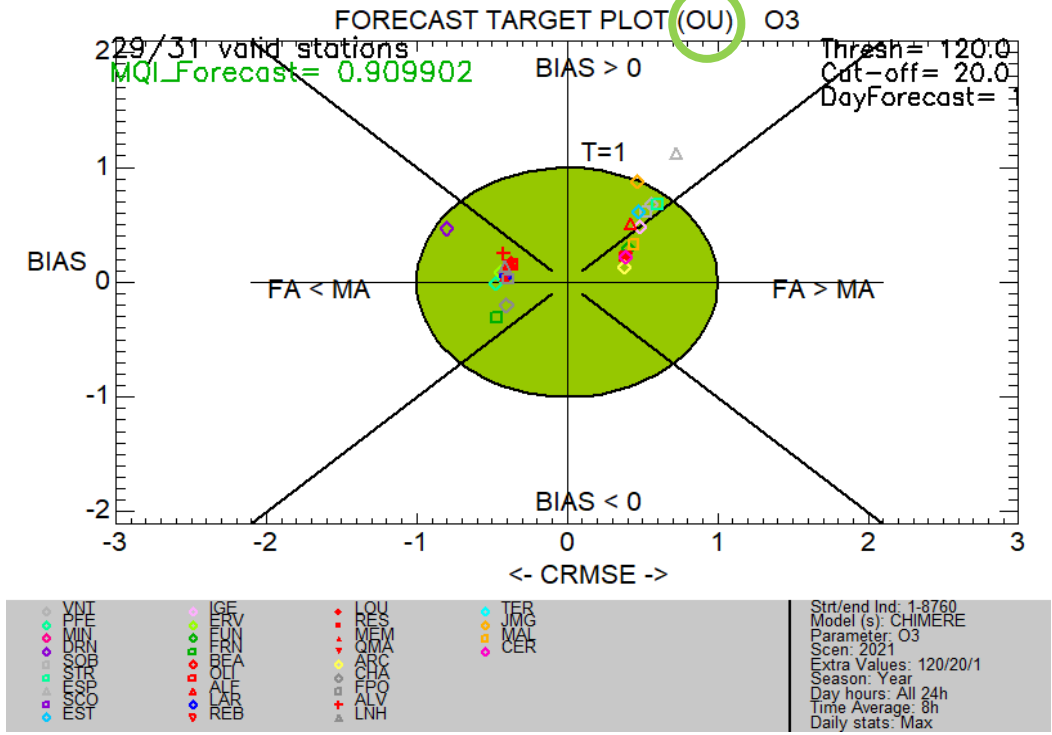




Yearly mean of O3?

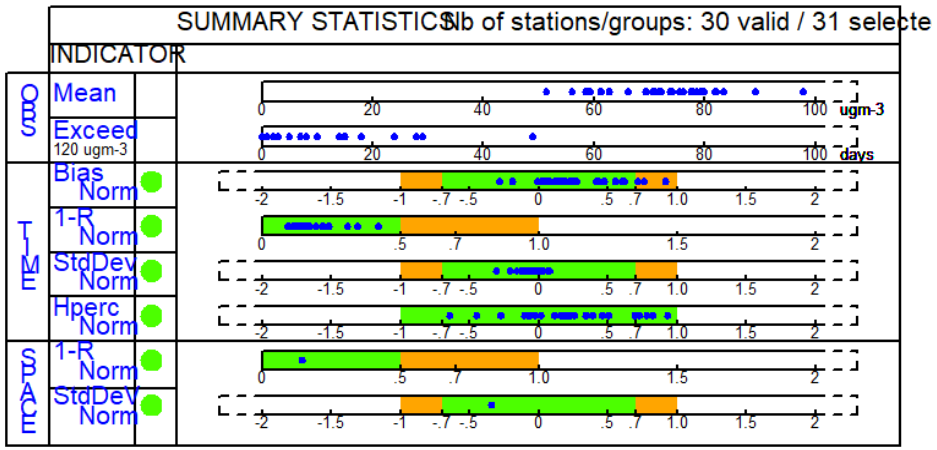
O_3

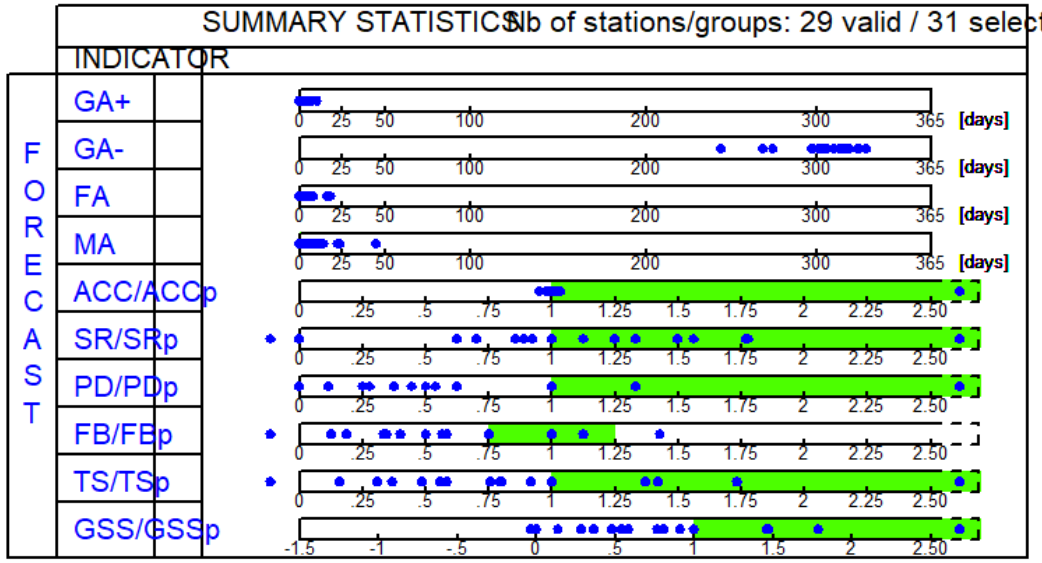

FORECAST TARGET PLOT O3
29/31 valid stations
MQI_Forecast= 1.75042
BIAS > 0
Thresh= 120.0
Cut-off= 20.0
DayForecast= 1
T=1
BIAS
FA < MA
FA > MA
BIAS < 0
<- CRMSE ->
VNT PFE MIN DRN SOB STR ESP SCO EST
IGE ERV FUN FRN BEA OLI ALE LAR REB
LOU RES MEM QMA ARC CHA FPO ALV LNH
TER JMG MAL CER
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: O3
Scen: 2021
Extra Values: 120/20/1
Season: Year
Day hours: All 24h
Time Average: 8h
Daily stats: Max


FORECAST TARGET PLOT (OU) O3
29/31 valid stations
MQI_Forecast= 0.909902
BIAS > 0
Thresh= 120.0
Cut-off= 20.0
DayForecast= 1
T=1
BIAS
FA < MA
FA > MA
BIAS < 0
<- CRMSE ->
VNT PFE MIN DRN SOB STR ESP SCO EST
IGE ERV FUN FRN BEA OLI ALE LAR REB
LOU RES MEM QMA ARC CHA FPO ALV LNH
TER JMG MAL CER
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: O3
Scen: 2021
Extra Values: 120/20/1
Season: Year
Day hours: All 24h
Time Average: 8h
Daily stats: Max

O_3

ASSESSMENT vs FORECAST



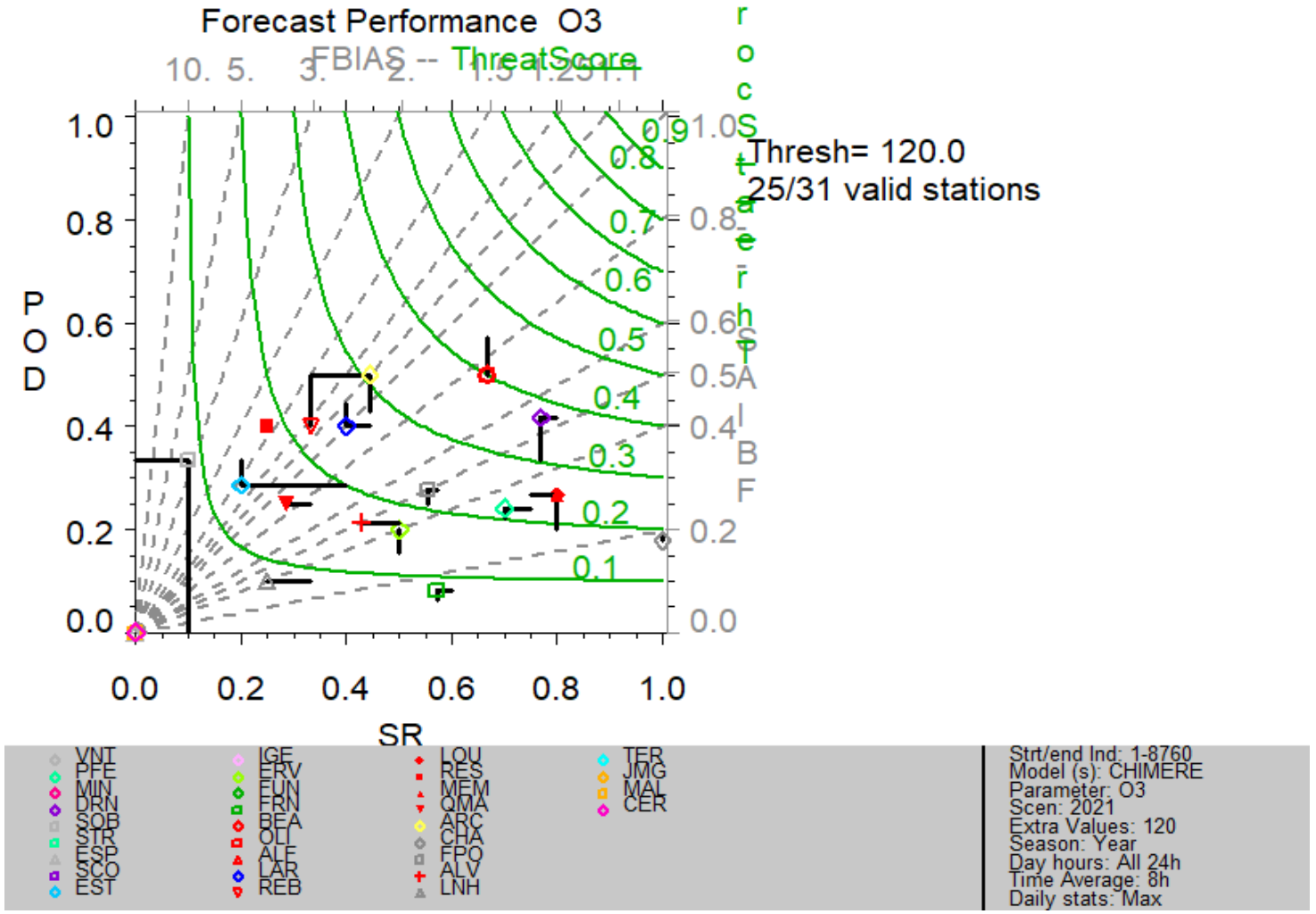


Performance Criteria satisfied
Performance Criteria satisfied; Error dominated by corresponding Indicator
TIME: >90% of stations fulfills the Performance Criteria
SPACE: Dot fulfills the Performance Criteria
TIME: <90% of stations fulfills the Performance Criteria
SPACE: Dot does not fulfill the Performance Criteria

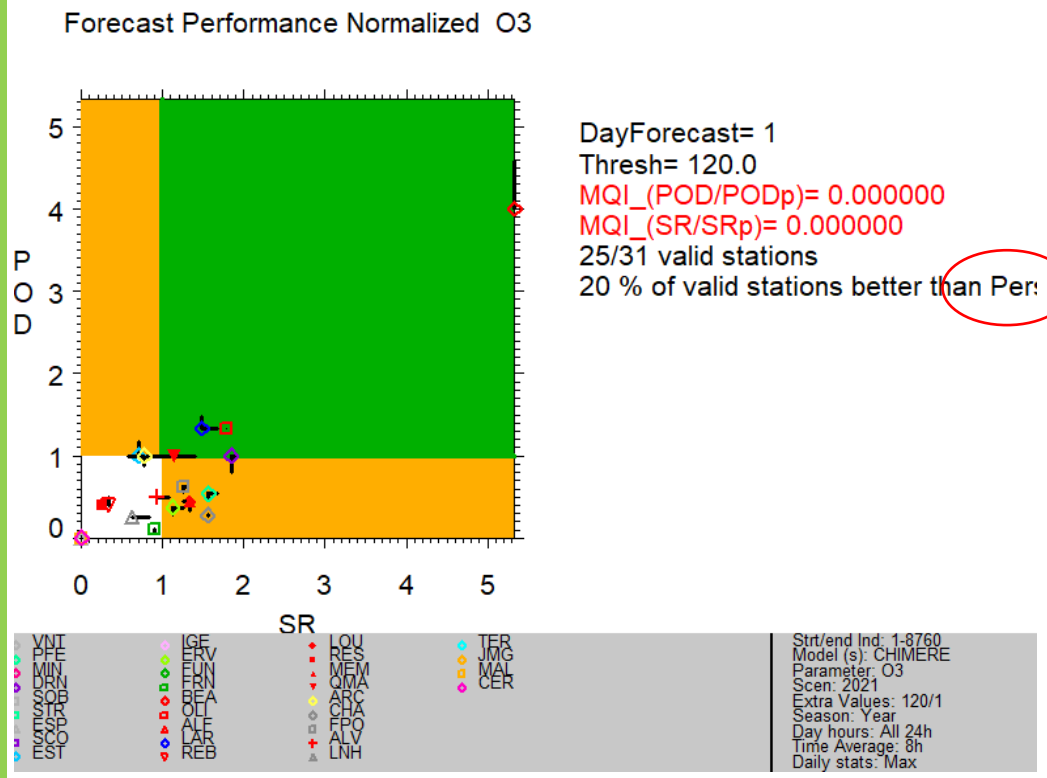
Orange range?

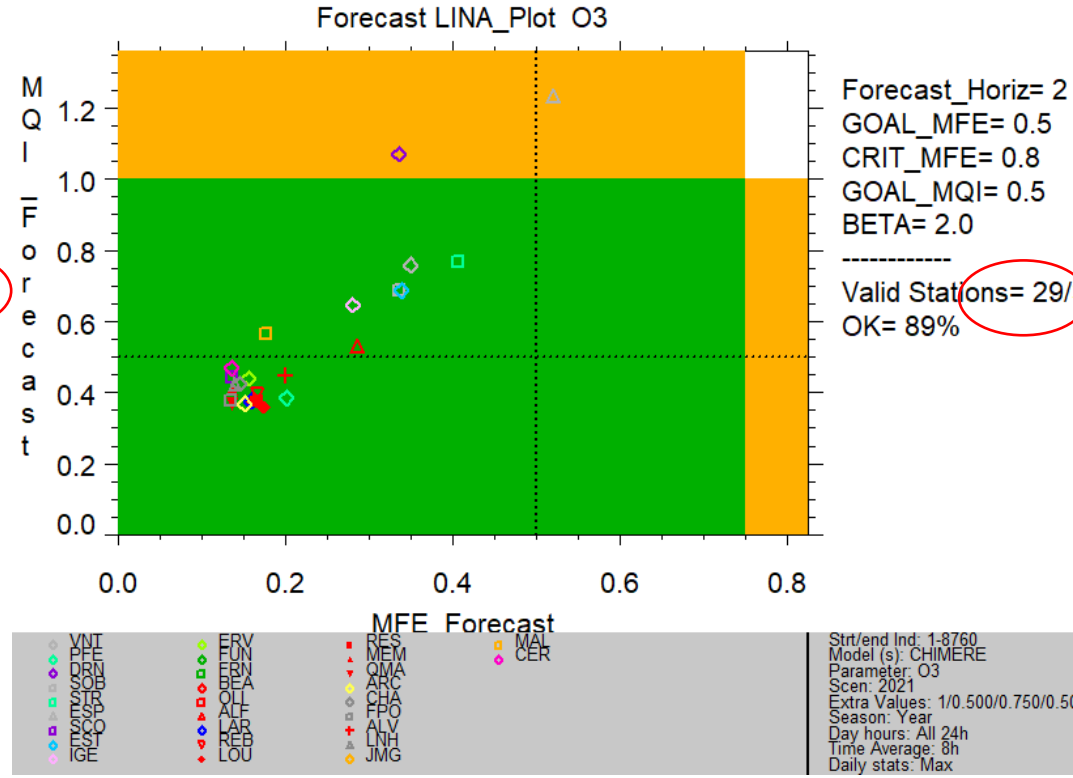
Performance classification

O_3


Forecast Performance O3
FBIAS -- ThreatScore
10. 5. 3. 2. 1.5 1.25 1.1
POD
SR
Threshold
Thresh= 120.0
25/31 valid stations
0.0 0.2 0.4 0.6 0.8 1.0
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
VNT PFE MIN DRN SOB STR ESP SCO EST
IGE ERV FUN FRN BEA OLI ALE LAR REB
LQU RES MEM QMA ARC CHA FPO ALV LNH
TER JMG MAL CER
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: O3
Scen: 2021
Extra Values: 120
Season: Year
Day hours: All 24h
Time Average: 8h
Daily stats: Max

O_3

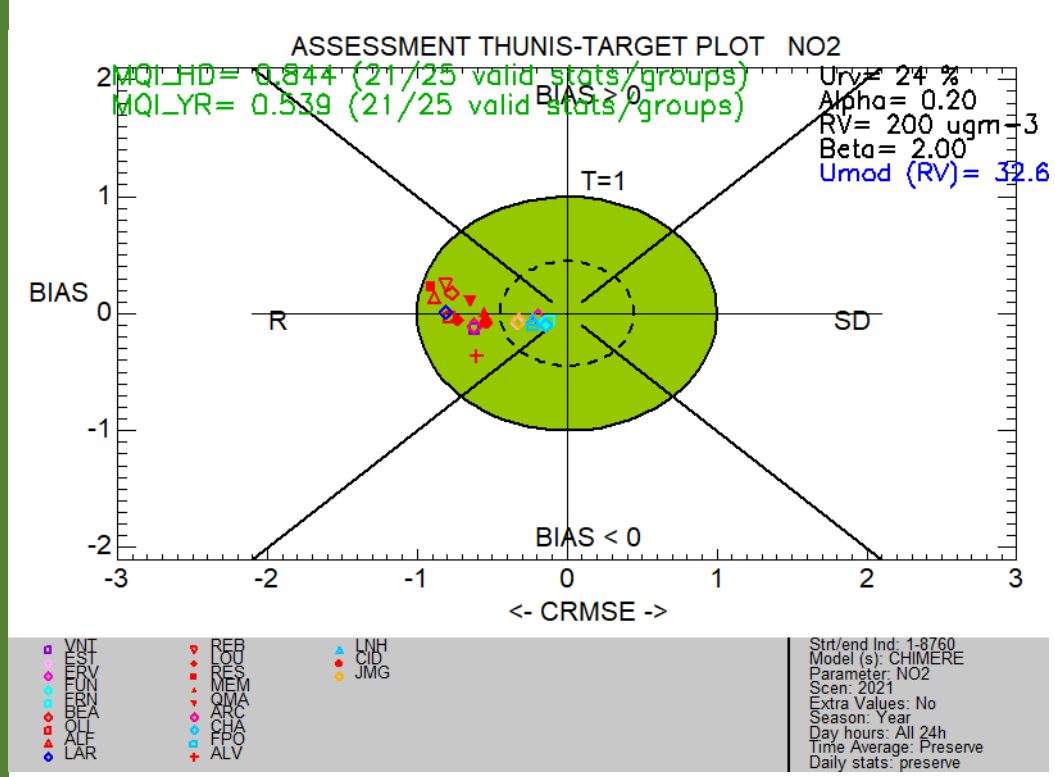


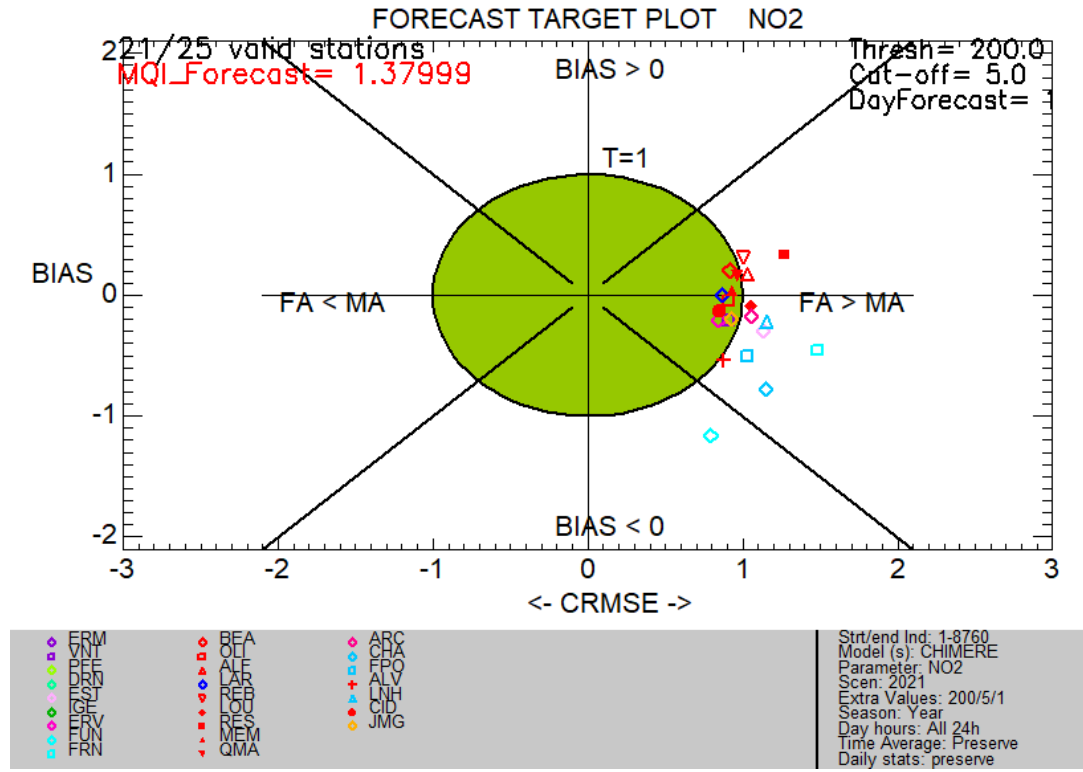


Why not also the % of valid stations better than persistence?

NO_2

ASSESSMENT vs FORECAST

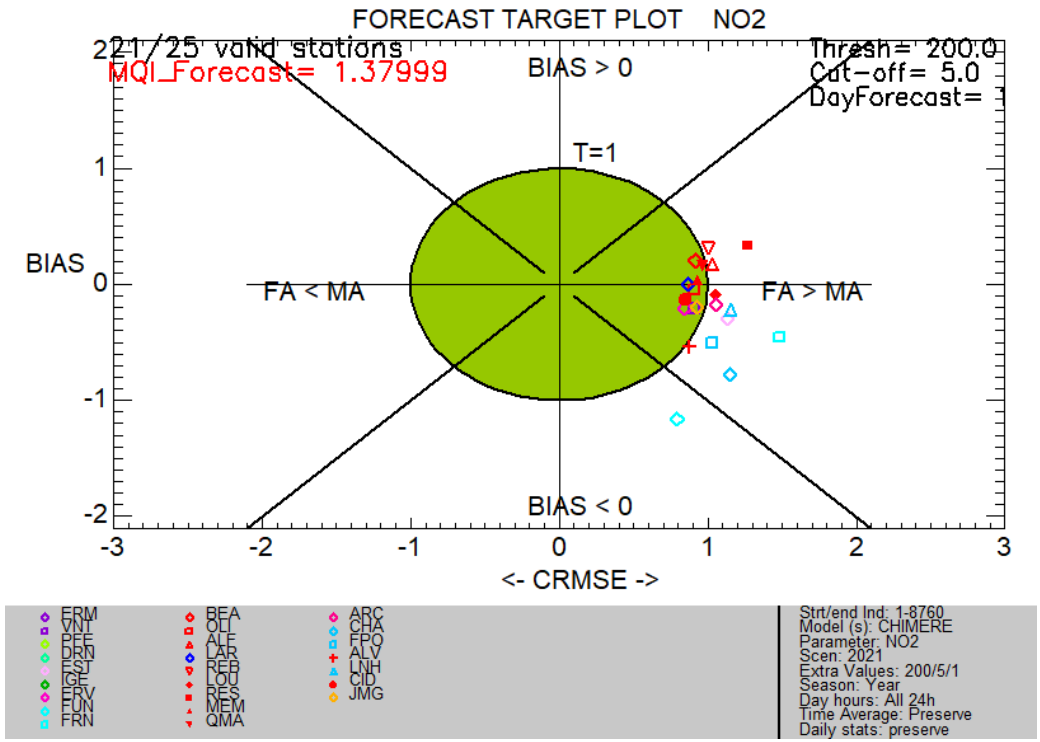


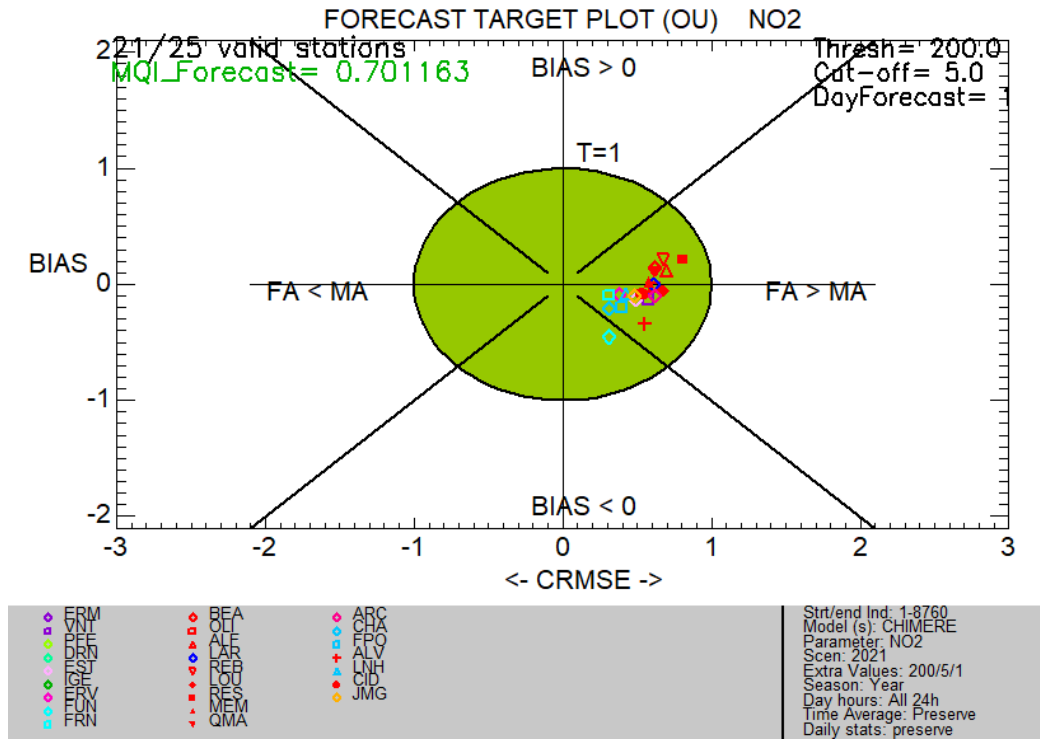


Daily Stats -> Preserve

Day forecast=1 or 2?

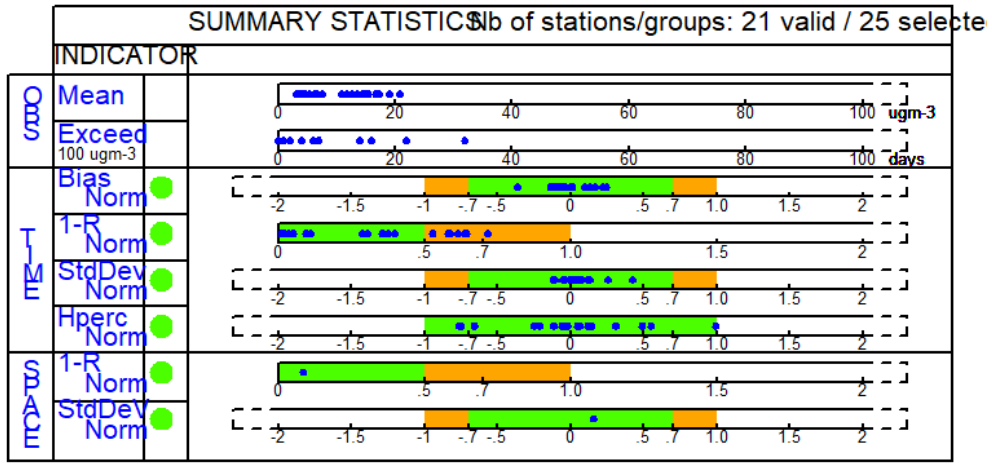
NO_2

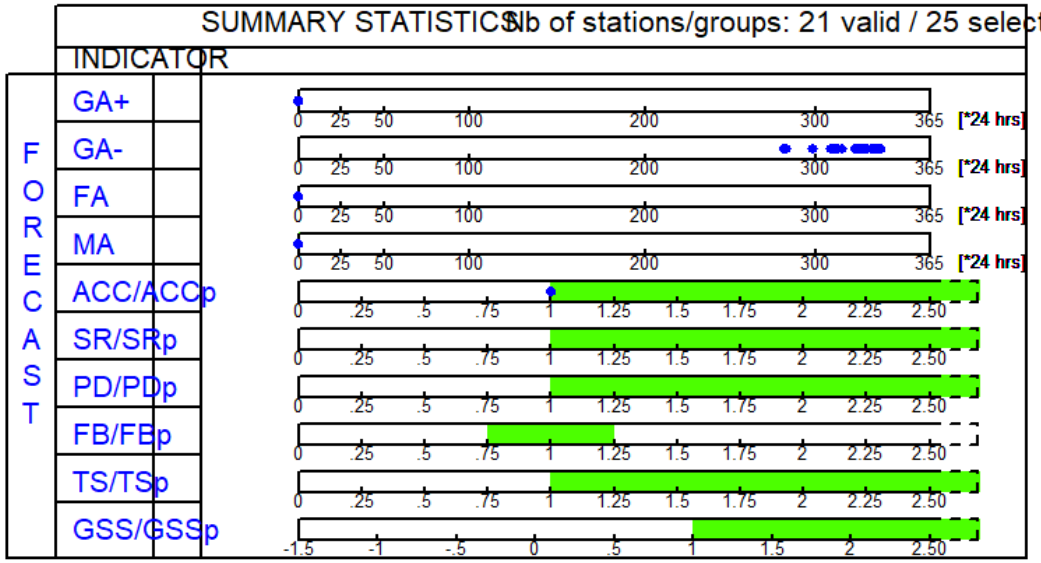

FORECAST TARGET PLOT NO2
221/225 valid stations
MQI_Forecast= 1.37999
BIAS > 0
Thresh= 200.0
Cut-off= 5.0
DayForecast= 1
T=1
BIAS
FA < MA
FA > MA
BIAS < 0
<- CRMSE ->
FRM VNT PFE DRN FST IGE ERV FUN FRN
BEA OLI ALF LAR REB LOU RES MEM QMA
ARC CHA FPO ALV LNH CID JMG
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: NO2
Scen: 2021
Extra Values: 200/5/1
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: preserve


FORECAST TARGET PLOT (OU) NO2
221/225 valid stations
MQI_Forecast= 0.701163
BIAS > 0
Thresh= 200.0
Cut-off= 5.0
DayForecast= 1
T=1
BIAS
FA < MA
FA > MA
BIAS < 0
<- CRMSE ->
FRM VNT PFE DRN FST IGE ERV FUN FRN
BEA OLI ALF LAR REB LOU RES MEM QMA
ARC CHA FPO ALV LNH CID JMG
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: NO2
Scen: 2021
Extra Values: 200/5/1
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: preserve

NO_2

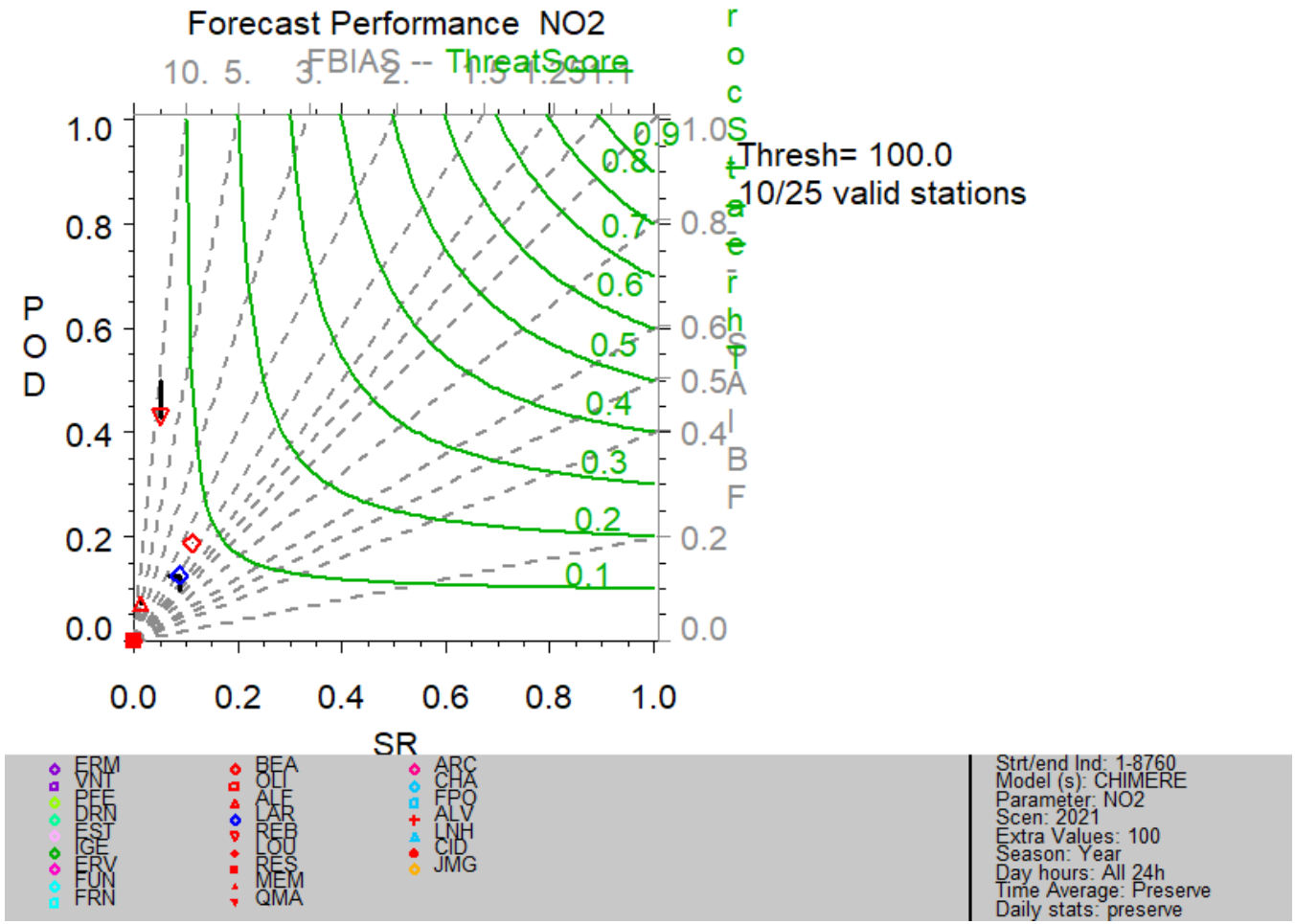
ASSESSMENT vs FORECAST



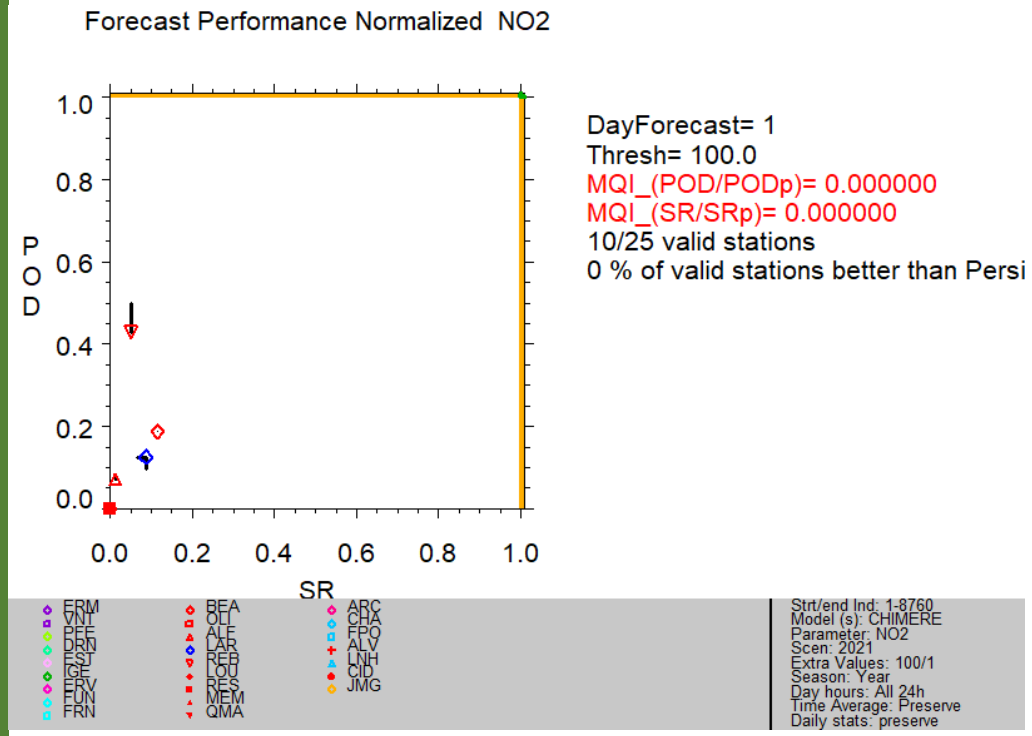


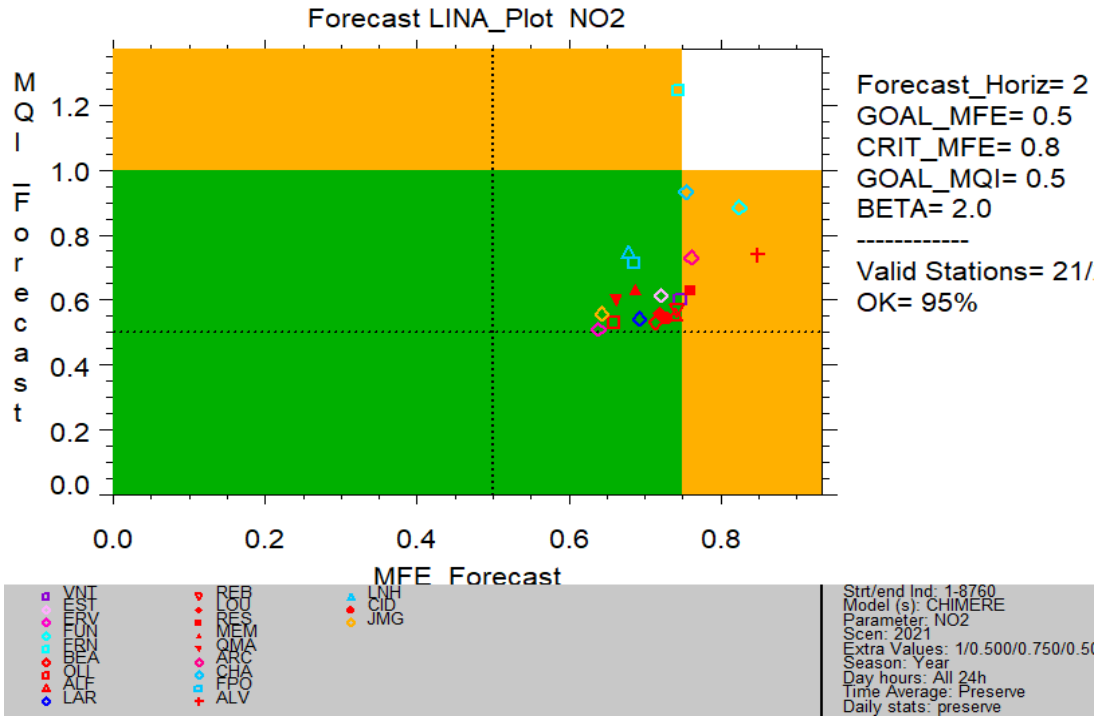
Performance Criteria satisfied
Performance Criteria satisfied; Error dominated by corresponding Indicator
TIME: >90% of stations fulfills the Performance Criteria
SPACE: Dot fulfills the Performance Criteria
TIME: <90% of stations fulfills the Performance Criteria
SPACE: Dot does not fulfill the Performance Criteria

NO_2


Forecast Performance NO2
FBIAS -- ThreatScore
10. 5. 3. 2. 1.5 1.25 1.1
POD
SR
FBIAS
Thresh= 100.0
10/25 valid stations
FRM
VNT
PFE
DRN
FST
IGE
FRV
FUN
FRN
BEA
OLI
ALF
LAR
REB
LOU
RES
MEM
QMA
ARC
CHA
FPO
ALV
LNH
CID
JMG
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: NO2
Scen: 2021
Extra Values: 100
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: preserve

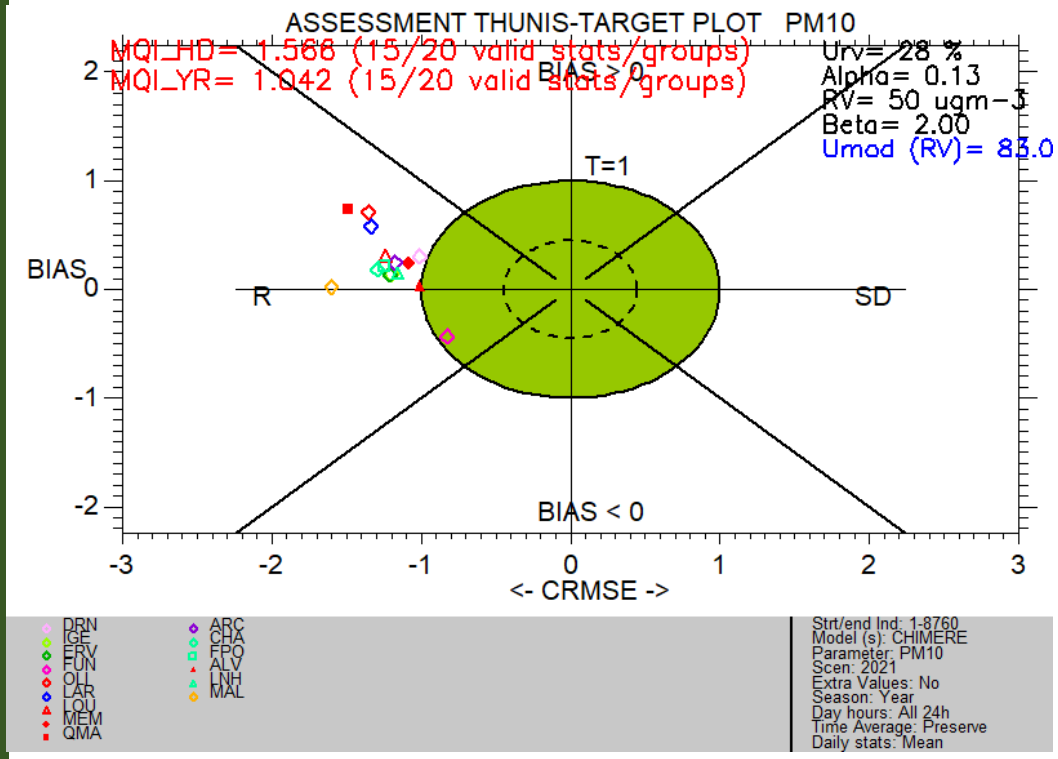
NO_2

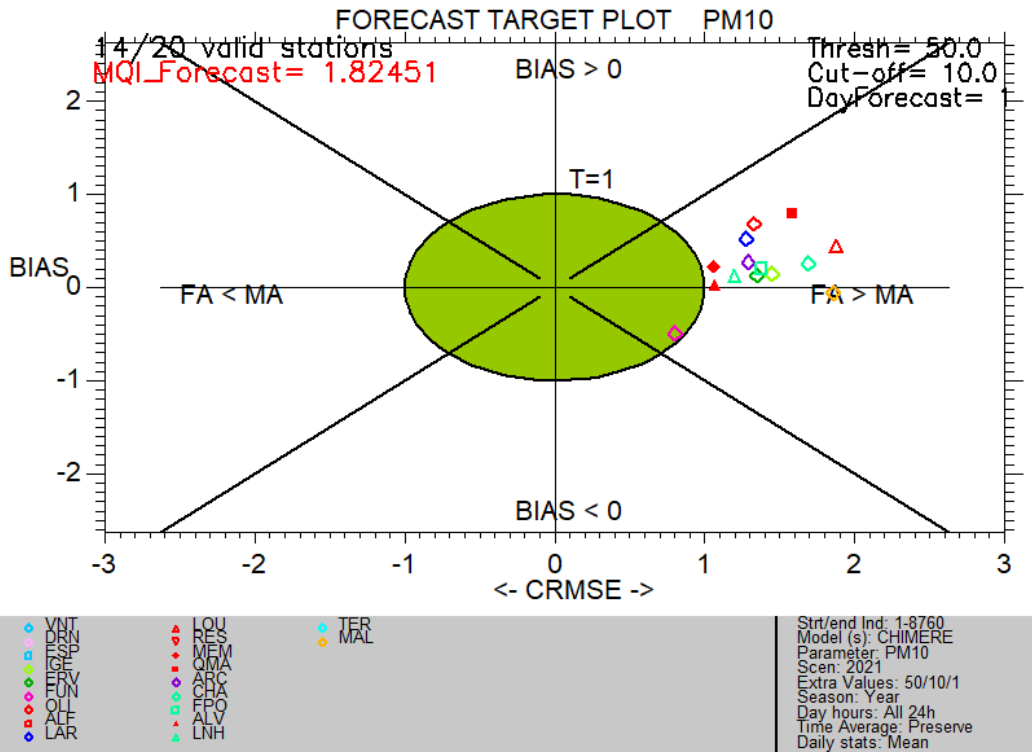

Forecast Performance Normalized NO2
POD
SR
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
DayForecast= 1
Thresh= 100.0
MQI_(POD/PODp)= 0.000000
MQI_(SR/SRp)= 0.000000
10/25 valid stations
0 % of valid stations better than Persi
ERM
VNT
PEE
DRN
EST
IGE
ERV
FUN
FRN
BEA
OLI
ALF
LAR
REB
LOU
RES
MEM
QMA
ARC
CHA
FPO
ALV
LNH
CID
JMG
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: NO2
Scen: 2021
Extra Values: 100/1
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: preserve


Forecast LINA_Plot NO2
MQI_Forecast
MFE_Forecast
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
Forecast_Horiz= 2
GOAL_MFE= 0.5
CRIT_MFE= 0.8
GOAL_MQI= 0.5
BETA= 2.0
Valid Stations= 21/
OK= 95%
VNT
EST
ERV
FUN
ERN
BEA
OLI
ALF
LAR
REB
LOU
RES
MEM
QMA
ARC
CHA
FPO
ALV
LNH
CID
JMG
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: NO2
Scen: 2021
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: preserve

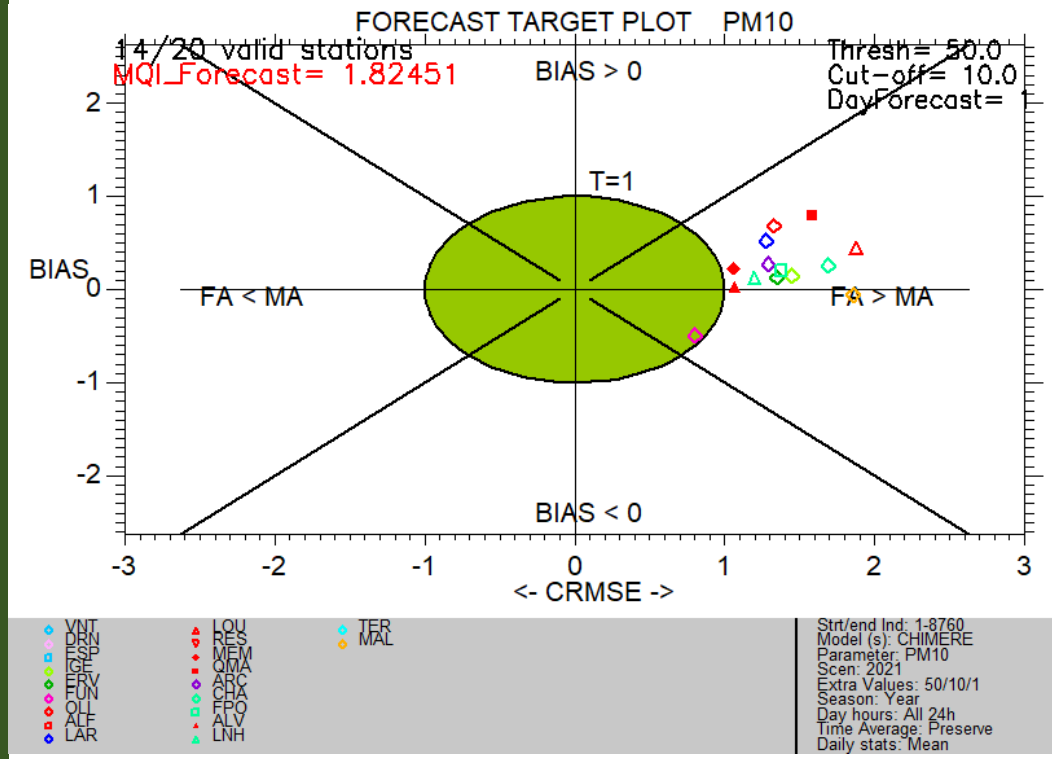
PM

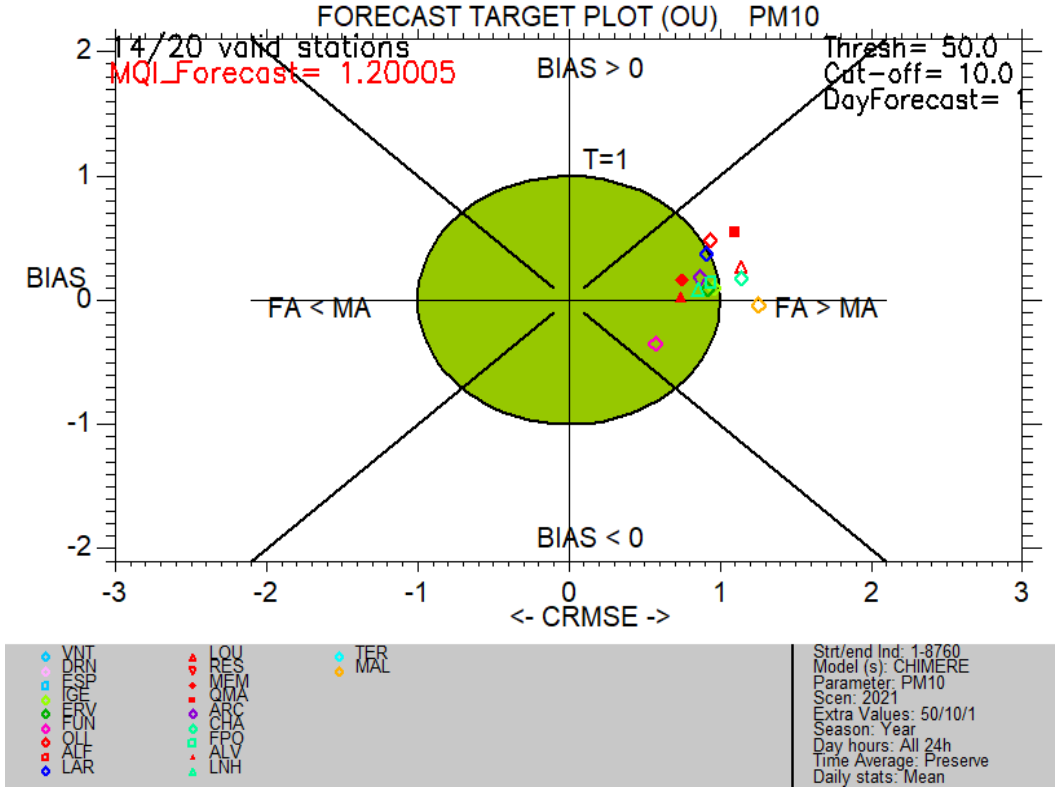
ASSESSMENT vs FORECAST





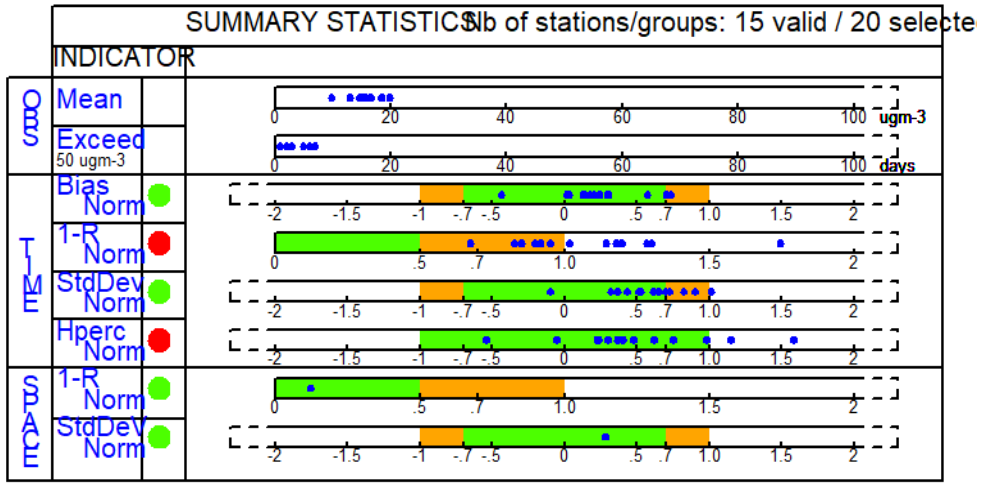
PM

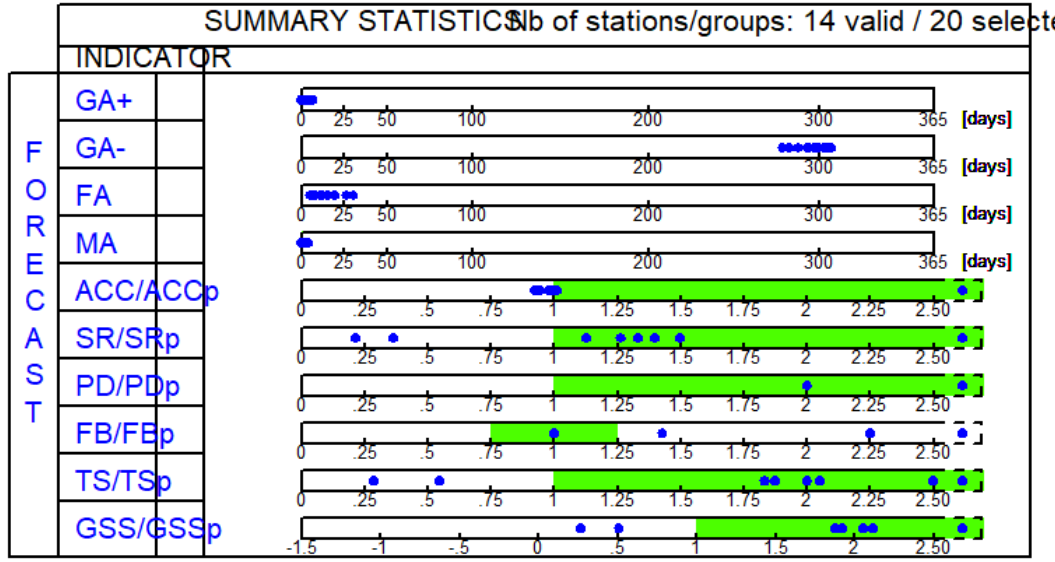

FORECAST TARGET PLOT PM10
14/20 valid stations
MQI_Forecast= 1.82451
BIAS > 0
Thresh= 50.0
Cut-off= 10.0
DayForecast= 1
T=1
BIAS
FA < MA
FA > MA
BIAS < 0
<- CRMSE ->
VNT DRN FSP IGE FRV FUN OLI ALF LAR
LOU RES MEM QMA ARC CHA FPO ALV LNH
TER MAL
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: PM10
Scen: 2021
Extra Values: 50/10/1
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: Mean


FORECAST TARGET PLOT (OU) PM10
14/20 valid stations
MQI_Forecast= 1.20005
BIAS > 0
Thresh= 50.0
Cut-off= 10.0
DayForecast= 1
T=1
BIAS
FA < MA
FA > MA
BIAS < 0
<- CRMSE ->
VNT DRN FSP IGE FRV FUN OLI ALF LAR
LOU RES MEM QMA ARC CHA FPO ALV LNH
TER MAL
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: PM10
Scen: 2021
Extra Values: 50/10/1
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: Mean

PM

ASSESSMENT vs FORECAST





Performance Criteria satisfied
Performance Criteria satisfied; Error dominated by corresponding Indicator
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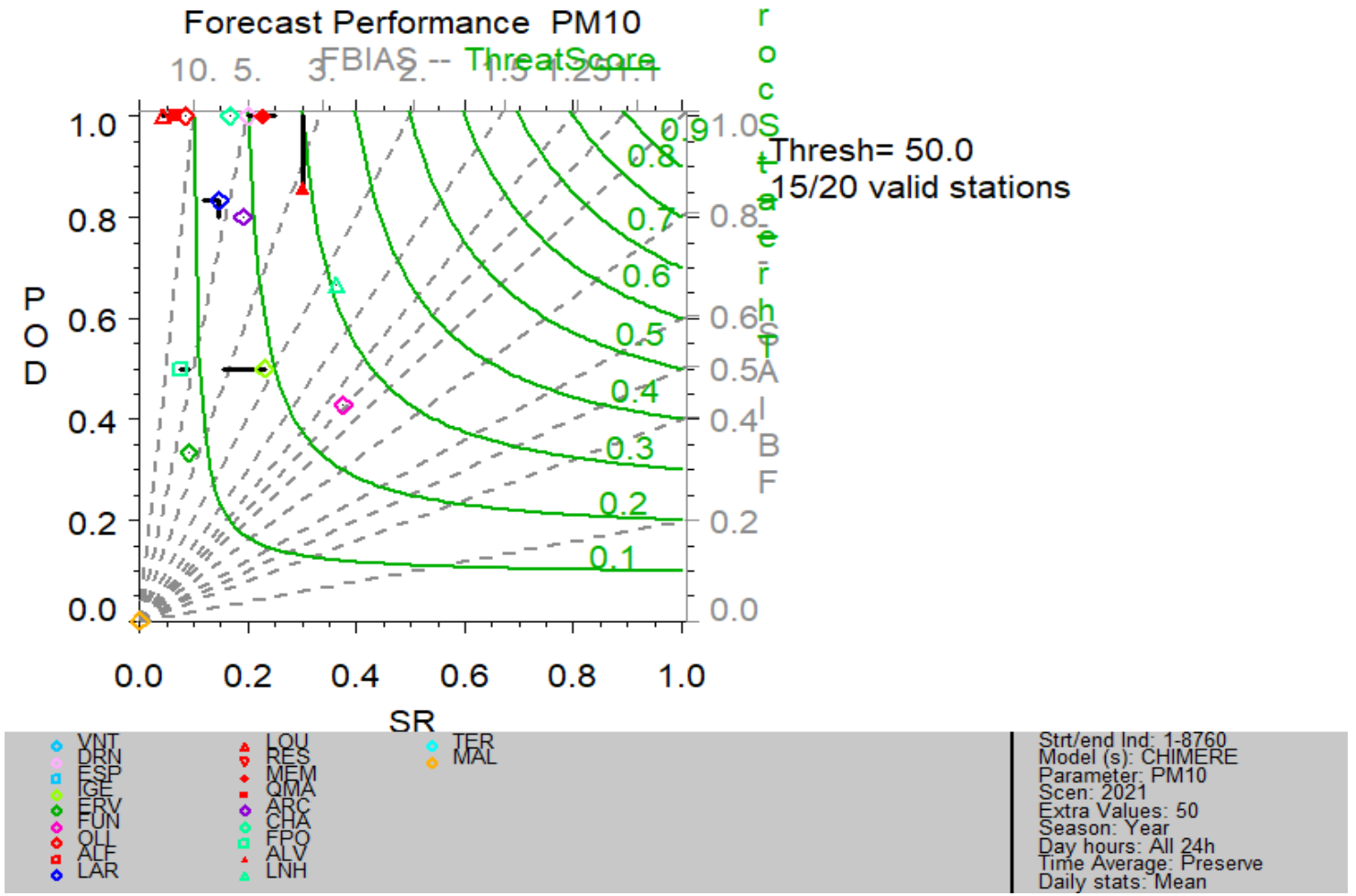
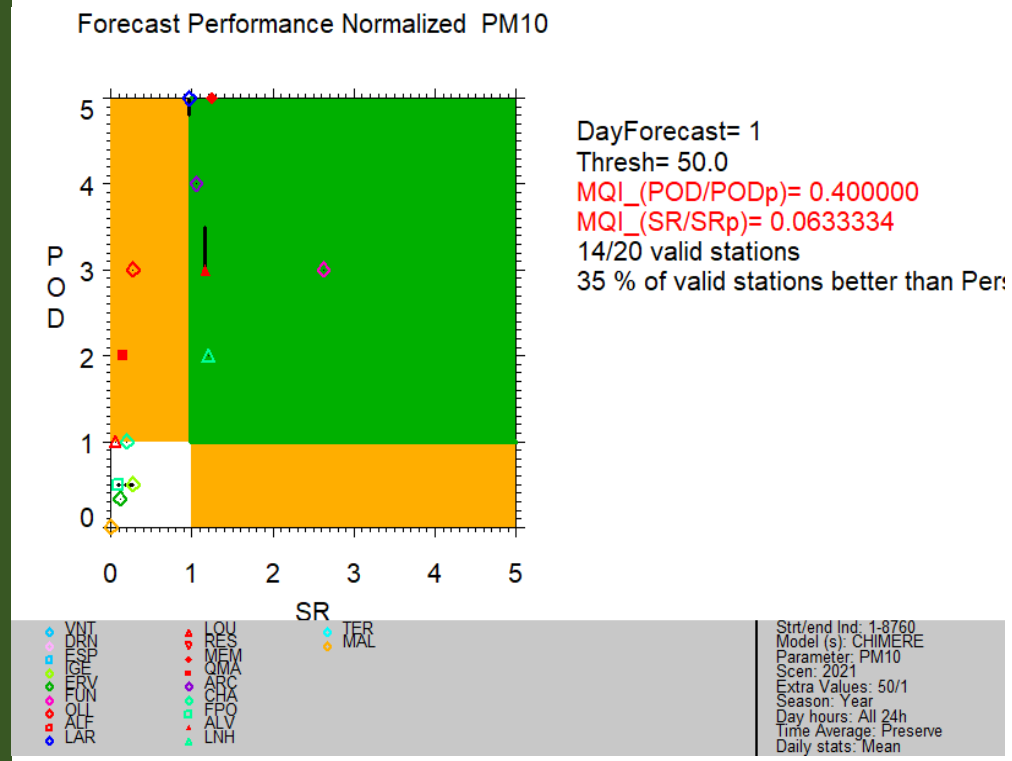
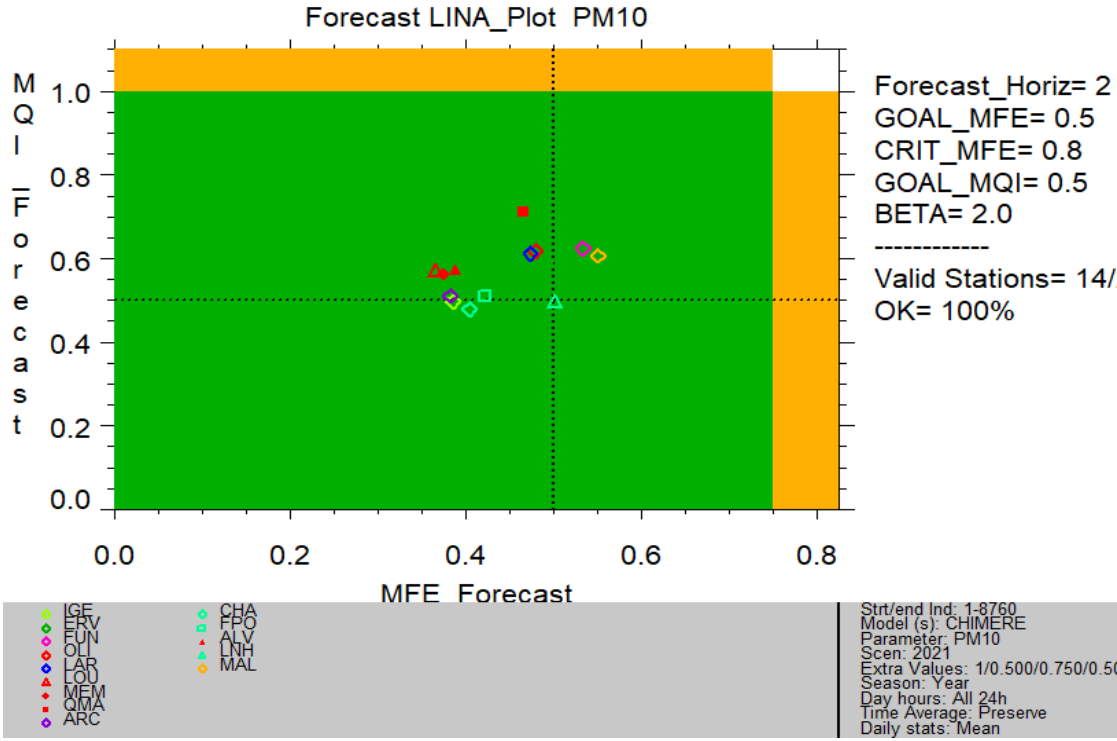
PM


Forecast Performance PM10
FBIAS -- ThreatScore
10. 5. 3. 2. 1.5 1.25 1.1
POD
SR
CSI
Thresh= 50.0
15/20 valid stations
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
VNT
DRN
ESP
IGE
ERV
FUN
OLL
ALF
LAR
LOU
RES
MEM
QMA
ARC
CHA
FPO
ALV
LNH
TER
MAL
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: PM10
Scen: 2021
Extra Values: 50
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: Mean

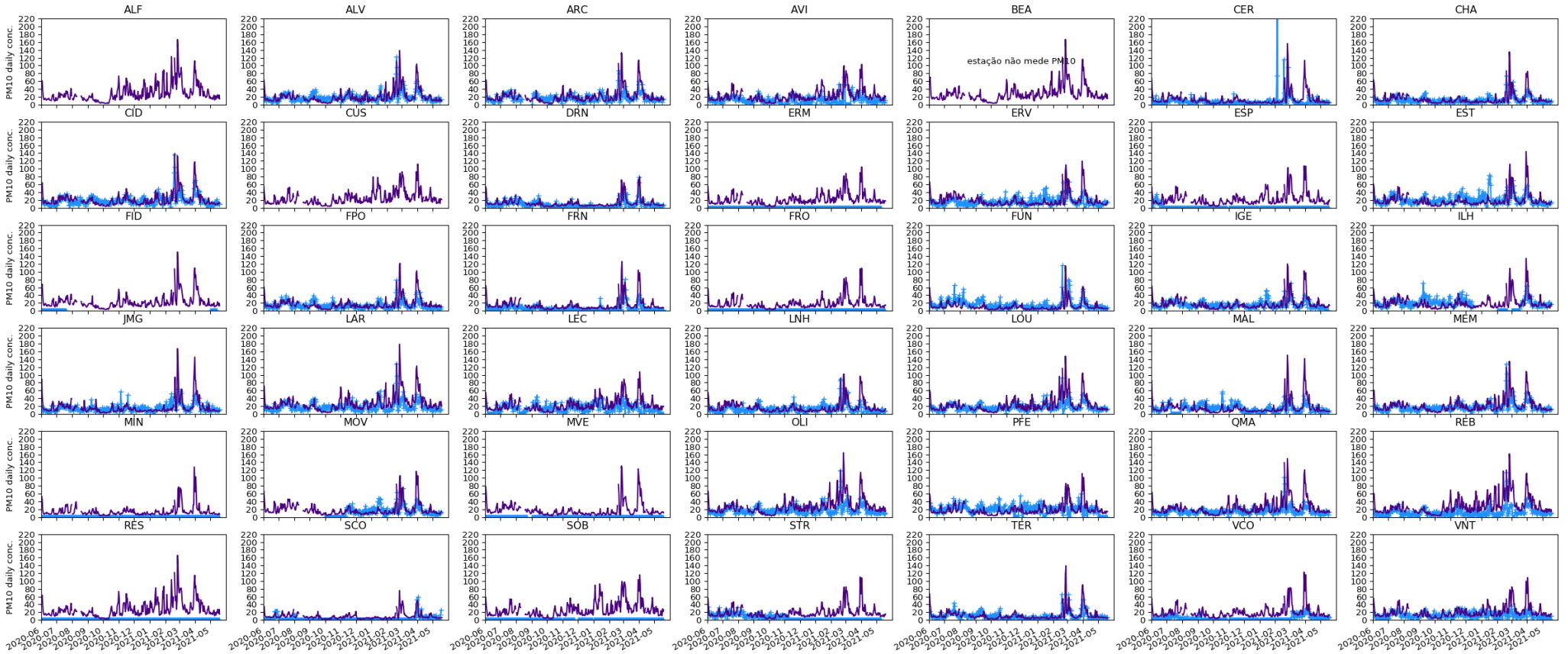
PM


Forecast Performance Normalized PM10
POD
SR
0
1
2
3
4
5
DayForecast= 1
Thresh= 50.0
MQI_(POD/PODp)= 0.400000
MQI_(SR/SRp)= 0.0633334
14/20 valid stations
35 % of valid stations better than Per
VNT
DRN
FSP
IGE
ERV
FUN
OLI
ALF
LAR
LOU
RES
MEM
QMA
ARC
CHA
FPO
ALV
LNH
TER
MAL
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: PM10
Scen: 2021
Extra Values: 50/1
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: Mean

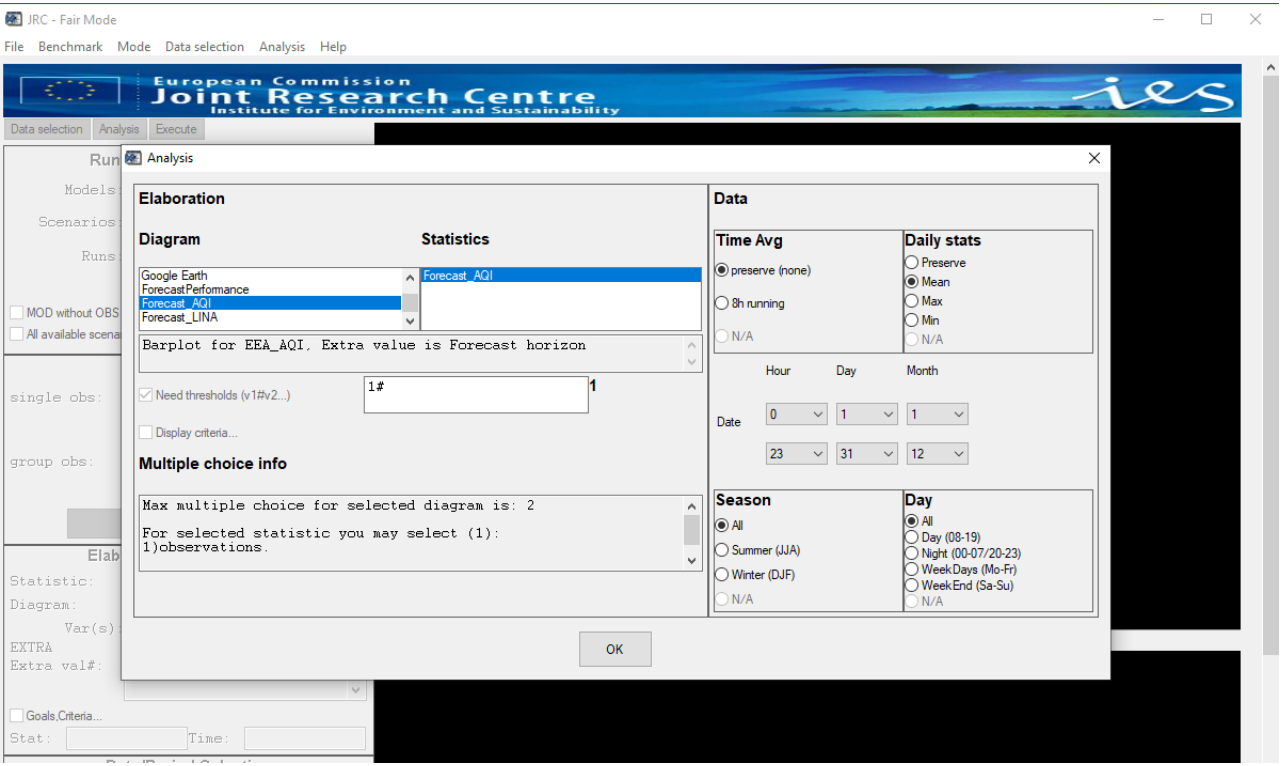

Forecast LINA_Plot PM10
MQI_Forecast
MFE_Forecast
0.0
0.2
0.4
0.6
0.8
1.0
Forecast_Horiz= 2
GOAL_MFE= 0.5
CRIT_MFE= 0.8
GOAL_MQI= 0.5
BETA= 2.0
Valid Stations= 14/
OK= 100%
IGE
ERV
FUN
OLI
LAR
LOU
MEM
QMA
ARC
CHA
FPO
ALV
LNH
MAL
Strt/end Ind: 1-8760
Model (s): CHIMERE
Parameter: PM10
Scen: 2021
Extra Values: 1/0.500/0.750/0.5
Season: Year
Day hours: All 24h
Time Average: Preserve
Daily stats: Mean

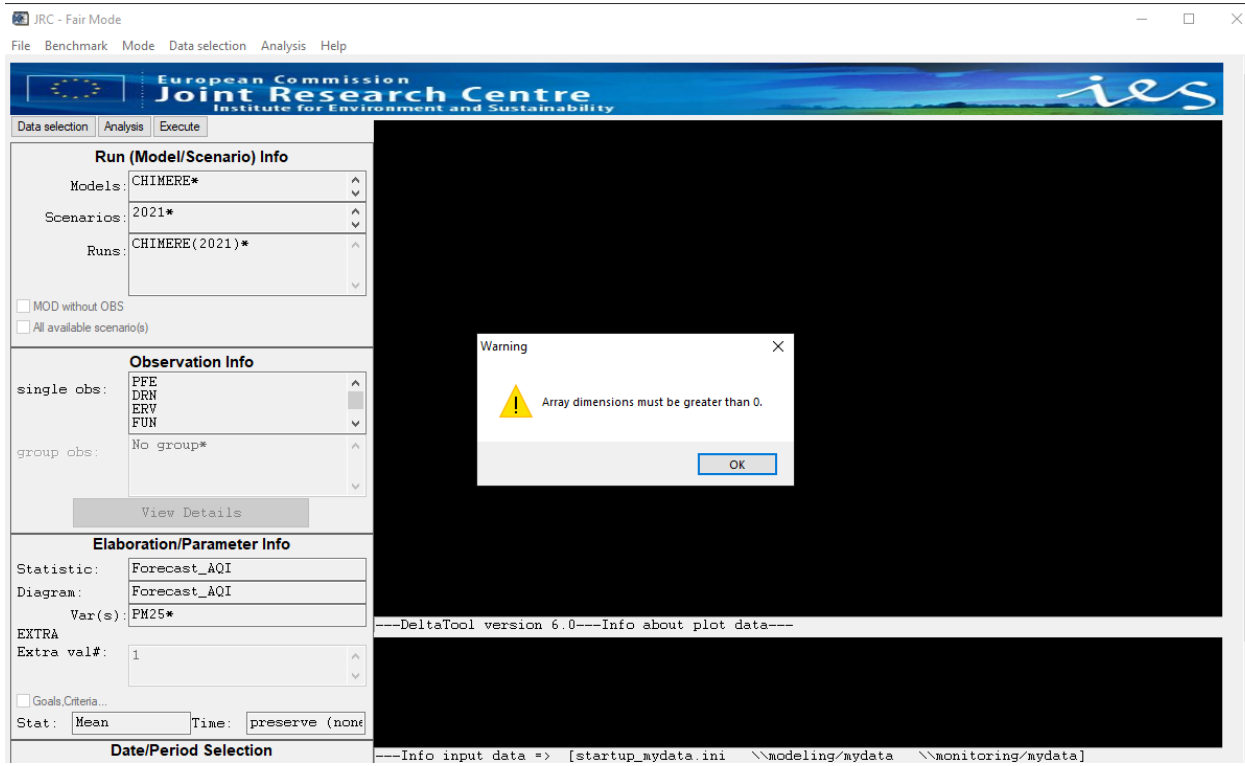
PM

We were not expecting so bad results...



FORECAST AQI





Last note:

This type of analysis (AQI) was requested by the PT agency to evaluate the forecast system...