

Intercomparison of operational wave forecasting systems against  
in-situ observations: data from BoM, DMI, DWD, ECCO,  
ECMWF, JMA, LPOS, METEOAM, METFR, METNO, NCEP,  
NZMS, PRTOS, SHNSM, UKMO.

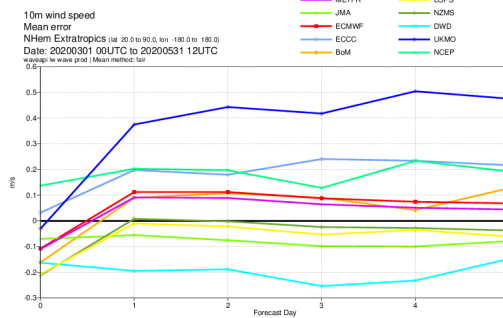
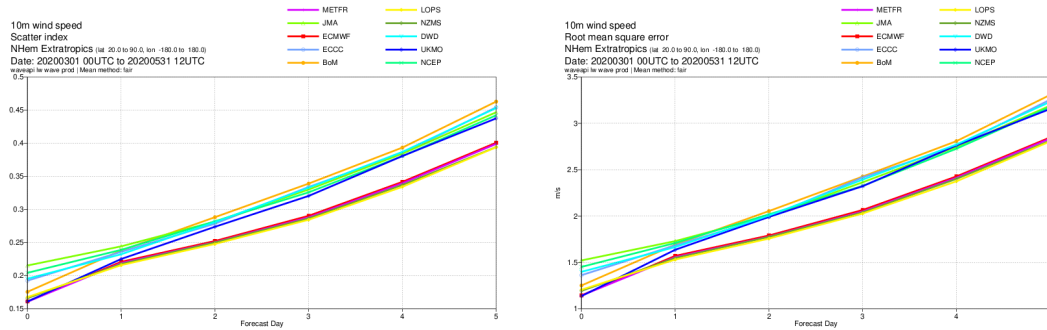
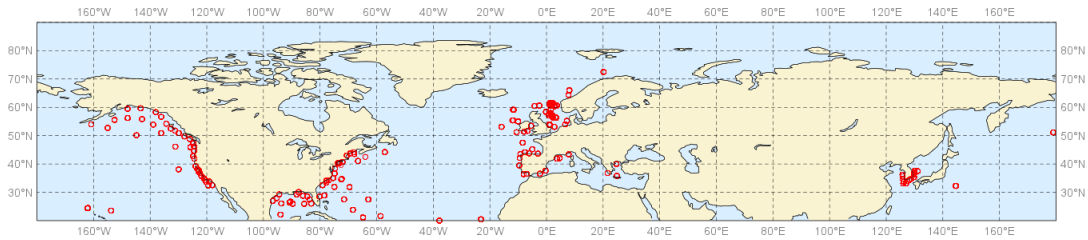
00 and 12 UTC runs

WMO Lead Centre for Wave Forecast Verification LC-WFV,  
European Centre for Medium-Range Weather Forecasts ECMWF

June 17, 2020

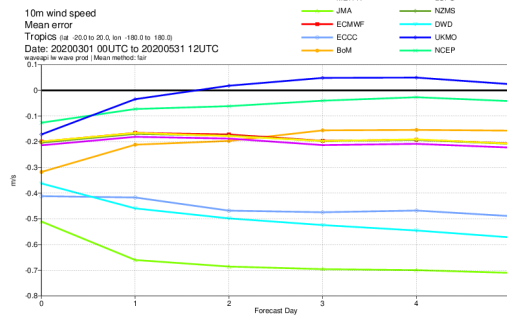
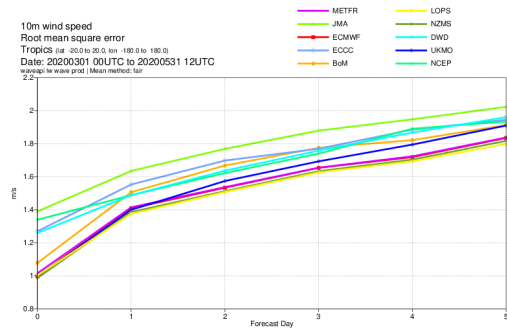
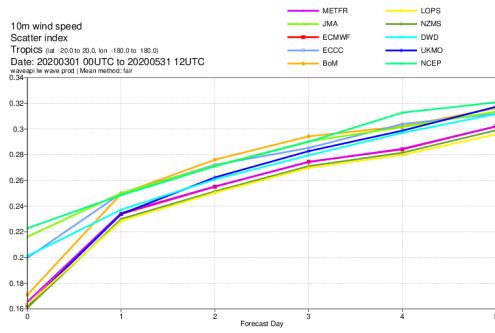
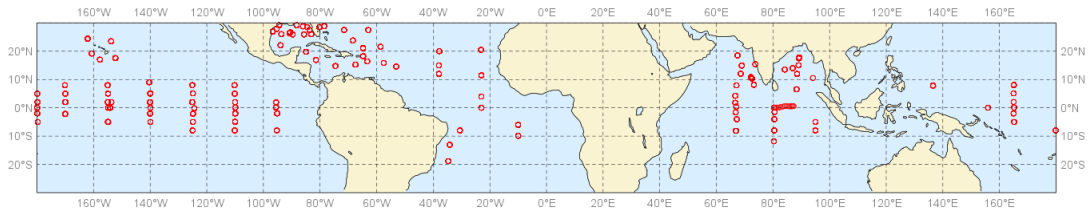
**PART III: 10 meter wind speed (10ff)**

Buoys observations - from 20200301 to 20200531 - (10ff)



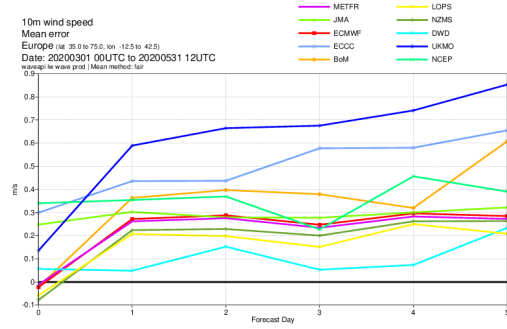
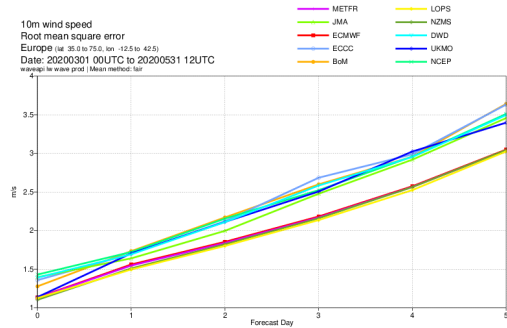
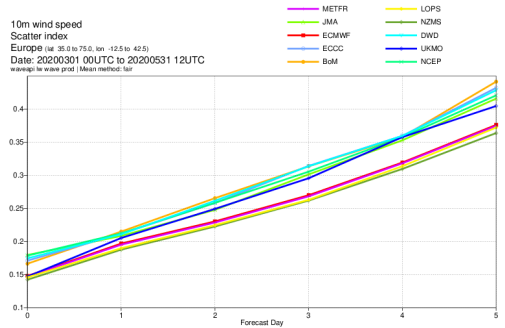
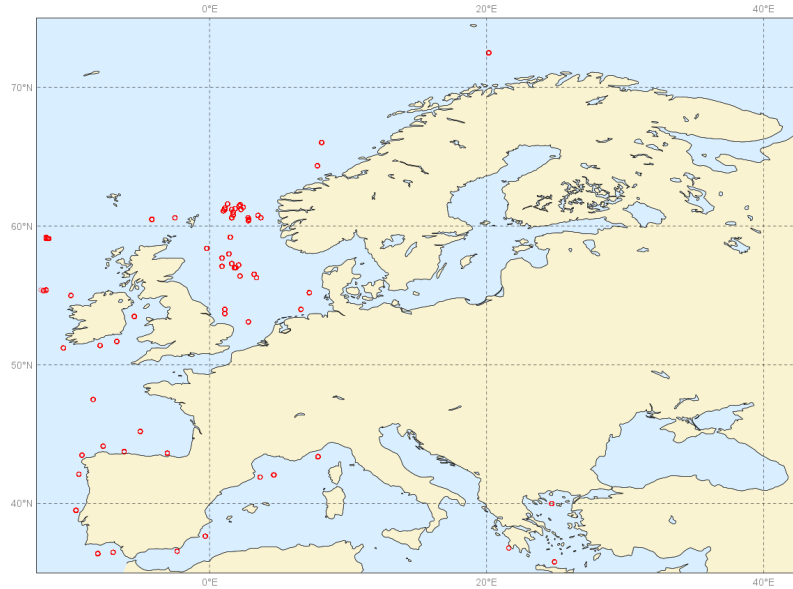
**Northern Hemisphere.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531 - (10ff)



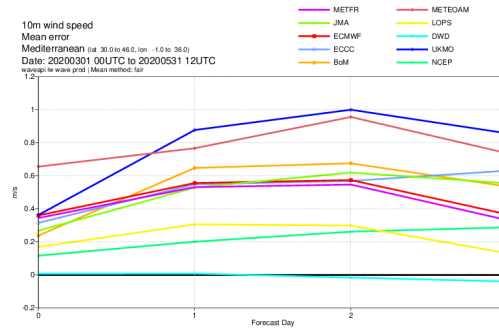
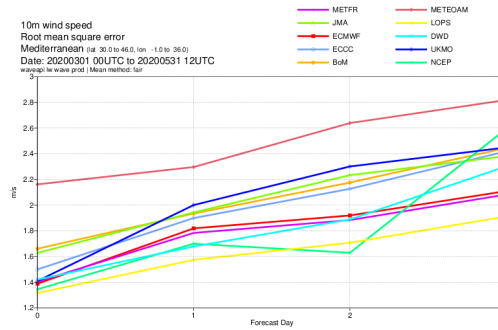
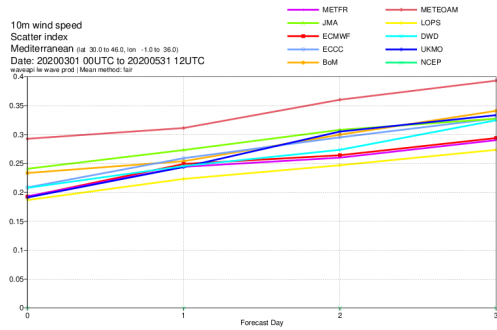
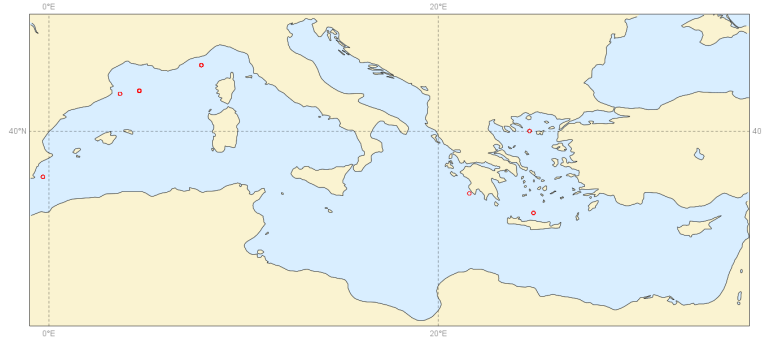
**Tropics.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531 - (10ff)



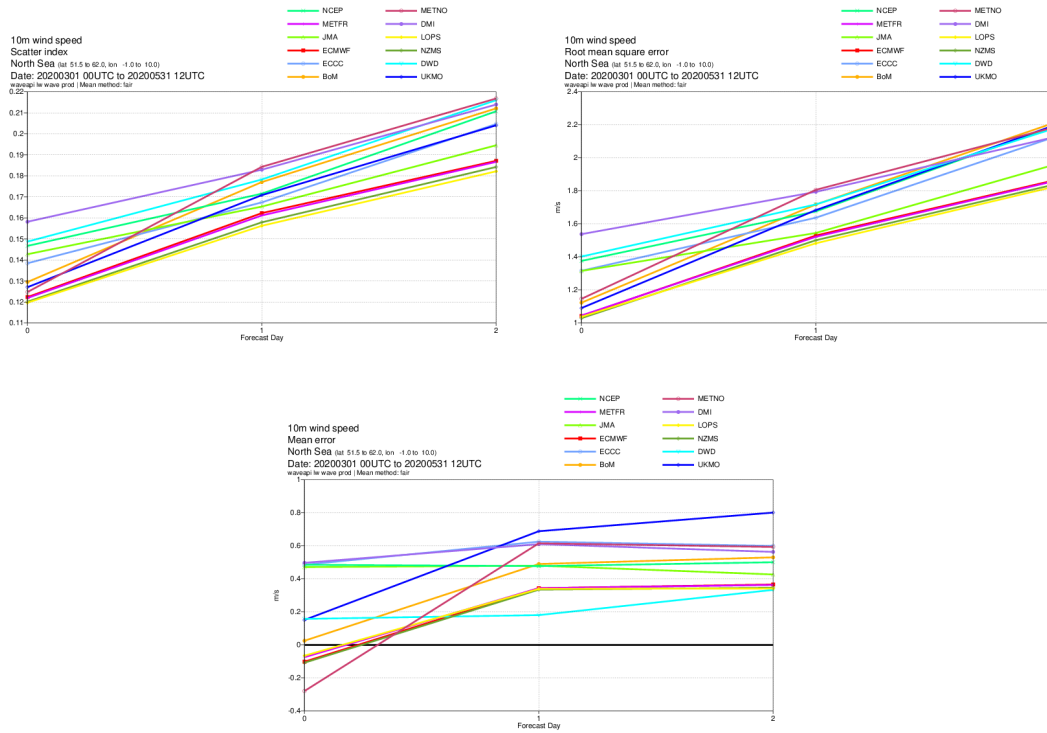
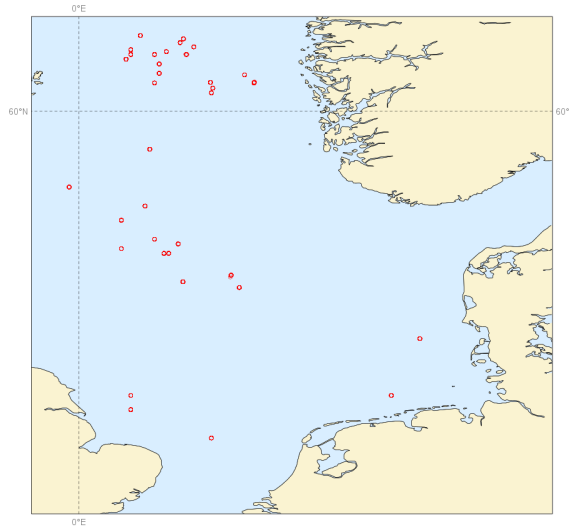
**Europe.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531 - (10ff)



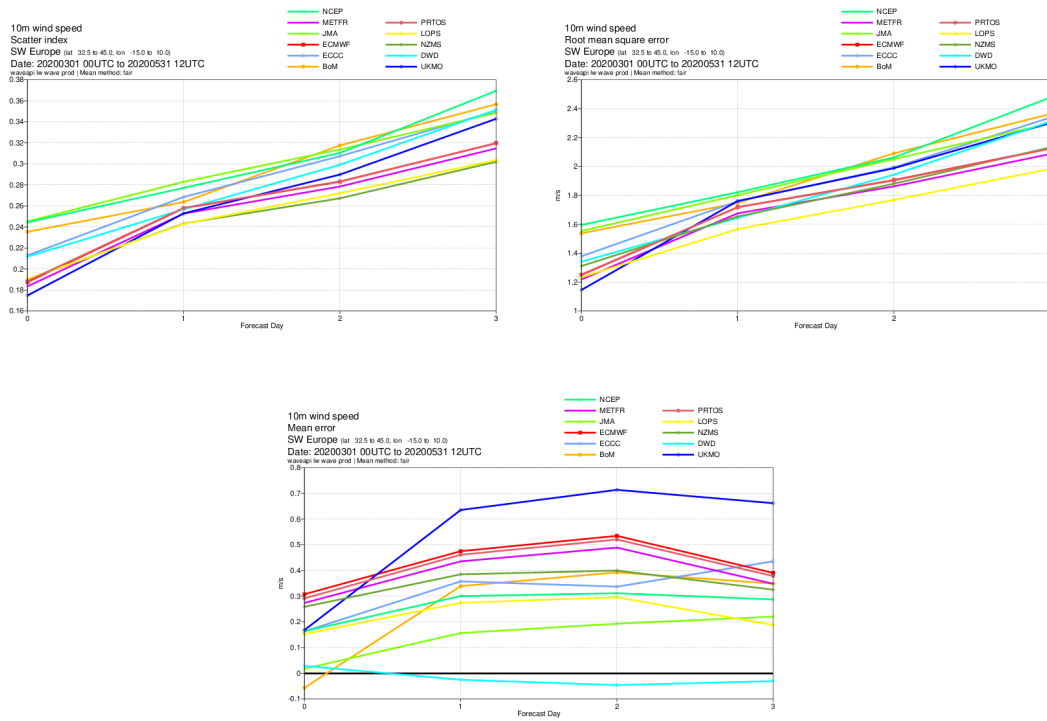
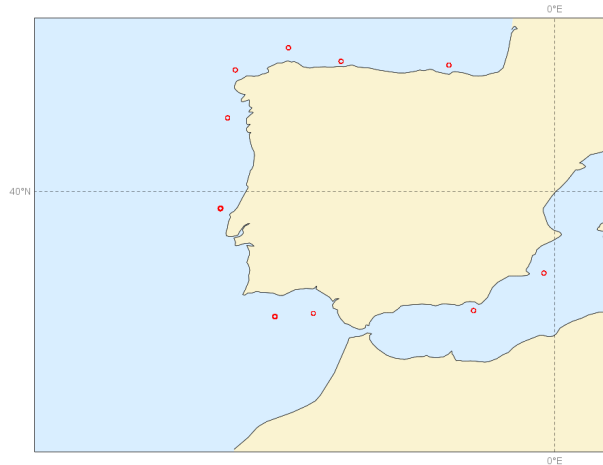
**Mediterranean Sea.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531 - (10ff)



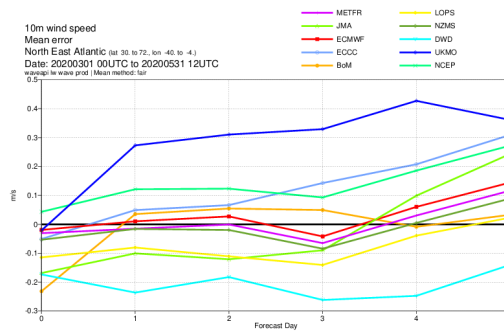
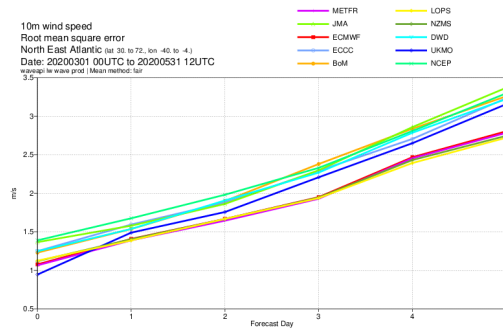
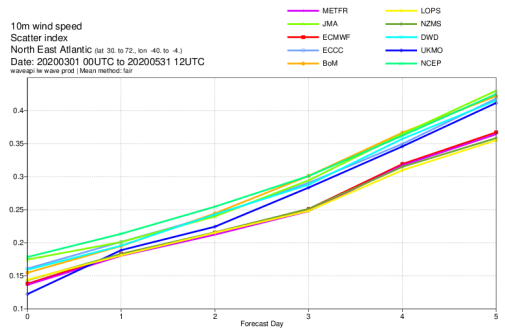
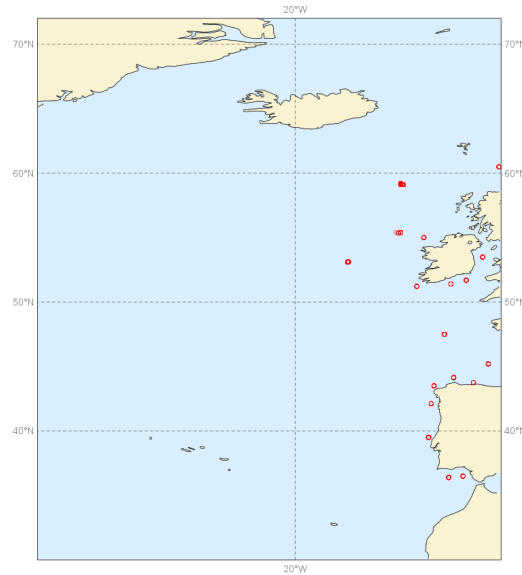
**North Sea.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531



**South West Europe.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

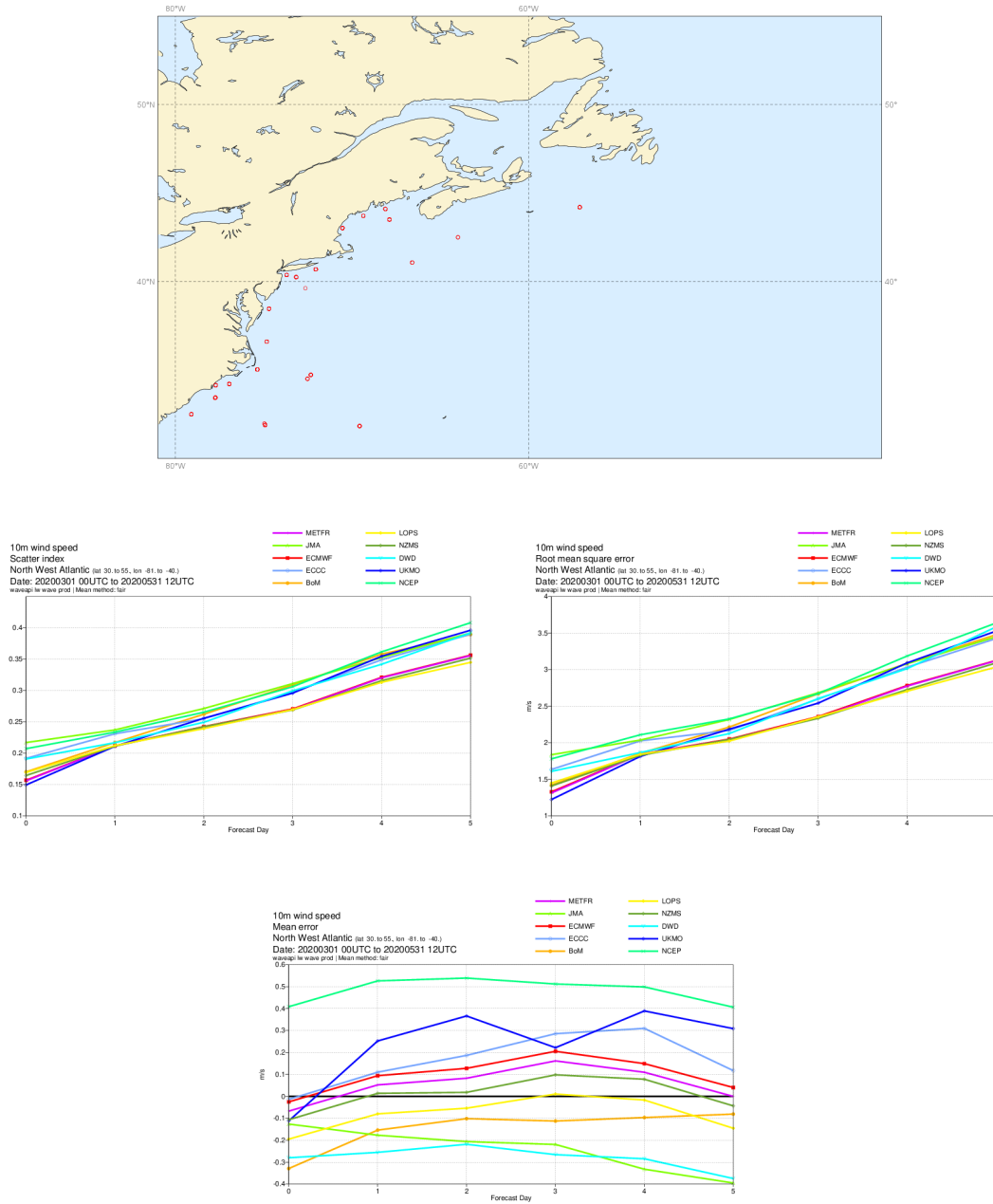
Buoys observations - from 20200301 to 20200531 - (10ff)



**North East Atlantic.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

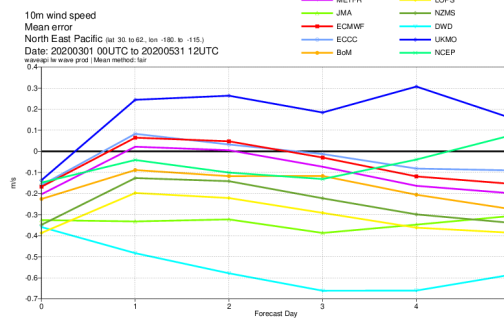
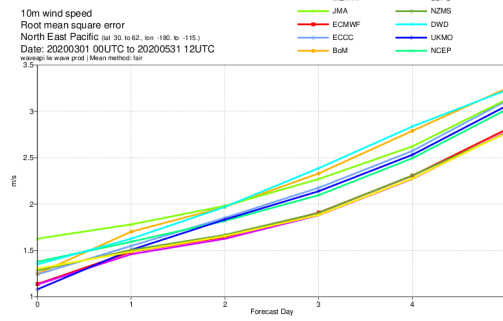
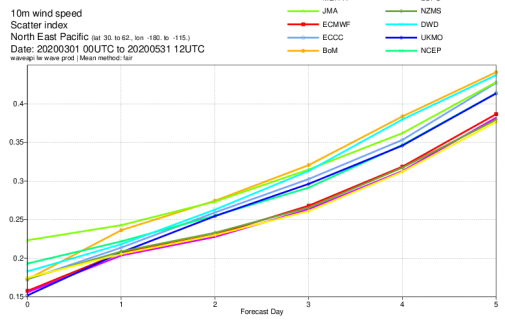
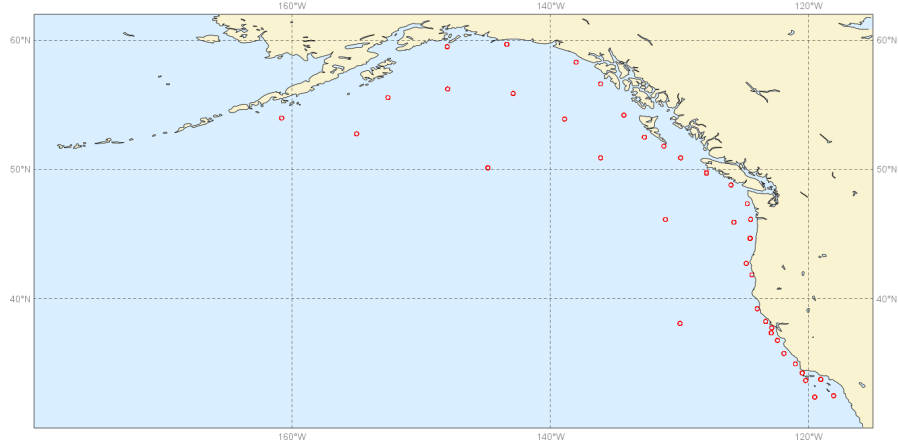


Buoys observations - from 20200301 to 20200531 - (10ff)



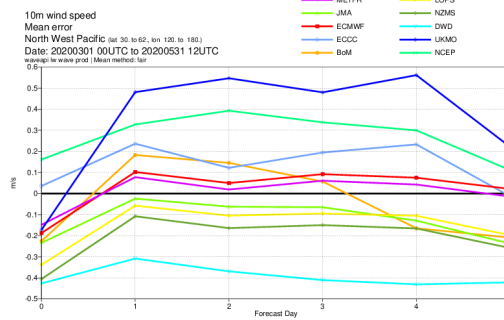
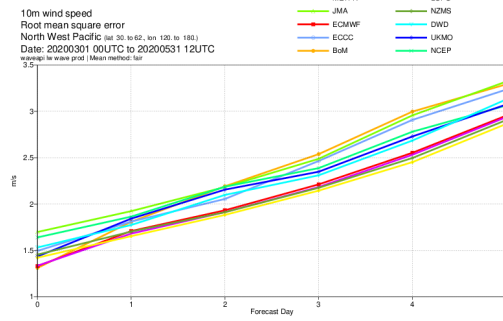
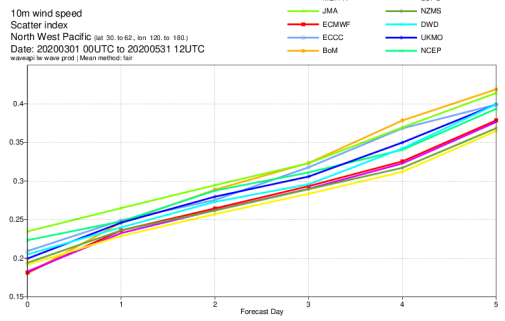
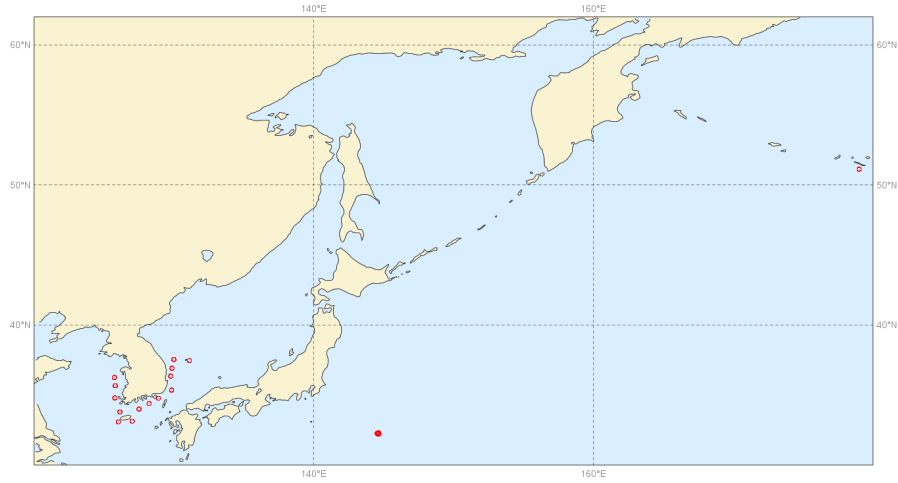
**North West Atlantic.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531 - (10ff)



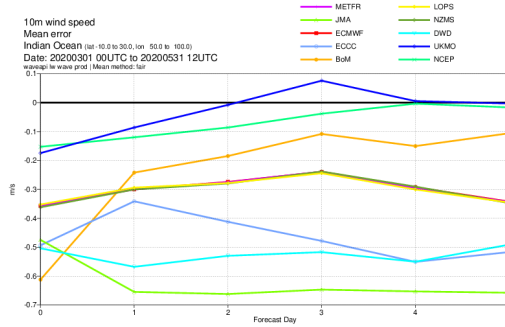
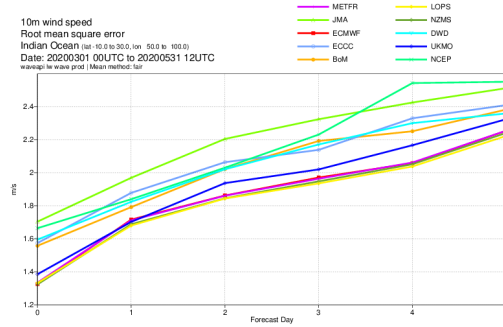
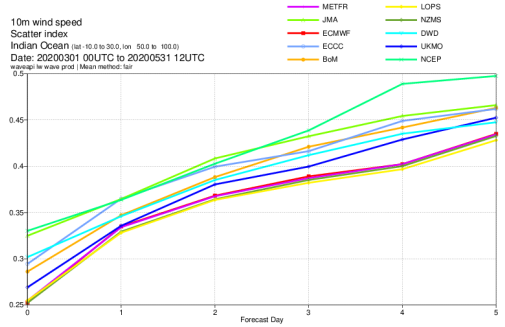
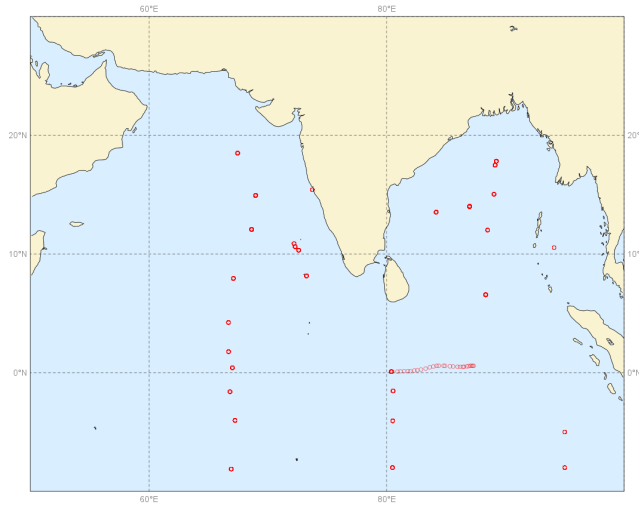
**North East Pacific.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531 - (10ff)



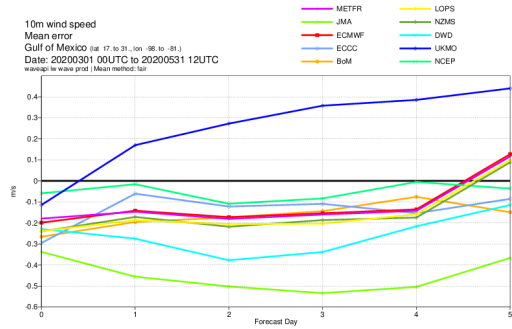
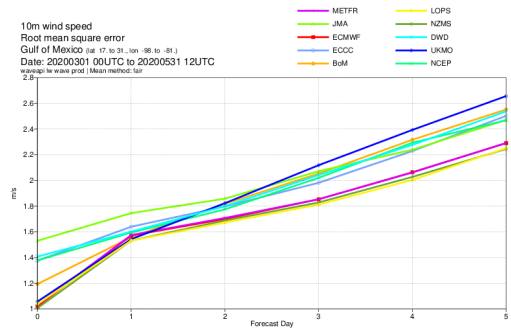
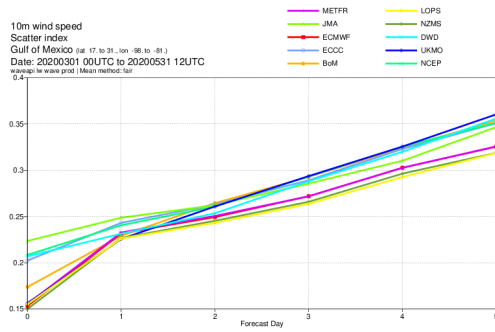
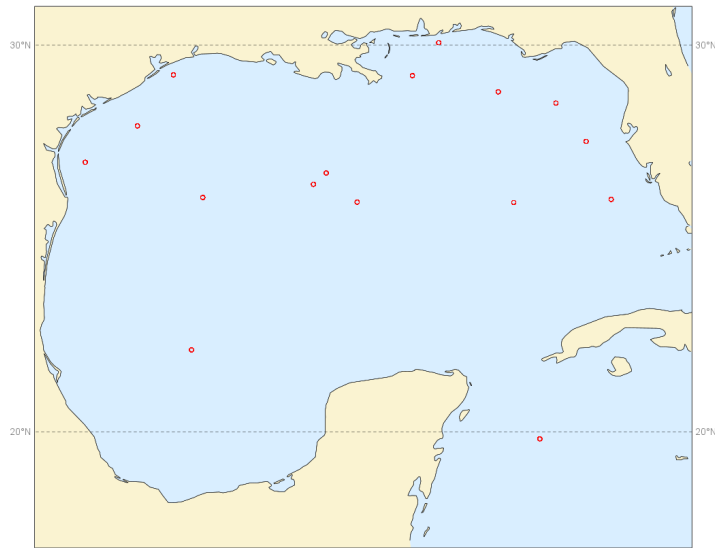
**North West Pacific.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531 - (10ff)



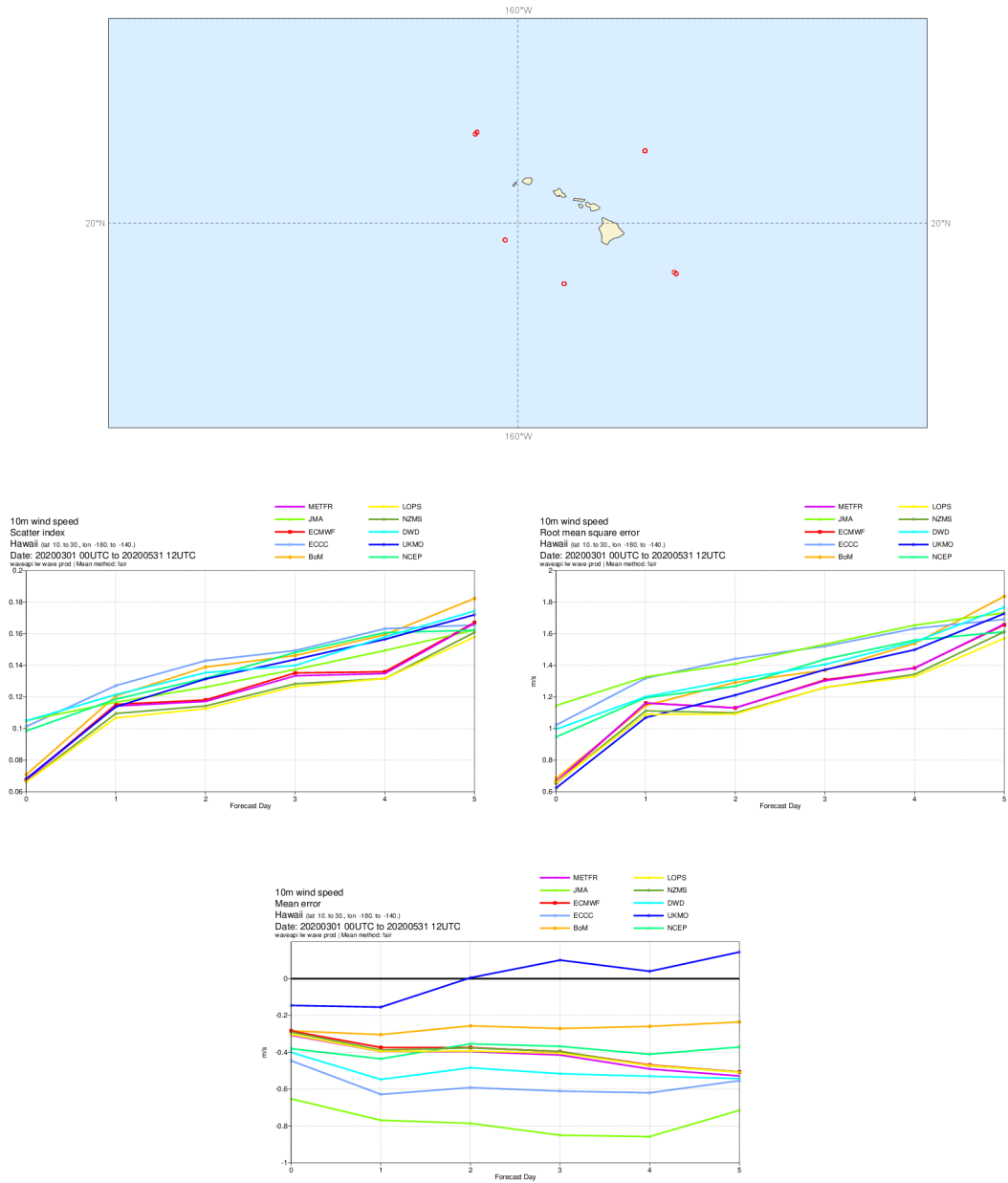
**Indian Ocean.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531 - (10ff)



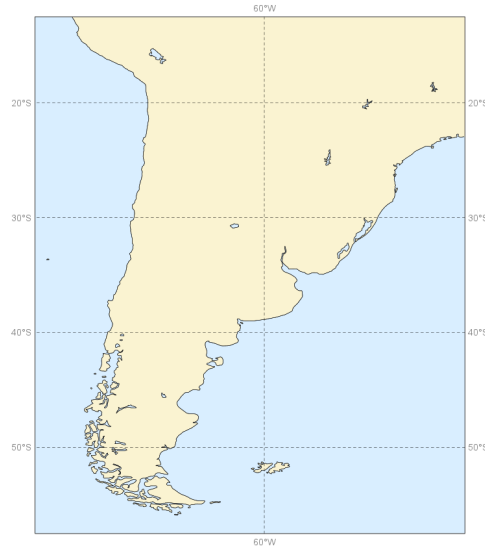
**Gulf of Mexico.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200301 to 20200531 - (10ff)

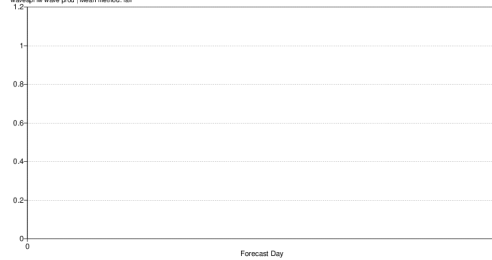


**Hawaii.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

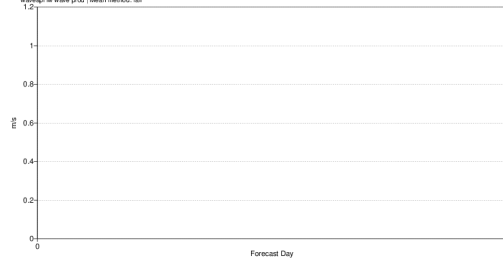
Buoys observations - from 20200301 to 20200531 - (10ff)



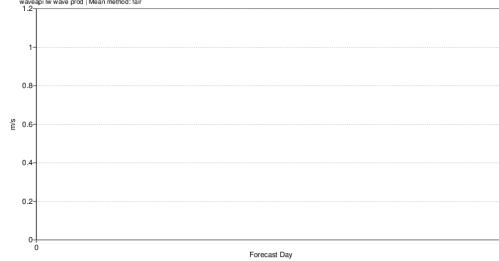
10m wind speed  
Scatter index  
S America (south) (lat: 57.5 to 12.5, lon: -80.0 to -42.5)  
Date: 20200301 00UTC to 20200531 12UTC  
Average for every grid. Mean method. lat



10m wind speed  
Root mean square error  
S America (south) (lat: 57.5 to 12.5, lon: -80.0 to -42.5)  
Date: 20200301 00UTC to 20200531 12UTC  
Average for every grid. Mean method. lat

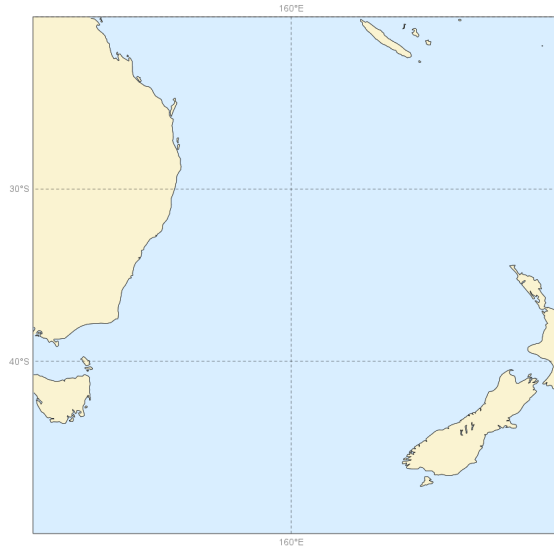


10m wind speed  
Mean error  
S America (south) (lat: 57.5 to 12.5, lon: -80.0 to -42.5)  
Date: 20200301 00UTC to 20200531 12UTC  
Average for every grid. Mean method. lat

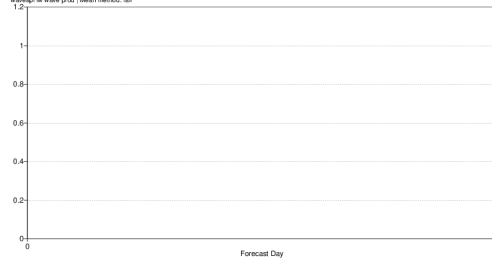


**South of South America.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

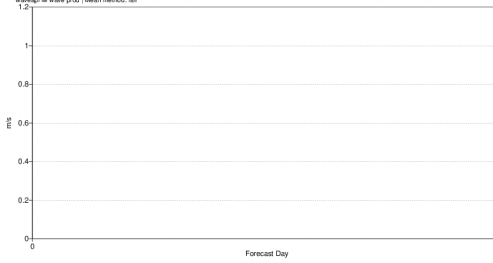
Buoys observations - from 20200301 to 20200531 - (1C)



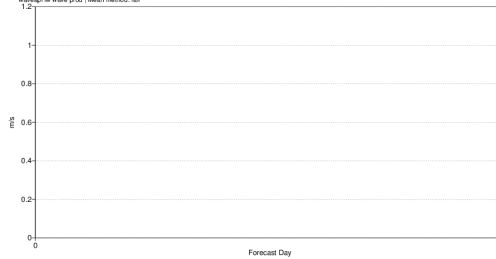
10m wind speed  
Scatter index  
Eaustnz (lat: 50 to 20, lon: 145 to 185)  
Date: 20200301 00UTC to 20200531 12UTC  
Average for every grid (Mean method: lat)



10m wind speed  
Root mean square error  
Eaustnz (lat: 50 to 20, lon: 145 to 185)  
Date: 20200301 00UTC to 20200531 12UTC  
Average for every grid (Mean method: lat)



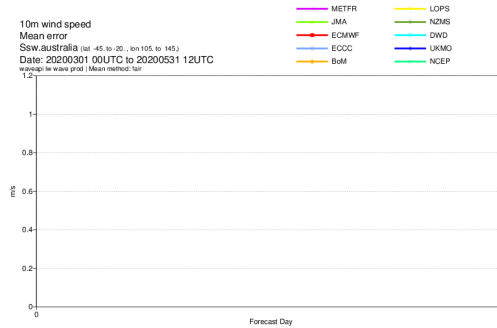
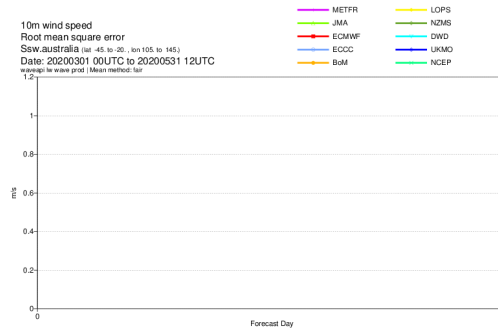
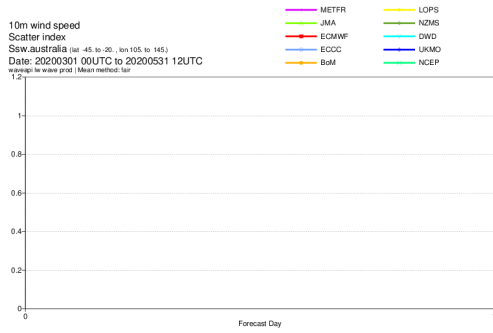
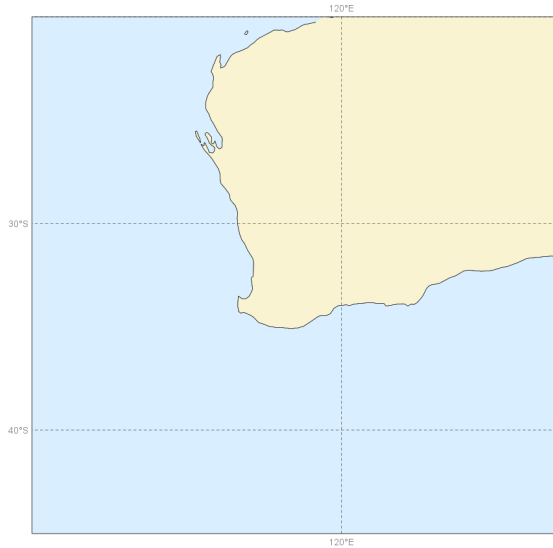
10m wind speed  
Mean error  
Eaustnz (lat: 50 to 20, lon: 145 to 185)  
Date: 20200301 00UTC to 20200531 12UTC  
Average for every grid (Mean method: lat)



**East Australia - New Zealand.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).



Buoys observations - from 20200301 to 2C



**South South West Australia.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).