

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

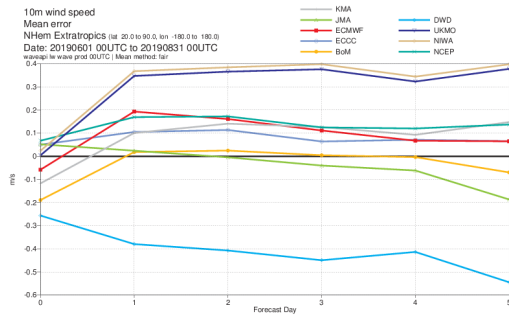
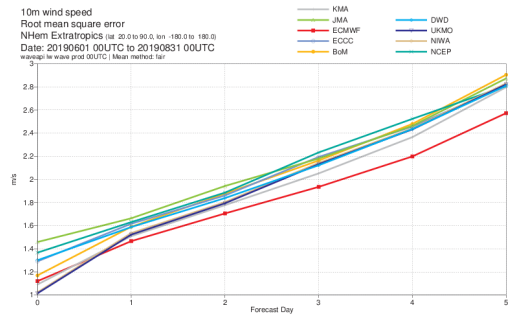
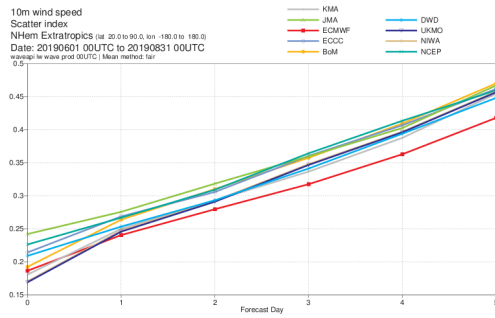
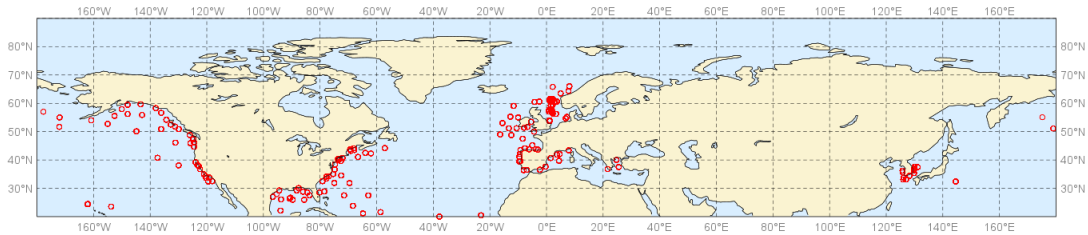
00 UTC runs only

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

September 24, 2019

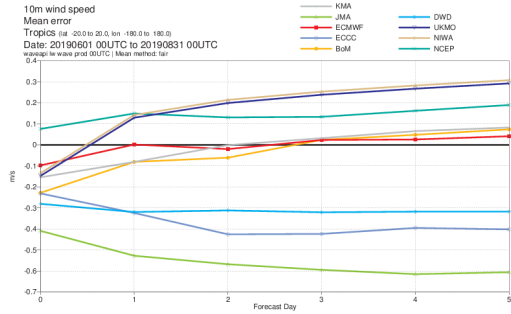
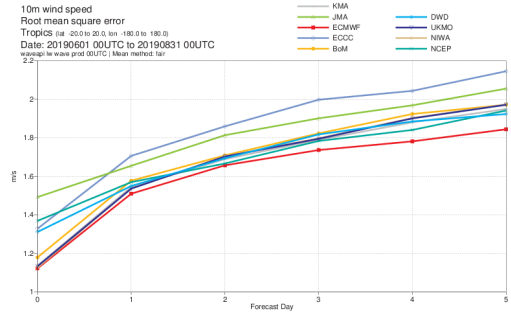
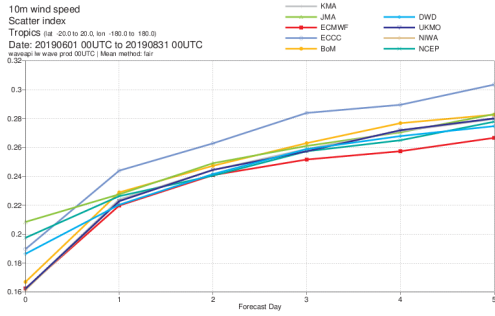
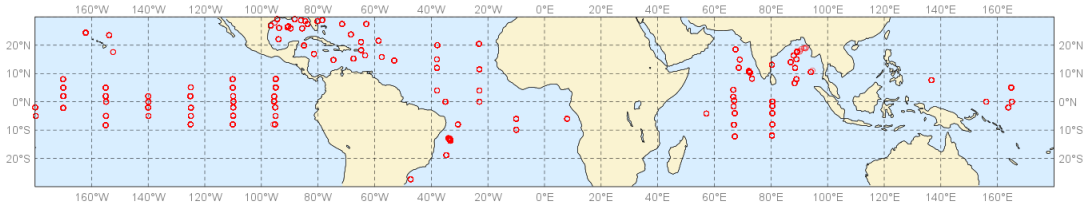
**PART III: 10 meter wind speed (10ff)**

Buoys observations - from 20190601 to 20190831 - (10ff)



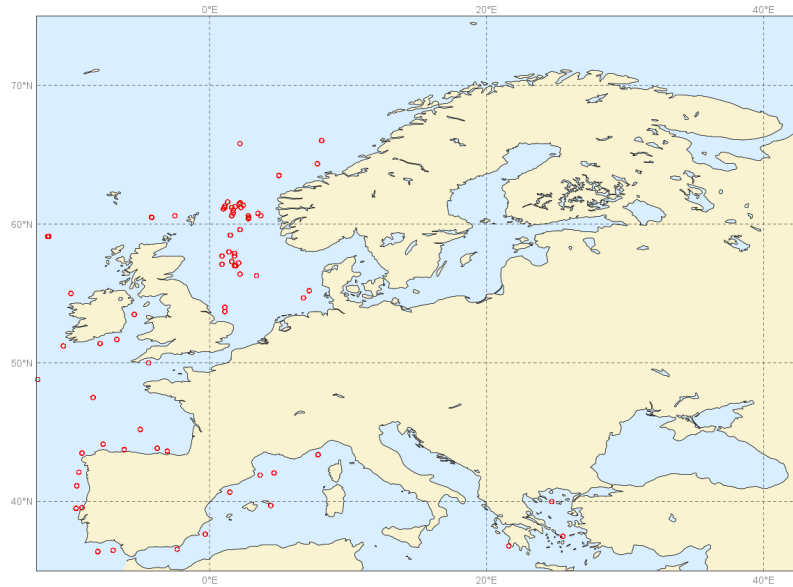
**Northern Hemisphere.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20190601 to 20190831 - (10ff)

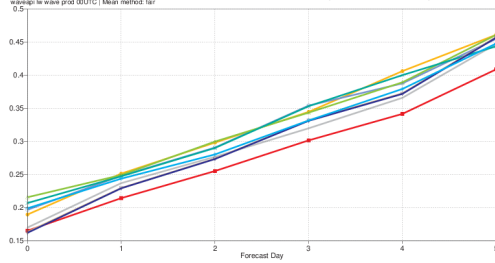


**Tropics.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

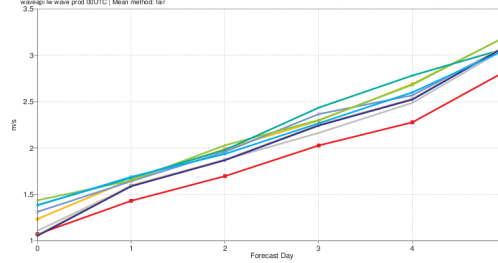
Buoys observations - from 20190601 to 20190831 - (10ff)



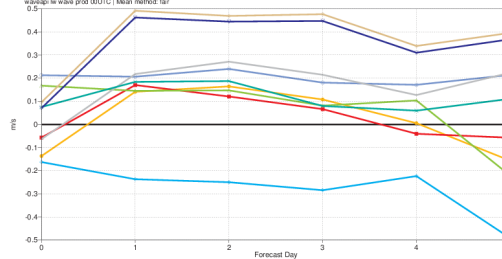
10m wind speed  
Scatter index  
Europe (lat. 35.0 to 75.0, lon. -12.5 to 42.5)  
Date: 20190601 00UTC to 20190831 00UTC  
Average for every grid (0.05°). Mean method for



10m wind speed  
Root mean square error  
Europe (lat. 35.0 to 75.0, lon. -12.5 to 42.5)  
Date: 20190601 00UTC to 20190831 00UTC  
Average for every grid (0.05°). Mean method for

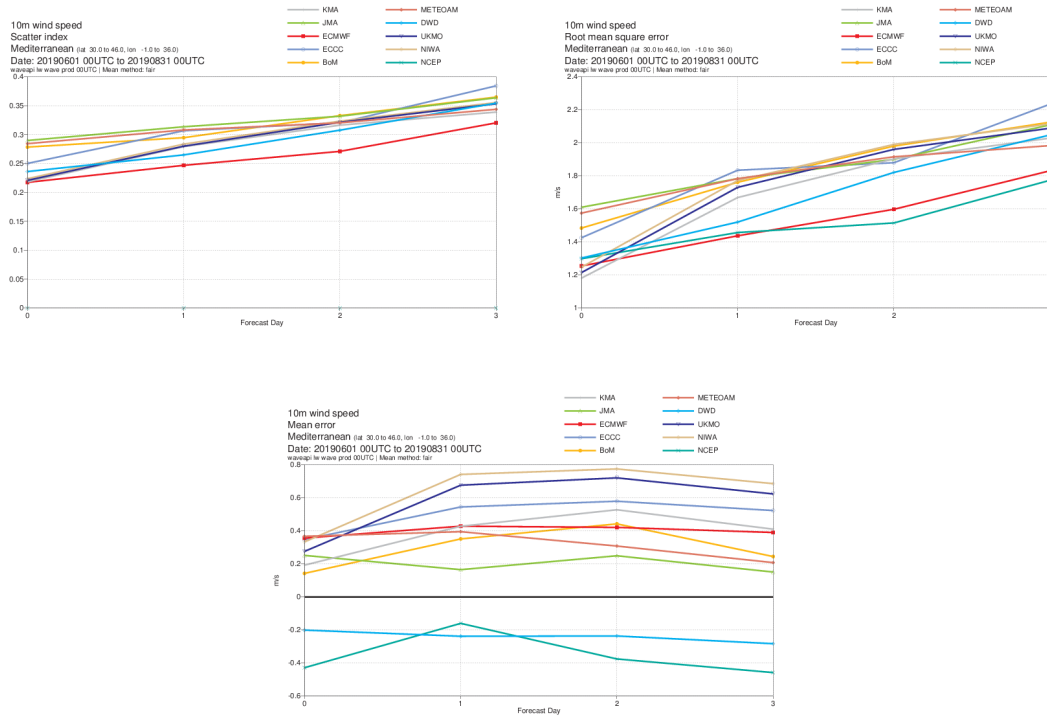


10m wind speed  
Mean error  
Europe (lat. 35.0 to 75.0, lon. -12.5 to 42.5)  
Date: 20190601 00UTC to 20190831 00UTC  
Average for every grid (0.05°). Mean method for



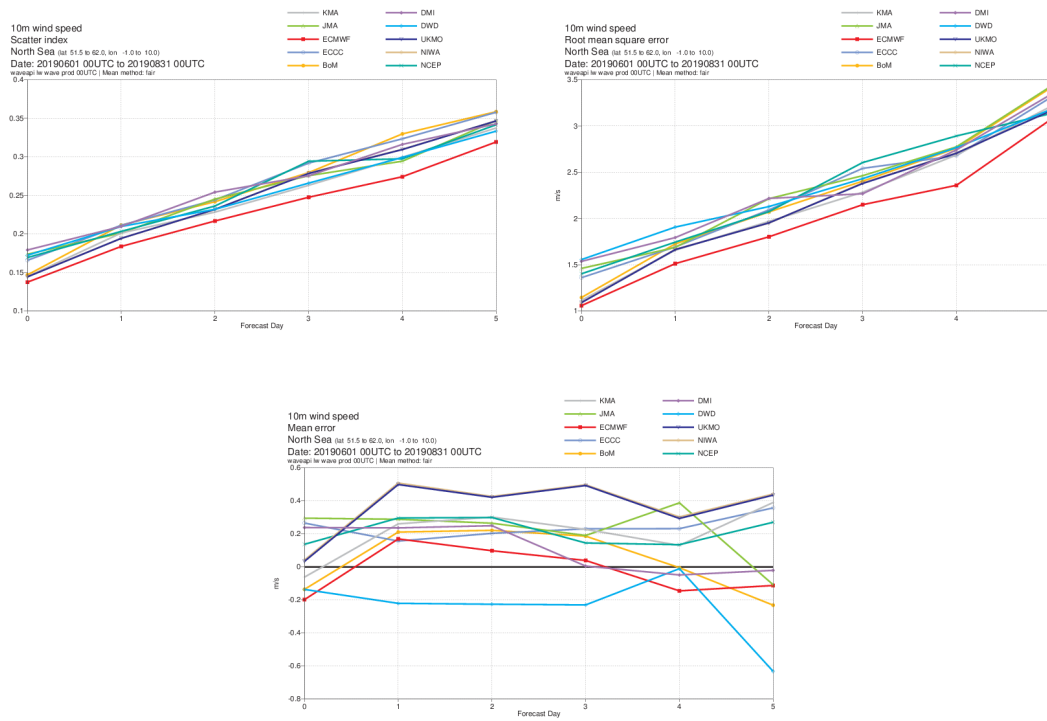
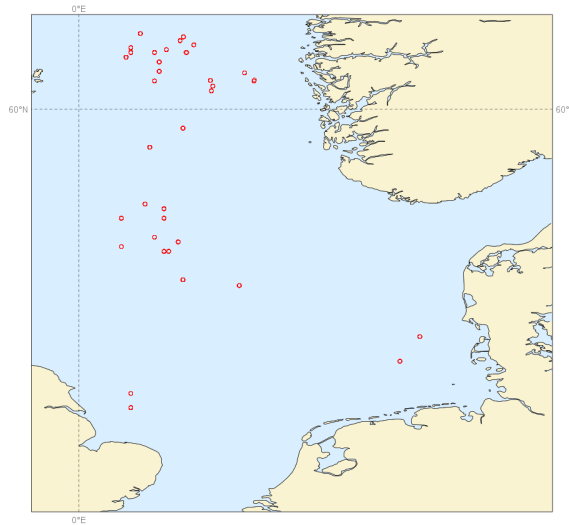
**Europe.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20190601 to 20190831 - (10ff)



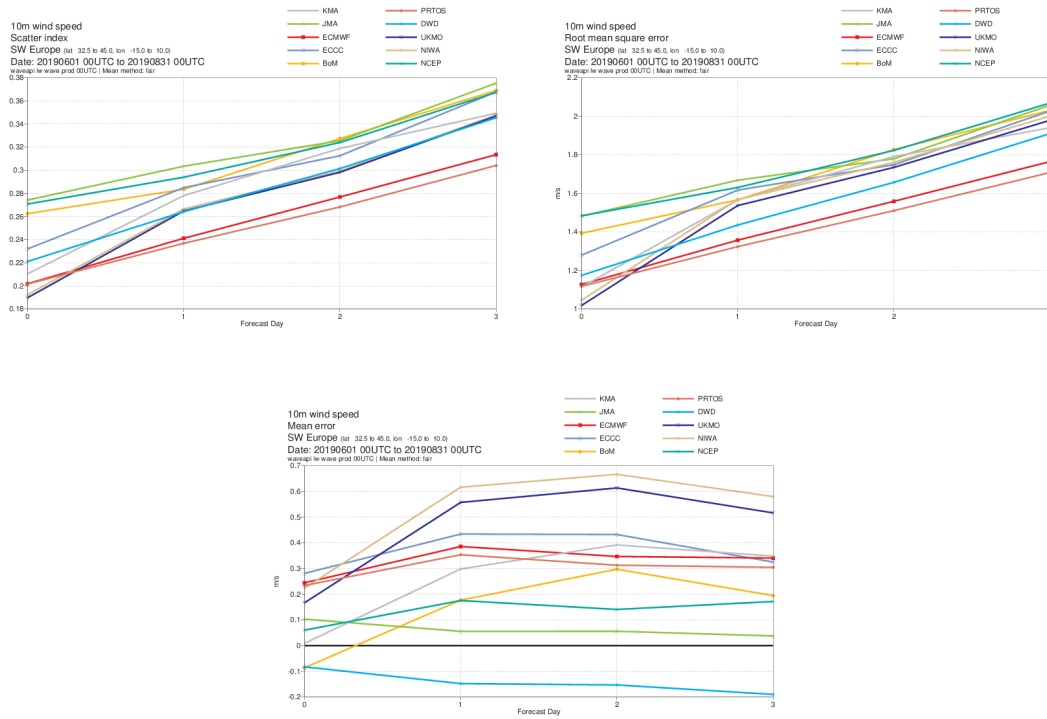
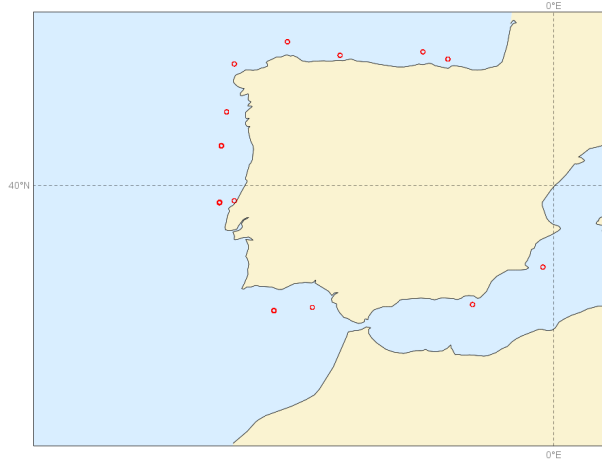
**Mediterranean Sea.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20190601 to 20190831 - (10f)



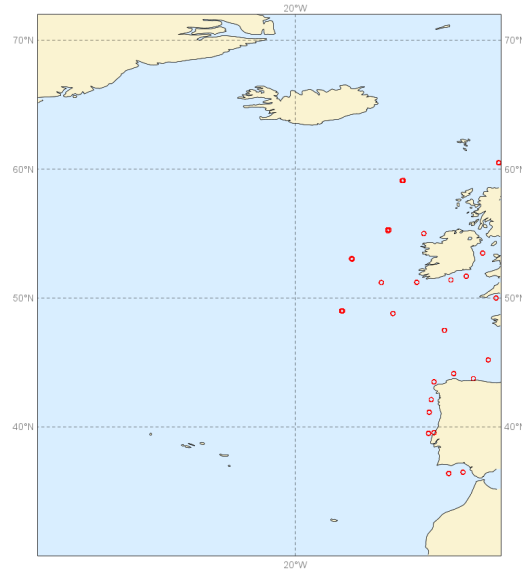
**North Sea.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20190601 to 20190831

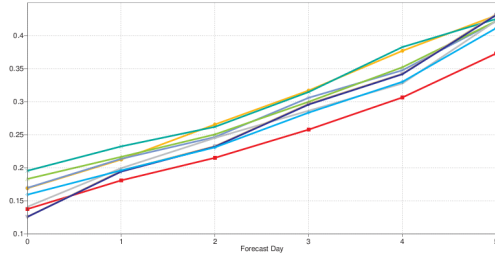


**South West Europe.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

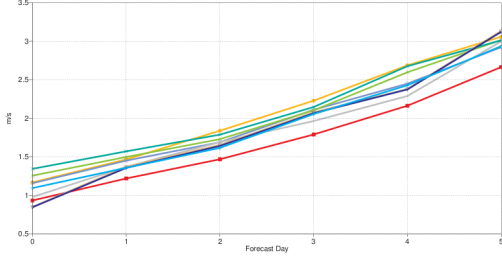
Buoys observations - from 20190601 to 20190831 - (10ff)



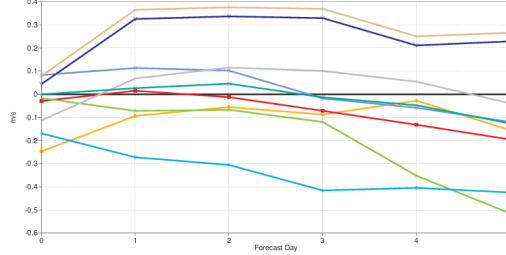
10m wind speed  
Scatter index  
North East Atlantic (lat 30 to 72, lon -40 to -4)  
Date: 20190601 00UTC to 20190831 00UTC  
Average for wind prod. 00UTC. Mean method. lat



10m wind speed  
Root mean square error  
North East Atlantic (lat 30 to 72, lon -40 to -4)  
Date: 20190601 00UTC to 20190831 00UTC  
Average for wind prod. 00UTC. Mean method. lat



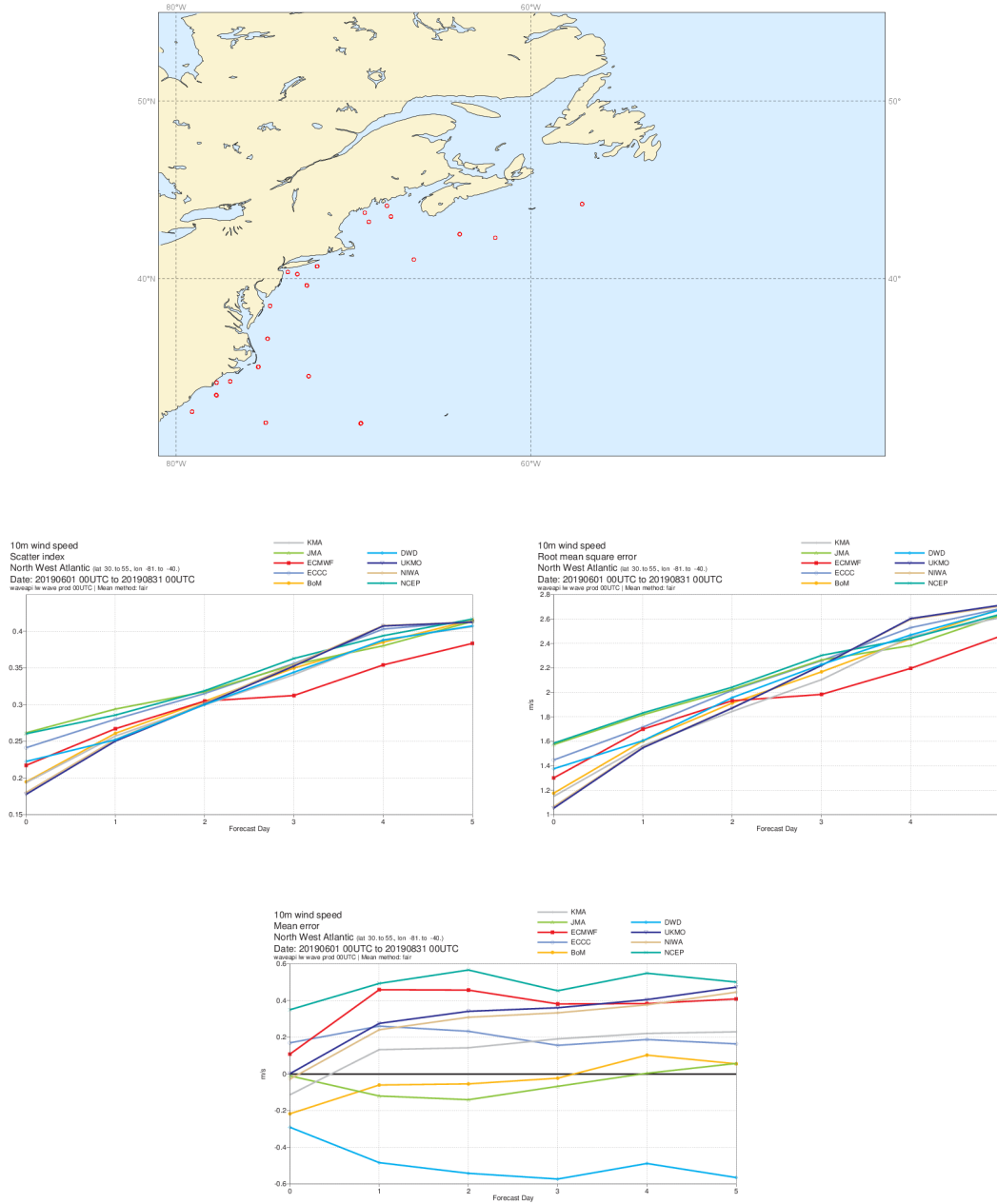
10m wind speed  
Mean error  
North East Atlantic (lat 30 to 72, lon -40 to -4)  
Date: 20190601 00UTC to 20190831 00UTC  
Average for wind prod. 00UTC. Mean method. lat



**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).

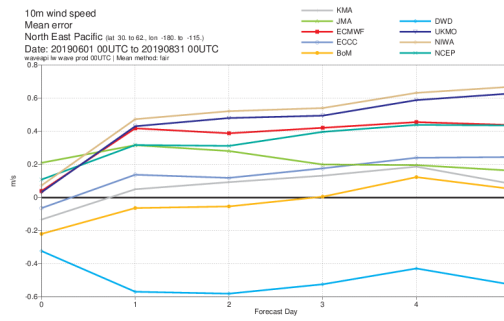
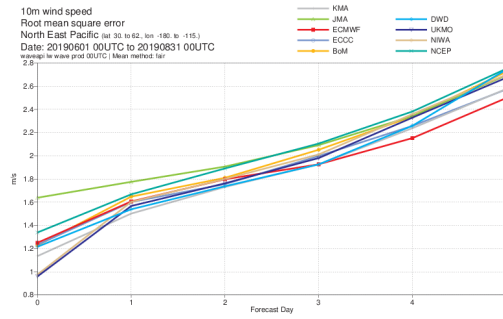
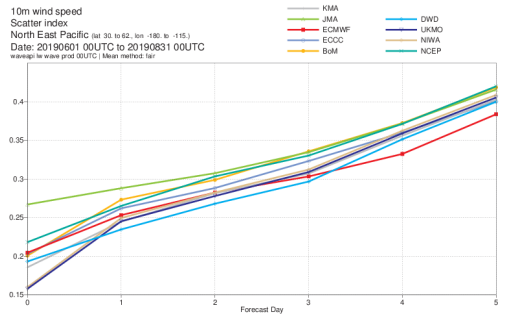
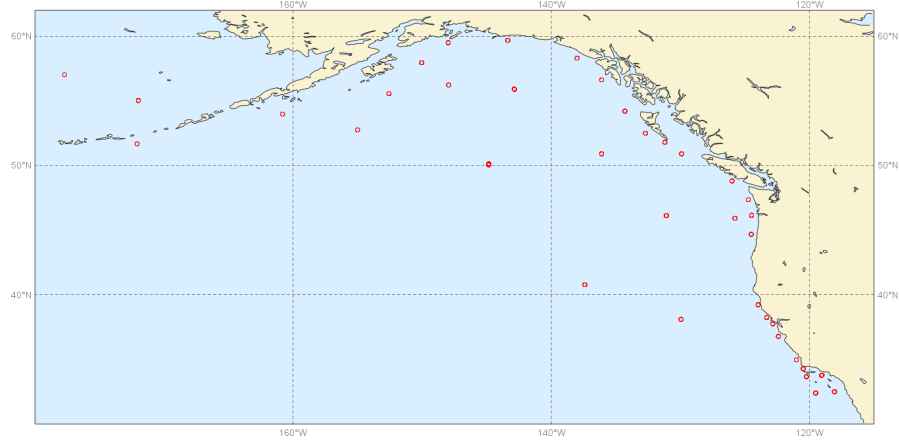


Buoys observations - from 20190601 to 20190831 - (10ff)



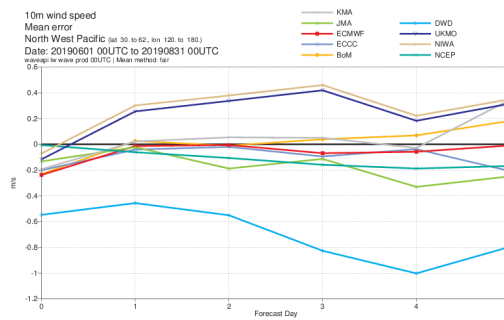
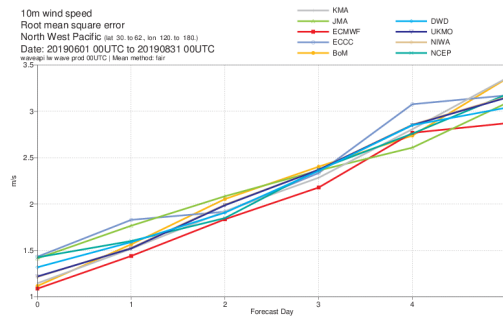
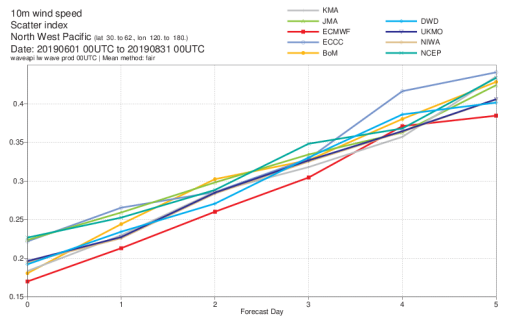
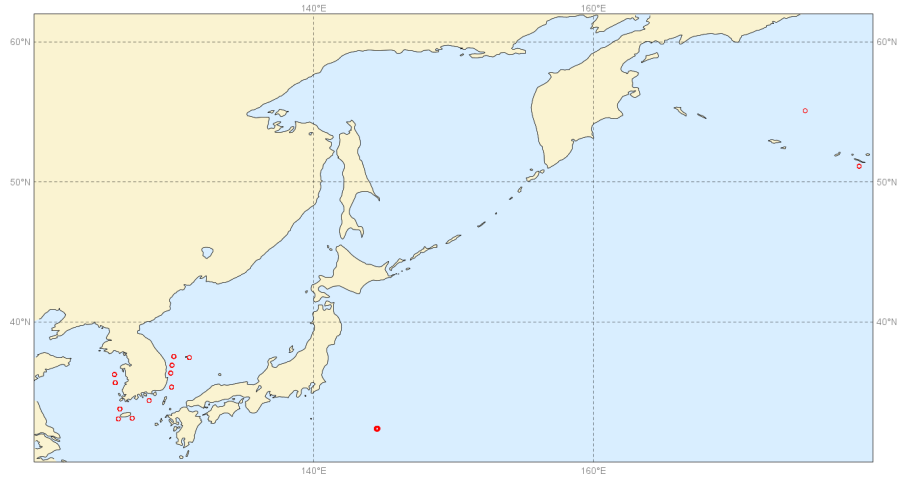
**North West Atlantic.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20190601 to 20190831 - (10ff)



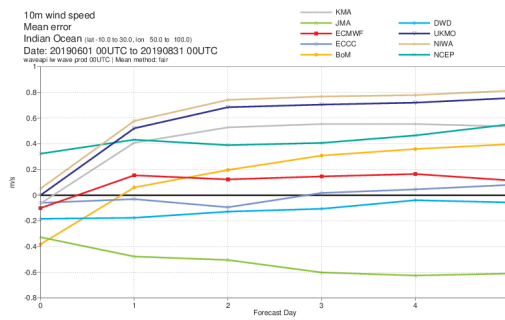
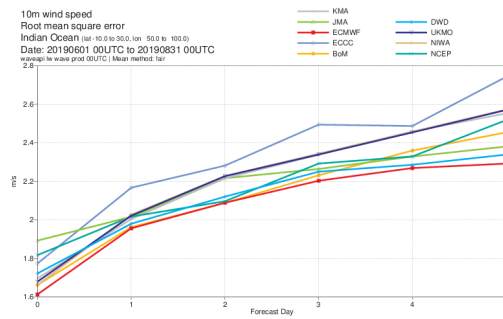
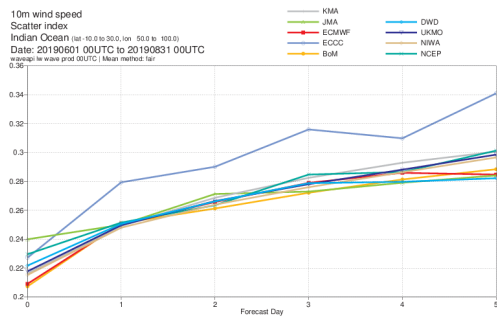
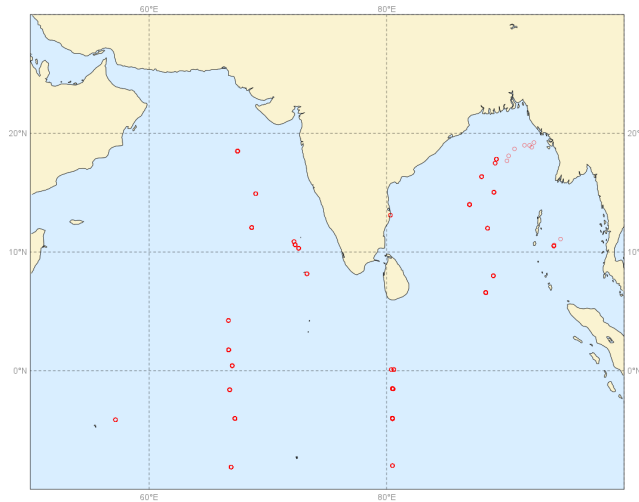
**North East Pacific.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20190601 to 20190831 - (10ff)



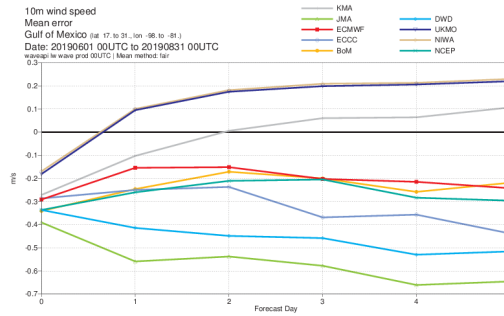
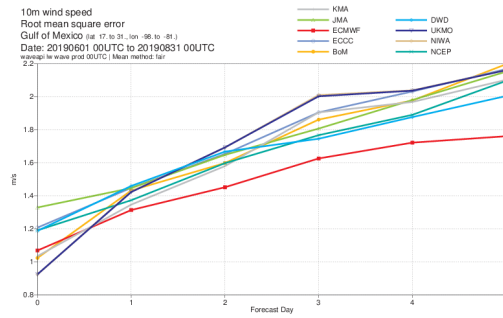
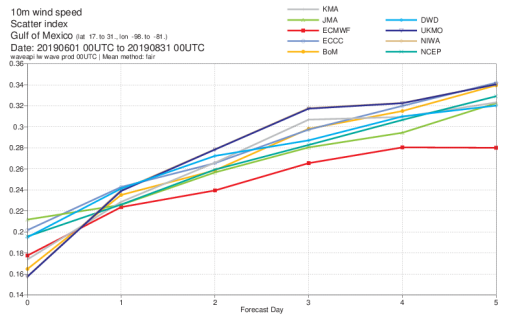
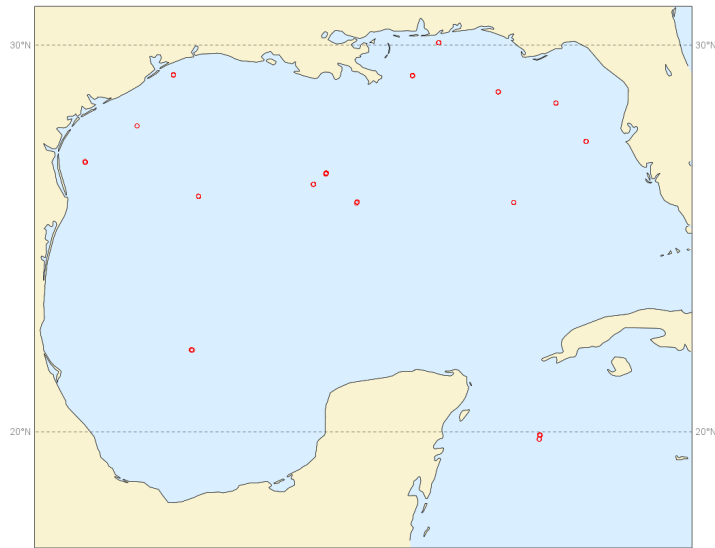
**North West Pacific.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20190601 to 20190831 - (10ff)



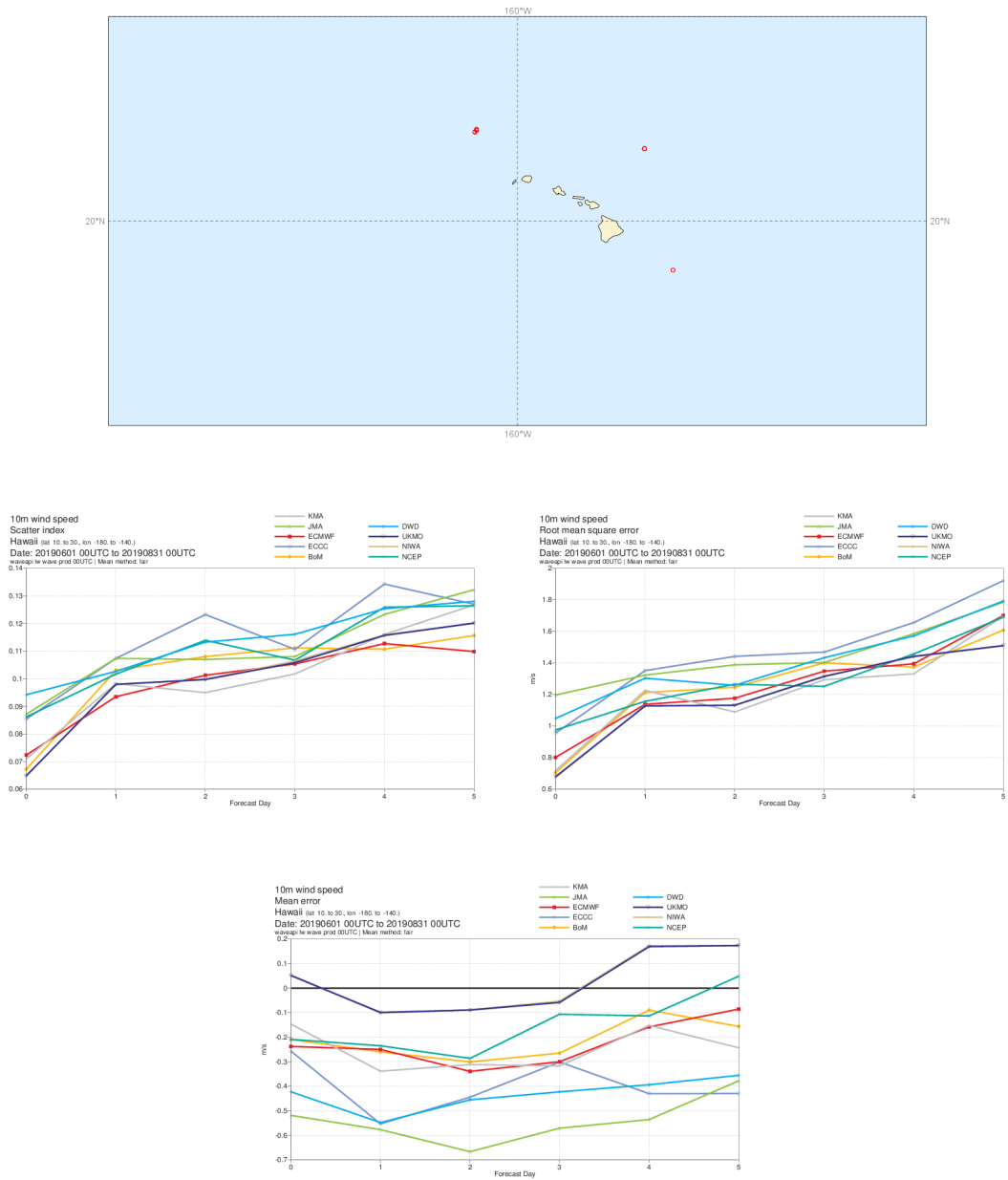
**Indian Ocean.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20190601 to 20190831 - (10ff)



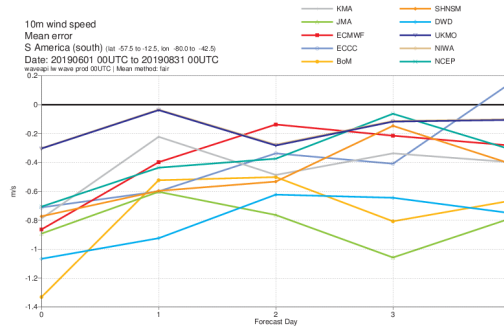
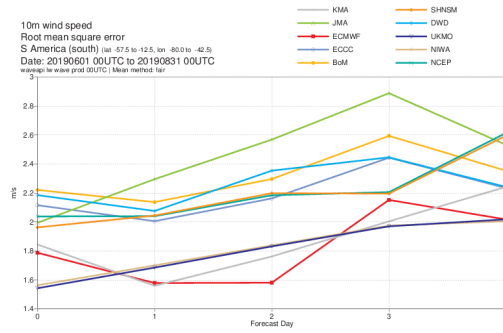
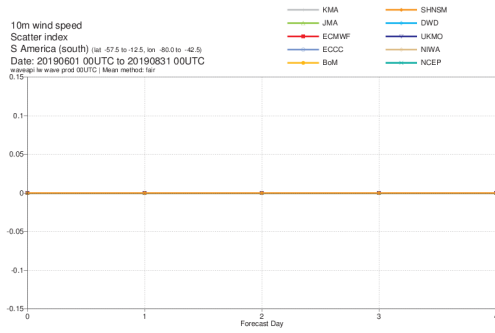
**Gulf of Mexico.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20190601 to 20190831 - (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 20190601 to 20190831 - (10ff)



**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).