

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

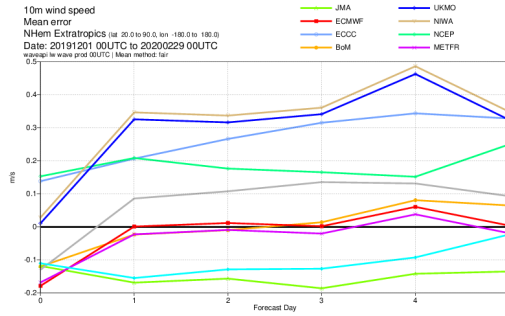
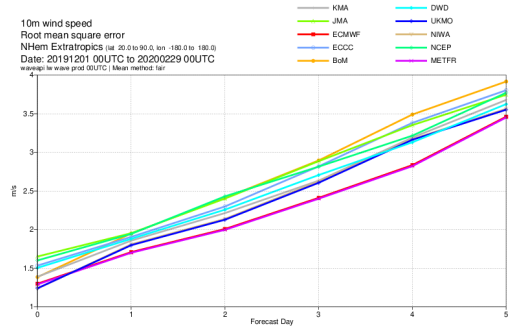
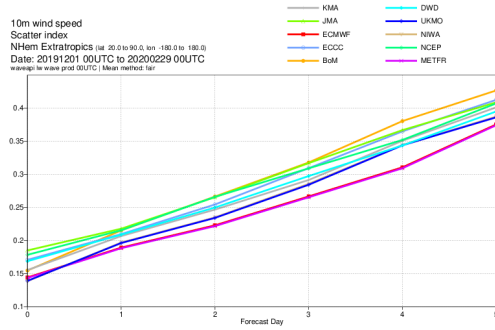
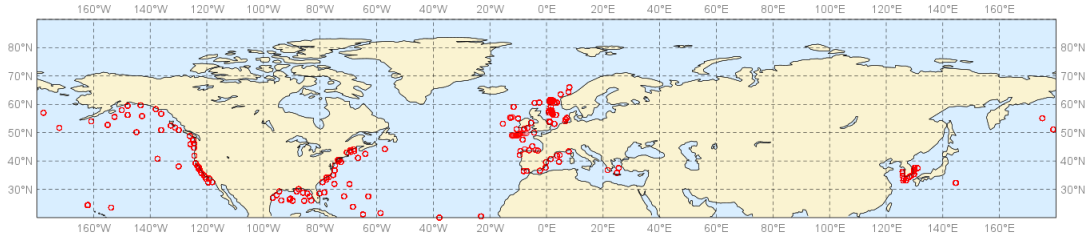
00 UTC runs only

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

March 17, 2020

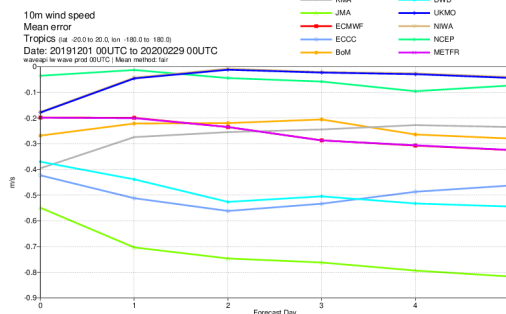
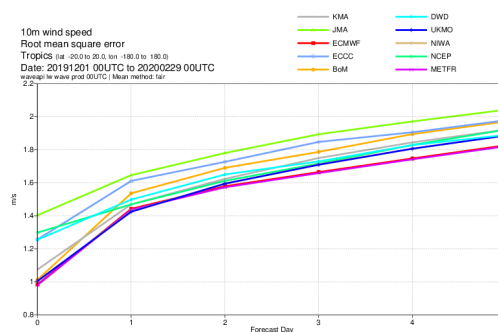
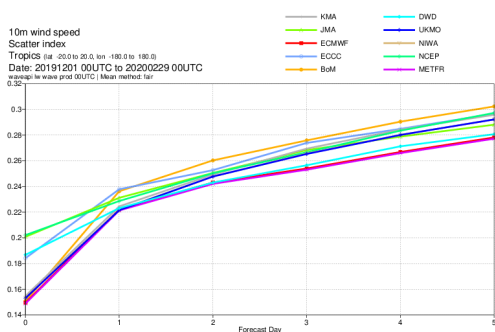
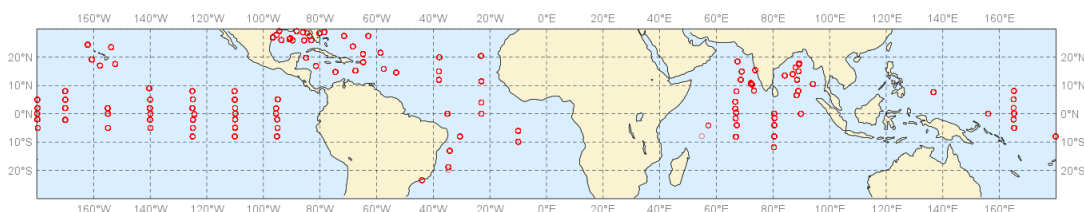
**PART III: 10 meter wind speed (10ff)**

Buoys observations - from 20191201 to 20200229 - (10ff)



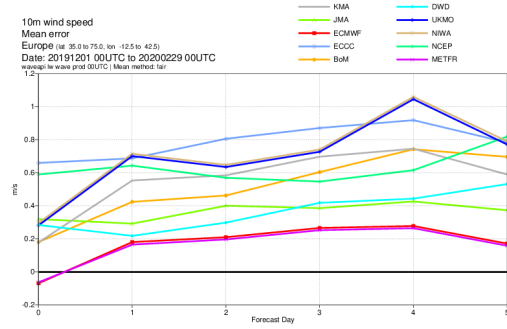
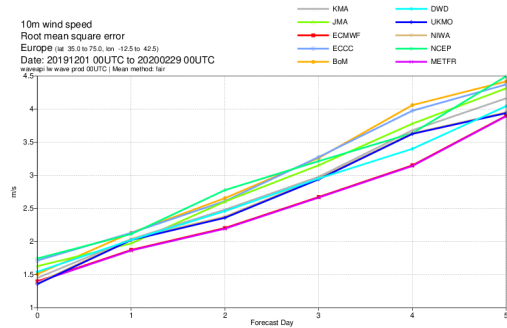
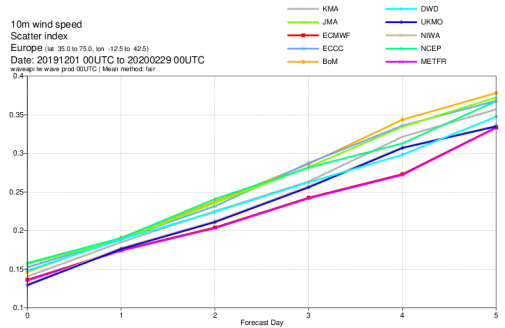
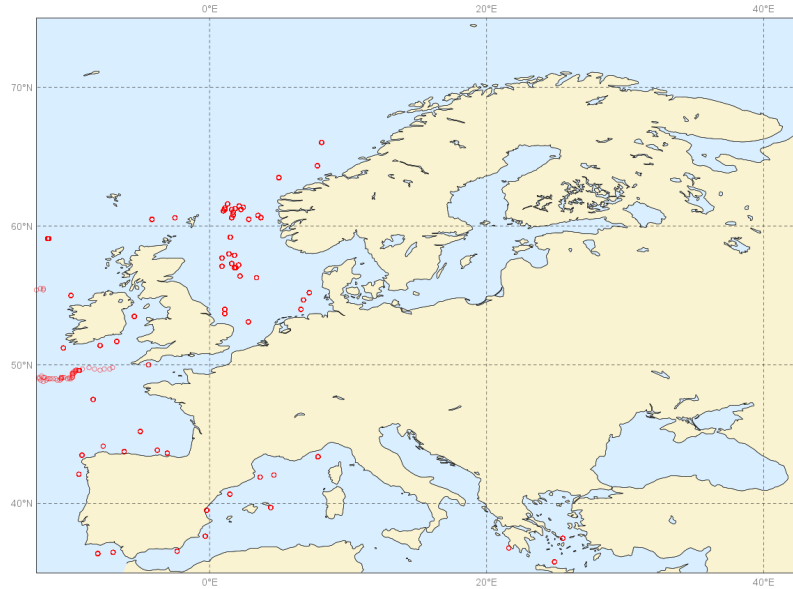
**Northern Hemisphere.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229 - (10ff)



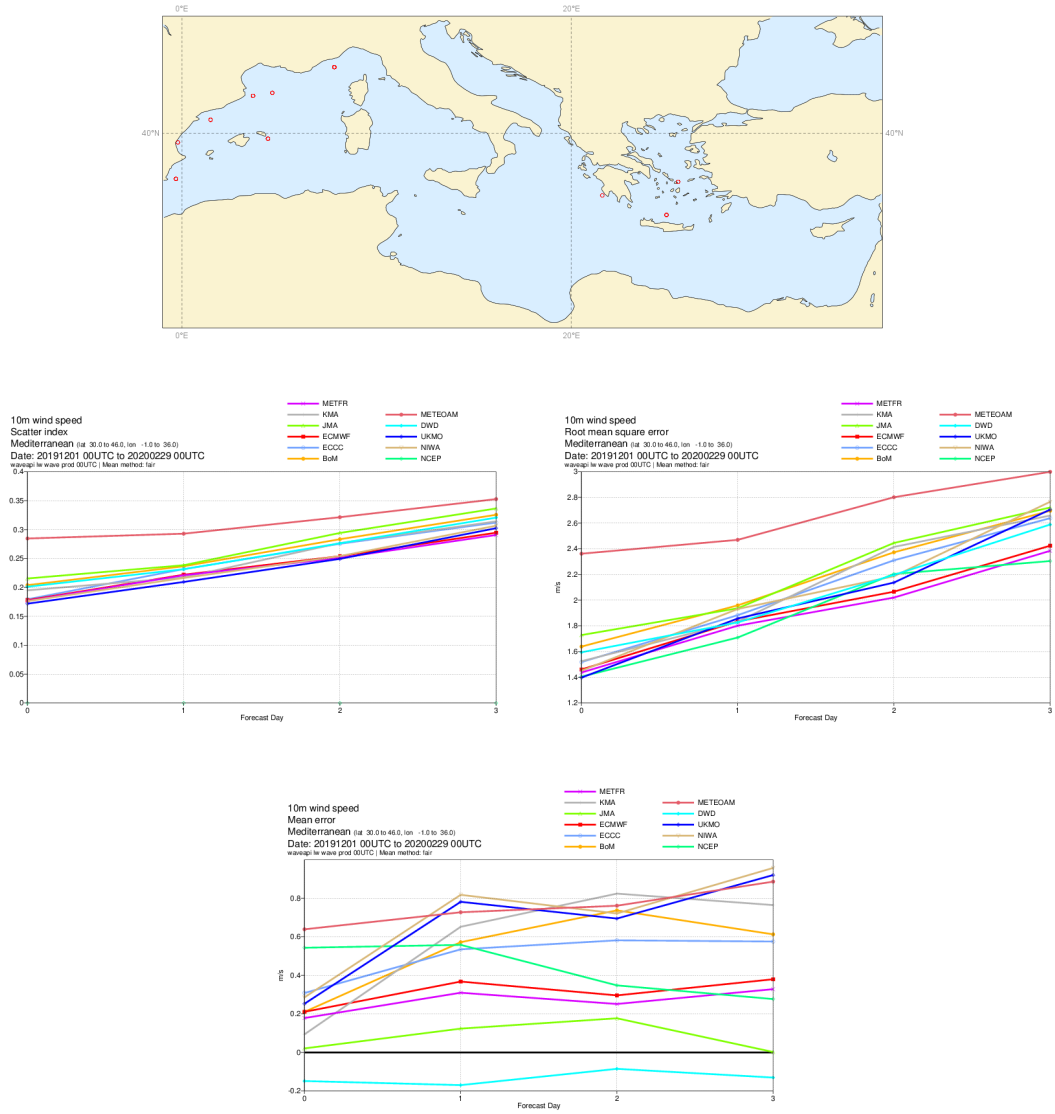
**Tropics.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229 - (10ff)



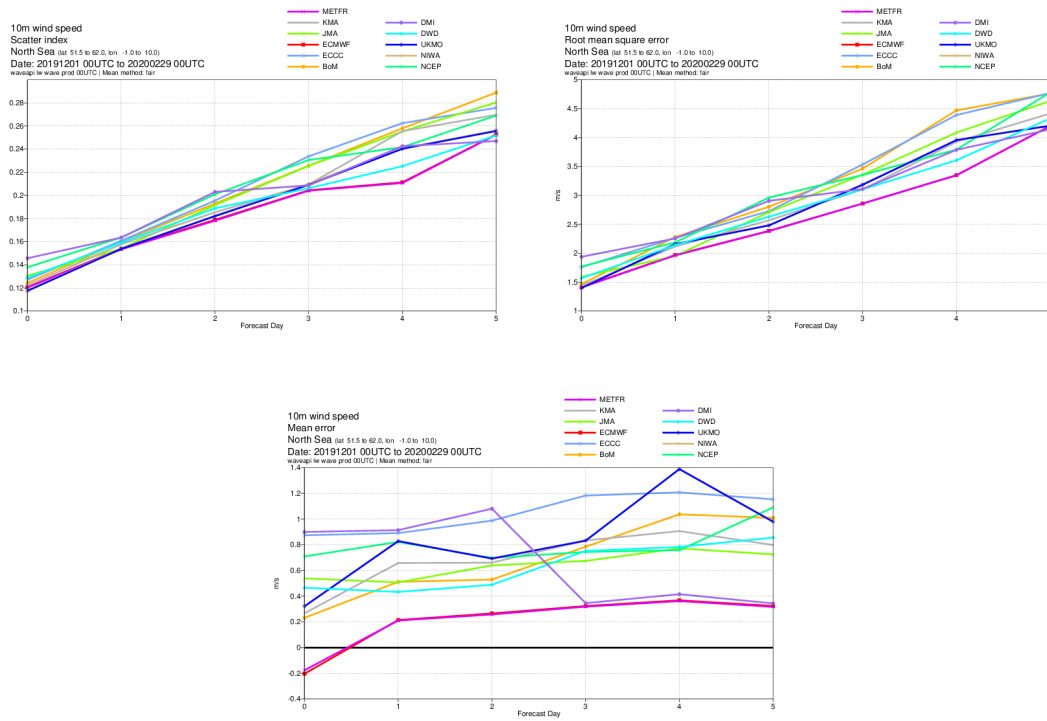
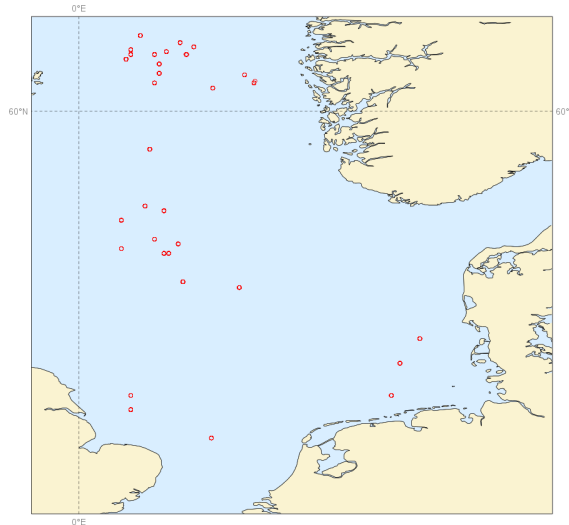
**Europe.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229 - (10ff)



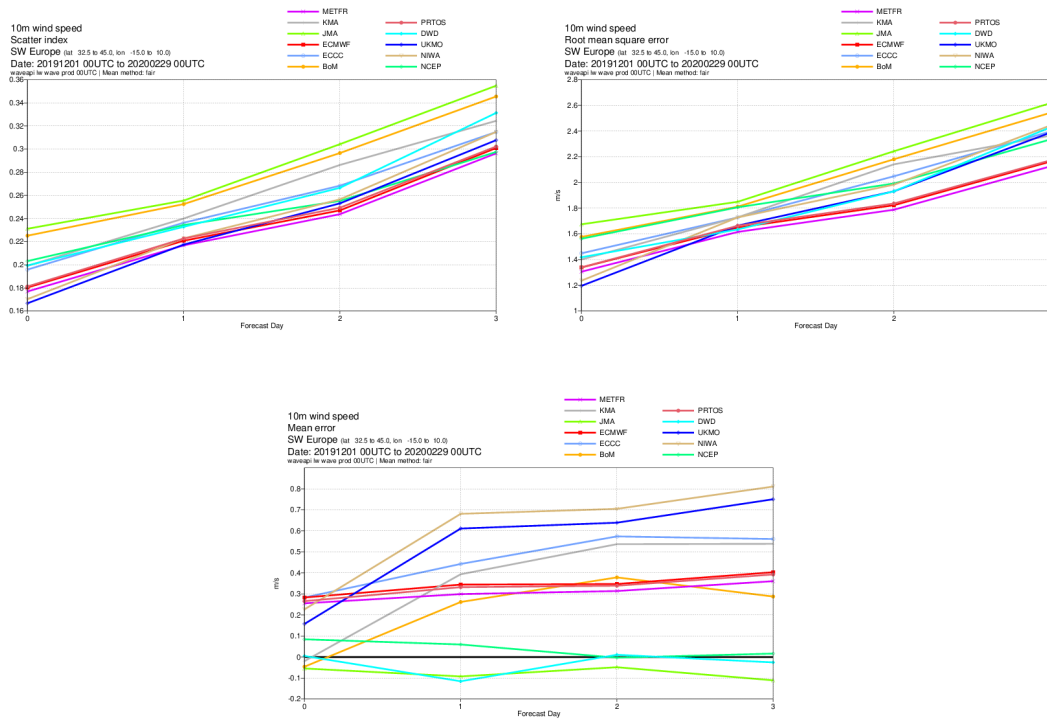
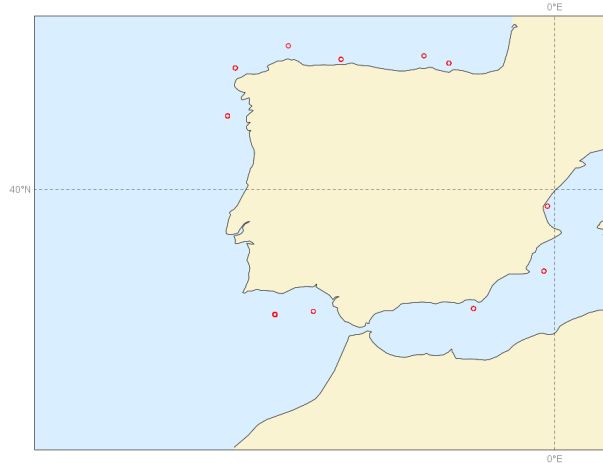
**Mediterranean Sea.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229 - (10ff)



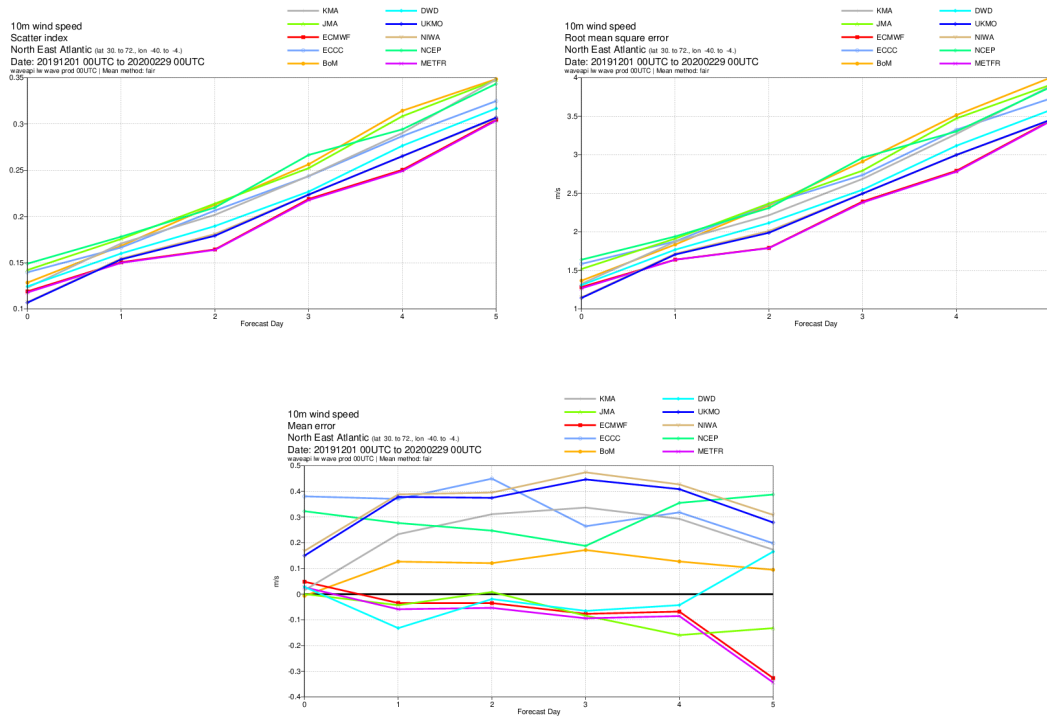
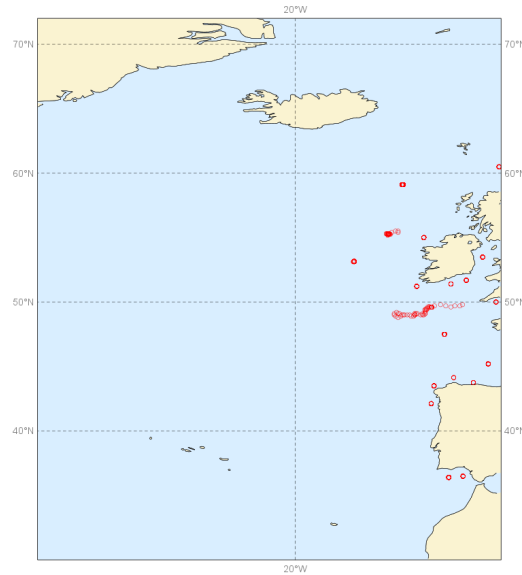
**North Sea.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229



**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).

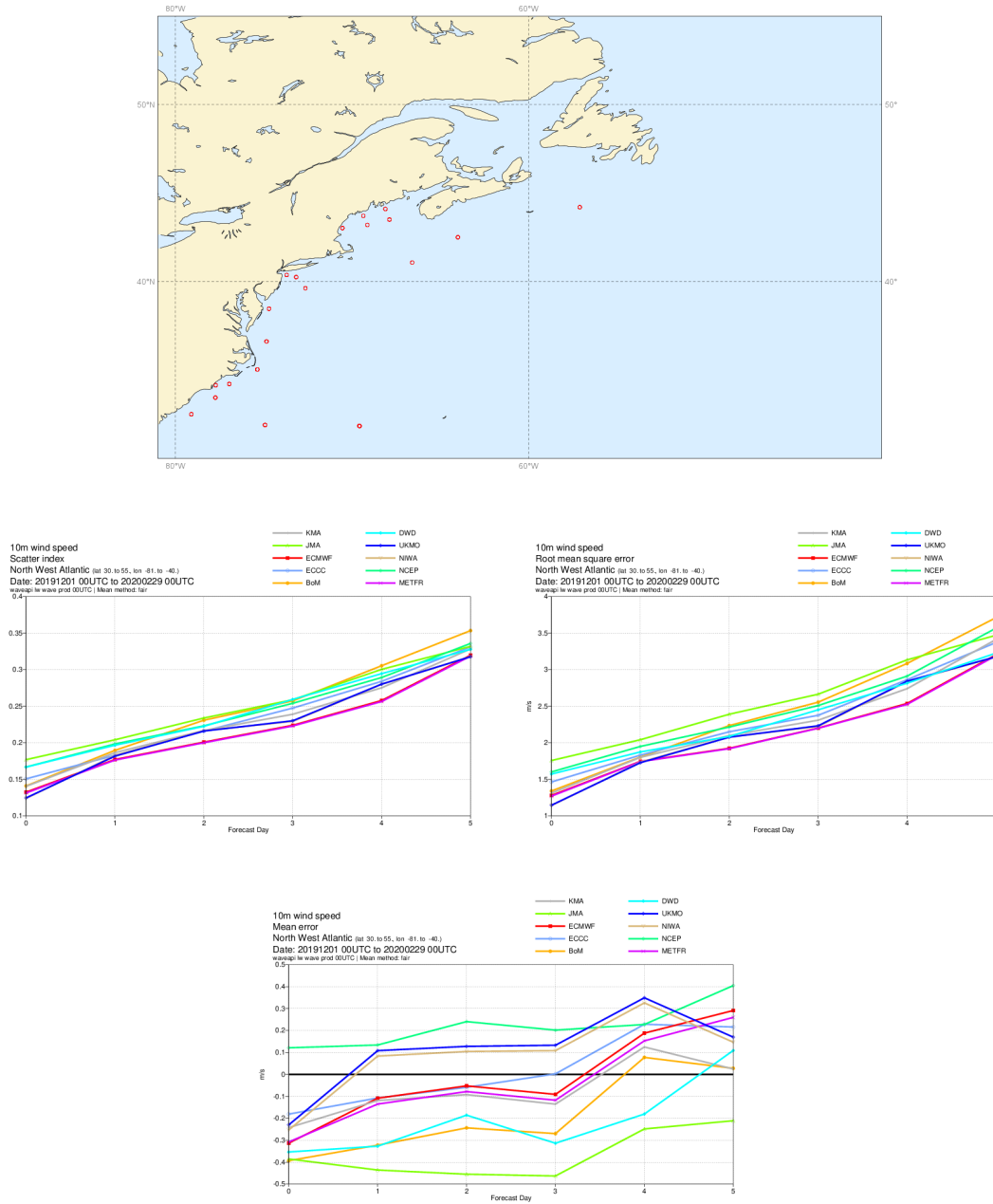
Buoys observations - from 20191201 to 20200229 - (10ff)



**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).

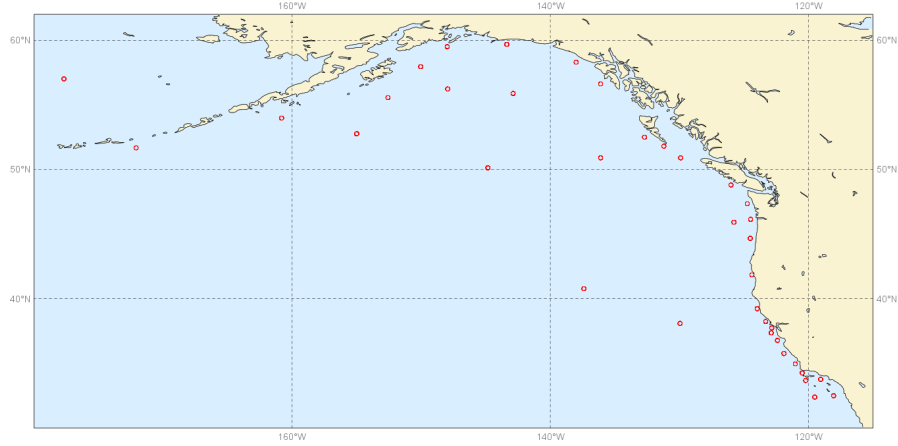


Buoys observations - from 20191201 to 20200229 - (10ff)

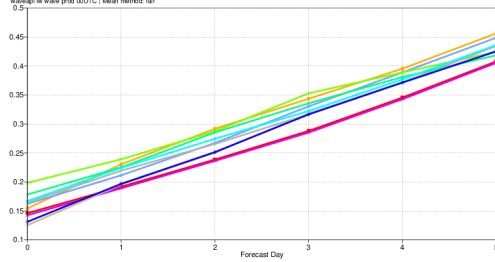


**North West Atlantic.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

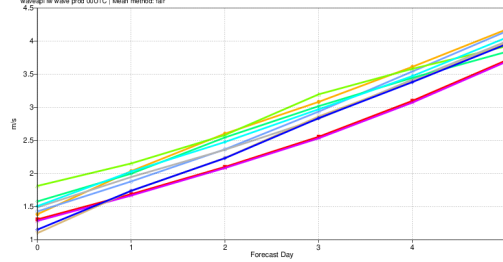
Buoys observations - from 20191201 to 20200229 - (10ff)



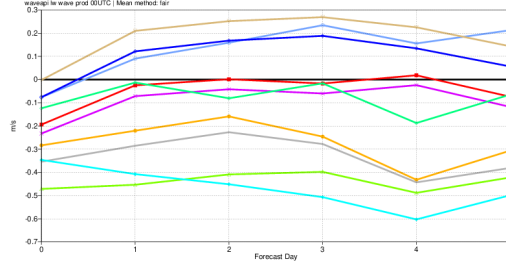
10m wind speed  
Scatter index  
North East Pacific (lat 30 to 62, lon -180 to -115)  
Date: 20191201 00UTC to 20200229 00UTC  
averaged by wind speed (0UTC). Mean method (lat)



10m wind speed  
Root mean square error  
North East Pacific (lat 30 to 62, lon -180 to -115)  
Date: 20191201 00UTC to 20200229 00UTC  
averaged by wind speed (0UTC). Mean method (lat)

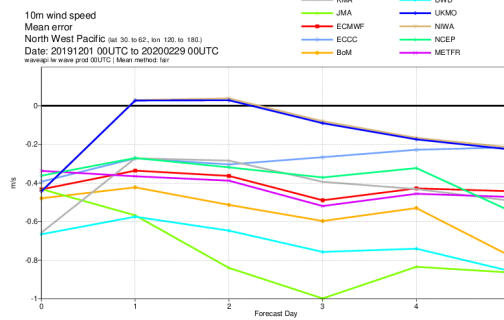
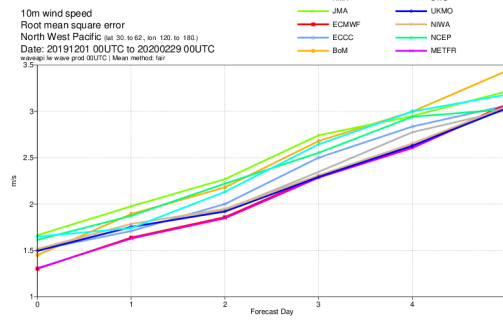
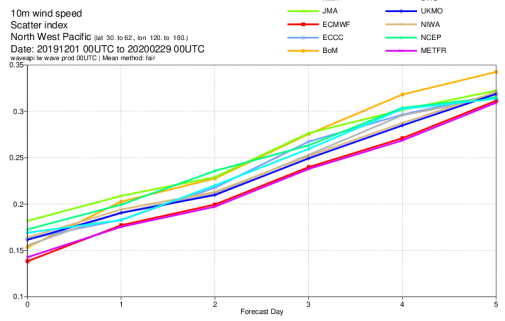
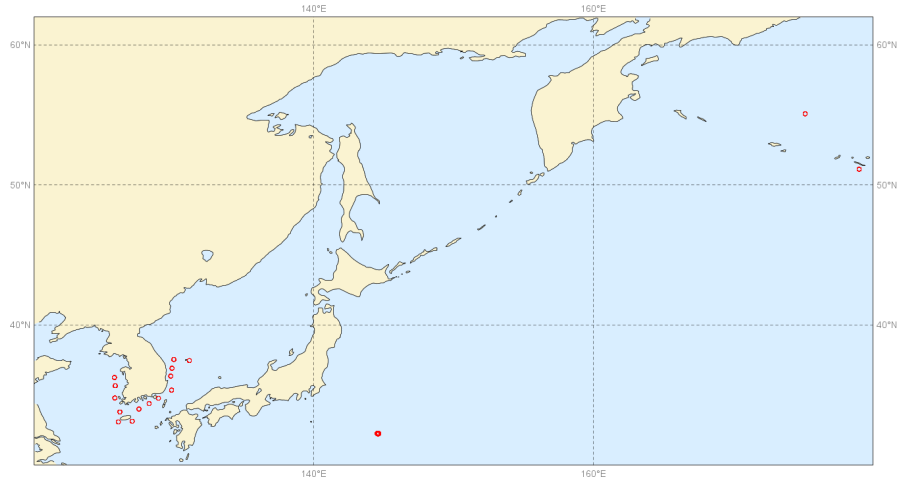


10m wind speed  
Mean error  
North East Pacific (lat 30 to 62, lon -180 to -115)  
Date: 20191201 00UTC to 20200229 00UTC  
averaged by wind speed (0UTC). Mean method (lat)



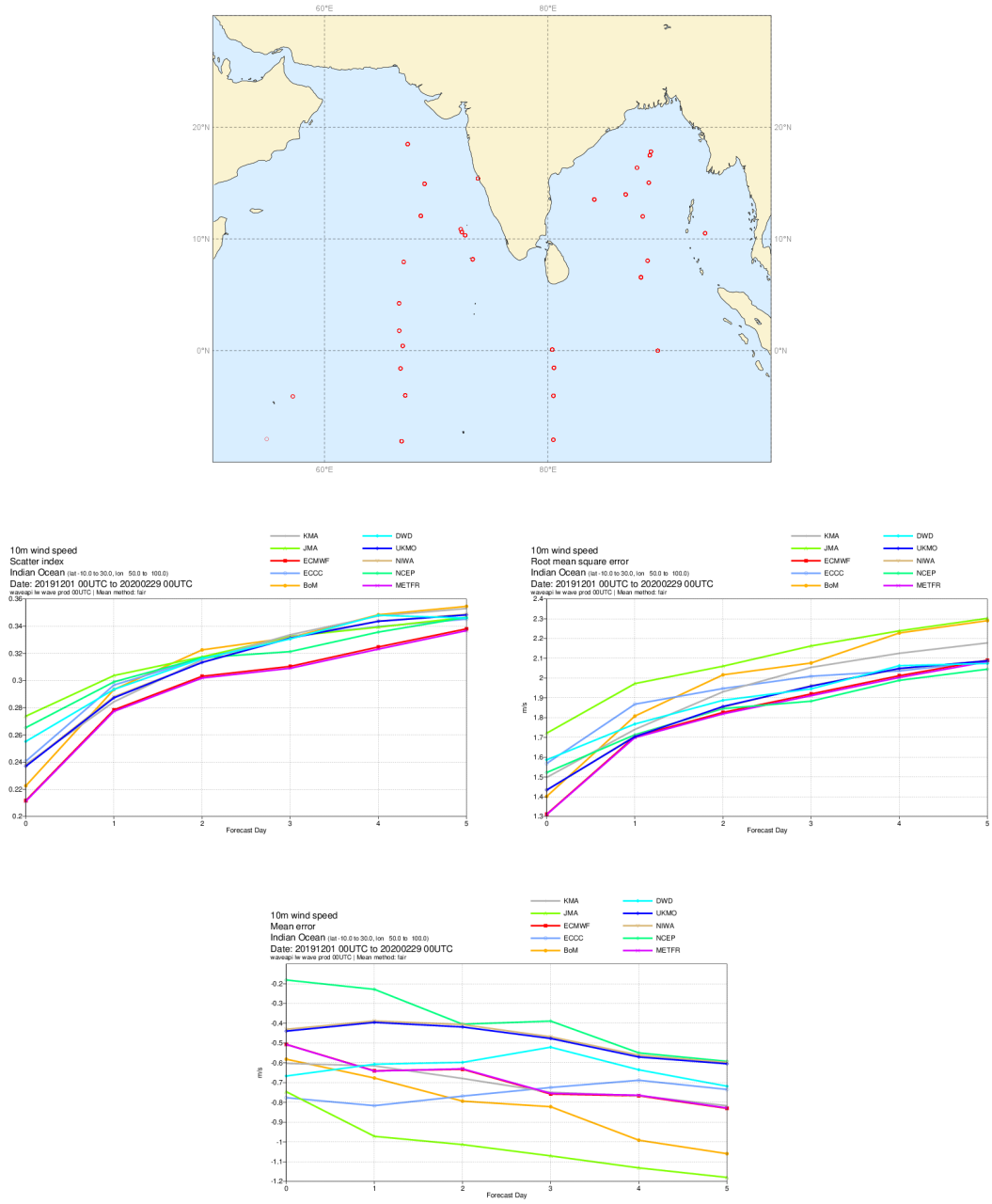
**North East Pacific.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229 - (10ff)



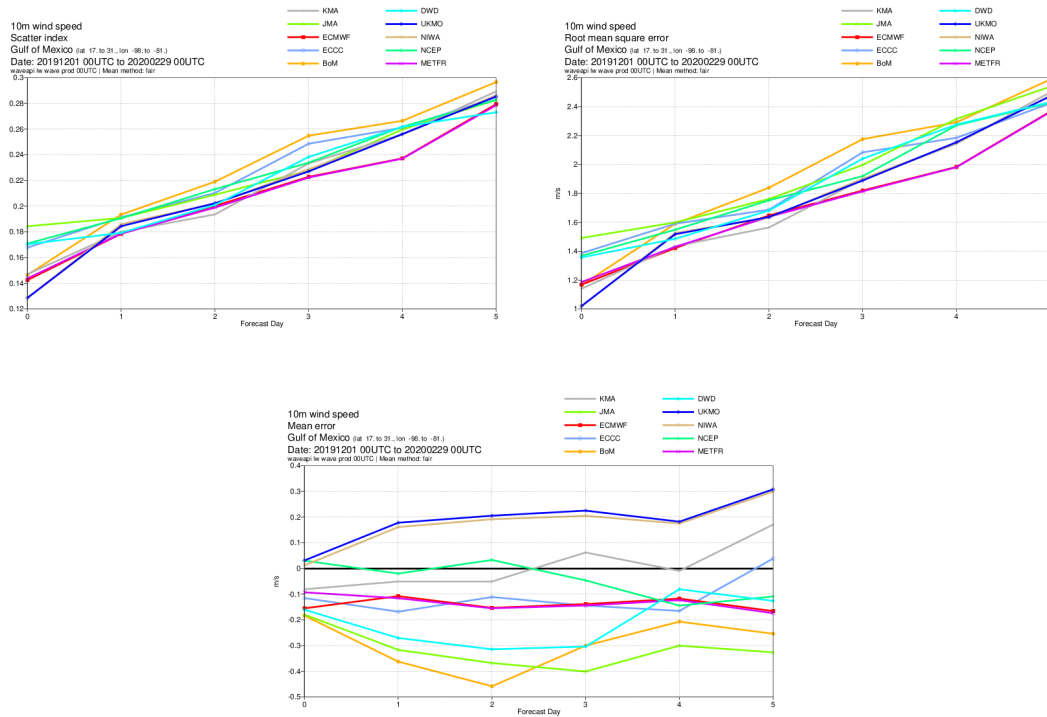
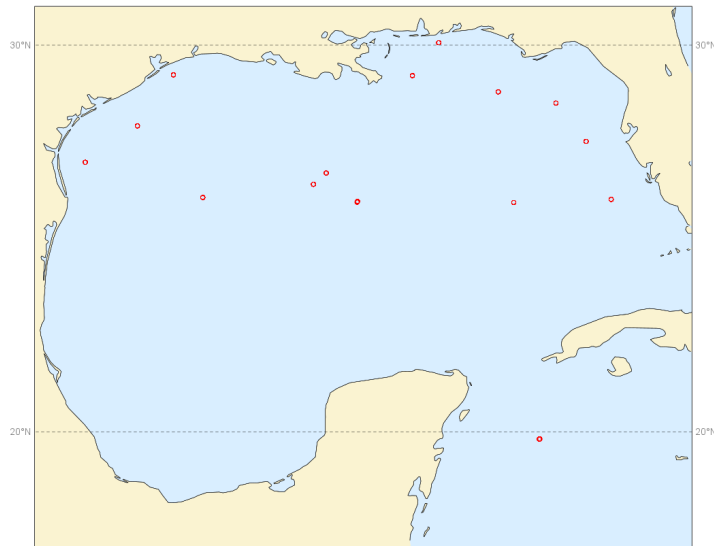
**North West Pacific.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229 - (10ff)



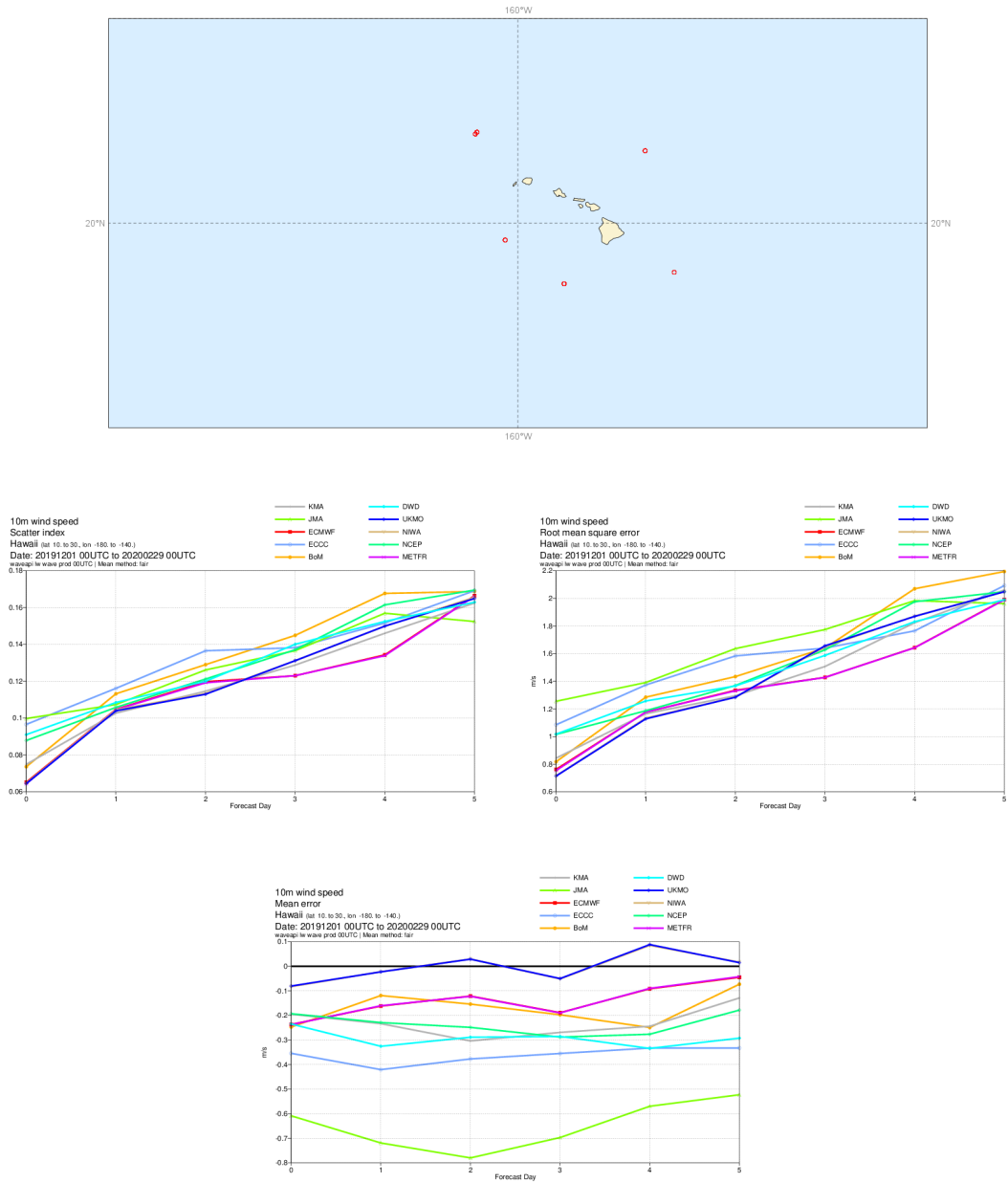
**Indian Ocean.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229 - (10ff)



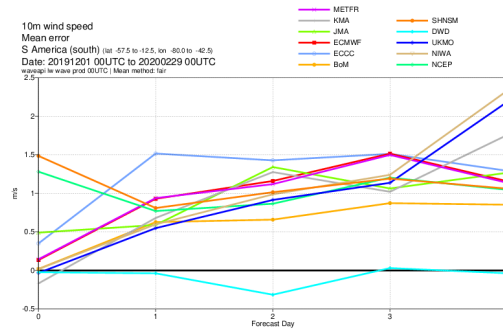
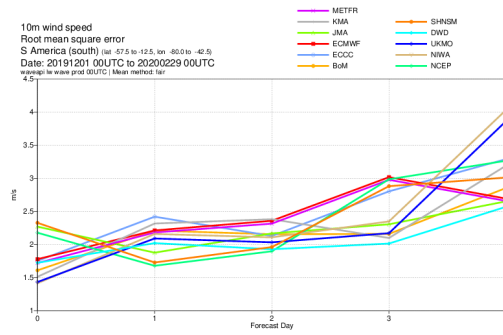
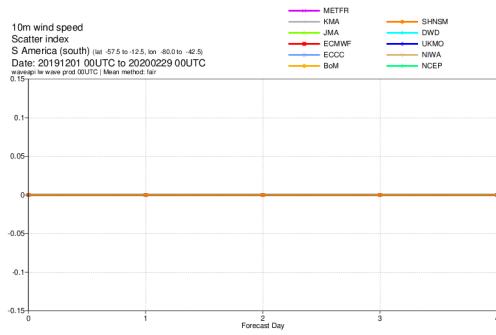
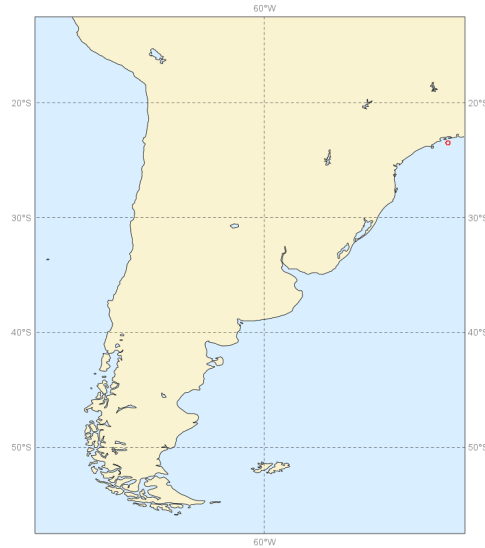
**Gulf of Mexico.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229 - (10ff)



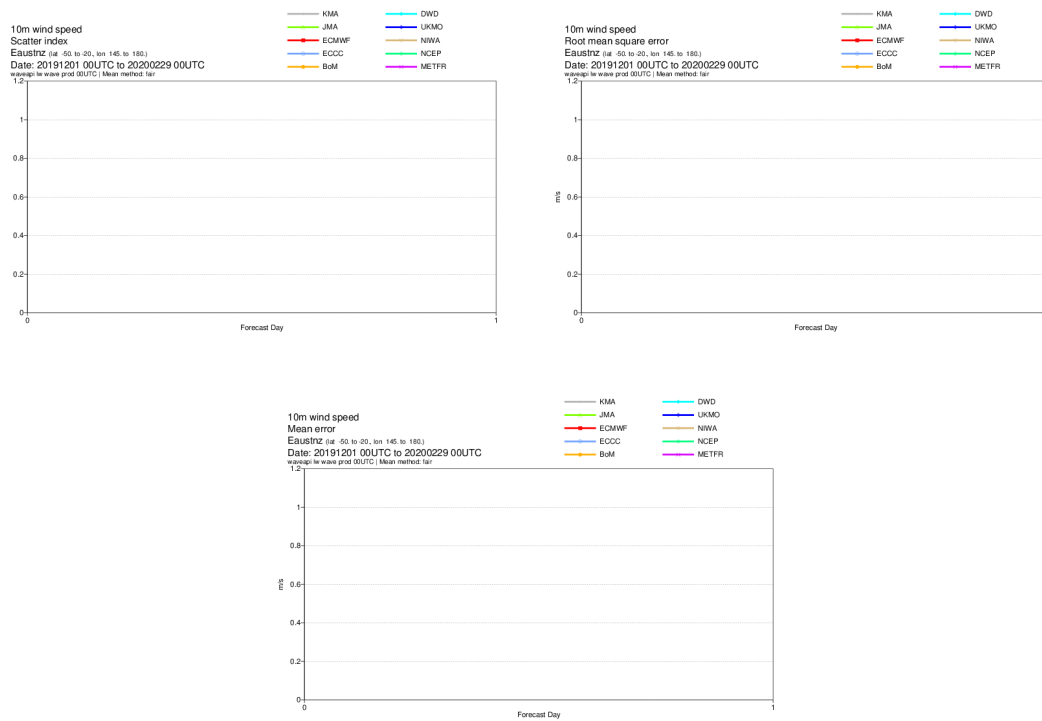
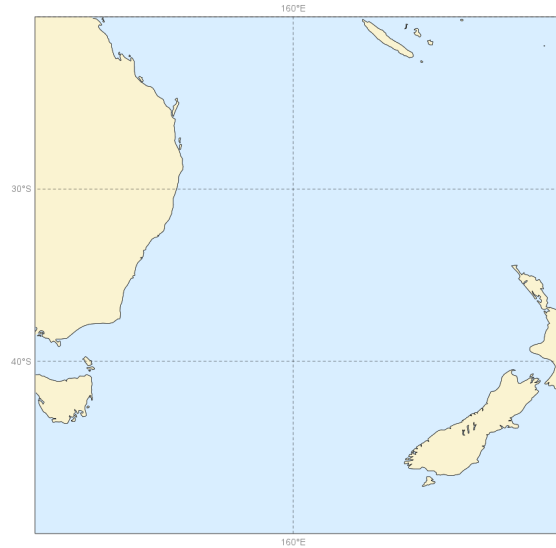
**Hawaii.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20191201 to 20200229 - (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).

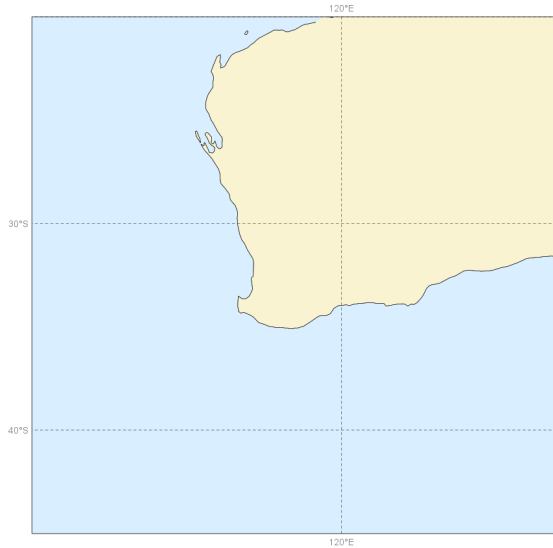
Buoys observations - from 20191201 to 20200229 - (1C)



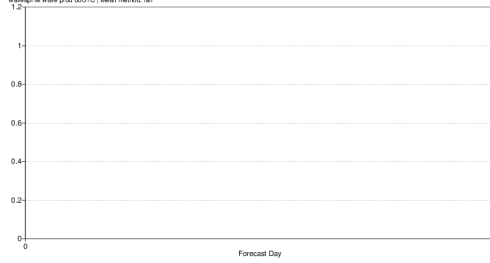
**East Australia - New Zealand.** Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).



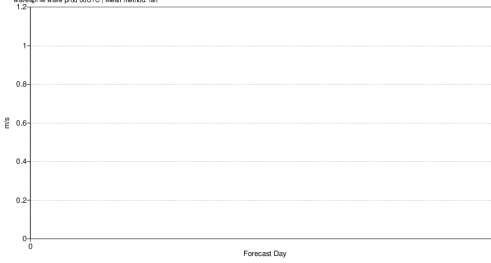
Buoys observations - from 20191201 to 2C



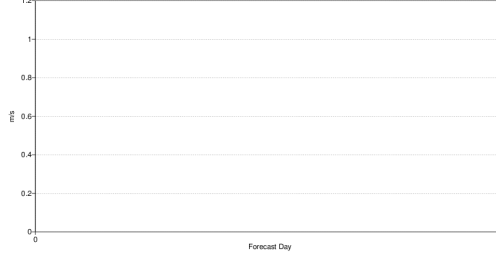
10m wind speed  
Scatter index  
Ssw.australia (lat -45 to -20, lon 105 to 145)  
Date: 20191201 00UTC to 20200229 00UTC  
Average for every grid (0.5°). Mean method (lat)



10m wind speed  
Root mean square error  
Ssw.australia (lat -45 to -20, lon 105 to 145)  
Date: 20191201 00UTC to 20200229 00UTC  
Average for every grid (0.5°). Mean method (lat)



10m wind speed  
Mean error  
Ssw.australia (lat -45 to -20, lon 105 to 145)  
Date: 20191201 00UTC to 20200229 00UTC  
Average for every grid (0.5°). Mean method (lat)



**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).