

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

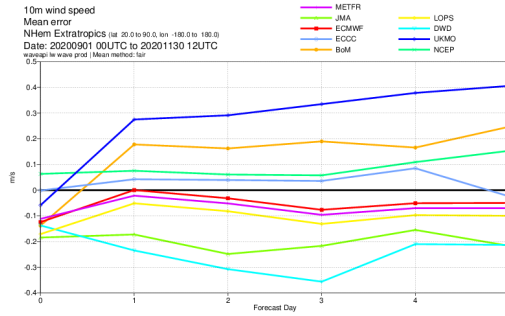
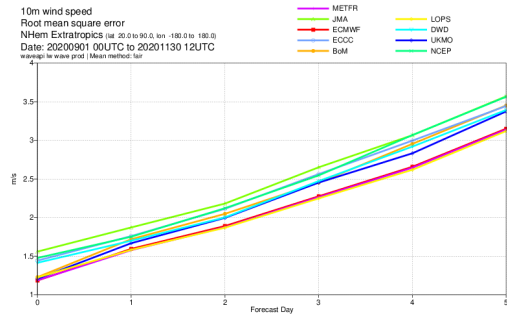
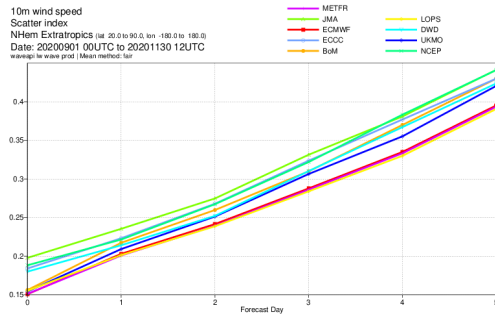
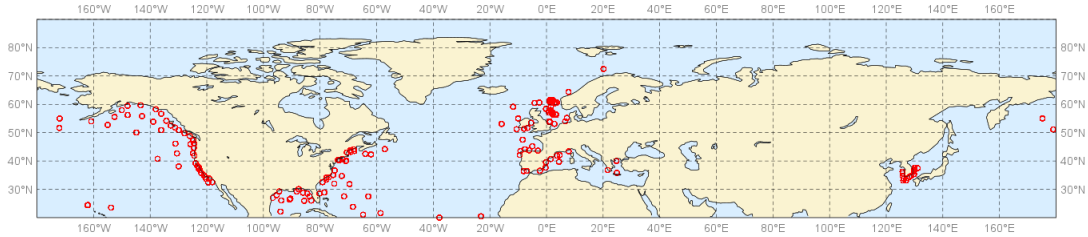
00 and 12 UTC runs

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

December 14, 2020

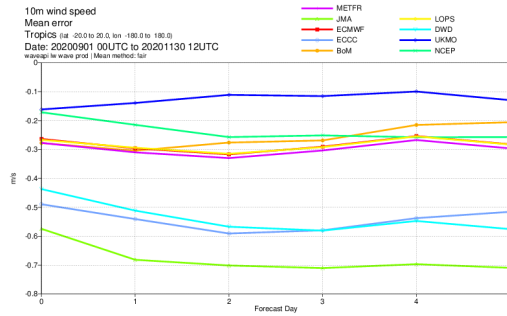
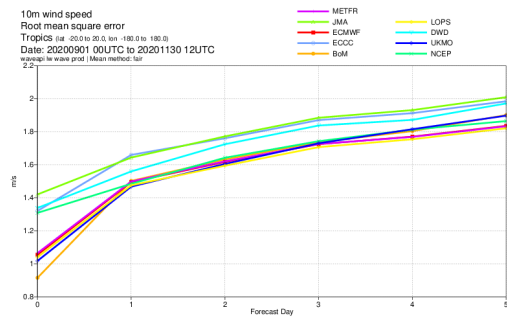
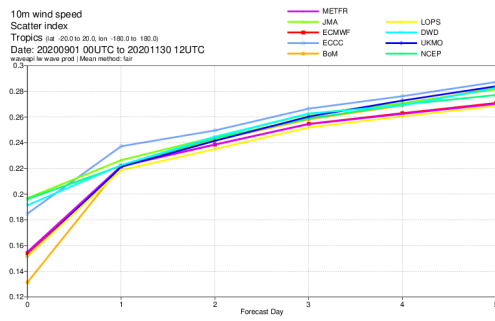
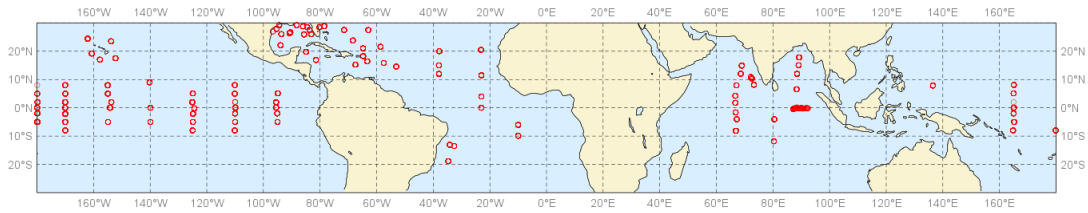
PART III: 10 meter wind speed (10ff)

Buoys observations - from 20200901 to 20201130 - (10ff)



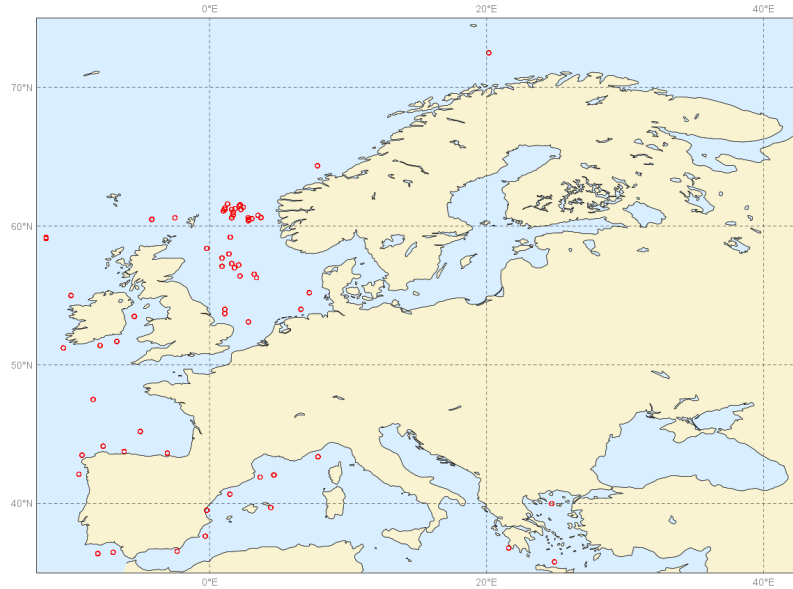
Northern Hemisphere. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200901 to 20201130 - (10ff)

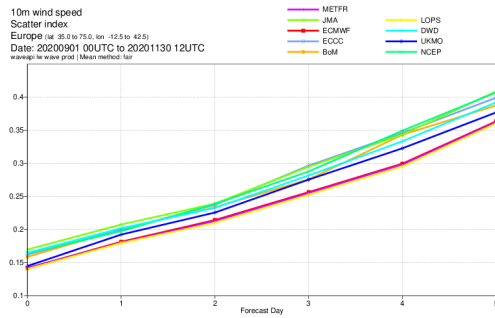


Tropics. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

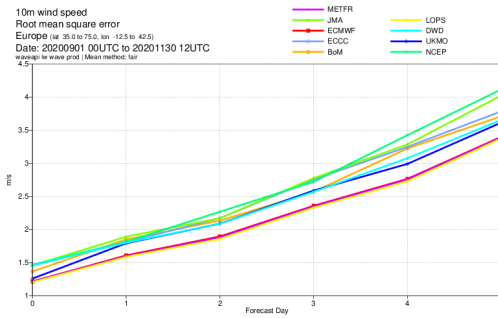
Buoys observations - from 20200901 to 20201130 - (10ff)



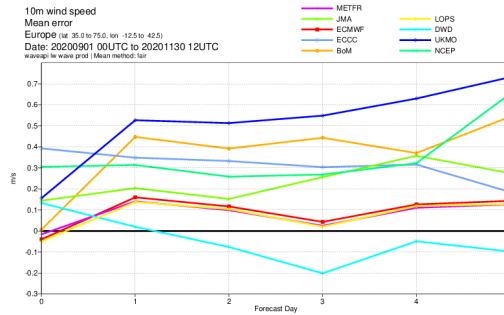
10m wind speed
Scatter index
Europe (lat: 35.0 to 75.0, lon: -12.5 to 42.5)
Date: 20200901 00UTC to 20201130 12UTC
warping: by wave prod. (Mean method: lat)



10m wind speed
Root mean square error
Europe (lat: 35.0 to 75.0, lon: -12.5 to 42.5)
Date: 20200901 00UTC to 20201130 12UTC
warping: by wave prod. (Mean method: lat)

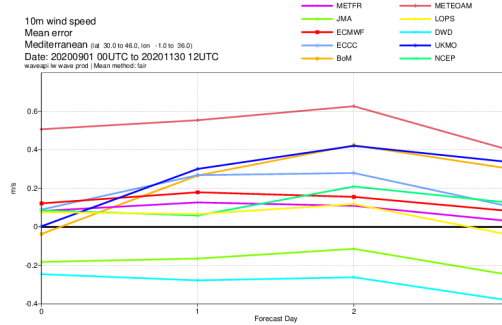
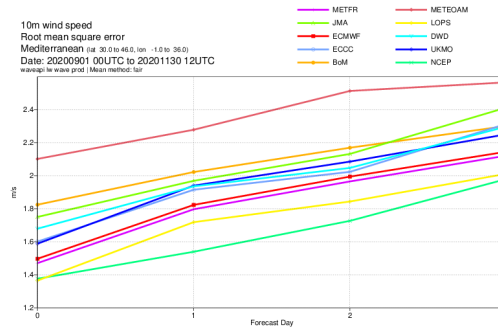
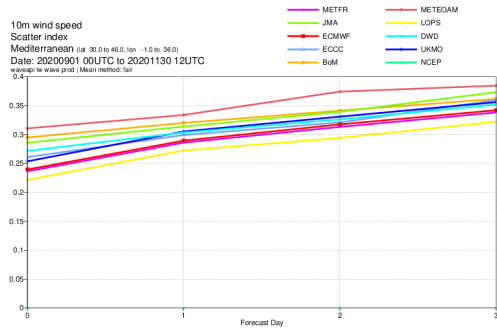
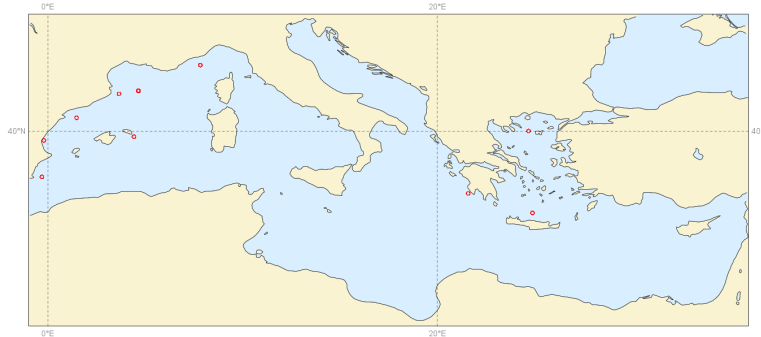


10m wind speed
Mean error
Europe (lat: 35.0 to 75.0, lon: -12.5 to 42.5)
Date: 20200901 00UTC to 20201130 12UTC
warping: by wave prod. (Mean method: lat)



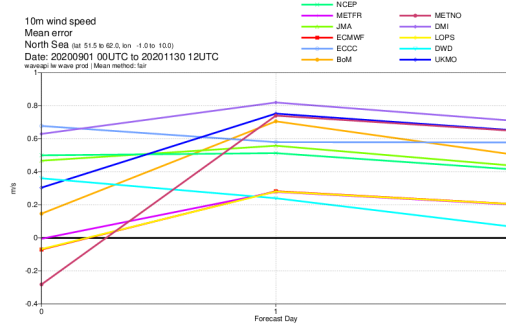
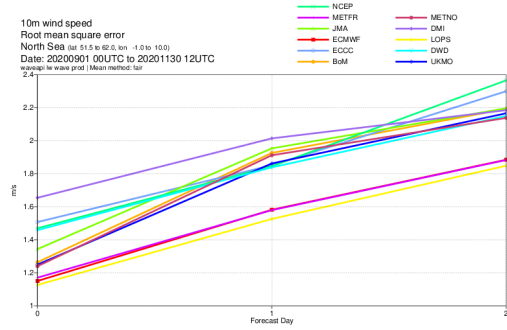
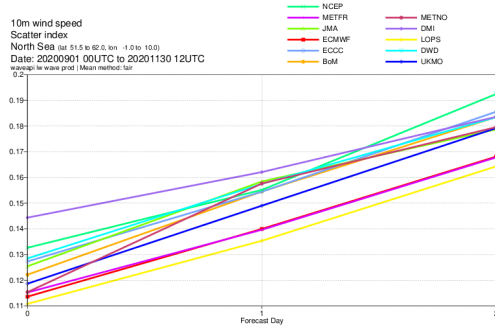
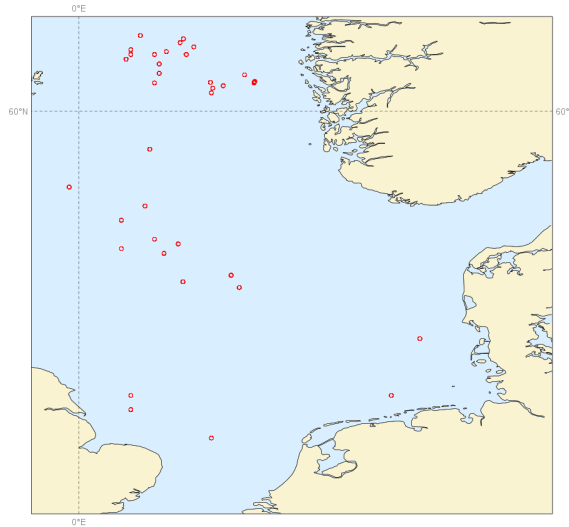
Europe. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200901 to 20201130 - (10ff)



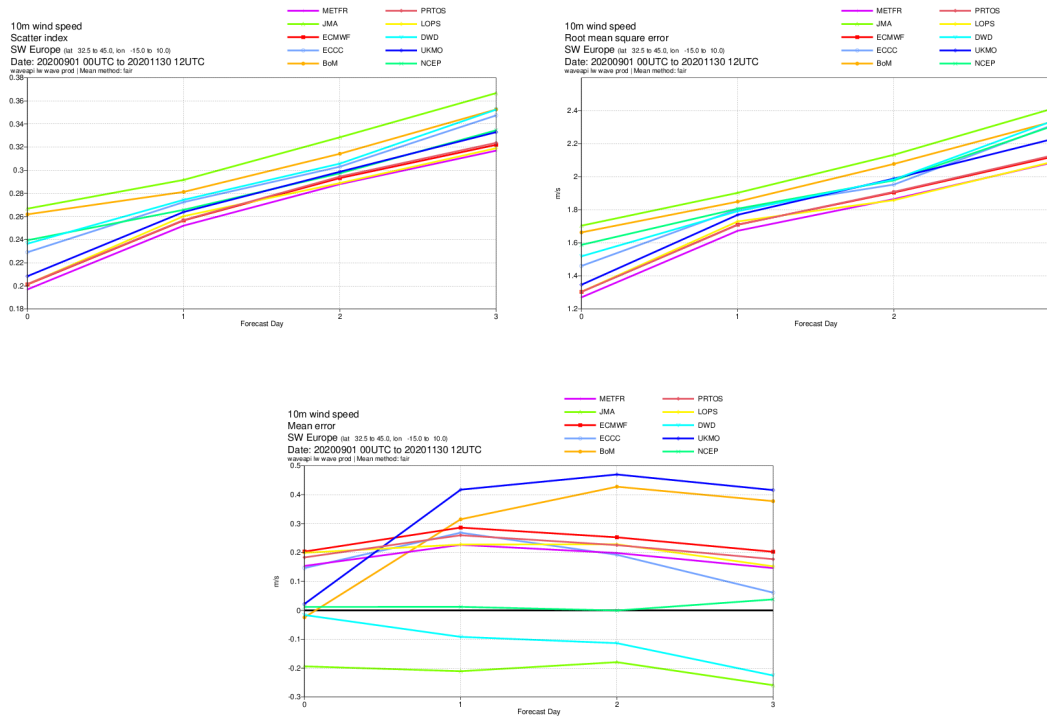
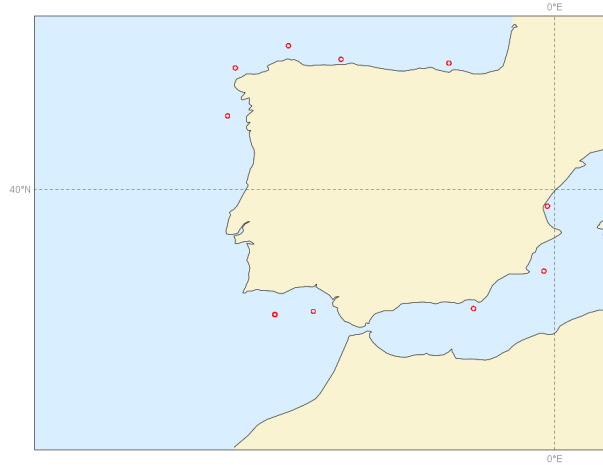
Mediterranean Sea. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200901 to 20201130 - (10ff)



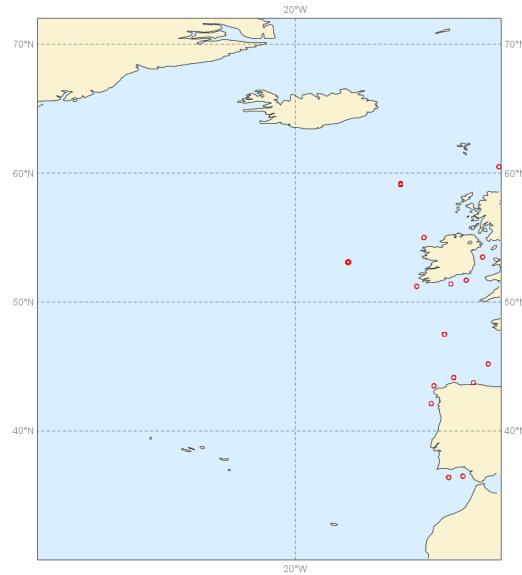
North Sea. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200901 to 2020

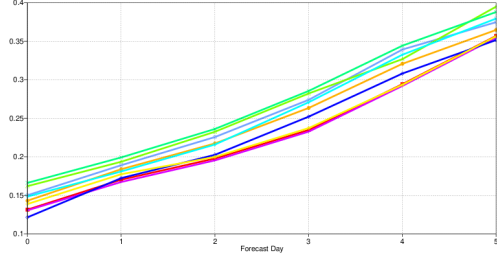


South West Europe. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

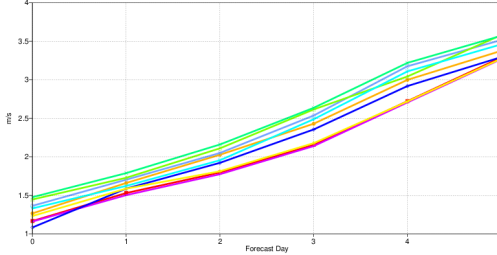
Buoys observations - from 20200901 to 20201130 - (10ff)



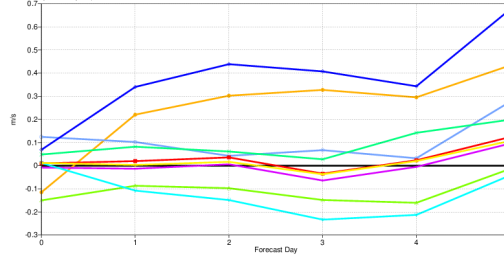
10m wind speed
Scatter index
North East Atlantic (lat 30 to 72, lon -40 to -4)
Date: 20200901 00UTC to 20201130 12UTC
average for every grid (Mean method: last)



10m wind speed
Root mean square error
North East Atlantic (lat 30 to 72, lon -40 to -4)
Date: 20200901 00UTC to 20201130 12UTC
average for every grid (Mean method: last)

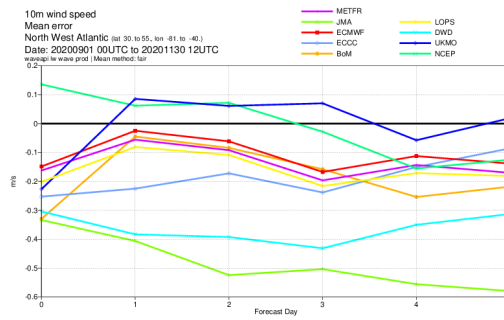
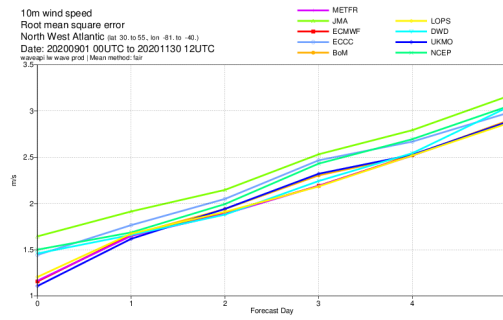
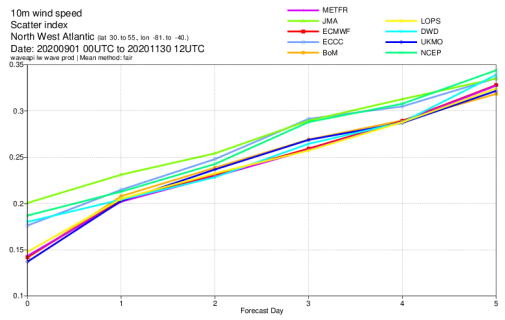
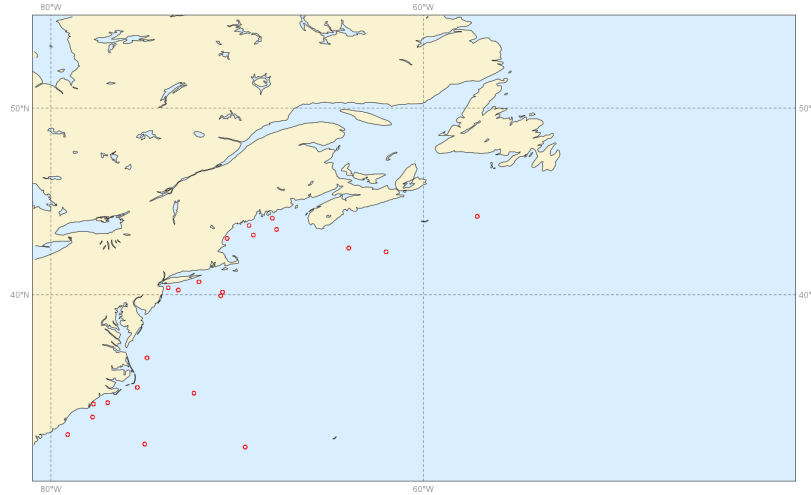


10m wind speed
Mean error
North East Atlantic (lat 30 to 72, lon -40 to -4)
Date: 20200901 00UTC to 20201130 12UTC
average for every grid (Mean method: last)



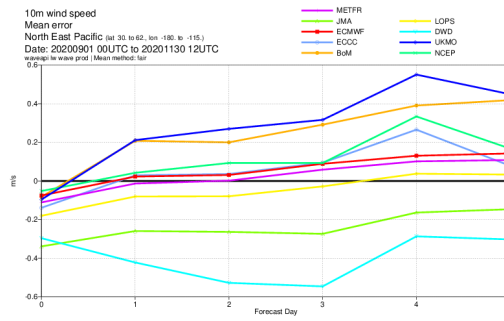
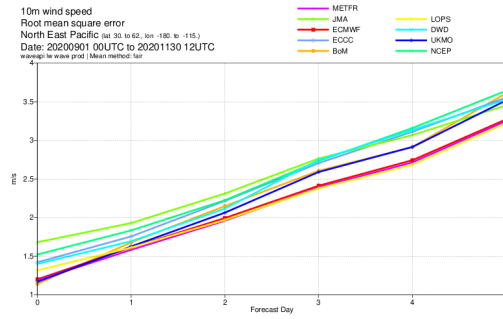
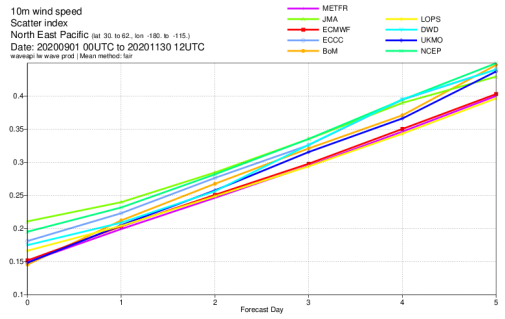
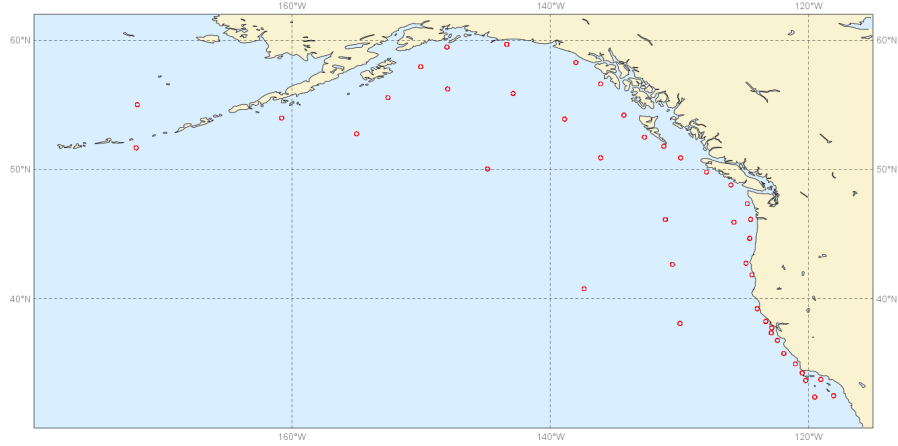
North East Atlantic. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200901 to 20201130 - (10ff)



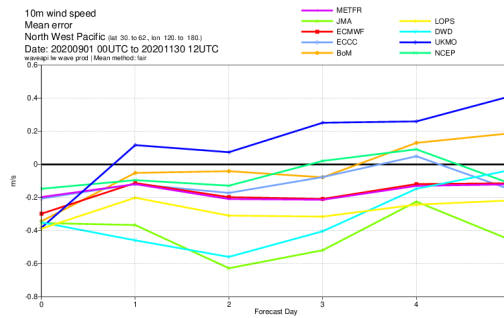
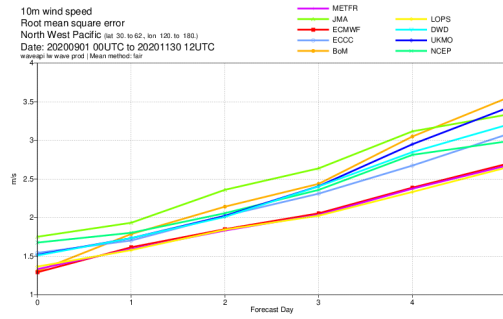
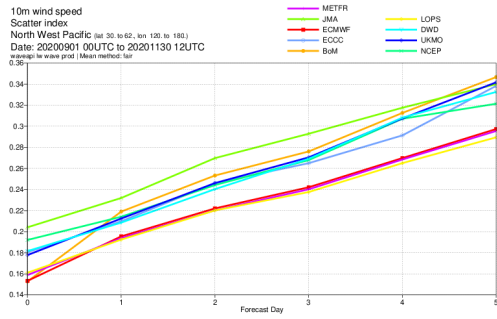
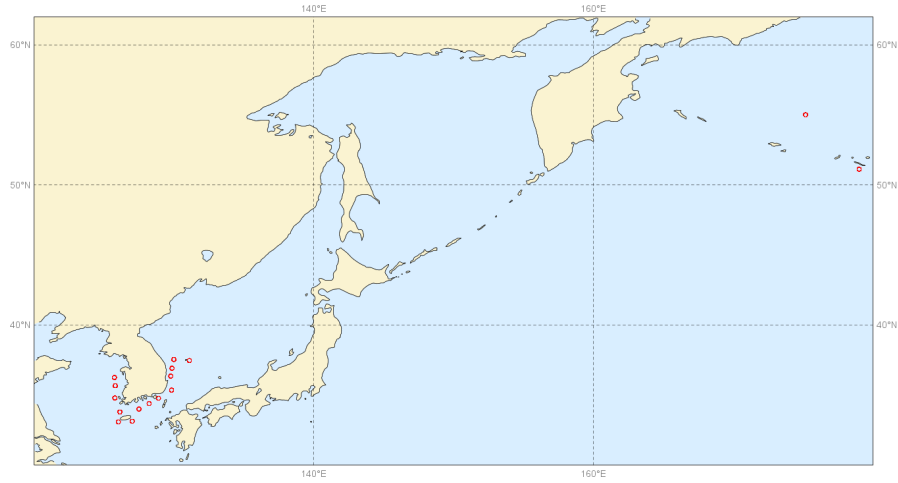
North West Atlantic. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200901 to 20201130 - (10ff)



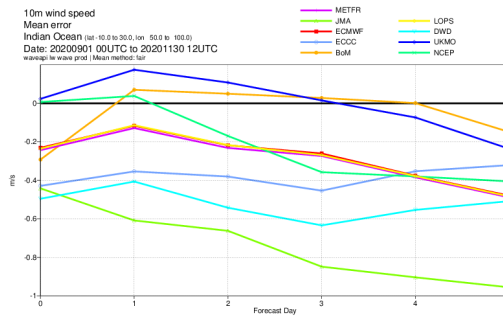
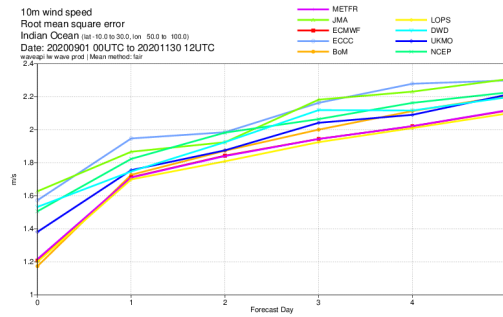
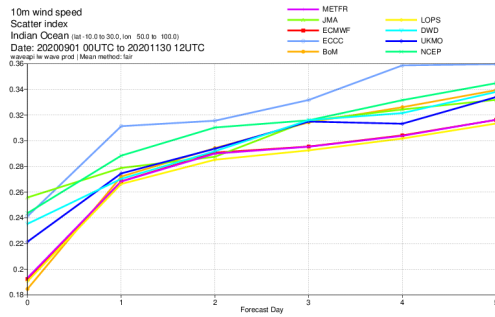
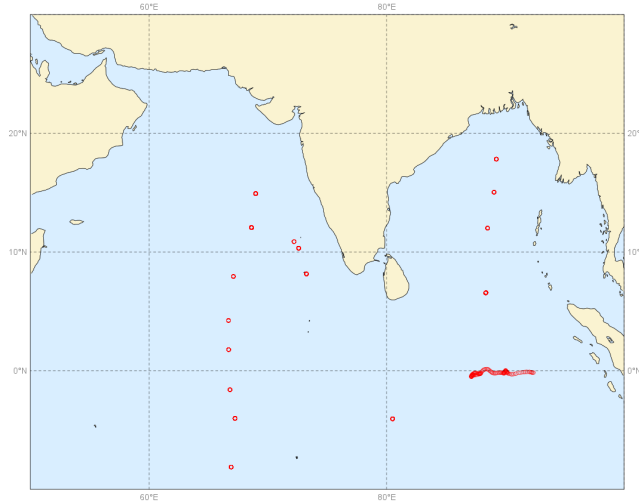
North East Pacific. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200901 to 20201130 - (10ff)



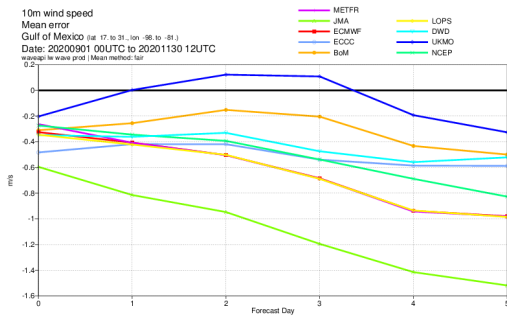
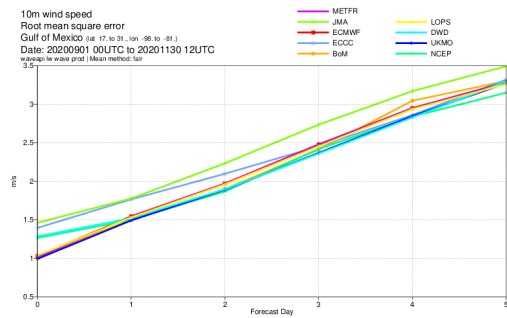
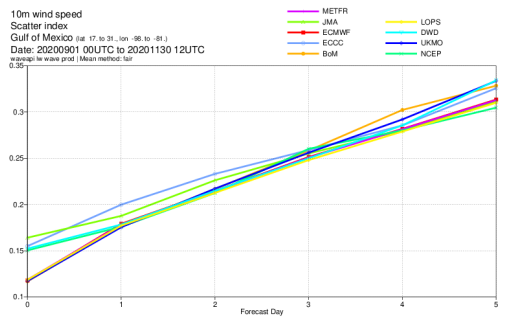
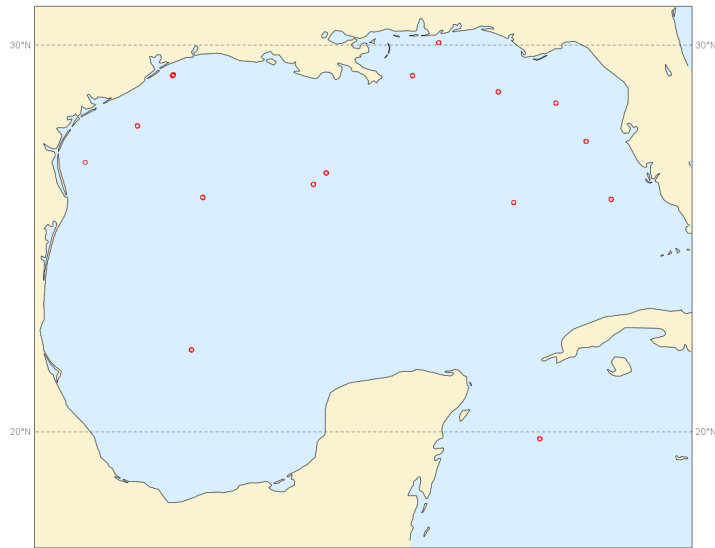
North West Pacific. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200901 to 20201130 - (10ff)



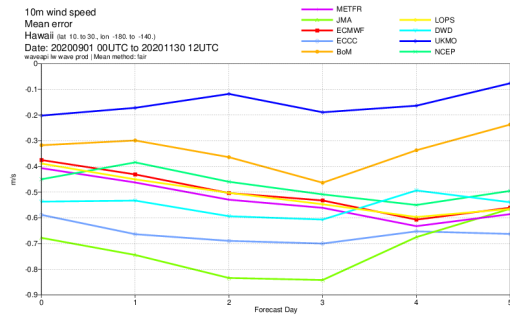
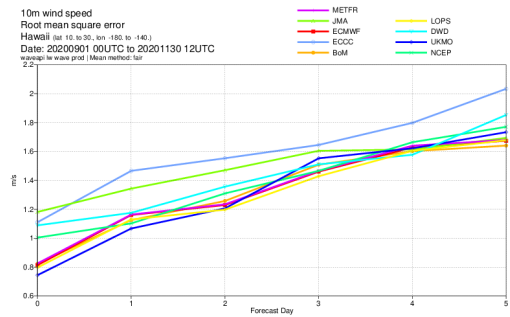
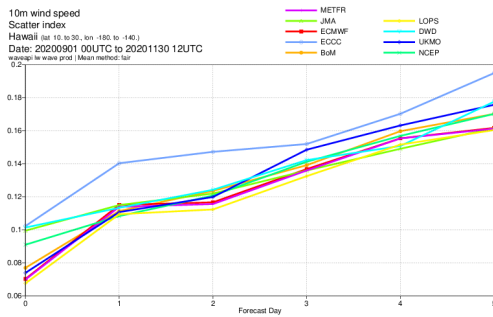
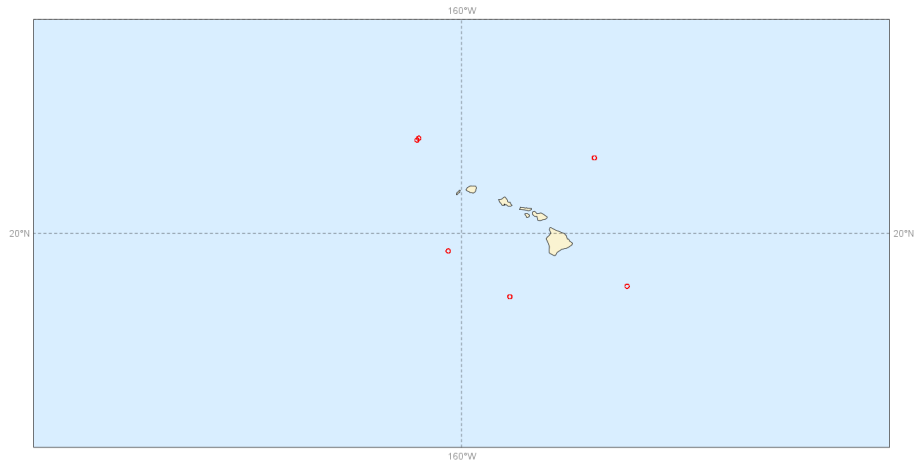
Indian Ocean. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

Buoys observations - from 20200901 to 20201130 - (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 20200901 to 20201130 - (10ff)

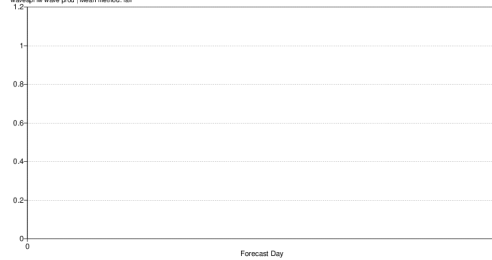


Hawaii. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

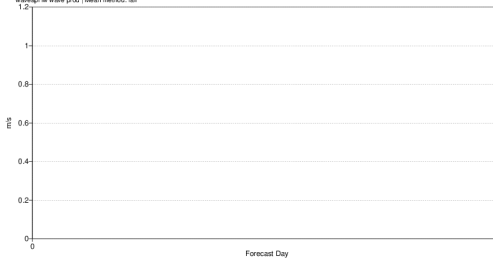
Buoys observations - from 20200901 to 20201130 - (10ff)



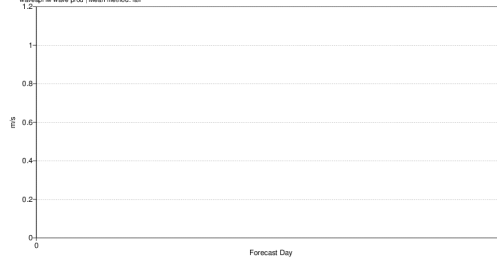
10m wind speed
Scatter index
S America (south) (lat: 57.5 to 12.5, lon: -80.0 to -42.5)
Date: 20200901 00UTC to 20201130 12UTC
Average for every grid. Mean method. lat



10m wind speed
Root mean square error
S America (south) (lat: 57.5 to 12.5, lon: -80.0 to -42.5)
Date: 20200901 00UTC to 20201130 12UTC
Average for every grid. Mean method. lat

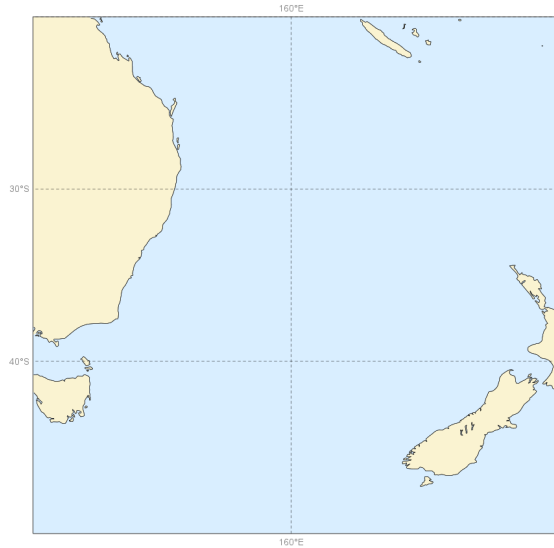


10m wind speed
Mean error
S America (south) (lat: 57.5 to 12.5, lon: -80.0 to -42.5)
Date: 20200901 00UTC to 20201130 12UTC
Average for every grid. Mean method. lat

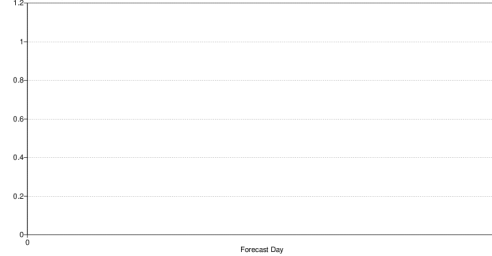


South of South America. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

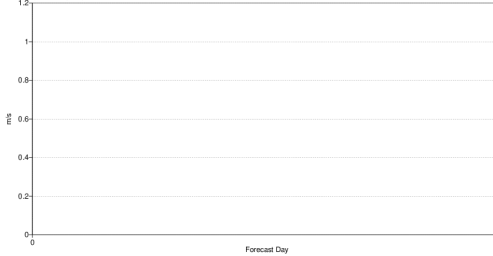
Buoys observations - from 20200901 to 20201130 - (1C)



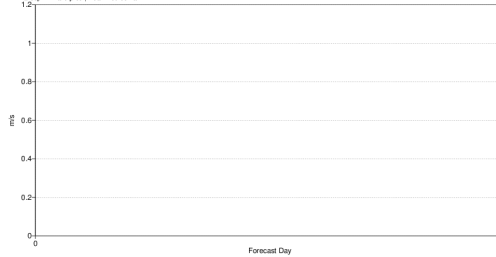
10m wind speed
Scatter index
Eastuznz (lat: 50 to 20, lon: 145 to 185)
Date: 20200901 00UTC to 20201130 12UTC
Average for every grid (Mean method: lat)



10m wind speed
Root mean square error
Eastuznz (lat: 50 to 20, lon: 145 to 185)
Date: 20200901 00UTC to 20201130 12UTC
Average for every grid (Mean method: lat)

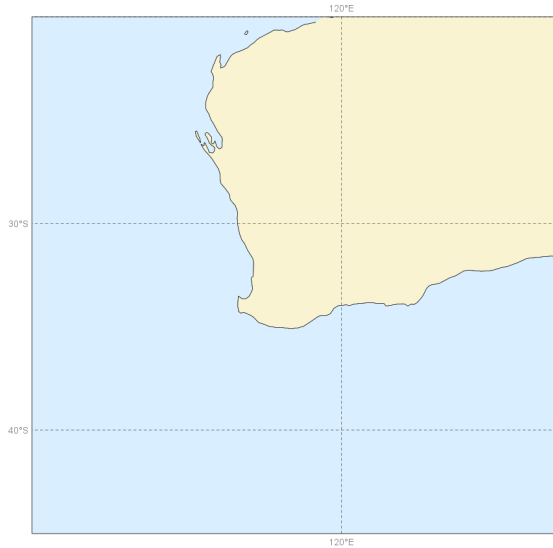


10m wind speed
Mean error
Eastuznz (lat: 50 to 20, lon: 145 to 185)
Date: 20200901 00UTC to 20201130 12UTC
Average for every grid (Mean method: lat)

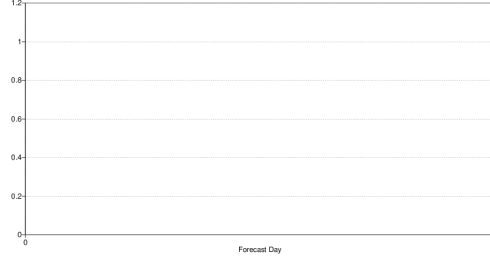


East Australia - New Zealand. Top panel: observation distribution. Middle left panel: Forecast scatter index (standard deviation of the difference normalised by the mean of the observations). Middle right panel: Forecast root mean square error (RMSE). Bottom panel: forecast mean error (bias).

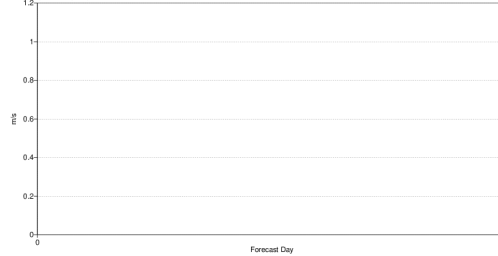
Buoys observations - from 20200901 to 2C



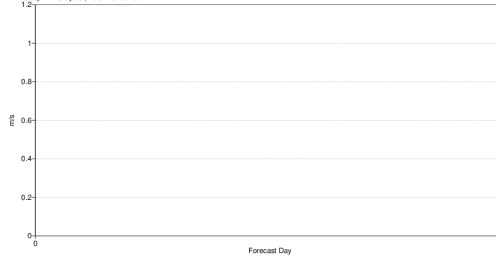
10m wind speed
Scatter index
Ssw.australia (lat -45 to -20, lon 105 to 145)
Date: 20200901 00UTC to 20201130 12UTC
averaged by area grid (Mean method, lat)



10m wind speed
Root mean square error
Ssw.australia (lat -45 to -20, lon 105 to 145)
Date: 20200901 00UTC to 20201130 12UTC
averaged by area grid (Mean method, lat)



10m wind speed
Mean error
Ssw.australia (lat -45 to -20, lon 105 to 145)
Date: 20200901 00UTC to 20201130 12UTC
averaged by area grid (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).