

Comments to Referee #1

To validate the model, the authors could use wave buoy data, if available, and/or significant wave height obtained from altimetry (e.g. see the AVISO web page).

A comparison of averaged SWH values obtained from the AVISO database against corresponding modeled SWH values was performed. It demonstrated that modeled SWH values are in general somewhat lower than measured ones. However, the correlation between these arrays is quite satisfactory (corr=0.6).

I think that the English should be reviewed and improved.

English is carefully checked in the revised version of the manuscript. We are particularly grateful to the Referee #2 for a detailed list of proposed corrections.

I feel that the analyses performed in the paper are limited and that the dataset can provide much more information.

Indeed, several new analyzing approaches are used in the revised manuscript. These are time series of wave parameters and seasonal average values as proposed by the Referee.

There is no detailed discussion of the results. The authors should compare their results with those of other authors and highlight the similarities and discrepancies with them, and not only say that results “agree or not agree” with them without further details

A discussion section with more detailed comparison of our results against those published earlier is added to the revised manuscript. Where possible, differences in modeling approaches and forcing are stated.

There are other atmospheric hindcasts for the period 1950-2010 covering the Black Sea with higher resolution than NCEP/NCAR (see for instance the results of ENSEMBLES, PRUDENCE or EuroCordex/MedCordex projects among others). In such semienclosed domain surrounded by steep orography the spatial resolution of winds may play a significant role. If the authors are not able to run the model with higher resolution winds, at least they should discuss the drawbacks of using a low resolution forcing.

Of course, the usage of low resolution forcing can lead to incorrect results, especially in coastal areas. Therefore, it is useful to deal with the proposed datasets in case of high resolution computations. However, we believe that for the current goals (namely the assessment of wave parameters in the entire Black Sea) and with the current computational grid the usage of NCEP/NCAR is acceptable.

What is the period covered by the hindcast?

The hindcast covers the period between January 1, 1948 and December 31, 2010.

Fig 1 should include a colorbar in order to identify the depths.

Such a colorbar was added to the figure in the revised version of the manuscript.

P1201. L 16-29. The authors describe the atmospheric situation that lead to extreme wave heights. Although the explanation seems plausible, the authors should demonstrate that it is that situation which is associated to the extreme waves. For instance, they could show the SLP fields at the time that the hindcast show extreme waves. Or maybe they could create composites averaging the SLP fields corresponding to all the events with wave heights exceeding a certain threshold

Now SLP figures are replaced, and Figure 4 shows centroids (composites) for both SLP types.

There is no discussion about the interannual variability of the storminess. Does it correspond to changes in the dominant wind direction? Or is because of the interannual variability of wind intensity? What can be the mechanisms behind this variability? Maybe because of changes in the Northern Hemisphere circulation? The authors could check the correlations with the NH climate indices as the NAO, EA/WR, EA, SCAN, ...

We would say that correlation of wind direction and storminess is another task which is not described in this paper. Wind direction during storm varies too much over the sea. Storms are usually localized over a part of the sea. So, it may be the next step, to distinguish storminess location and to correlate it with the wind direction.

Time trends of climate indices are compared with storminess. The correlation of monthly EA/WR, EA and SCAND indices with yearly storm duration is rather weak. For NAO it is better, $\text{corr}=0.35$ (95% significance) if to take NAO for period November-March. It is seen from the figure, that periods with the lowest NAO index are accompanied by high storminess. It is may be interpreted as decreasing of the influence of Azor anticyclone's ridge over the Mediterranean and Black Sea giving the opportunity of local cyclones intensification.

L.14-19 Pg 1203. I do not understand this paragraph and do not see the link with the results discussed in the paper.

This paragraph indicates some possible ways to use the presented results in further studies. We did focus the revised paper.

Comments to Referee #2

It is not clear which are the gaps that authors would like to fill in implementing their research.

As far as we know the NCEP/NCAR reanalysis was not applied yet as forcing for wave simulations covering the entire Black Sea. Therefore, the present dataset is the first one covering the Black Sea for the period between 1948 and 2010.

It is not clear what the advantage of using this bathymetry is with respect to already available ones, particularly in view of the fact that the coastal areas are still poorly represented and chosen numerical grid resolution do not allow downscaling to those areas.

Already available versions of bathymetry (e.g. the ETOPO database) do not represent the bottom relief of the Black Sea in an adequate way. For example, maximal depth values exceed 2400 m, which is approximately 200 m deeper than the actual deepest point in the sea. Therefore, the present bathymetry was created in order to obtain a more reliable dataset, which could be used for other numerical studies as well. Bathymetries of coastal areas will be created in the same way by digitizing more detailed charts.

Wave model set-up description still misses the resolution in the frequency-directional space. It is not clear if 30 min is computational time step (that is somewhat large in view of chosen grid resolution of 5 km) or the model output time step.

The directional resolution was of 1° . In the frequency-space there were 21 logarithmically distributed divisions between 0.7 and 1 Hz. The time step was really of 30 minutes – such a value was selected in order to optimize computational resources. The model output time step was of 3 hours.

There must be some explanation of the fact that SWH maxima occur in the most SW and NE “corners” of the sea while the area of largest waves in terms of mean/average SWH is located in the central northern part of the basin.

Maximal SWH are observed in the mentioned SW and NE areas during storms, which are quite short and compact events. Thus, they only slightly affect the distribution of average SWH, which was calculated on the basis of the whole calculated dataset.

In this section a description of two prevailing synoptic situations is presented but this lacks balance between hydro- and meteorological elements. It is not clear which atmospheric pattern affects which part of the basin and to what extent, how storms propagate and what the wave parameter evolution is.

Synoptic patterns accompanying storminess over the Black Sea are described only to illustrate atmospheric conditions initiating storm winds. Wind speed is the ‘product’ of the atmospheric pressure field, on the one hand, and, on the other hand, it is the main controlling factor of the wave height. Wind speed is one of the most important input data for the wave model, thus it is important to understand the storm wind genesis and synoptic storm factors. The frequency of synoptic situations typical for the Black sea storms and its climate projections are given in [Surkova et al., 2013].

Analysis is given for the Black Sea as a whole without dividing the sea to separate parts. It should be the next stage of our investigation.

Only two storminess proxies are considered, namely number of storms and stormy hours, which could be misleading with respect to the wave energy, for example.

Wave energy transport is in fact a quite useful storminess proxy. A calculation of for example total annual wave energy transport during storms could also illustrate the evolution of the wave climate in the studied area. Nevertheless, the main proxies discussed in this paper are more traditional wave parameters (SWH, wave length, period and direction). We believe that the transport of wave energy will be discussed in detail in our further investigations.

It is not demonstrated in a tangible manner which parts of the basin are affected mostly by the severe storms.

A map of storm waves occurrence on the Black Sea is added to the revised version of the manuscript in order to define most stormy regions.

Following citation in the text is not listed here: Efimov and Komarovskaya, 2009. There are two references to Rusu E., (2010), for which I'd suggest using (2010a) and (2010b).

These and other corrections mentioned in the supplement are applied in the revised version of the manuscript.