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Interactive comment on "On the feasibility of the use of wind SAR to downscale waves on shallow water" *by* O. Q. Gutiérrez et al.

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Concerning the referees major comments, two interesting question arised concerning: i) boundary conditions used for wave modeling; ii) the Geophysical Model Function (GMF) used to estimate wind field from SAR data.

i) The authors agree with referee about the importance of boundary conditions, and want to remark that on the simulated cases "where wind sources show opposite direction, due to low resolution of the modeled winds" and "a good correlation was found on the downscaled waves" both sources of wind are less than 5 ms-1. Generally, such wind magnitude is not enough to be appreciated on waves generation at this scale on local areas like the study area. The authors consider that on different scenarios, where winds are significant, wind fields with higher spatial resolution increase the quality of

amplitude and direction of waves. The main focus of the research study is, however, to show the incorporation of SAR wind fields to simulate waves by means of a downscaling methodology rather than to evaluate the accuracy of boundary conditions, whilst the latter play a major role.

ii) The referee suggests adopting "CMOD-5" or "CMOD-5h" GMF that are optimized for high wind speed retrieval from SAR data based on specific literature suggestions. The authors took under advisement such improved GMF for the estimation of wind fields from Normalized Radar Cross Section (NRCS), because of their ability in retrieve more accurately wind speeds in cases of extreme wind stress, as some of the cases occurred in the period considered for the simulation. Nevertheless the author's still holds on the choice for two main reasons: 1) Indeed of all the geophysical model functions (GMFs - CMOD C-band model4, CMOD_IFR2, CMOD5 and CMOD5.N), the latest C-band GMF, CMOD5.N, has the smallest bias and root mean square error based on recent literature. But considering results presented in Takeyama et al., Comparison of Geophysical Model Functions for SAR Wind Speed Retrieval in Japanese Coastal Waters, Remote Sens. 2013, 5, 1956-1973; doi:10.3390/rs5041956 all of the GMFs exhibit a negative bias in the retrieved wind speed that lead the authors to separate the SAR-retrieved wind speeds into two categories: onshore wind (blowing from sea to land) and offshore wind (blowing from land to sea). Only offshore winds exhibit the large negative bias at the moment and shows to be greatly affected by complex coastal topography and variable atmospheric stability due to prevailing winds and warm and cold ocean currents. Considering the Northern Adriatic study area with a lesser complex topography and currents there is ample room for future improvement for the effect from short fetch for the SAR wind speed retrieval with specific atmospheric stability correction using CMOD-IFR2. This leads to the 2) point 2) "CMOD-IFR2" is used to estimate wind fields from NRCS for operational generation of SAR Level-2 Ocean (OCN) products. The results the author's are presenting are in the research development of Copernicus CMEMS Service Evolution. Starting from August 2015, such operational OCN products are generated and distributed from Sentinel-1A SAR data. The algorithm used for wind field estimation from Sentinel-1 data is "s-1 owi", which makes use of "CMOD-IFR2" Neural Network based GMF. The Since Sentinel data will be used also for wave downscaling in shallow waters, the authors selected "CMOD-IFR2" as GMF for the estimation of wind fields with this perspective. This option would have resulted in a forcing dataset more realistic to what oceanographer can operationally use in the near future. Based on the above we introduced a short discussion about operational oceanography research development of Copernicus CMEMS Service Evolution and a short discussion about geophysical model functions accuracy as an ample room for future improvement of wind SAR retrieval.

Interactive comment on Ocean Sci. Discuss., 12, 1567, 2015.