

Interactive comment on “Wind, waves, and surface currents in the Southern Ocean: Observations from the Antarctic Circumnavigation Expedition” by Marzieh H. Derkani et al.

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Response to Anonymous Reviewer #3

R#3: I would like a brief comment by the authors on the spectral frequency resolution and parameters variability that originates from the 160-second long duration of Wamos-II acquisition (if I correctly understood). I mean, with 160-s long records the spectral resolution over frequency is very low (large Δf). And given the rotation speed of the antenna I guess also the maximum resolved frequency may be very low. How does this affect the spectral representation? In

C1

addition, with $T_m > 8$ s (also 13 s) waves every sample includes less than 20 waves. So, I suspect the estimate of the spectrum and wave parameters (even including the 600×1200 m² area) might be pretty unstable.

AC: The X-band radar provides spatio-temporal information by recording 64 images of the surrounding ocean surface over a period of 175 s (we erroneously indicated 160 s in the original submission). This corresponds to one image for each full turn of the antenna. A single wave spectrum is computed from all images recorded within this period of time. Specifically, the spectral density is estimated by applying a two dimensional Fast Fourier Transform to three sub-areas (x,y) of dimensions $600 \text{ m} \times 1200 \text{ m}$ for each image/surface. The final spectrum is computed as an ensemble average over the 175 s and all sub-areas. Therefore, the spectral resolution is dictated by the spatial resolution of the sub-area and not the temporal duration of the sampling. Considering the resolution of the image (5 m) and the minimum dimension of the sub-area (600 m), WaMoS-II can detect wavelengths between 10 m and 600 m which correspond to frequencies from 3 s to about 16 s. We have added a comment on the spectral resolution in the revised version of the manuscript (Section 3.2).

R#3: Wind data are measured by an on board meteorological station, but in Figure 7 the measured wind U10 is labeled as Wamos-II. Please may you check consistency?

AC: We thank the reviewer for spotting this error. Label of wind speed has been corrected in the revised version.

R#3: In Figure 8, axis labels (units and variables) are missing.

AC: The figure has been updated.

C2

