

EGU2020-12247

<https://doi.org/10.5194/egusphere-egu2020-12247>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



Evaluation of the numerical wave model (WaveWatch III) for wave simulation in the Antarctic marginal ice zone

Marzieh H. Derkani¹, Katrin Hessner², Stefan Zieger³, Filippo Nelli¹, Alberto Alberello^{1,4}, and Alessandro Toffoli¹

¹The University of Melbourne, Melbourne, Australia (marzieh.h.derkani@gmail.com)

²OceanWaveS GmbH, Lüneburg, Germany

³The Australian Bureau of Meteorology, Melbourne, Australia

⁴University of Adelaide, Adelaide, Australia

The Southern Ocean is the birthplace of the fiercest waves on the Earth, which play a fundamental role in global climate by regulating momentum, heat and gas exchanges between the atmosphere and ocean. At high latitudes, waves interact with Antarctic sea ice, another crucial player of the Earth's climate system, modulating its expansion in the winter and its retreat in summer and hence affecting the global albedo. Despite the impact of waves on climate, global wave models are considerably biased in the Southern Hemisphere, due to the scarcity of observations in these remote waters. This is exacerbated in the marginal ice zone, the region of ice-covered water between the compact ice or land and the open ocean, where surface waves, upper ocean and atmosphere interact with sea ice but the dominant physics are still largely unknown. To improve our understanding of physical processes in Southern Ocean and model capabilities, the Antarctic Circumnavigation Expedition (ACE) sailed these waters from December 2016 to March 2017 to acquire wave data (among other climate variables) both in the open ocean and Antarctic marginal ice zone. Observations were gathered using a radar-based wave and surface current monitoring system (WaMoS-II) built on board of the research icebreaker Akademik Tryoshnikov. Here, we discuss how these observations underpin the set up, calibration and validation of the WaveWatch III wave model over a domain covering the entire Southern Hemisphere, therefore spanning from tropical waters to the edge of sea ice (open waters only). The calibrated model will then be used to carry out a thorough assessment of different sea ice modules, to evaluate accuracy of predictions in the marginal ice zone. Test cases of waves-in-ice recorded during the Antarctic Circumnavigation Expeditions will be discussed in details.

How to cite: H. Derkani, M., Hessner, K., Zieger, S., Nelli, F., Alberello, A., and Toffoli, A.: Evaluation of the numerical wave model (WaveWatch III) for wave simulation in the Antarctic marginal ice zone, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-12247, <https://doi.org/10.5194/egusphere-egu2020-12247>, 2020

How to cite: H. Derkani, M., Hessner, K., Zieger, S., Nelli, F., Alberello, A., and Toffoli, A.:

Evaluation of the numerical wave model (WaveWatch III) for wave simulation in the Antarctic marginal ice zone, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-12247, <https://doi.org/10.5194/egusphere-egu2020-12247>, 2020