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Ocean Science Discussions

Interactive comment on "Super-ensemble techniques applied to wave forecast: performance and limitations" *by* F. Lenartz et al.

F. Lenartz et al.

fabian.lenartz@gmail.com

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We would like to thank referee #2 for his general comments about our study, as well as for the specific and technical reamrks that have allowed the improvement of the paper.

Specific comments

The authors should provide a reference (or at least a website link) for all four applied wave forecast systems as well as for their associated atmospheric forcing systems.
We have added the links to the wave and weather forecast system websites: WAM ATHENS

http://forecast.uoa.gr/waminfo.php
SKIRON
http://forecast.uoa.gr/forecastnewinfo.php
WAM ISMAR
http://ricerca.ismar.cnr.it/MODELLI/ONDE_MED_ITALIA/page-html/nettur
ECMWF/IFS
http://www.ecmwf.int/research/ifsdocs/CY31r1/WAVES/IFSPart7.pdf
SWAN ARPA
http://www.arpa.emr.it/sim/?mare&idlivello=72
COSMO
http://www.cosmo-model.org
ALADIN CROATIA
http://www.meteo.hr/
However, since the fields that were used for the DART campaigns may differ from the present products, we have mentioned that such a difference may exist. Please also note that the operational version of SWAN NRL in the Adriatic Sea was only temporarily run in order to support the DART campaigns, thus we can not refer to a website.

Furthermore some information/discussion should be added concerning the main differences between the two types of wave models used, WAM and SWAN.
One introducing paragraph has been added for each model:
The WAve Model was originally designed for modeling waves in the deep ocean or in intermediate depth water. However, in the course of time it has been adapted for simulations in shallow water by the use of a shallow-water phase speed in the expressions of wind input, a depth dependent scaling of the quadruplet wave-wave interactions, a reformulation of whitecapping in terms of wave number rather than frequency and the addition of bottom dissipation. WAM was the first wave model to use the discrete interaction approximation to calculate non-linear transfers of energy by quadruplet wave-wave interactions. Besides, it accounts for the effects of shoaling

and refraction due to spatial variations in bottom and current and can also simulate blocking and reflection when waves propagate against the current. Still, WAM cannot be realistically applied to coastal regions with water depths less than 20-30 m. Regarding the numerics, WAM uses a different discretization scheme for the integration of the source functions and the calculation of the advective terms of the action balance equation: the source functions are computed with a fully implicit scheme, while two alternative explicit propagation schemes are implemented to calculate the advection terms, a first-order upwind scheme or a second-order leapfrog scheme.
The Simulating WAves Nearshore model was developed to compute short crested waves in coastal regions with shallow water and ambient currents. Two rather important processes in coastal environment were added with respect to WAM: depth induced wave breaking and triad wave-wave interactions. Similarly to WAM, SWAN incorporates the effects of shoaling, refraction, blocking and reflection due to currents and variations in bathymetry. Concerning its numerical implementation, SWAN uses an implicit propagation scheme based on finite differences, which is unconditionally stable and more suited for small-scale, shallow-water and high-resolution computations. This scheme allows for relatively large time steps because it is only limited by accuracy. The drawback of this implicit scheme is that it is fairly diffusive for long propagation distances (oceanic scales).

Technical corrections

Figures 2, 3. Please provide variable name and units.
Thanks for mentioning this lack, variable name and units have been added on top of the colorbar.

Figures 4,5,8, 9: Provided resolution is too low and need to be considerably increased.
We have increased the size of the symbols and the thickness of the lines in figures

4, 5, 8 and 9. The new figures are included in the attached revised version of the paper.