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The effect of the driving wind fields on the accuracy of wave hindcasting in the Black Sea

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Availability of realistic input information on wind spatial and temporal distribution affects significantly accuracy of wave model output. Accordingly, the paper addresses the crucial issue such as sensitivity of wave hindcasting to the input wind data. This problem is brought to the geographical frames of the Black Sea region where long-term observations in deep water areas are extremely rare that add up to extra complications. The luck of representative deep water data to be assimilated in the global atmospheric models imposes comparison of available atmospheric pressure or surface wind sources and selection of proper regional model capable of interpolating and eventually increasing the quality of the input driving fields.

With this respect the present study estimates results derived for the Black Sea region through a couple regional atmospheric models both forced with the major reanalysis (ECMWF and NCEP/NCAR) data. The wind speed time series, simulated for three of the severest storms in the Black Sea during last 50 years are compared with meteorological stations records. As an alternative of global reanalysis, data originated from standard synoptic maps are considered to resolve the extreme storm events.

Further, the effect of the wind data feasibility on the accuracy of the modeled significant wave height is considered by comparison with buoy measurements. Therefore, three of wave models that have proved their viability and are widely used in the world practice– WAM (cycles 3 and 4), Tolman's WAVEWATCH – III and Davidan's new spectral-parametric model (SPM) – are adopted. It is found that more realistic wave fields are simulated using the atmospheric pressure field reanalysis rather than the

reanalysis of surface wind. This is substantiated with the comparison of significant wave heights return values obtained for various hindcast model outputs spanning the 45-years period (1958-2002) driven with different input wind data. In wave climatic aspects, the difference between estimated n-year significant wave heights computed through these sets exceeds 10%.