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Observation-based input and dissipation version of WAVEWATCH III

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Measurements collected at Lake George, Australia, resulted in new insights on the processes of wind wave interaction and white-capping dissipation and consequently new parameterisations of these source terms. The new nonlinear wind input source term accounts for dependence of the growth increment on wave steepness, for airflow separation which leads to a relative reduction of the growth under extreme wind conditions, and for negative growth rate under adverse winds. The new wave breaking and whitecapping dissipation source function features two separate terms: the inherent breaking term and a cumulative dissipation term due to influences of longer waves on wave breaking of shorter waves. Another novel feature of this dissipation is the threshold in terms of spectral density: below this threshold breaking stops and whitecapping becomes zero. In such conditions dissipation due to wave interaction with water turbulence takes over, which regime is particularly relevant for decaying seas and for swell. This paper describes these source terms implemented in WAVEWATCH III and evaluates the performance against existing source terms in duration-limited simulations and against buoy measurements for windsea-dominated conditions. Results show agreement by means of growth curves and integral parameters in the simulations and hindcast. The paper also introduces wave breaking probability as model output, along with standard wind-wave metrics.