



Numerical evidence for reduced drag coefficient during the North Sea storm Anatol.

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Traditionally it has been assumed, that the drag coefficient is an always growing function of the wind speed, a hypothesis based on momentum transfer measurements in low to moderate winds. In recent years, however, measurements in high wind speeds have become available and they suggest that the hypothesis may not be valid for winds above some 30-35 m/s, for which the drag coefficient seems to level off or perhaps even decrease. Anatol was a storm moving rapidly across the North Sea in the afternoon and evening at the 3. of December 1999 with maximum wind speeds well above 40 m/s. Numerical simulations of the storm have been carried out, using a version of the wave model "WAM", using the Janssen momentum transfer model and different forcing wind fields. Most of these forcing fields produces too small waves in comparison with in-situ buoy measurements. This is demonstrated to be mainly due to too low space/time resolution of the forcing fields. A simulation with a high quality wind field of the storm oppositely produces much too high waves. One possible explanation for this that the model parameterisation causes the drag coefficient to grow (almost linearly) with wind speed even for very high winds. It is - by putting a cap to the drag coefficient - demonstrated that results in agreement with the measurements are obtained for a maximum drag coefficient which is close to that suggested by measurements.