



The impact of stability on the near-surface wind in high-wind conditions over sea

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We study the influence of the stability of the boundary layer on the near-surface wind, especially for high-wind conditions. An analysis of vertical wind speed ratios observed at tall masts in the North Sea and The Netherlands demonstrates that over sea stability has still a significant impact on the wind profile when the wind speed at 10 m is 7 Bft or higher (at least 13.9 m s⁻¹). Over land, stability effects are much less important in high-wind conditions. This is because over land large vertical temperature differences are rare in these conditions. An analysis of 30 years of station data shows that the ratio of the 10-m wind speed between sea and land depends systematically on the difference between the air temperature and the sea surface temperature. The observational results are represented by HARMONIE, a state-of-the-art Numerical Weather Prediction model, although the impact of stability is smaller than in the observations. They also indicate that in estimating the wind speed over sea from the wind speed of a nearby land station the stability over sea should be taken into account.