Geophysical Research Abstracts
Vol. 19, EGU2017-7358, 2017
EGU General Assembly 2017
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Impact of the interfaces for wind and wave modeling – interpretation using COAWST, SAR and point measurements

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Air and sea interacts, where winds generate waves and waves affect the winds. This topic is ever relevant for offshore functions such as shipping, portal routines, wind farm operation and maintenance. In a coupled modeling system, the atmospheric modeling and the wave modeling interfere with each other through an interface. In most modeling system the interface is described through the roughness length. The roughness length is parameterized with the basic idea of the Charnock formulation while the coefficients could be functions of simply wind speed, or wave parameters. More advanced interfaces use the stress directly, thus avoiding the uncertainties caused by parameterizations. This study examines the efficiency of the wave impact transfer to the atmospheric modeling through the two types of interfaces, roughness length and stress, through the coupled-ocean-atmosphere-wave-sediment-transport (COAWST) modeling system. The roughness length has been calculated using seven schemes (Charnock, Fan, Oost, Drennen, Liu, Andreas, Taylor-Yelland). The stress approach is applied through a wave boundary layer model in SWAN. The experiments are done to a case where the Synthetic Aperture Radar (SAR) image shows the wind field affected by the coastal wave field. Point measurements from Horns Rev are used for data analysis and validation.