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Computed and observed turbulent heat fluxes during an extreme Bora event in the Adriatic using atmosphere-ocean coupling

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We have studied the performances of (a) a two-way coupled atmosphere–ocean modeling system and (b) one-way coupled ocean model (forced by the atmosphere model), as compared to the available in situ measurements during and after a strong Adriatic Bora wind event in February 2012, which led to extreme air–sea interactions. The simulations span the period between January and March 2012. The models used were ALADIN (4.4 km resolution) on the atmosphere side and Adriatic setup of POM ($1^\circ/30 \times 1^\circ/30$ angular resolution) on the ocean side. The atmosphere-ocean coupling was implemented using the OASIS3-MCT model coupling toolkit. Two-way coupling ocean feedback to the atmosphere is limited to sea surface temperature. We have compared modeled atmosphere-ocean fluxes (computed using modified Louis scheme) and sea temperatures from both setups to platform and CTD measurements of fluxes (computed using COARE scheme) and temperatures from three observational platforms (Vida, Paloma, Acqua Alta) in the Northern Adriatic. We show that turbulent fluxes from both setups differ up to 20% during the Bora but not significantly before and after the event. The impact of the coupling on the ocean is significant while the impact on the atmosphere is less pronounced. When compared to observations, two way coupling ocean temperatures exhibit a four times lower RMSE than those from one-way coupled system. Two-way coupling improves sensible heat fluxes at all stations but does not improve latent heat loss.