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Influence of wind speed and wind direction above the sea surface on the diffusive methane flux and the atmospheric methane concentration at the North Sea

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The estimations of the diffusive methane flux from the water phase into the atmosphere in coastal waters is relevant for a better estimate of the atmospheric greenhouse-gas budget. Unfortunately, so far, the numerical determination of the fluxes has a high level of uncertainty in coastal waters.

To improve the estimation of coastal methane fluxes, not only a high temporal and spatial sampling resolution of the dissolved methane in the water are required. Besides, also the atmospheric methane concentration and the wind speed and wind direction above the surface is important. In most cases, these atmospheric data are obtained from near-by atmospheric and meteorologic monitoring stations. In this study, we measured wind speed, direction and atmospheric methane local directly on board of three research vessel cruising in the southern North Sea within the MOSES project and compared the effects of local versus remote measurements of these data on the flux data. In addition, using the wind direction and speed, we try to assess the origin of the atmospheric methane measured in the study area. Using these “improved” data sets, we discuss if local measurements of auxiliary data provide better insights in the determining factors of the methane flux, and thus also improve the regional aquatic methane budget.