



## **Investigation on the air-sea Carbon Dioxide exchange process**

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The ocean has an important impact on atmospheric carbon dioxide (CO<sub>2</sub>), because it is a sink for a significant fraction of anthropogenically produced CO<sub>2</sub>. Therefore, the understanding and parameterizing of the CO<sub>2</sub> flux across the air-sea interface is an important prerequisite for climate modelling. However, there is still controversy about the parameterization of the CO<sub>2</sub> transfer velocity  $k$  as function of the wind speed  $u$ . In order to improve our understanding of the transfer velocity a new experiment which provides long-time observations of the atmospheric marine boundary layer and of the carbon budget in the surface water was started in spring 2003. The field study should help to decide which type of parameterization is more appropriate to describe the CO<sub>2</sub> gas exchange: a quadratic or a cubic one? On a platform in the central Arkona Sea, Baltic Sea, the structure of the marine atmospheric boundary layer has been observed by an eddy-covariance measurement system to determine the three-dimensional wind field and the fluxes of momentum, sensible heat, moisture and CO<sub>2</sub>. The air-sea exchange of CO<sub>2</sub> depends on the partial pressure difference of CO<sub>2</sub> between air and sea and the CO<sub>2</sub> transfer velocity. The partial CO<sub>2</sub> pressure in the sea is measured with a SAMI-sensor at about 5 m depth at the platform. In addition, spatial variability of the partial pressure difference of CO<sub>2</sub> in the Arkona Sea area have been obtained during intensive observation phases by ship measurements. In this contribution instrumental set-ups, methods and first results of this field study are presented. The CO<sub>2</sub> flux parameterization for various atmospheric and oceanic conditions is investigated on the basis of the two-year data set of direct measurements of the CO<sub>2</sub> flux over a wide range of wind speeds. Results of this study will be discussed.