Air-sea exchange of CO_2 in the East China Sea: Present synthesis and future changes

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The role of the productive East China Sea (ECS) in regulating the anthropogenic CO_2 and effect of environmental changes on CO_2 uptake changes are being revealed gradually. Here we report the synthesis of time-series data of the annual mean CO_2 fluxes since 1950 based on both observations and model calculation. This assessment of annual CO_2 uptake is more reliable and complete, compared to previous estimates, in terms of temporal and spatial coverage. Additionally, the CO_2 time-series exhibits distinct seasonal pattern and also reveals apparent inter-annual variations. The flux seasonality shows a strong sink in spring and a weak source in the period from late summer to mid fall. The weak sink status during warm periods in summer-fall is fairly sensitive to changes of pCO_2 and may easily shift from a sink to a source due to environmental changes. Finally, the effects of the Changjiang river discharge (CRD) and the Kuroshio strength on the CO_2 uptake have been discerned and future changes due to the CRD fluctuation are examined; i.e. how the CO_2 uptake in the ECS is controlled by the CRD fluctuation and the Kuroshio strength, which, in turn, are influenced by climate change and anthropogenic forcing, has been investigated as well.