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Neural-network based mapping of pCO_2 from simulated VOS, float and remote sensing data generated by an eddy-resolving North Atlantic model

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A high resolution coupled-ecosystem model of the North Atlantic is used to simulate VOS-lines, floats and the remote sensing of pCO_2 related parameters such as SST, Chlorophyll and mixed layer depth. We examine the quality of Neural-network (Kohonen Feature Maps, KFM) and Multiple Linear Regression (MLR) based basin-scale mapping of pCO_2 and associated air-sea CO_2 fluxes with regard to the spatial and temporal resolution of the measurements and the significance of each of the input data types. Results show that the annual cycle of averaged CO_2 fluxes can be well reproduced (with both KFM and MLR) in the latitudinal band between the UK and the Carribean where VOS-line coverage is high but also point to the necessity of a higher spatial resolution of VOS-line sampling beyond this well covered region for a successful basin-wide mapping.