



## **Assessment of the temporal and spatial changes of surface ocean fCO<sub>2</sub> in the Nordic Seas, Barents Sea and northern North Atlantic**

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Growth rates of surface ocean fCO<sub>2</sub> in the northern North Atlantic, Nordic Seas, North Sea and Barents Sea have been determined using several analyses with linear regression techniques. The different analyses/methods often yield quite different results even using the same dataset. This of course, represents a problem when assessing long term fCO<sub>2</sub> and flux change. The results given here indicate a stronger rate of change of fCO<sub>2</sub> in the ocean than in the atmosphere ( 1.5 μatm yr<sup>-1</sup>), but the rates are highly variable from one area to the next. The results are most robust in the northern North Atlantic between 45-55 deg N, with a rate of change 2.0 μatm yr<sup>-1</sup> in February, and in the Barents Sea, where the growth rate in February is about the same as observed in the atmosphere. The calculated rates of change were used to validate two climatological estimates of fCO<sub>2</sub>/pCO<sub>2</sub>, one by Olsen et al. (2003) and that of Takahashi et al. (2002). The conclusion is that both climatologies underestimate fCO<sub>2</sub>/pCO<sub>2</sub> in 1995 in the studied area, and therefore overestimate the air-sea fluxes in the studied area, since it is undersaturated. The lack of data in the northern North Atlantic is the primary source of error in the estimated rates of change, and in the climatological estimates of fCO<sub>2</sub>.