Supplement of

Seasonal methane accumulation and release from a gas emission site in the central North Sea

S. Mau et al.

Correspondence to: S. Mau (smau@marum.de)

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Supplement Fig. S1

The MOx values were corrected for differences between in situ and incubation temperatures using a temperature coefficient $Q_{10}$ of 1.6 (unpublished data of a North Sea sample) and Eq. 1:

\[
Q_{10} = \left( \frac{R_2}{R_1} \right)^{\frac{10}{T_2-T_1}}
\]

(1)

where $R_1$ is the reaction rate measured at temperature $T_1$ and $R_2$ the rate measured at temperature $T_2$ ($T_1 < T_2$). Due to the temperature differences the measured rates are 11-16% higher or lower than in situ rates depending if the incubation temperature was higher or lower than the in situ temperature.
Supplement Fig. S2: Modelled east-west (u) and north-south (v) component of current vector during deployment of CTD/rosette in summer.
Supplement Fig. S3: Modelled east-west (u) and north-south (v) component of current vector during deployment of CTD/rosette in winter.
Supplement Fig. S4: Depth profiles of methane concentrations on a log-scale. Methane concentrations were measured on discrete water samples.
Supplement Fig. S5: Methane concentrations measured at reference station located 55°18.35' N and 4°05.44' E.
Supplement Fig. S6: Sea level height ($\zeta$) during deployment of UWMS and CTD/rosette.
Supplement Fig. S7: **Fig. 1 by Mau et al. 2013**: Range of methane oxidation rates measured at different locations in the ocean water column derived from tracer incubations using $^3$H-CH$_4$ (Reeburgh et al., 1991; Valentine et al., 2001, 2010; Heintz et al., 2012, Mau et al., 2012) or $^{14}$C-CH$_4$ (all others). Pack et al. (2011) compared incubations with $^3$H-CH$_4$ (*1) and incubations with low-level $^{14}$C-CH$_4$ (*2) that were measured with accelerator mass spectrometry. In this study we compared incubations with $^3$H-CH$_4$ (*3) and incubations with $^{14}$C-CH$_4$ (*4).
Supplement Fig. S8: Time series of water samples collected during both field programs and incubated with $^3$H-methane.