

Interactive comment on “Comment on “Ideas and perspectives: is shale gas a major driver of recent increase in global atmospheric methane?” by Robert W. Howarth (2019)” by Michael D. Lewan

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The comment was uploaded in the form of a supplement:

<https://bg.copernicus.org/preprints/bg-2019-419/bg-2019-419-AC1-supplement.pdf>

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2019-419>, 2020.

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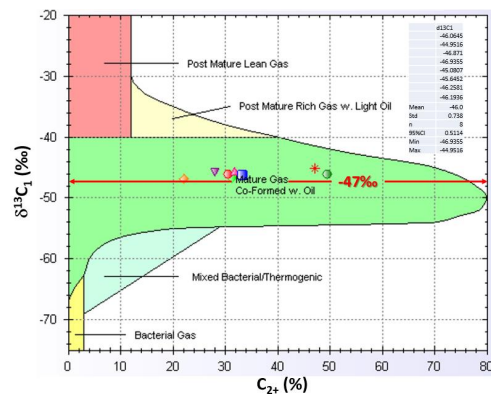


Figure 1. Plot presented by Schoell and LeFever (2011) showing composition and $\delta^{13}\text{C}_1$ values for Associated gases produced with oil from the Bakken Shale.

Fig. 1.

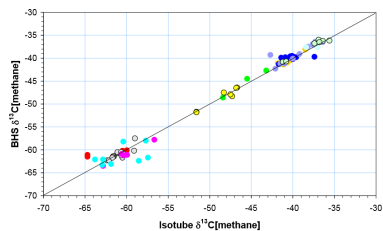


Figure 2. Comparison of $\delta^{13}\text{CH}_4$ obtained from mud gas samples (isotubes) versus bottom hole gas samples (95 samples, from Dawson and Murray, 2011).

Fig. 2.

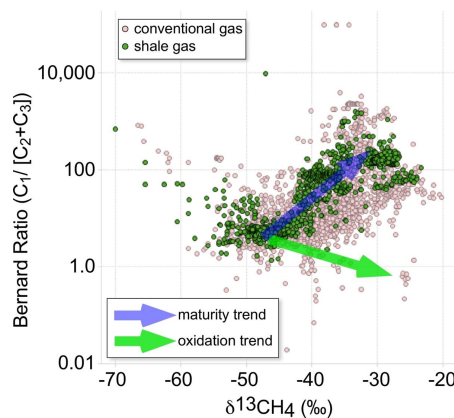


Figure 3. Bernard plot of gas wetness versus $\delta^{13}CH_4$ of CG and SG from Milkov et al. (2020) showing maturation trend and methane oxidation trend.

Fig. 3.

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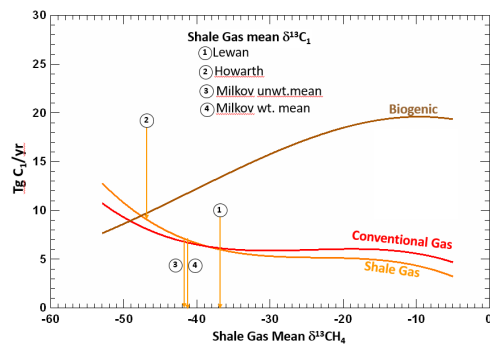


Figure 4. Plot of the sources of methane emissions from Biogenic, conventional and shale gas sources as a result of mean δ¹³CH₄ values used for shale gas according to the rationale and mathematical constructs of Howarth (2019).

Fig. 4.