

The effect of a land-use gradient and sediment characteristics on methane ebullition in four headwater streams

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INTRODUCTION

- Freshwater systems contribute significantly to the global atmospheric methane budget (Maek et al. 2014)
- Fluvial methane emissions studies generally neglect the ebullitive (bubble-mediated) pathway (Stanley et al. 2016)
- Ebullitive emissions may account for up to 80% of methane emissions from rivers and streams (Baulch et al. 2011).
- Studies have correlated human activity and development with sediment deposition (fine-grained, high percent of organic material)
- As there are limited resources providing information on the main drivers of methane ebullition in streams, we ask the question:

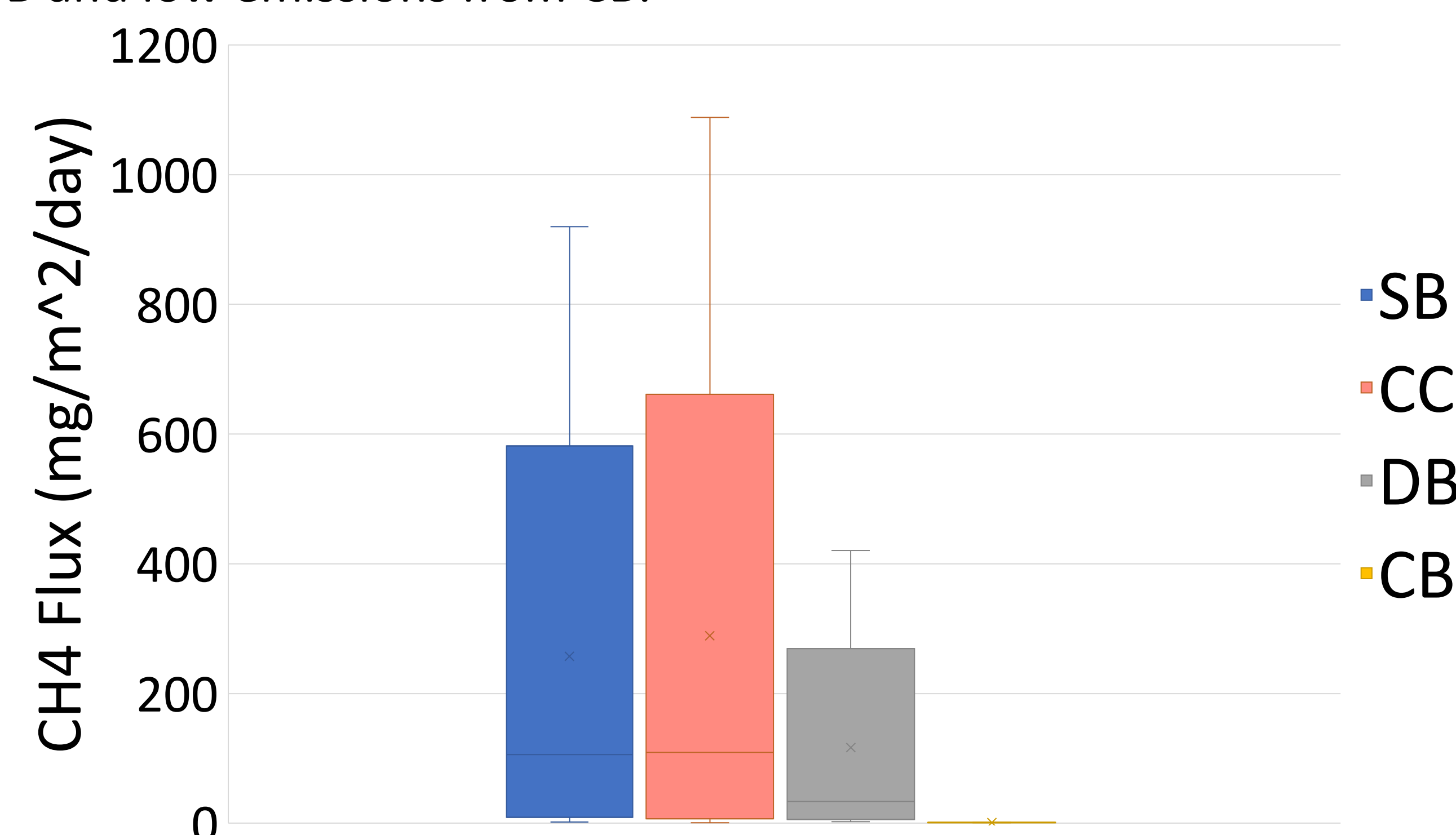
How do sediment characteristics and a land use gradient affect [the rate of] methane ebullition in streams?

METHODS

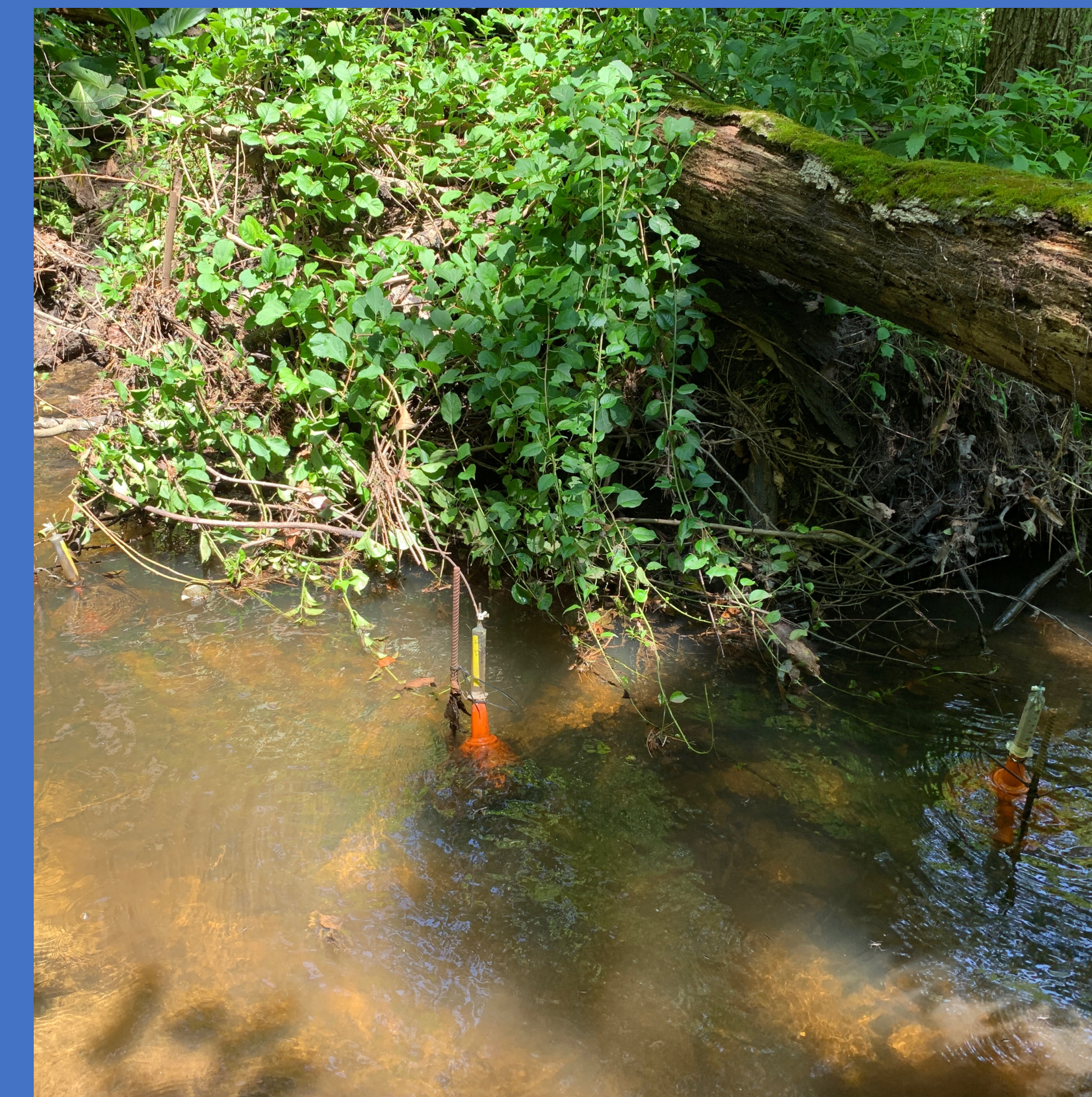
1. Deployed 45 inverted-funnel bubble traps into four headwater streams- Cart Creek (CC, forested in MA) Sawmill Brook (SB, urban in MA), Dube Brook (DB, forested in NH) and College Brook (CB, urban in NH).
2. A gas chromatograph was used to determine methane concentrations in the bubble samples.
3. Sediment samples were taken with a corer to determine bulk density, organic content and sediment-methane concentrations.

RESULTS

Figure 1: Methane fluxes in the four streams show that high methane emissions are released from sites CC and SB, moderate emissions from DB and low emissions from CB.



There are no strong correlations between sediment characteristics or land use gradient and ebullitive methane flux in these headwater streams.



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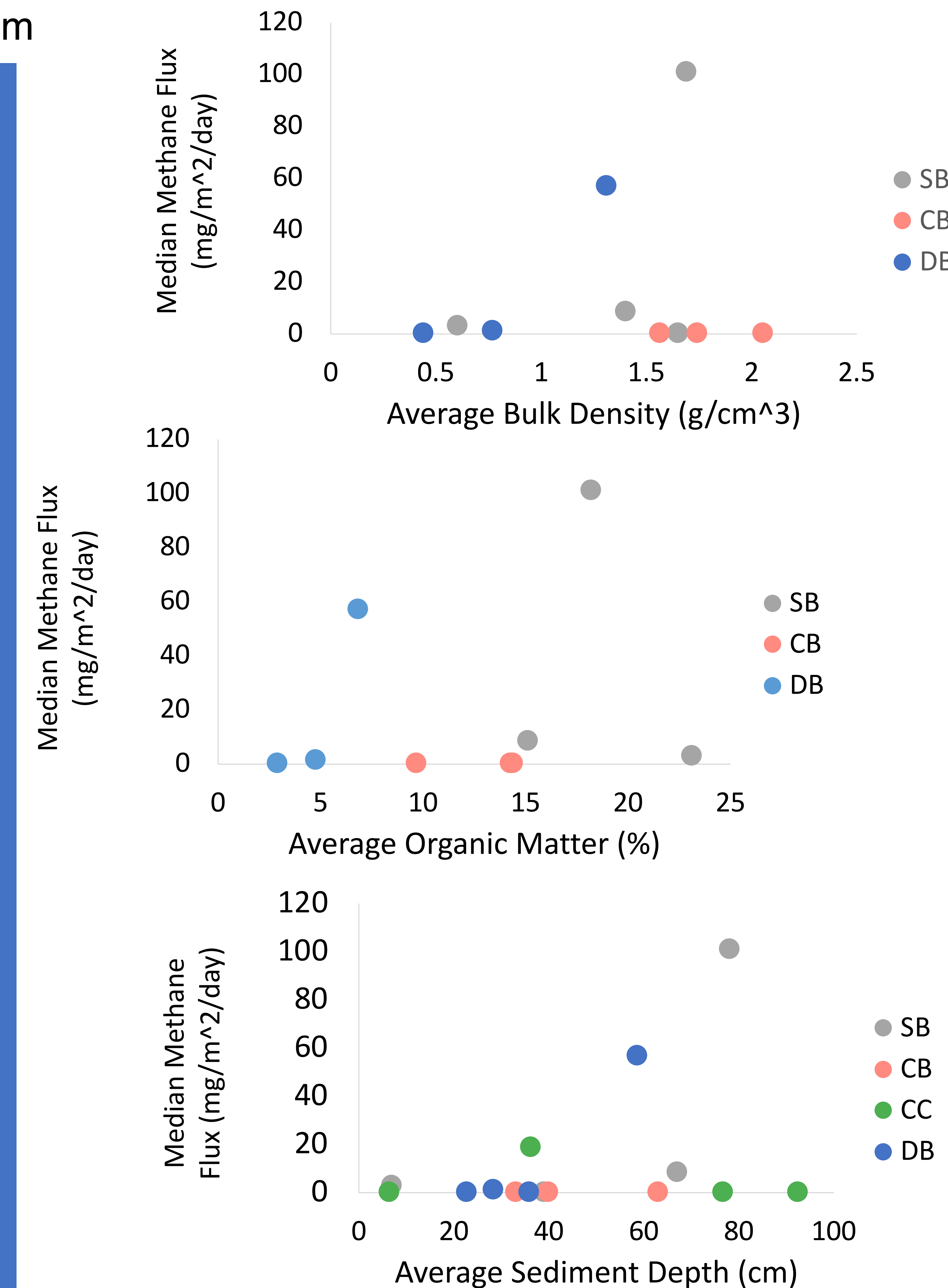


Figure 2: Sediment characteristics such as Average Bulk Density, Average organic matter and Average sediment depth vs Median Methane Flux do not depict any obvious trends across the four locations.

DISCUSSION

- The most active sites were DB and SB while the other sites, CB and CC, were not as active throughout the summer
- SB and CB were considered urban locations while CC and DB were considered forested locations. This did not seem to affect the data.

REFERENCES

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