Turnover of Organic Matter in Ports and Waterways: Project BIOMUD

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Research questions BIOMUD

1) Influence of biophysicochemical properties of sediments on organic matter (OM) degradation.
2) Effect of OM degradation on flocculation, sedimentation and consolidation within the four-layer system of SPM, FM, PS and CS (Fig. 1).

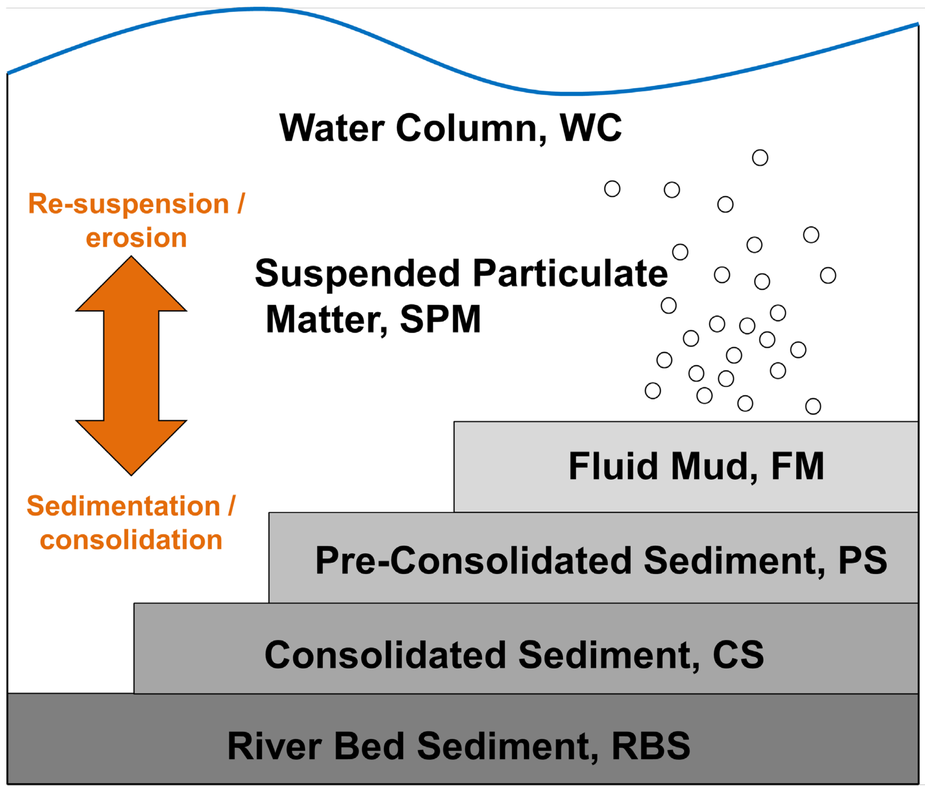

Fig. 1: Conceptual model of layers within the water-sediment-riverbed-system.

Investigation area, sampling & analyses

Nine locations in the **Port of Hamburg** are sampled. SPM, FM, PS and CS layers are analysed for biological, physical and chemical properties, and aerobic and anaerobic organic matter turnover rates (Fig. 2 and 3).

Fig. 2: Investigation area and sampling locations (source: Google).

Fig. 3: Core-sampling (left), four cores divided in layers (middle). Right: Gas production analysis by pressure monitoring (above) and by flow measurement (below).

First results

I. Gas generation decreases from east to west (Fig. 4):

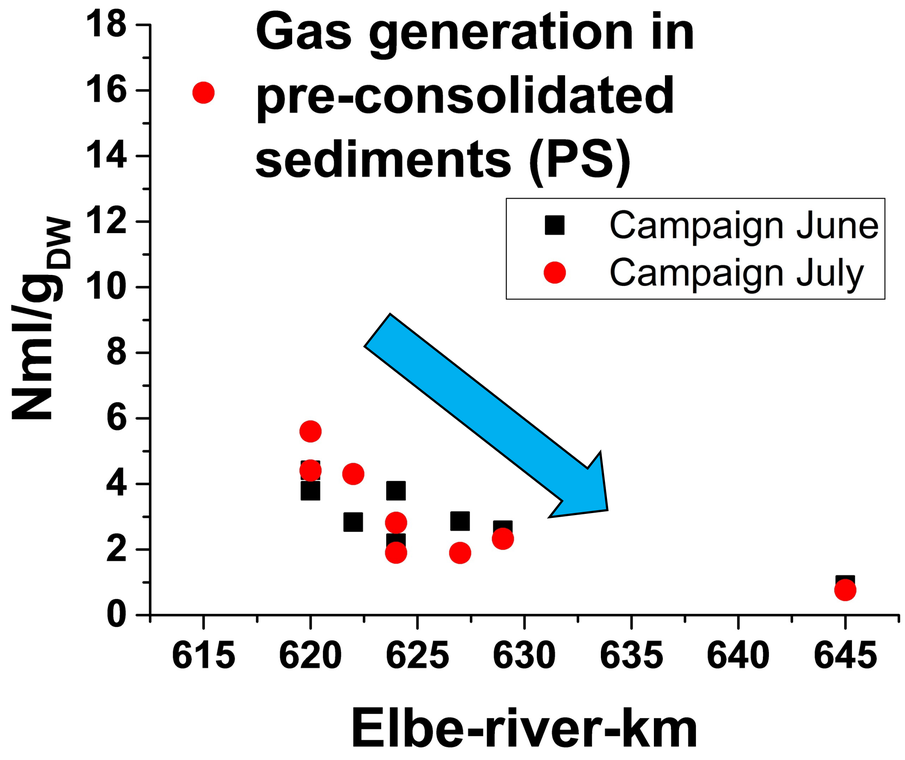

Fig. 4: Cumulative gas generation for pre-consolidated sediments, measured over 21 days. DW = dry weight.

II. Gas generation decreases with depth (FM > PS > CS), suspended material shows markedly lower gas production (Fig. 5):

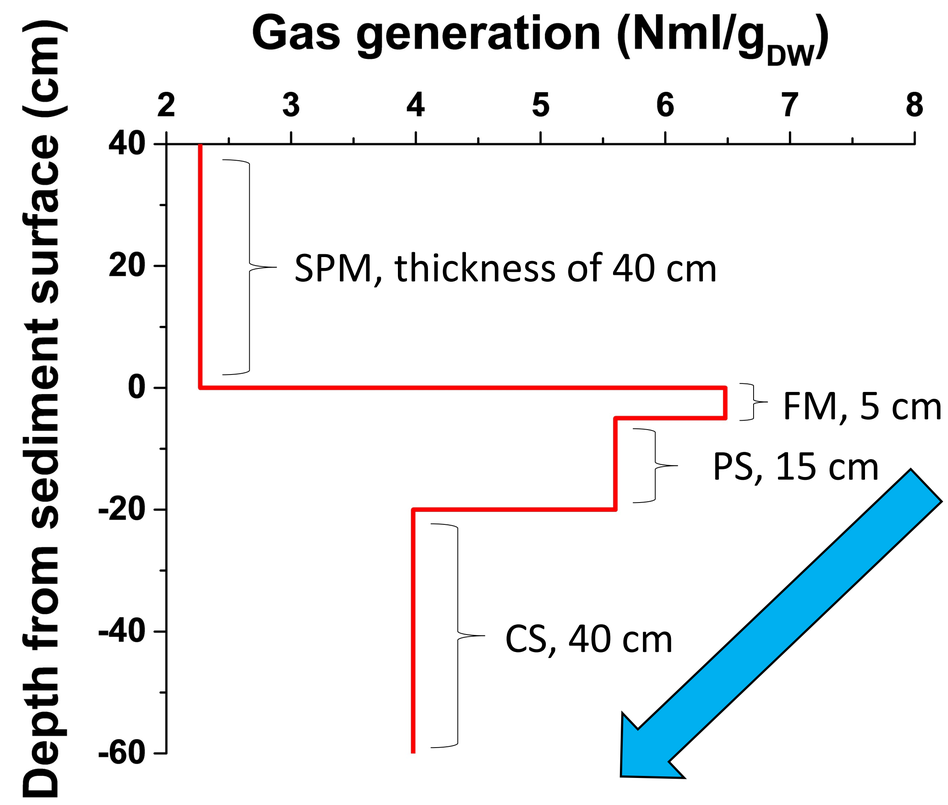

Fig. 5: Cumulative gas generation after 21 days for a sediment profile at location 4. DW = dry weight.

Conclusions

Gas generation appears to follow a gradient with higher rated upstream and lower rates downstream. At the same sampling site, anaerobic organic matter turnover rates decrease with depth.

BIOMUD is funded by Hamburg Port Authority and is a member of the MUDNET network.

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