

Modelling the long-term permeability evolution in a full-scale MBR: Statistical approaches

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Introduction

Problem:

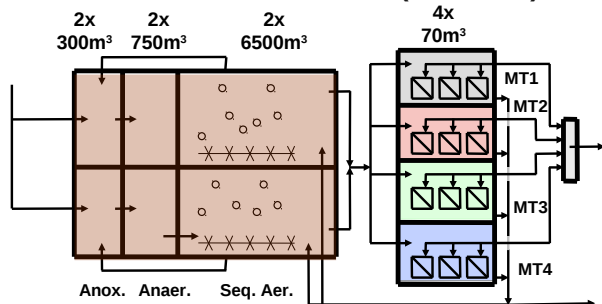
- Understanding membrane fouling in MBRs
- Prediction of long-term fouling in full-scale plants

Solutions:

- Highlight correlations between operational variables, short-term fouling indicators and long-term fouling
- Use of these correlations in a predictive model

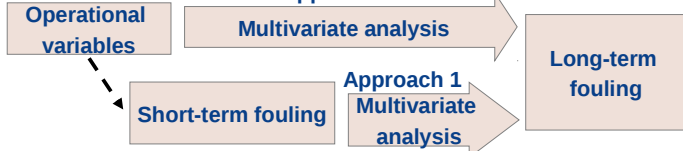
Full-scale MBR:

- One year monitoring of a 66,700 P.E. MBR
- Zenon Zeeweed 500d membranes (4x4550m²)



Two statistical approaches:

Approach 2



Approach 1

Approach 1:

Links between short-term and long-term fouling

Two short-term fouling indicators

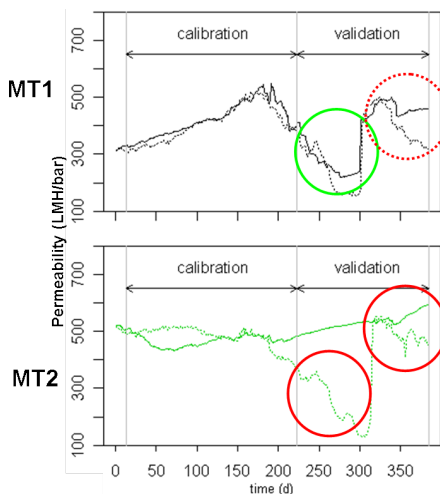
- Instantaneous fouling rate during flux-steps (daily mean)
- Backwash impact on permeability (daily mean)

Before regeneration cleaning:

- Relevance varies between membrane tanks

After regeneration cleaning:

- Doesn't work

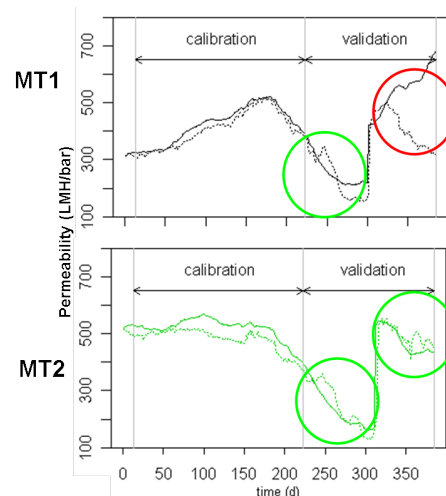


Before regeneration cleaning:

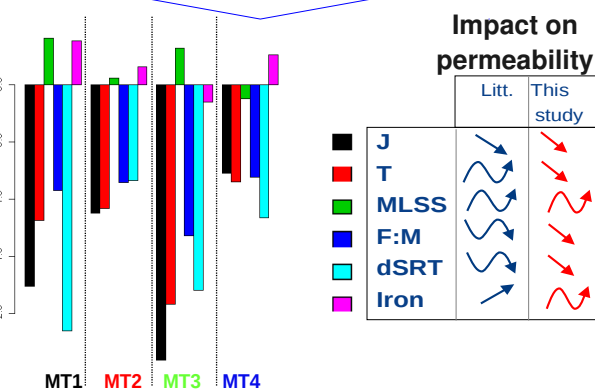
- Able to predict long-term fouling

After regeneration cleaning:

- Works only on MT3 (calibrated starting one month after a regeneration cleaning)



Normalized regression coefficients for long-term fouling prediction



Impact on permeability

	Litt.	This study
J	↘	↘
T	↘	↘
MLSS	↘	↘
F:M	↘	↘
dSRT	↘	↘
Iron	↘	↘

Conclusions

- Flux, temperature, F:M and SRT are the main fouling factors.
- Statistical modelling of long-term fouling based on op. var. is possible between two regeneration cleanings.



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