Overarching theme
Ammonia removal in engineered biofilms

Relevance
Ammonia removal is a key process in wastewater treatment preventing eutrophication of natural water bodies

Tools
Growing and examining biofilms

Skills
Work in an interdisciplinary team

Modeling biofilms

\[ \frac{1}{X} \frac{dX}{dt} = \frac{\mu_{\text{max}} S}{K_S + S} \]

Modeling
• Knowledge on flow and transport modeling
• Knowledge on numerical methods to solve transport problems
• Programing experience

Bio
• Knowledge on microbial growth kinetics
• Basic skills on laboratory work
• Critical analysis of experimental results

Research questions
• What is a good model setup for the description of biomass growth and ammonia transport (\(\rightarrow\) experiments) incl. appropriate boundary conditions?
• What are suitable numerical schemes to solve the problem?
• Can the model be used to identify limitations of competition mechanisms in the biofilm?
• How ammonium concentration selects for certain Ammonia Oxidizing Microorganisms (AOM) in detriment to others?
• How can we explain the co-existence of several species of AOM with distinct kinetics in the same biofilm?
• Are distinct AOM present in different biofilm layers?

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