

1 Microbial utilisation of particulate substrate utilisation during anaerobic plug-flow feeding and aerobic fully-
2 mixed conditions in aerobic granular sludge operation

3 **Supplementary Information**

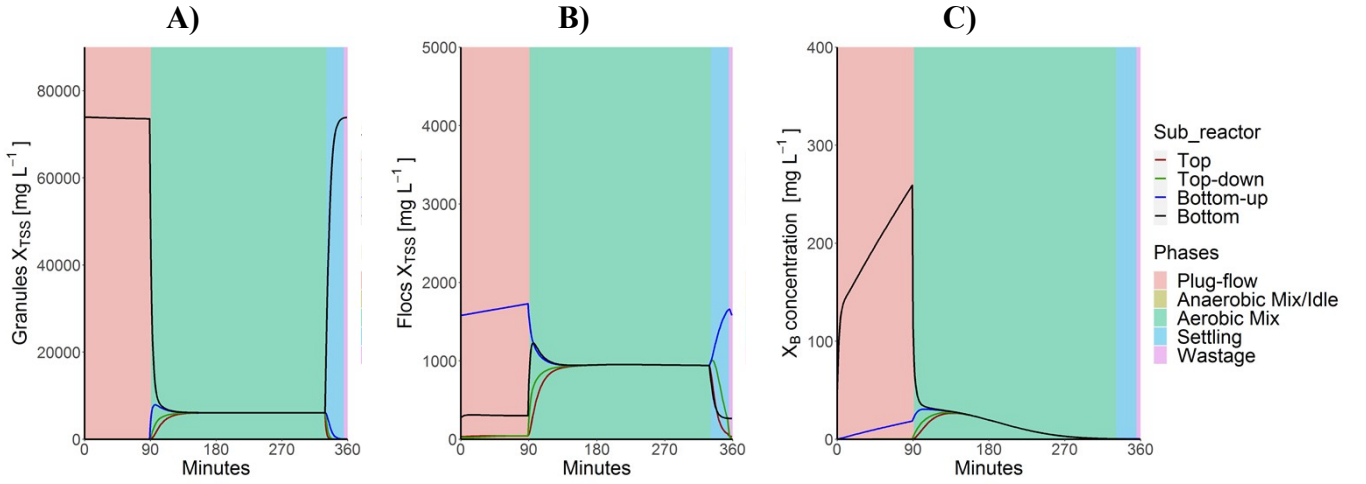
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9 S1 Distribution of granules and flocs during AGS-SBR operation



10 **Figure S1:** Distribution of X_{TSS} of flocs (A) and granules (B), as well as of influent X_B (C) within
 11 the four sub-reactors of the AGS model during the different operational phases of the default
 12 scenario.

13 S2 Kinetic model

14 **Table S1:** Kinetic (Gujer) matrix, model parameters and calculated variables of the mathematical
 15 model “SUMO1_XBSBSVFASH2_sep” used in this study. The tables are in “multimedia component
 16 1”.
 17

18 S3 S_{VFA} storage kinetics of PAO and GAO

$$r_{storage, X_{STO,PAO}}$$

$$= q_{PAO, X_{STO,PAO}} \cdot X_{PAO} \cdot \frac{S_{VFA}}{K_{VFA,PAO} + S_{VFA}} \cdot \frac{\frac{X_{PP}}{X_{PAO}}}{K_{PP} + \frac{X_{PP}}{X_{PAO}}} \cdot \frac{1}{1 + \exp\left[\frac{X_{STO,PAO}}{X_{PAO}} - K_{i, X_{STO,PAO}, PAO, PAOmax}\right]}$$

19
 20

Equ. S1

$$r_{storage, X_{STO,GAO}}$$

$$= q_{PAO, X_{STO,GAO}} \cdot X_{GAO} \cdot \frac{S_{VFA}}{K_{VFA,GAO} + S_{VFA}} \cdot \frac{1}{1 + \exp\left[\left(\frac{X_{STO,GAO}}{X_{GAO}} - K_{i, X_{STO,GAO}, GAO, GAOmax}\right) * s_2\right]} \cdot \frac{1}{1 + e}$$

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Equ. S2

23 where $q_{PAO, X_{STO,PAO}}$ and $q_{GAO, X_{STO,GAO}}$ are the maximum rate of S_{VFA} storage of $X_{STO,PAO}$ and

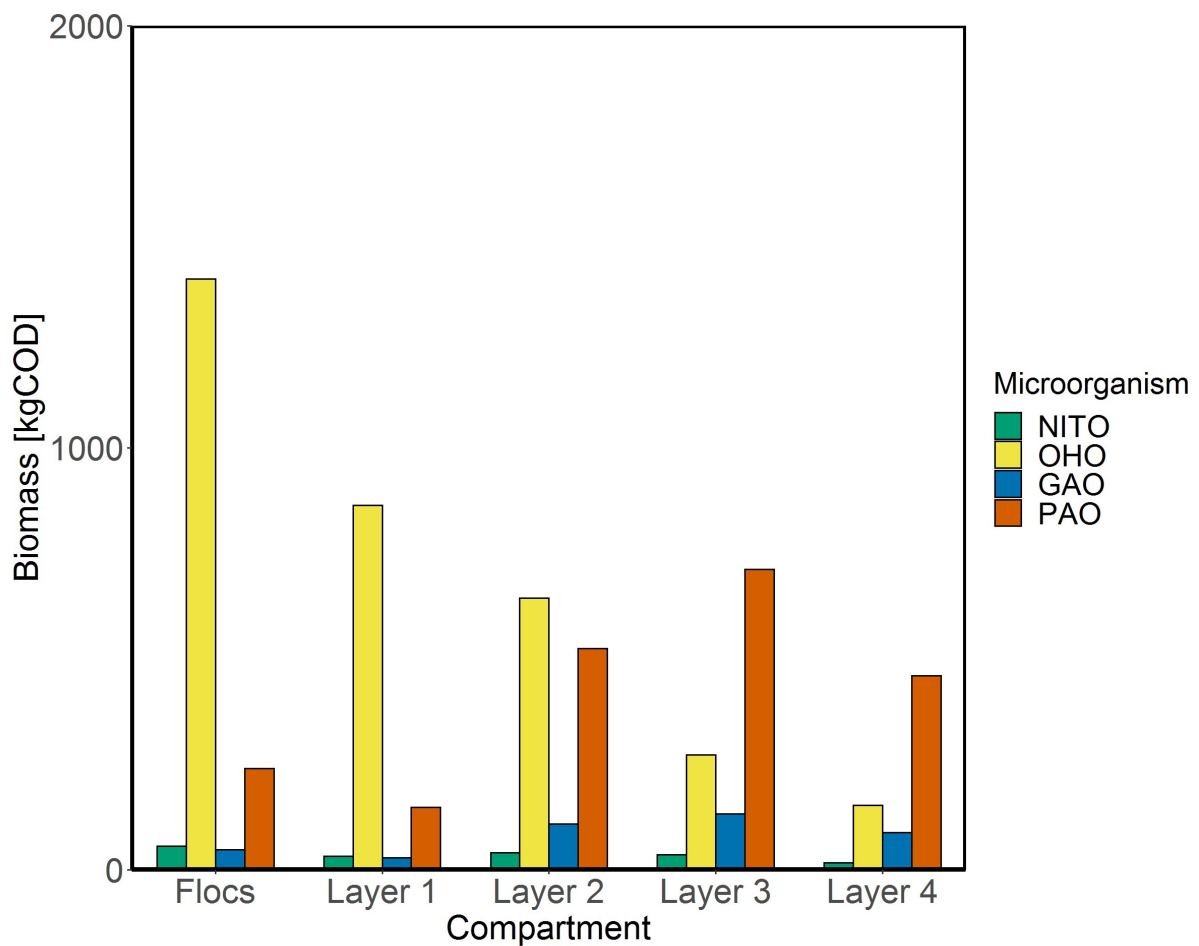
24 $X_{STO,GAO}$ by PAO and GAO, respectively (both 4 d^{-1}), S_{VFA} the VFA concentration (g m^{-3}),

25 $K_{VFA,PAO}$ and $K_{VFA,GAO}$ the half-saturation of S_{VFA} storage for PAO and GAO, respectively

26 (both 5 g m^{-3}), X_{PP} the poly-phosphate concentration (g m^{-3}), K_{PP} the half-saturation of poly-

27 phosphate for PAO (0.01 gP m^{-3}), $K_{i,X_{\text{STO,PAO,PAOmax}}}$ the half-inhibition of maximum $X_{\text{STO,PAO}}$
 28 content of PAO ($0.60 \text{ gCOD gCOD}^{-1}$), $K_{i,X_{\text{STO,GAO,GAOmax}}}$ the half-inhibition of maximum
 29 $X_{\text{STO,GAO}}$ content of GAO ($0.50 \text{ gCOD gCOD}^{-1}$), s_1 and s_2 the logistic slope of the logistic
 30 inhibition of GAO and PAO (500), respectively, $K_{\text{ORP,GAO}}$ the logistic half-saturation of ORP
 31 switching of GAO (-100 mV), ORP the oxidation reduction potential (mV) and $s_{\text{ORP,GAO}}$ the
 32 logistic slope of the ORP switching of GAO (0.1).

33 **S4 Microbial community composition of the default scenario**



34 **Figure S2:** Microbial composition (nitrifiers (NITRO), OHO, GAO and PAO) of the flocs, and
 35 granule layers 1-4 of the default scenario.

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