

Multiplicity of modelling concepts in ASMs

Representative examples

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Introduction

Methodologies for Activated Sludge Models evaluation and to define default parameter sets

- Modelling and modellers profiles
- Synthesis on practical modelling experiences
- Theoretical modelling knowledge
 - Models verification
 - Modelling concepts comparison
- Methodology to get "default" parameter set

=> schematic representation of modelling concepts

Model complexity

Models	Publication year	C	N	P	Processes (ni)	State variables (nj)	Complexity* C=ni*nj	Stoichiometric parameters	Kinetic parameters	Nb of parameters changed >50% (Hauduc et al., 2010)
ASM1	1987	X	X		8	13	104	5	13	9
Barker & Dold	1997	X	X	X	36	19	684	33	22	?
ASM2d	1999	X	X	X	21	19	399	22	43	8
ASM3	2000	X	X		12	13	156	15	21	?
ASM3 + BioP	2001	X	X	X	23	17	391	31	42	?
ASM2d+TUD	2004	X	X	X	22	18	396	36	50	?
UCTPHO+	2007	X	X	X	35	16	560	26	28	?

*(Gujer, 2006, n_s=1)



Modelling concepts (Hauduc et al.)

Schematic conventions

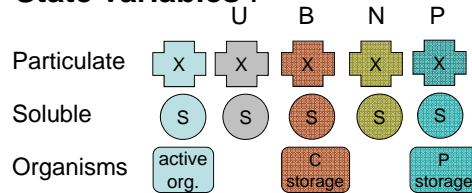
Models :

- ASM1 (Henze, 1987)
- Barker & Dold (Barker, 1997)
- ASM2d (Henze, 1999)
- ASM3 (Gujer, 2000)
- ASM3 + BioP (Rieger, 2001)
- ASM2d + TUD (Meijer, 2004)
- UCTPHO+ (Hu, 2007)

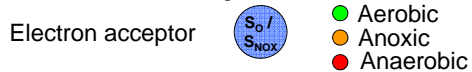
To simplify:

- Standardised notation from Corominas et al. (2010)
- Alkalinity and TSS not represented
- Only important stoichiometric coefficients specified

State variables :

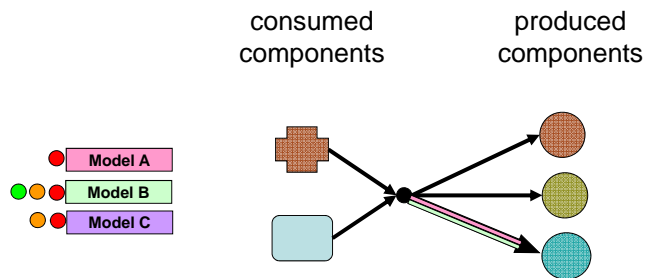


Electron acceptor conditions:



Modelling concepts (Hauduc et al.)

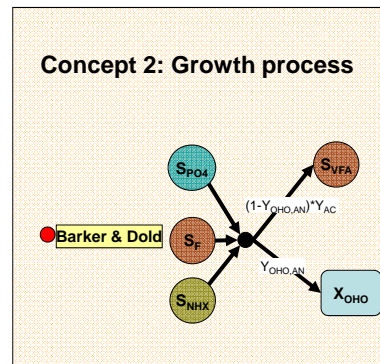
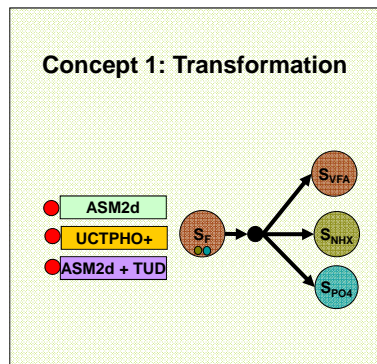
Schematic conventions



Modelling concepts (Hauduc *et al.*)



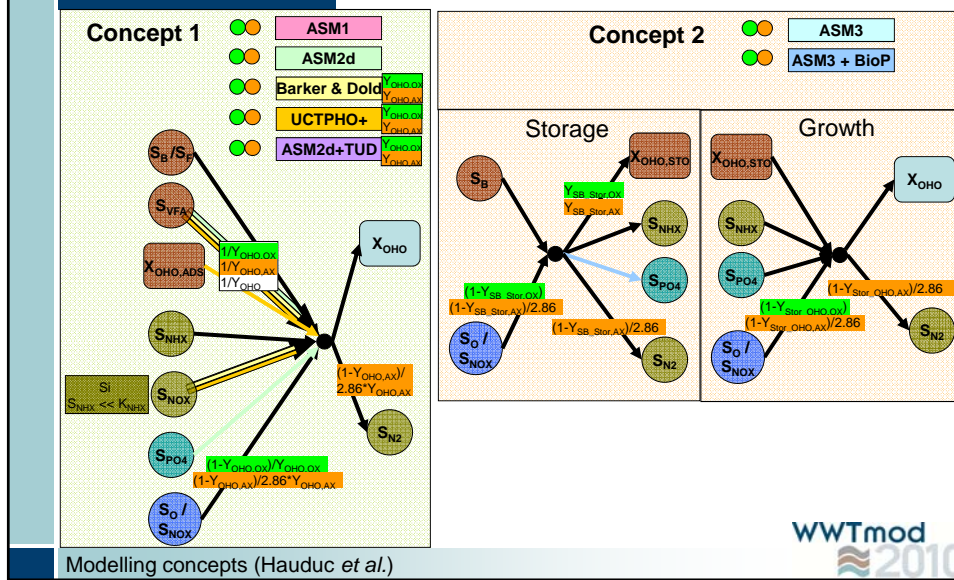
Example: Fermentation process



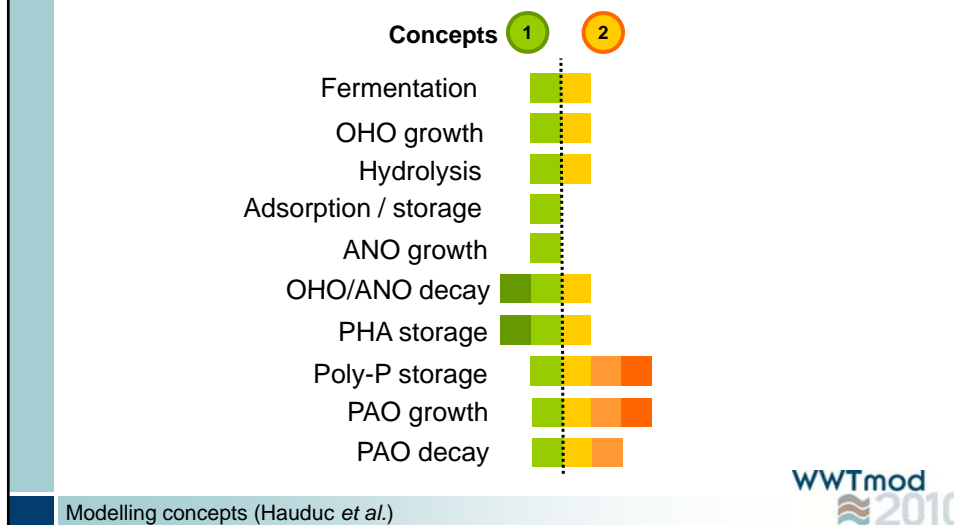
Modelling concepts (Hauduc *et al.*)



Example: OHO growth



Diversity of concepts



Limits of concepts

	Large anaerobic zones	Large anoxic zones	High HRT	NH ₄ depletion risk	High PAO biomass
ASM1					
Barker & Dold					
ASM2d					
ASM3					
ASM3 + BioP					
ASM2d + TUD					
UCTPHO+					

simplification

theory

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2010

Modelling concepts (Hauduc *et al.*)

Conclusions

- comprehensive representation of modelling processes
- highlights diversity of concepts
- limits of concepts
 - ➔ **first step to model choice**

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Modelling concepts (Hauduc *et al.*)