Review 1

This paper uses a Monte Carlo Sampling (MCS) method to auto-calibrate a hydrodynamic ecological model. This is perhaps the first application of MCS method for auto-calibration a hydrodynamic lake ecosystem model, and thus, the study is providing new concepts/methods. The paper is well organized, and the methods are valid, as backed up by their use in the calibration of other types of models. The results are discussed in an appropriate and balanced way, the discussion comparison to the Burger et al (2008) paper is very useful for putting this method in context. The method presented definitely has the potential to lead to significant scientific results. For example, if future use of hydrodynamic ecological models are able to incorporate these methods, the researchers can spend more time doing the science instead of tedious trial-and-error calibration. A very valuable part of the paper will be the code for auto-calibration, so that other researchers may modify to fit their own needs and application. There are a few areas that need more explanation (see "specific comments" below) in addition to some typing errors (see "technical corrections" below).

Specific Comments

5:21 how was it determined that the model output was not sensitive to the parameter? Please describe with at least a little more detail in the text. What is the threshold you used for if a parameter is sensitive or not?

Response (now 5:25-5:27)

Thanks for the nice comments.

There are many parameters which are not necessary to change in the calibration. For example, the density of suspended solid particles is normally set to be 2.65×10^3 *kg/m*^{3} *for all the types of sediment with difference size. So we might set "2.65E+03 2.65E+03" in the sediment parameter file and the same with diameters of POM1 and POM2 particles in the chemical parameter file. Also the same way will be used for many other similar parameters. The model users can decide which parameter needs to be changed during calibration by their experience or set the value range for every parameter if they are not able to judge. All the stoichiometric parameters will have fixed value so they have the same minimum and maximum values.*

Change in the text:

"judged by experience" has been added at the end of "When the model output was not sensitive to the parameter" at 5:27 in the text.

5: 27 "An alternative approach is to enter the physical parameters manually as many of these parameters can be fixed on the basis of their theoretically constrained values."

Why do you provide the alternative approach here? This statement sounds more appropriate for the introduction or discussion. Are you saying the auto-calibration isn't really necessary for the physical parameters? Please explain more, or move to intro/discussion.

Response (now 5:35-5:36):

Sorry for the confusion and thanks for the excellent comments.

In the DYRESM-CAEDYM model, there are physical (par), biological (bio), chemical (chm) and sediment (sed) parameter files. It is actually very easy to calibrate the physical parameters for a experienced model user and the model outputs are still very good even all the physical parameters are set to be the default value from the sample files previously downloaded from CWR website. So it is not necessary to calibrate the physical parameters if the model user can easily get their suitable value based on comparison of observed and modeled temperatures. There is a switch for each parameter file (i.e. par, bio, chm and sed) in the configure file to tell the model to calibrate the parameters in this file or not. For a beginner, I would suggest all the four files be included for calibration. This description is part of auto-calibration procedure so I would keep it at the same place.

No change in the text.

5:35 What were the weighing factors? What where they based on? (then possibly in Discussion: Would your results change if the weighing factors were different?)

Response (now 6:1):

*For each variable, a RMSE value can be calculated based on the simulations and observations from the equation at "**2.5 Statistical evaluation methods for the auto-calibrated model**". The combined RMSE is the sum of each variable-specific RMSE multiplied by a weighing factor from 0 to 1. So if the model users might choose "0" as the weighing factor for a variable if they don't want to calibrate parameters for this variable or choose a comparatively smaller weighing factor (e.g. 0.2) if they think this variable is less important than the other ones. Otherwise they might choose "1" for all the variables if they are equally important.*

Change in the text (5:39 – 6:2)

"The root mean square error (RMSE) was estimated for comparisons of simulations and observations for the variables chlorophyll a and DO." has been changed to "The root mean square error (RMSE) was estimated for comparisons of simulations and observations for the variables chlorophyll a and DO. The combined RMSE is the sum of RMSEs for chlorophyll a and DO with each RMSE multiplied by an arbitrarily chosen weighing factor varying from 0 to 1."

5:22 Table 3 has a stoichiometric parameter (Stoichiometric ratio of C to O2 for respiration); yet on line 5:21-23 you state: "When the model output was not sensitive to the parameter or when fixed parameter values could be used (e.g., stoichiometric parameters), the minimum and maximum value were set to be equal and the parameter calibration was deemed unnecessary." Can you explain why you calibrated this particular stoichiometric parameter in your method? Or, be more clear about for which parameters calibration is not necessary. Can you provide a table of all parameters (including ones that were not auto-calibrated) in the supplementary document? Useful columns would be: parameter name and unit, parameter value, indication of if the parameter was auto-calibrated or not, if parameter was not auto-calibrated provide a very brief description of why parameter was not auto-calibrated (e.g. deemed not sensitive in sensitivity analysis, fixed parameter based on literature/theory/etc.)

Response (now 5:27):

Thanks for the nice comments. All the stoichiometric parameters shouldn't be calibrated but they still need to set a minimum and maximum values (the same value) because the software has to read the two values for each parameter. In this case study, we set up a very small range (2.6 - 2.7) for stoichiometric ratio of C to O_2 for respiration to check if the model outputs are sensitive to this parameter. We have found the model results were the same with the stoichiometric value of 2.66667 and MCS-generated value 2.69 in this paper. So the stoichiometric value should be used for DYRESM-CAEDYM and we have deleted the revelent information in Table 3. As required by the anonymous reviewer, the parameters which were calibrated in this case study was shown in the supplement table. There are still some parameters which were not calibrated but can be calibrated with a minimum value and a maximum value to be set up because I though they might be constant (e.g. diameter and density of different type of sediments).

11:5 Change "massive parameters" to "a massive number of parameters" and maybe replace "massive" with a more quantifiable measure? Also: change "dynamic water quality model" to either "a dynamic water quality model" or "dynamic water quality models." Also: add "calibration of" to ". . .effective method for [calibration of] dynamic water. . ."

Response (now 11:14):

Thanks for the nice comments. "massive parameters" has been replaced by "a massive number of parameters" at 11:14. It is difficult to quantify the exact number of all the parameters which need to be calibrated for me because different model user might have different opinion on how many parameters need to be calibrated. So the exact number might depend on the experience of model user. CAEDYM model has 4 parameter files (par,

chm, bio, sed) including more than 300 parameters. So I would use "a massive number of parameters" in the text.

"dynamic water quality model" has been changed to "calibration of a dynamic water quality model" at 11:14.

11:9 Did you quantify the "time-consuming" part of this conclusion? Perhaps be a bit more descriptive in the extent to which you know it is in fact

Technical Corrections

Equation 1 and 2 have an undefined Q variable.

Figure 2 needs a color ramp scale/legend

Figure 1 is referred to in text as "Figure 1" whereas Figure 2 is referred to in text as "Fig. 2" –should be consistent in abbreviating or not with in text figure references.

Response (now 11:18):

Thanks for the nice comments.

We were not quantify the "time-consuming" part of the conclusion" since we didn't take any comparison. However, it might be actually more time-consuming for most of model users to calibrate so many parameters using conventional method than using this auto-calibration software. However, some experts might manually calibrate the parameters with less time than this software running time. So we added "For most of the model users" at the beginning of this conclusion at 11:17.

The variable O_i *has been defined below the equations.*

Color scale has been added to fig.2.

All the "figure" has been referred to "fig." in the text.

Supplement – calibrated parameters in this case study

Physical parameters				
Name	**Unit**	**Min_value**	**Max_value**	**Description or default value from literature**
Bulk aerodynamic mmt. transport coeff.		0.001	0.0015	0.0013
Mean albedo of water		0.08	0.09	0.08
Emissivity of a water surface		0.8	0.98	0.088
Critical wind speed	m/s	3.0	8.0	4.0
Bubbler entrainment coefficient		0.01	0.015	0.012
Buoyant plume entrainment coefficient		0.07	0.09	0.083
Shear production efficiency		0.05	0.1	0.08
Potential energy mixing efficiency		0.15	0.4	0.25
Wind stirring efficiency		0.15	0.4	0.25
Effective surface area coefficient		0.50E+06	1.5E+08	1.0E+07
BBL dissipation coefficient		0	0.2	
Vertical mixing coeff.		50	500	200

Ranges of the minimum layer thickness		0.5	0.8	
Ranges of the maximum layer thickness		1	3	
Chemical parameters				
Name	**Unit**	**Min_value**	**Max_value**	**Description or default value from literature**
Decay rate for colour/tracer		0	0	
Setting rate for colour/tracer		0	0	
Maximum limit of polychaete biomass	g/m^2	40	60	50
Respiration stoichiometric ratio of C to O2	mg C/mg O	2.66667	2.66667	**stoichiometric**
Fraction of net DO allocated to seagrass roots		0.09	0.11	0.1
Stoichiometric factor, seagrass C : DO	mg seagC/mg O	2.66667	2.66667	**Stoichiometric**
Stoichiometric factor, jellyfish C : DO	mg jelC/mg O	2.66667	2.66667	**stoichiometric**
Minimum DO in the bottom layer	mg/L	0	0	
Photo-respiration phytoplankton DO loss		0	0.5	
KDOB: Half sat. const. for DO dependence of POM/DOM decomposition – water column	mg/L	2.0	3.0	2.5
KDOB: Half sat. const. for DO dependence of POM/DOM decomposition – sediment	mg/L	2.0	3.0	2.5
fanB: aerobic/anaerobic factor–water column		0.2	0.4	0.3
fanB: aerobic/anaerobic factor–sediment		0.2	0.4	0.3
vT - temperature multiplier for bacteria		1.08	1.08	1.08
Tsta - standard temperature	Deg C	16	20	18
Topt - optimum temperature	Deg C	20	24	22
Tmax - maximum temperature	Deg C	28	32	30
KrB - respiration of Bacteria – water column	/day	0.005	0.015	0.01
KrBs - respiration of Bacteria – sediment	/day	0.005	0.015	0.01
kexB - Bacterial Excretion of DOC–water column	/day	0.1	0.3	0.2
kexB - Bacterial Excretion of DOC–sediment	/day	0.0	0.0	0.0
Half sat const for bacteria function f(BAC) - water column	/day	0.4	0.6	0.5
Half sat const for bacteria function f(BAC) - sediment	/day	0.0	0.0	0.0
Bacterial "grazing" preferences (decimal %) – pbPOM (labile)		0.75	0..75	0.75
Bacterial "grazing" preferences (decimal %) – pbPOM (refractory)		0.05	0.05	0.05
Bacterial "grazing" preferences (decimal %) – pbDOM (labile)		0.15	0.15	0.15
Bacterial "grazing" preferences (decimal %) – pbDOM (refractory)		0.05	0.05	0.05
Max transfer of POCL->DOCL	/day	0.001	0.01	0.005
Max transfer of POCR->DOCR	/day	0.001	0.01	0.005
Max transfer of POPL->DOPL	/day	0.001	0.01	0.005
Max transfer of POPR->DOPR	/day	0.001	0.01	0.005
Max transfer of PONL->DONL	/day	0.0008	0.004	0.002
Max transfer of PONR->DONR	/day	0.001	0.01	0.005
Diameter of POM particles – POM1	m	0.100E-04	1.00E-04	0.50E-04
Diameter of POM particles – POM2	m	0.100E-04	1.00E-04	0.50E-04
Density of POM particles – POM1	kg/m^3	0.1 E+04	0.12 E+04	0.11E+04
Density of POM particles – POM2	kg/m^3	0.1 E+04	0.12 E+04	0.11E+04
Critical shear stress for resuspension – POM1	N/m^2	0.01	0.05	
Critical shear stress for resuspension – POM2	N/m2	0.5	10.0	
Specific attenuation coefficient of POC1	mg/L/m	0.001	0.01	
Specific attenuation coefficient of POC2	mg/L/m	0	0	
Max mineralisation of DOCL->DIC	/day	0.002	0.008	0.005

Max mineralisation of DOCR->DIC	/day	0.002	0.008	0.005
Max mineralisation of DOPL->PO4	/day	0.003	0.009	0.006
Max mineralisation of DOPR->PO4	/day	0.002	0.008	0.005
Max mineralisation of DONL->NH4	/day	0.001	0.005	0.002
Max mineralisation of DONR->NH4	/day	0.002	0.008	0.005
Specific attenuation coefficient of DOC1	mg/L/m	0.006	0.015	0.010
Specific attenuation coefficient of DOC2	mg/L/m	0.006	0.015	0.010
flocculation rate constant		0.5	0.5	0.5
Rate of DOCr Photolytic Decay		0.3	0.3	0.3
Temp multiplier for denitrification		1.07	1.08	1.08
Denitrification rate coefficient	/day	0.01	0.6	0.02
Half sat const for denitrification	mg/L	0.1	5.5	5.0
Temp multiplier for nitrification		1.07	1.08	1.08
Nitrification rate coefficient	/day	0.01	0.4	0.08
Half sat constant for nitrification	mg O/L	0.1	1.5	1.0
Ratio of O2 to N for nitrification	mg N/mg O	3.4258	3.4258	3.4258
Constant for IRON, MANGANESE, SULFUR, ALUMINIUM, ZINC, AND ORGANIC COMPONENTS				
Biological parameters **1- DINOF 2- CYANO 3- NODUL 4- CHLOR 5- CRYPT 6- MDIAT 7- FDIAT**				
Name	**Unit**	**Min_value**	**Max_value**	**Description or default value from literature**
Maximum potential growth rate - 1	/day	0.4	0.7	0.5
Maximum potential growth rate - 2	/day	0.4	1.5	1.1
Maximum potential growth rate - 3	/day	1.0	1.0	1.0
Maximum potential growth rate - 4	/day	1.0	1.5	1.3
Maximum potential growth rate - 5	/day	1.0	1.5	1.2
Maximum potential growth rate - 6	/day	1.0	1.5	1.3
Maximum potential growth rate - 7	/day	1.0	1.5	1.14
Parameter for initial slope of P_I curve - 1	microE/m²/s	100	160	140
Parameter for initial slope of P_I curve - 2	microE/m²/s	150	300	150
Parameter for initial slope of P_I curve - 3	microE/m²/s	60	100	80
Parameter for initial slope of P_I curve - 4	microE/m²/s	80	120	100
Parameter for initial slope of P_I curve - 5	microE/m²/s	30	50	40
Parameter for initial slope of P_I curve - 6	microE/m²/s	110	130	120
Parameter for initial slope of P_I curve - 7	microE/m²/s	15	25	20
Light saturation for maximum production - 1	uE/m²/s	200	400	390
Light saturation for maximum production - 2	uE/m²/s	100	300	200
Light saturation for maximum production – 3	uE/m²/s	100	300	200
Light saturation for maximum production – 4	uE/m²/s	100	100	100
Light saturation for maximum production – 5	uE/m²/s	100	300	200
Light saturation for maximum production – 6	uE/m²/s	60	100	80
Light saturation for maximum production - 7	uE/m²/s	5	80	10
Specific attenuation coefficient - 1	ug chla/L/m	0.01	0.03	0.02
Specific attenuation coefficient – 2	ug chla/L/m	0.03	0.05	0.04
Specific attenuation coefficient – 3	ug chla/L/m	0.01	0.03	0.02
Specific attenuation coefficient – 4	ug chla/L/m	0.01	0.03	0.02
Specific attenuation coefficient – 5	ug chla/L/m	0.01	0.03	0.02
Specific attenuation coefficient – 6	ug chla/L/m	0.01	0.03	0.02
Specific attenuation coefficient – 7	ug chla/L/m	0.01	0.03	0.02
Half saturation constant for phosphorus - 1	mg/L	0.003	0.004	0.00393
Half saturation constant for phosphorus – 2	mg/L	0.003	0.007	0.006
Half saturation constant for phosphorus – 3	mg/L	0.06	0.06	0.06
Half saturation constant for phosphorus – 4	mg/L	0.0065	0.01	0.0085
Half saturation constant for phosphorus – 5	mg/L	0.0011	0.0051	0.0031
Half saturation constant for phosphorus – 6	mg/L	0.002	0.006	0.004

Half saturation constant for phosphorus – 7	mg/L	0.008	0.012	0.01
Half saturation constant for nitrogen – 1	mg/L	0.01	0.04	0.019
Half saturation constant for nitrogen – 2	mg/L	0.015	0.035	0.03
Half saturation constant for nitrogen – 3	mg/L	0.04	0.05	0.045
Half saturation constant for nitrogen – 4	mg/L	0.008	0.015	0.011
Half saturation constant for nitrogen – 5	mg/L	0.035	0.055	0.045
Half saturation constant for nitrogen – 6	mg/L	0.005	0.007	0.006
Half saturation constant for nitrogen – 7	mg/L	0.03	0.1	0.045
Minimum internal N concentration – 1	mg N/mg Chla	1.5	4.5	2.0
Minimum internal N concentration – 2	mg N/mg Chla	1.5	5.5	2.5
Minimum internal N concentration – 3	mg N/mg Chla	1.5	3.5	2.5
Minimum internal N concentration – 4	mg N/mg Chla	2.0	4.0	3.0
Minimum internal N concentration – 5	mg N/mg Chla	1.5	3.5	2.5
Minimum internal N concentration – 6	mg N/mg Chla	1.5	3.5	2.5
Minimum internal N concentration – 7	mg N/mg Chla	1.0	5.0	2.0
Maximum internal N concentration – 1	mg N/mg Chla	4	9	6
Maximum internal N concentration – 2	mg N/mg Chla	3	8	4
Maximum internal N concentration – 3	mg N/mg Chla	8	10	9
Maximum internal N concentration – 4	mg N/mg Chla	8	10	9
Maximum internal N concentration – 5	mg N/mg Chla	8	10	9
Maximum internal N concentration – 6	mg N/mg Chla	8	10	9
Maximum internal N concentration – 7	mg N/mg Chla	3	9.5	4.5
Maximum rate of nitrogen uptake – 1	mg N/mg Chla/day	1.2	2.0	1.5
Maximum rate of nitrogen uptake – 2	mg N/mg Chla/day	1.0	3.5	1.5
Maximum rate of nitrogen uptake – 3	mg N/mg Chla/day	1.0	2.0	1.5
Maximum rate of nitrogen uptake – 4	mg N/mg Chla/day	1.0	3.0	2.0
Maximum rate of nitrogen uptake – 5	mg N/mg Chla/day	1.0	2.0	1.5
Maximum rate of nitrogen uptake – 6	mg N/mg Chla/day	1.0	2.0	1.5
Maximum rate of nitrogen uptake – 7	mg N/mg Chla/day	1.8	4.0	3.0
Minimum internal P concentration – 1	mg P/mg Chla	0.2	0.8	0.5
Minimum internal P concentration – 2	mg P/mg Chla	0.2	0.8	0.5
Minimum internal P concentration – 3	mg P/mg Chla	0.2	0.4	0.3
Minimum internal P concentration – 4	mg P/mg Chla	0.2	0.4	0.3
Minimum internal P concentration – 5	mg P/mg Chla	0.2	0.4	0.3
Minimum internal P concentration – 6	mg P/mg Chla	0.2	0.4	0.3
Minimum internal P concentration – 7	mg P/mg Chla	0.1	0.5	0.25
Maximum internal P concentration – 1	mg P/mg Chla	1	3	2
Maximum internal P concentration – 2	mg P/mg Chla	1	2	1.4
Maximum internal P concentration – 3	mg P/mg Chla	1	3	2
Maximum internal P concentration – 4	mg P/mg Chla	1	3	2
Maximum internal P concentration – 5	mg P/mg Chla	1	3	2
Maximum internal P concentration – 6	mg P/mg Chla	1	3	2.2
Maximum internal P concentration – 7	mg P/mg Chla	1	1.6	1.3
Maximum rate of phosphorus uptake – 1	mg P/mg Chla/day	0.5	0.9	0.6
Maximum rate of phosphorus uptake – 2	mg P/mg Chla/day	0.1	1.0	0.2
Maximum rate of phosphorus uptake – 3	mg P/mg Chla/day	0.1	1.0	0.2
Maximum rate of phosphorus uptake – 4	mg P/mg Chla/day	0.1	1.0	0.2
Maximum rate of phosphorus uptake – 5	mg P/mg Chla/day	0.1	1.0	0.2
Maximum rate of phosphorus uptake – 6	mg P/mg Chla/day	0.1	1.0	0.2
Maximum rate of phosphorus uptake – 7	mg P/mg Chla/day	0.5	1.5	1.0
Constant internal P ratio if no internal P is modeled – 1	mg P/mg Chla	0.3	0.7	0.5
Constant internal P ratio if no internal P is modeled – 2	mg P/mg Chla	0.4	0.8	0.6
Constant internal P ratio if no internal P is	mg P/mg Chla	0.4	0.8	0.6

modeled – 3				
Constant internal P ratio if no internal P is modeled – 4	mg P/mg Chla	0.4	0.8	0.6
Constant internal P ratio if no internal P is modeled – 5	mg P/mg Chla	0.4	0.8	0.6
Constant internal P ratio if no internal P is modeled – 7	mg P/mg Chla	0.4	0.8	0.6
Constant internal N ratio if no internal N is modeled – 1	mg N/mg Chla	7	11	9
Constant internal N ratio if no internal N is modeled – 2	mg N/mg Chla	7	11	9
Constant internal N ratio if no internal N is modeled – 3	mg N/mg Chla	7	11	9
Constant internal N ratio if no internal N is modeled – 4	mg N/mg Chla	5	9	7
Constant internal N ratio if no internal N is modeled – 5	mg N/mg Chla	7	11	9
Constant internal N ratio if no internal N is modeled – 6	mg N/mg Chla	7	11	9
Constant internal N ratio if no internal N is modeled – 7	mg N/mg Chla	7	11	9
Maximum nitrogen fixation rate – 1	mg N/mg Chla /day	1	3	2
Maximum nitrogen fixation rate – 2	mg N/mg Chla /day	1	3	2
Maximum nitrogen fixation rate – 3	mg N/mg Chla /day	1	3	2
Maximum nitrogen fixation rate – 4	mg N/mg Chla /day	1	3	2
Maximum nitrogen fixation rate – 5	mg N/mg Chla /day	1	3	2
Maximum nitrogen fixation rate – 6	mg N/mg Chla /day	1	3	2
Maximum nitrogen fixation rate – 7	mg N/mg Chla /day	1	3	2
Growth rate reduction under maximal N fixation – 1		0.5	1.5	1
Growth rate reduction under maximal N fixation – 2		0.5	1.5	1
Growth rate reduction under maximal N fixation – 3		0.5	1.5	1
Growth rate reduction under maximal N fixation – 4		0.5	1.5	1
Growth rate reduction under maximal N fixation – 5		0.5	1.5	1
Growth rate reduction under maximal N fixation – 6		0.5	1.5	1
Growth rate reduction under maximal N fixation – 7		0.5	1.5	1
Optimum temperature – 1	Deg C	20	24	22
Optimum temperature – 2	Deg C	26	30	28
Optimum temperature – 3	Deg C	25	29	27
Optimum temperature – 4	Deg C	27	31	29
Optimum temperature – 5	Deg C	28	32	30
Optimum temperature – 6	Deg C	18	22	20
Optimum temperature – 7	Deg C	25	29	27
Maximum temperature – 1	Deg C	26	30	28
Maximum temperature – 2	Deg C	33	37	35
Maximum temperature – 3	Deg C	31	35	33
Maximum temperature – 4	Deg C	35	39	37
Maximum temperature – 5	Deg C	38	42	40
Maximum temperature – 6	Deg C	30	34	32
Maximum temperature – 7	Deg C	33	37	35

Respiration rate coefficient – 1	/day	0.05	0.09	0.07
Respiration rate coefficient – 2	/day	0.05	0.09	0.07
Respiration rate coefficient – 3	/day	0.08	0.16	0.12
Respiration rate coefficient – 4	/day	0.03	0.07	0.05
Respiration rate coefficient – 5	/day	0.1	0.3	0.2
Respiration rate coefficient – 6	/day	0.1	0.2	0.15
Respiration rate coefficient – 7	/day	0.08	0.16	0.12
Sediment parameters				
Name	**Unit**	**Min_value**	**Max_value**	**Description or default value from literature**
Density of SSOL1	kg/m³	0.265E+04	0.265E+04	0.265E+04
Density of SSOL2	kg/m³	0.265E+04	0.265E+04	0.265E+04
Density of SSOL3	kg/m³	0.265E+04	0.265E+04	0.265E+04
Density of SSOL4	kg/m³	0.265E+04	0.265E+04	0.265E+04
Density of SSOL5	kg/m³	0.265E+04	0.265E+04	0.265E+04
Density of SSOL6	kg/m³	0.265E+04	0.265E+04	0.265E+04
Diameter of SSOL1	m	3.00E-04	3.00E-04	3.00E-04
Diameter of SSOL2	m	3.00E-03	3.00E-03	3.00E-03
Diameter of SSOL3	m	3.00E-02	3.00E-02	3.00E-02
Diameter of SSOL4	m	3.00E-01	3.00E-01	3.00E-01
Diameter of SSOL5	m	3.00E+00	3.00E+00	3.00E+00
Diameter of SSOL6	m	3.00E+01	3.00E+01	3.00E+01
Specific attenuation coefficient of SSOL1	mg/L/m	0.05	0.05	0.05
Specific attenuation coefficient of SSOL2	mg/L/m	0.05	0.05	0.05
Specific attenuation coefficient of SSOL3	mg/L/m	0.05	0.05	0.05
Specific attenuation coefficient of SSOL4	mg/L/m	0.05	0.05	0.05
Specific attenuation coefficient of SSOL5	mg/L/m	0.05	0.05	0.05
Specific attenuation coefficient of SSOL6	mg/L/m	0.05	0.05	0.05
Critical shear stress of SSOL1	N/m²	0.035	0.035	0.035
Critical shear stress of SSOL2	N/m²	0.05	0.05	0.05
Critical shear stress of SSOL3	N/m²	0.091	0.091	0.091
Critical shear stress of SSOL4	N/m²	0.1	0.1	0.1
Critical shear stress of SSOL5	N/m²	0.15	0.15	0.15
Critical shear stress of SSOL6	N/m²	0.2	0.2	0.2
Temp multiplier of sediment fluxes		1.05	1.09	1.08
Sediment oxygen demand	g/m²/day	1	8	2.5
Sat. const. for DO sediment flux	mg O/L	1	8	2.5
PO4 release rate	g/m²/day	0.01	0.5	0.08
Controls sed. release of PO4 via O and NO3	g/m³	0.1	2.5	1.5
NH4 release rate	g/m²/day	0.02	1.5	0.28
Controls sed. release of NH4 via O and NO3	g/m³	0.1	2.0	1.5
NO3 release rate	g/m²/day	-0.8	0.2	-0.6
Controls sed. release of NO3 via O	g/m³	0.8	1.2	1.0
Si release rate	g/m²/day	0.01	0.02	0.015
Controls sed. release of Si via O	g/m³	0.1	1.5	0.5
DOCL release rate	g/m²/day	0.003	0.007	0.005
DOCR release rate	g/m²/day	0.003	0.007	0.005
Controls sed. release of DOC via O	g/m³	1.2	1.8	1.5
DOPL release rate	g/m²/day	0	0	0
DOPR release rate	g/m²/day	0	0	0
Controls sed. release of DOP via O	g/m³	1.5	1.5	1.5
DONL release rate	g/m²/day	0.07	0.11	0.09
DONR release rate	g/m²/day	0	0	0
Controls sed. release of DON via O	g/m³	1.4	1.6	1.5
Metal fluxes are constant from CWR sample sediment file				