Modeling Workgroup Quarterly Review

July 12, 2022

Event webpage: Link
For Remote Access - WebEx Link:
https://umces.webex.com/umces/j.php?MTID=mf614d6f4e7eae5d479368552eb21bccf
Meeting number: 2620 351 8849 **Password:** SMfKkbR4T86
Phone number: +1-408-418-9388 **Access code**: 2620 351 8849
To enter the webinar, please open the webinar link first.
This meeting will be recorded for internal use to assure the accuracy of meeting notes.

9:30 Announcements and Amendments to the Agenda – Mark Bennett, USGS and Dave Montali, Tetra Tech

9:35 Phase 7 Watershed Model Overview – Gary Shenk, USGS-CBPO
Gary will provide an overall summary of progress.

9:50 Discussion of the Phase 7 Model Overview

10:00 Progress in Phase 7 WSM Development – Gopal Bhatt, Penn State
Prior presentations have showcased structural details and prototypes of an operational Phase 7 Dynamic Watershed Model for NHDplus scale hydrology. However, the model results of the prototype were based on Phase 6 calibration. Gopal will provide an overview of the progress made during this quarter on hydrology calibration and proposed method updates with respect to incorporating (a) potential options for simple routing, (b) CalCAST average annual hydrologic responses (i.e., total flow and stormflow) at NHDplus catchment and land use scale, and (c) daily streamflow monitoring information and corresponding hydrograph statistics, in the model calibration.

10:30 Discussion of Phase 7 WSM Development Progress

10:40 Update on CalCAST Development: Sediment Component – Isabella Bertani, UMCES
Isabella will provide an update on the progress made in the development of CalCAST, specifically focusing on adding the capability to predict sediment load. CalCAST is a relatively parsimonious Bayesian modeling tool that is being developed to test predictors and spatially calibrate parameters that will ultimately inform prediction of flow and loads at monitoring stations throughout the watershed.

11:00 Discussion of CalCAST development

11:10 Development of Efficient Multi-Objective Optimization Procedures: Inclusion of new BMPs and understanding of solutions through visualization – Kalyan Deb, Pouyan Nejadhashemi, Gregorio Toscano, Hoda Razavi, and Vahid Rafiei, MSU
Progress in the development of efficient multi-objective (MO) optimization procedures. We added new Best Management Practices to our optimization algorithms in this update. In addition, we developed a visualization method that can let us understand the diversity of solutions that our multi-objective methods find.

11:30 Optimization Discussion

11:40 BREAK

12:30 Atmospheric Nitrogen Deposition Contributions to the Chesapeake Bay Watershed: Maryland Animal NH_3 Emissions Sensitivity – Jesse Bash[1], Sarah Benish[1], Tesh Rao[2], Gary Shenk[4], Lewis Linker[3], Kristen Foley[1], Sergey Napelenok[1], James Kelly[2], Yijia Dietrich[1], Ian Rumsey[1]
1. EPA Office of Research and Development
2. EPA Office of Air Quality Planning and Standards
3. EPA Chesapeake Bay Program Office
4. U.S. Geological Survey
We used the EPA's Community Multiscale Air-Quality (CMAQ) model version 5.3.3 with Integrated Source Apportionment (ISAM) to explore the impact of animal NH_3 emissions from Maryland on reduced nitrogen deposition to the Chesapeake Bay Watershed and tidal waters. CMAQ ISAM simulations were run with EQUATES emissions where Maryland animal sector NH_3 emissions were several orders of magnitude lower previous estimates in National Emissions Inventory (NEI) and EPA estimated values comparable to previous estimates NEI estimates. The emission change resulted in large local changes in reduced nitrogen deposition, up to a factor of three, and modest changes in deposition to the watershed and tidal waters of 4.1% and 5.9%, respectively. The updated animal emissions resulted in 1.8% increase in total nitrogen deposition to the Chesapeake Bay Watershed. The highest deposition changes were co-located with emissions changes and resulted in virtually no change in the evaluation against network air-quality and deposition observations due to an insufficient density of observations but is apparent in the model evaluation against satellite NH_3 observations.

1:00 Discussion of Estimating Atmospheric Nitrogen Deposition Contributions

1:10 Evaluating Conowingo Dredging as a Nutrient Reduction BMP – Matt Rowe, MDE
There is interest in pursuing a model-supported expert panel approach to evaluating Conowingo dredging as a nutrient reduction best management practice (BMP). Several CBP groups will have a role in this proposed work including the Modeling Workgroup, a future Expert Panel, the Watershed Technical Workgroup, and the WQGIT. The roles and functions of these groups will be described.

1:30 Discussion of Evaluating Conowingo Dredging as a BMP

1:40 Evaluation of Approaches to Simulating Conowingo Dredging – Lew Linker, EPA-CBPO

Modeling tools to evaluate Conowingo dredging as a BMP will be discussed to determine if the scientific rigor, model documentation, and model transparency is sufficient for achieving a Conowingo Dredging Expert Panel goals. The Modeling Workgroup is also being asked to provide modeling advice and technical support to the Expert Panel through the dredging simulations and to assist with integrating Conowingo model outputs with the Chesapeake Bay modeling suite to assess water quality impacts in the Bay.

2:00 Discussion of Approaches to Simulating Conowingo Dredging

2:10 ADJOURN

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July 13, 2022

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9:00 Announcements and Amendments to the Agenda – Dave Montali, Tetra Tech and Mark Bennett, USGS

9:05 The Main Bay Model (MBM) Progress – Jian Shen and Joseph Zhang, VIMS
The overall approach and key questions to be resolved over the four year MBM development period will be discussed and the work underway will be described. Ideas on the SAV simulation approach in the MBM, the PIP, G1, G2, G3 approach in sediment and water column, and the wave model as a "stand alone" simulation for shoreline erosion and suspension will be discussed. Also, the treatment of iron-oxyhydroxides as a either a simulated state variable or delt with by a "key" to a date, or temp, or DO turnover event will be discussed.

9:40 Discussion of the Main Bay Model (MBM) Progress

9:50 Analyses for a Designated Use Modification for CB6 and CB7 – Tish Roberson, DEQ and Richard Tian, UMCES-CBPO
The northernmost portions of the CB6PH and CB7PH segments are designated for both the Deep Water and Open Water uses, while the remaining portions are only designated for the Open Water use. However, the presence of a pycnocline in wider areas of the two segments than represented in published documentation on the DU boundaries (USEPA, 2003) indicates an expansion of the Deep Water designated use is warranted for the two segments. Tish and Richard will provide an overview of the DU modification work and the modeling analysis that supports it.

10:10 Discussion of Analysis for DU Mod for CB6 & CB7

10:15 Phase 7 Watershed and Tidal Water Model Boundaries – Andy Fitch, USGS-CBPO
Andy will describe progress in the shoreline product of updated and refined model boundaries for the Phase 7 Watershed Model, MBM, and MTMs including spatially detailed estimates of the tidal wetlands.

10:25 Discussion of Phase 7 Watershed and Tidal Water Model Boundaries Including How Sea Level Rise Will Be Simulated in Future Climate Change Scenarios

10:40 Corsica River Shallow Water Simulation Progress – Richard Tian and Jeremy Testa, UMCES and Nicole Cai, EPA-ORISE

The Corsica presents a unique opportunity to examine the effects of nutrient load reductions on a shallow ecosystem with both models and data. In particular, the Corsica will be a good test of MBM & MTM's ability to reproduce diel-cycling hypoxia and the forces that drive it (shallow water metabolism, wetland inputs, etc.) and very high chlorophyll concentrations often found in Chesapeake shallow water systems. Progress in the Corsica Shallow water simulation will be presented.

11:00 Discussion of the Corsica River Shallow Water Model Development Work

11:10 Approaches to MTM Selection – Lew Linker, EPA-CBPO

The EPA will develop an RFA that can support up to three Multiple Tributary Model (MTM) teams over five years. The CBPO can also support two in-house MTM teams. The MTM teams might begin in the first Quarter of 2023 with the following timeline: 2025 Fully Operational MTMs, 2026 CBP Review of MTMs, and 2027 CBP Application of MTMs. The CBP Partners will choose the five tributaries for MTM development. With the caveat that the Potomac & James are absolutely needed because of their large size and management needs. Criteria that the CBP Partners could use for MTM selection will be discussed.

11:40 Discussion of Approaches to MTM Selection

11:50 Progress on MTMs in the Tidal York and James Rivers – Nicole Cai, EPA ORISE

Review of current ICM and version comparisons between SCHISM and CH3D. The update of SCHISM-ICM to the current CH3D-ICM will be one of the starts of the MBM and MTM.

12:10 Discussion of the York and James River Progress

12:20 ADJOURN