Modeling Workgroup Quarterly Review

October 17, 2023

Event webpage: Link
For Remote Access - WebEx Link:
https://umces.webex.com/umces/j.php?MTID=mb3166da17a0eda0d70d269eac8514425
Meeting number: 2621 710 3884 **Password:** qsCkEvBE283
Phone number: +1-408-418-9388 **Access code**: 2621 710 3884
To enter the webinar, please open the webinar link first.
This meeting will be recorded for internal use only to assure the accuracy of meeting notes.

10:00 Announcements and Amendments to the Agenda – Mark Bennett, USGS and Dave Montali, Tetra Tech

10:05 Introduction to AI within Watershed Management – Isabella Bertani and Qian Zhang, UMCES-CBPO and Mike Evans, Chesapeake Conservancy
This is a reprise from the recent STAC Quarterly on potential and actual application of artificial intelligence (AI) for watershed management. Among the specific applications discussed will be the Chesapeake Conservancy's work on mapping wetlands and large solar arrays throughout the Chesapeake watershed.

10:45 Discussion of AI Applications for Watershed Analysis and Management

10:55 Phase 7 Watershed Model Overview – Gary Shenk, CBPO
Gary will provide an overall summary of progress.

11:05 Discussion of the Phase 7 Model Overview

11:15 Update on CalCAST Development – Isabella Bertani, UMCES-CBPO
Isabella will provide an update on the development of a reproducible workflow to process water quality data in order to update and expand the calibration dataset for CalCAST and the dynamic watershed model.

11:30 Discussion of CalCAST development

11:40 Progress in Phase 7 WSM Development – Gopal Bhatt, Penn State-CBPO
The NHDplus 100K scale Phase 7 Dynamic Watershed Model (DWM) prototype with simulations of hydrology, sediment, nutrients, water temperature, DO, and phytoplankton is now operational for the entire watershed. The DWM is using a nested model segmentation of streams and rivers with a hybrid structure for the simulation of water quality processes using HSPF and Simple Routing models. During this quarter, progress has been made on the implementation and testing of a simplified hydraulic routing scheme for the small NHDplus streams. Gopal will survey the progress and results from the simple routing for hydrology and describe activities upcoming in the next quarter.

12:10 Discussion of Phase 7 WSM Development Progress

12:20 LUNCH

1:00 Development of Efficient Multi-Objective Optimization Procedures –Gregorio Toscano Pulido, Kalyan Deb, Pouyan Nejadhashemi, and Hoda Razavi, MSU
Progress since the June Quarterly in the development of efficient multi-objective (MO) optimization procedures including replicating the study with the rest of the BMPs will be presented.

1:20 Optimization Discussion

1:30 Integrated Source Apportionment Analysis of Atmospheric N-Deposition – Gopal Bhatt, Penn State-CBPO; Jesse Bash, ORD-EPA; and Gary Shenk, CBPO
Sarah Benish, Jesse Bash, et al. developed estimates of emission source contributions to N deposition for the Chesapeake Bay airshed using CMAQ model v5.3.2 with Integrated Source Apportionment Method (ISAM). CBPO has been reanalyzing that data in conjunction with CAST data for its potential management applications. The presentation will survey the progress on this integrated analysis along with a few example applications using plausible *what-if* scenarios.

1:50 Discussion of ISAM Analysis

2:00 SWAT-C: A Watershed Scale Carbon Cycling Model - Xuesong Zhang, USDA-ARS, Hydrology and Remote Sensing Laboratory
Integrating field experiments, remote sensing, and process-based modeling to improve understanding and quantification of watershed scale carbon cycling.

2:20 Discussion of Chesapeake SWAT-C modeling

2:30 STAC Workshop Report *Using Local Monitoring Results to Inform the Chesapeake Bay Program's Watershed Model* – Gary Shenk, CBPO
Gary will describe the recently approved STAC workshop report *Using Local Monitoring Results to Inform the Chesapeake Bay Program's Watershed Model*.

2:45 Discussion of STAC workshop report

2:55 Introducing the Patapsco MTM Team – Lew Linker EPA-CBPO, Harry Wang, VIMS and Jeremy Testa, UMCES
The Patapsco MTM Team, one of the three MTMs supported by a five year grant, will be presented and the work plan will be discussed. The CBPO will also support two in-house MTM teams for the James and Potomac.

3:10 Discussion of Patapsco MTM

3:20 ADJOURN

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

9:05 Update on Main Bay Model (MBM) Progress – Zhengui Wang and Joseph Zhang, VIMS
Progress in the MBM development will be presented.

9:35 Discussion of the Main Bay Model (MBM) Progress

9:45 Refinement of the Temperature Dependence of Algal Growth Rates in the MBM and Multiple Tributary Models (MTMs) – Carl Cerco, Arlluk Technology Solutions, LLC
Carl will wrap up his examination of the shallow water monitoring data of continuous temperature and chlorophyll observations and other data sources for the purpose of refining the algal growth response to temperature in the MBMs and MTMs. The Modeling Workgroup will be asked to decide how to apply the current understanding of how temperature effects algal growth rates in the Phase 7 MBM.

10:10 Discussion of the Refinement of the Temperature Dependence of Algal Growth Rates

10:20 Introducing the Choptank MTM Team – Lew Linker EPA-CBPO, Jian Zhao, UMCES, Jiabi Du, Texas A&M, and Larry Sanford, Jeremy Testa, Elizabeth North, and William Nardin, UMCES
The Choptank MTM Team, one of the three MTMs supported by a five year grant, will be presented and the work plan will be discussed.

10:35 Discussion of Choptank MTM

10:45 Progress on the Rappahannock MTM – Qubin Qin, East Carolina University and Nicole Cai, ORISE-CBPO
Initial work on the Rappahannock MTM will be described.

11:05 Discussion of Rappahannock MTM Progress

11:15 Estimated Nutrient Exchanges Among Coastal Estuaries in Restoration – Nicole Cai, ORISE-CBPO

We will delve into the examination of the benthos database and the benthic role in sediment resuspension. This will involve categorizing more than 2,000 species documented in the Chesapeake Bay into various functional groups, which will subsequently be integrated into the MBM and MTMs to account for their impacts on the sulfide release and nutrient cycling. Furthermore, we will provide an overview of the initial advancements made in creating a comprehensive regional model spanning from Long Island Sound to Florida. These efforts will serve as a foundation for a tracer study designed to assess connectivity among East Coast water bodies. The study will be invaluable not only for understanding general water flow patterns but also for specific investigations, such as tracking the movement of debris.

11:35 Discussion of Inclusion of Benthos in MBM and MTMs and Estimated Nutrient Exchanges Among Coastal Estuaries

11:45 LUNCH

1:00 Shoreline Erosion Testbeds of Corsica and Choptank Rivers – Richard Tian, UMCES-CBPO

Progress in assessing the efficacy of a dynamic input of shoreline sediment and associated nutrients using fine scale models of the Corsica and Choptank Rivers will be presented. To do a dynamic input of shoreline loads we'd need 1) wave power (f wave speed, wave energy, and depth), 2) shoreline height, 3) protected shoreline, 4) bulk density, 5) sand, silt, clay classes, 6) eroded shoreline TN & TP species.

1:20 Discussion of Shoreline Erosion Testbeds

1:30 Comparison of P6 Bay Model and CESR Estimated Hypoxia – Richard Tian, UMCES-CBPO

In order to have a fair comparison between the model prediction and observation of water quality attainment in the CESR report, a long-term run of the CH3D-ICM was carried out and the outputs were analyzed in the save way of the reported observation result. The presentation will detail the methodology and outcomes from this effort.

1:50 Discussion of Comparison of Phase 6 Bay Model and CESR Estimated Hypoxia

2:00 Anacostia Toxics Assessment and Future 2035 and 2055 Climate Change Assessment – Pete von Loewe and Vamsi Sridharan, Tetra Tech

Pete will describe recent work done in the Anacostia River on estimating toxics fate and transport under current and future climate conditions.

2:20 Discussion of Anacostia Toxics Assessment and Future 2035 and 2055 Climate Change Assessment

2:30 ADJOURN