Modeling Workgroup Quarterly Review

April 6, 2021

Event webpage:
https://www.chesapeakebay.net/what/event/april_2021_modeling_workgroup_meeting_quarterly_review
For Remote Access
- WebEx Link: https://umces.webex.com/umces/j.php?MTID=m225fd77a46c264dba338317d117923ba
Meeting number: 120 687 6258 **Password:** GnHAY2rR

Phone number: +1-408-418-9388 **Access code**: 120 687 6258
To enter the webinar, please open the webinar link first.
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9:00 Announcements and Amendments to the Agenda – Mark Bennett, USGS and Dave Montali, Tetra Tech

9:05 Overall Development Plan for Phase 7 WSM – Gary Shenk, USGS

A plan outlining the tasks, sequence, timing, critical paths for the various tasks of Phase 7 CAST, CalCAST, and Dynamic Model for a fully operational model by December 2023 will be presented.

9:30 Discussion of Phase 7 Plan

9:45 Phase 7 WSM Development – Gopal Bhatt (Penn State), Gary Shenk (USGS-CBPO),

The presentation will provide progress updates on last Quarter's development of Phase 7 fine-scale distributed hydrology and water quality model of the Chesapeake Bay watershed at NHD100k catchment scale. Plans for further development over the next several quarters will be discussed.

10:15 Discussion of Phase 7 WSM Development

11:00 Comparison of Modeled and Monitored Nutrient Trends – Isabella Bertani, UMCES and Gary Shenk, USGS-CBPO

An appropriate comparison between the output of the Phase 6 Dynamic Watershed Model including lag times and flow normalized loads from WRTDS including the accounting for droughts will be presented.

11:30 Discussion of Modeled and Monitored Nutrient Trend Comparisons

12:00 BREAK

1:00 Optimization Update: Development of A Memetic Algorithm for Large-Scale Watershed Optimization – Gregorio Toscano, Kalyan Deb, and Pouyan Nejadhashemi, MSU

In large-scale optimization problems it's challenging for evolutionary algorithms to converge quickly to promissory regions. However, local search with gradient information is a powerful tool that enables fast convergence. The presentation will present the considerations and building blocks of a memetic algorithm that uses a genetic algorithm for coarse search and an interior-point-based method for local search to solve large-scale non-convex watershed optimization problems.

1:20 Optimization Discussion

1:30 High-resolution Landscape Characterization to inform Phase 7 CAST, CalCAST and Dynamic Models – Peter Claggett, USGS

A key aspect of support for the CRHM is provided by a one-meter-resolution land-cover and land-use datasets and complementary 1-meter resolution hydrography data now being developed. The land-cover datasets will be translated into three, 58-class, land-use datasets using a variety of local (e.g., tax parcels) and regional (e.g., soils and roads) ancillary datasets. To complement these data, the development of hydrography data consisting of 1-meter resolution (1:2400-scale) fluvial features such as channels, gullies, and ditches are also being developed. Channels will be attributed with estimates of flow permanence and channel dimensions (width, depth, and bank angle) and the mapping of floodplains and other hydrologically active areas on the landscape will be refined.

2:00 Discussion of High-resolution Landscape Characterization

2:15 Plans for CMAC Refinements, Tracer Runs, and Phase 7 Scenario Support – Sarah Benish and Jesse Bash, EPA-ORD

A "scenario library" of Chesapeake Airshed Model Scenarios will be developed over the next three years for Phase 7 Watershed and Bay Model development. The Airshed Scenarios will include 2010, 2017, 2025, 2035, 2050, and perhaps a future low carbon/NOx emission scenario. In addition, new work on an updated and improved estimate of the transport and fate of atmospheric emissions of oxidized nitrogen (NOx) and ammonium (NH_4^+) will be presented. The analysis centers on the question, "For a nitrogen emission source from different regions in the Chesapeake watershed, what is the fraction that is deposited to a particular region or point?"

3:00 Discussion of CMAQ Refinements, Tracer Runs, and Phase 7 Scenario Support

3:15 ADJOURN

Modeling Workgroup Quarterly Review

April 7, 2020

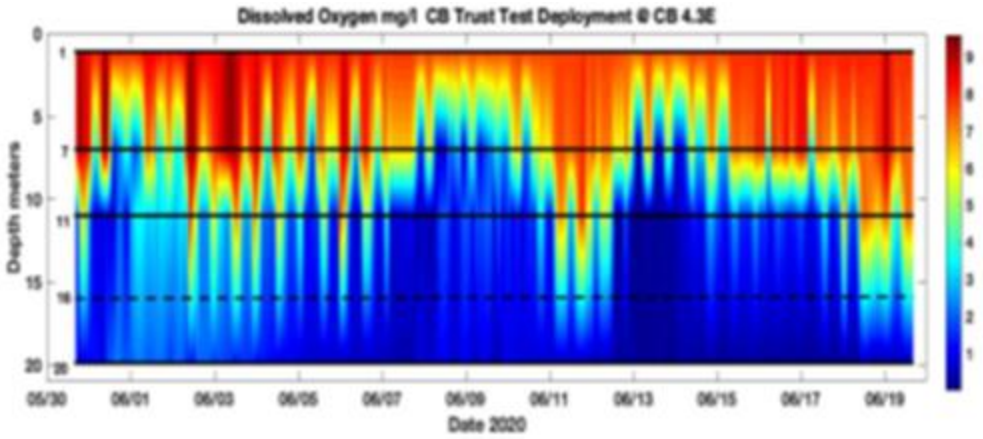
Event webpage:
https://www.chesapeakebay.net/what/event/april_2021_modeling_workgroup_meeting_quarterly_review_day_2
For Remote Access - WebExLink:
https://umces.webex.com/umces/j.php?MTID=m13f2b3fef17917407d3217335f89e1fc
Meeting number: 120 872 5106 **Password:** GnHAY2rR

Phone number: +1-408-418-9388 **Access code**: 120 872 5106
To enter the webinar, please open the webinar link first

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

9:05 Initial Analysis of Prototype Deployment – Rebecca Murphy, UMCES

A small group composed of Rebecca Murphy, Peter Tango, Gary Shenk, Jeremy Testa, Peter Tango, Gary Shenk, Larry Sanford, and Isabella Bertani will report out initial analysis findings of what the of prototype deployment is telling us regarding hypoxia processes.



9:30 Discussion of Continuous DO Vertical Profile Initial Analysis

9:40 SAV Nutrient Dynamics and DO Impacts – Carl Cerco, Attain and Richard Tian, UMCES

An update on the 2017 WQSTM estimated nutrient flux by submerged aquatic vegetation will be presented. Examination of net nutrient flux is anticipated to simulate net import to SAV in the growing season, augmented by simulated enhanced settling of particles in SAV beds. However, after the SAV growing season a nutrient flux out of the SAV beds, mostly as organics, is anticipated.

10:10 Discussion of SAV Nutrient Dynamics and DO Impacts

10:20 Analysis of Chesapeake Bay Marine Discharges – Richard Tian, UMCES and Lew Linker, EPA-CBPO

An initial analysis of the movement of marine discharges in the lower Bay will be described. The analysis is aimed at gaining insight into where marine discharges are adjected and their residence times based on conservative dissolved and particulate tracers in the 2017 Bay Model will be presented.

10:30 Discussion of Chesapeake Bay Marine Discharge Analysis

10:40 Chesapeake Bay Marine Vessel Nutrient Discharges – Tom Butler, CRC and Richard Tian, UMCES

A small but real nutrient input load as yet unaccounted in Chesapeake tidal waters is from Marine Sanitation Devices (MSDs). Estimates of the TN, TP, and TOC load made by an Expert Panel and parsed into monthly inputs with location and nutrient species will be made ready for input into the new unstructured grid model to be applied in 2025.

11:00 Discussion of Chesapeake Bay Marine Vessel Nutrient Discharges

11:15 BREAK

11:30 Extent and Causes of Chesapeake Bay Warming – Kyle Hinson, Marjorie Friedrichs, Pierre St-Laurent, and Fei Da, VIMS and Ray Najjar, Penn State

Recent Chesapeake Bay warming trends and their proximate causes were analyzed using a combination of observations and the ChesROMS modeling framework. Results demonstrate that temperatures in warmer months are increasing 3-4 times faster than cooler months. Although these trends are primarily driven by atmospheric warming for the majority of the year, oceanic warming also contributes substantially to southern Bay summer warming patterns.

11:50 Discussion of Extent and Causes of Chesapeake Bay Warming

12:00 Effects of Reduced Shoreline Erosion on Chesapeake Bay Water Clarity – Jessie Turner, Pierre St-Laurent, Marjorie Friedrichs, and Carl Friedrichs, VIMS

The difference between two scenarios of shoreline erosion vs. highly armored shorelines with reduced erosion was investigated using ChesROMS-ECB. Results show that armoring improves water clarity, especially where and when river influence is low; however, armoring creates an *Organic Fog Zone* in the mid-Bay in spring as Secchi depth and light attenuation depth change in opposite directions due to enhanced organic matter production.

12:20 Discussion of Effects of Reduced Shoreline Erosion on Chesapeake Bay Water Clarity

12:30 BREAK

1:30 Climate Change and Tidal Shallow Water Oxygen Dynamics STAC Technical Synthesis – Jeremy Testa and Richard Tian, UMCES

The STAC Science Technical Synthesis led by Jeremy Testa on oxygen dynamics in tidal shallow water will apply observations, research, and modeling to develop a diagnostic and predictive understanding of what controls the attainment of dissolved oxygen criteria in Chesapeake shallow waters allowing the CBP Bay Model to better represent tidal shallow waters. Progress on this work will be presented.

2:00 Discussion of Climate Change and Tidal Shallow Water Oxygen Dynamics

2:10 Tributary Summaries – Jeni Keisman, USGS

Progress with the Rappahannock Tributary Study and other future tributary studies similar to the Potomac Tributary Report completed last quarter will be described.

2:20 Discussion of Tributary Summaries

2:30 A Tidal Water Model for the Assessment of 2035 Climate Change Risk to the Chesapeake TMDL – Lew Linker, EPA-CBPO

Progress on the Chesapeake Bay Program Request for Assistance (RFA) for next generation state-of-the-science model of the Chesapeake using an unstructured grid will be discussed. The new tidal Bay model, to be fully operational in 2025, is needed for the assessment of water quality standards under 2035 climate change conditions. The approach will be consistent with the STAC Next Generation Model Workshop Report using multiple tributary model teams, all using the same model structure and code, in conjunction with an overall integrating model of the main stem Bay and all tributaries.

2:45 Discussion of a New Tidal Water Model for the Assessment Of 2035 Climate Change Risk.

3:00 ADJOURN