The Chesapeake Community Modeling Program's

Chesapeake Modeling Symposium

June 1-2, 2016 Williamsburg, VA

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Welcome to the Chesapeake Modeling Symposium 2016

Chesapeake Challenge: Advancing transparency and communication through community modeling

Planning Committee

Bill Ball – Johns Hopkins University
Chris Duffy – Penn State University
Marjy Friedrichs - Virginia Institute of Marine Science
Carl Friedrichs - Virginia Institute of Marine Science
Courtney Harris - Virginia Institute of Marine Science
Raleigh Hood - University of Maryland Center for Environmental Science
Dave Jasinski - Chesapeake Research Consortium
Kevin McIlhany - United State Naval Academy
Michael Paolisso - University of Maryland Department of Anthropology
Kevin Sellner - Chesapeake Research Consortium
Gary Shenk - EPA Chesapeake Bay Program Office
Howard Townsend - NOAA National Marine Fisheries Service
Claire Welty – University of Maryland Baltimore Campus

Scope and Aims

Numerical models are used extensively for marine research and also to guide management efforts in Chesapeake Bay and around the world. Many of these models are very complex. For example, the Chesapeake Bay Program modeling system is composed of a set of sub-models of the airshed, watershed and estuary and it also includes living resource components such as submerged aquatic vegetation, oysters and fish. Each of these sub-models consists of a complex system of equations that have been developed implemented by experts in each field. Combined, the CBP modeling system is too complex for one person to fully comprehend; yet we have to rely on this system to guide crucial management decisions that directly impact numerous stakeholder groups. One way to increase the transparency of complex models is through the use of open source and community modeling approaches that allow direct access to the code and encourage broad participation in the model development process. But these approaches create some significant challenges and they do not address the issue of how to increase transparency with stakeholder groups. For the latter we may need to employ new participatory modeling methods that directly engage stakeholders in the model development and/or application process.

By bringing together modelers, managers, scientists, and stakeholders for a series of plenary talks, panel discussions, and special sessions, the 2016 Chesapeake Modeling Symposium (ChesMS16) will focus on the challenge of increasing communication and transparency in the model development and application process through open source, community and participatory modeling.

Sponsors

Plenary Speakers

The Challenge of Transparency in Management Modeling – The Chesapeake Bay Program Experience

Rich Batiuk, MA, is the Associate Director for Science, Analysis, and Implementation at the United States Environmental Protection Agency's Chesapeake Bay Program Office located in Annapolis, Maryland. In his 31 years with EPA and the Chesapeake Bay Program partnership, Rich has led the integration of science into multi-partner policy-making and collaborative decision-making.

Rich is now focused on directing the Chesapeake Bay Program partnership resources towards helping local partners understand their part in the Bay and watershed restoration efforts and getting the job done, restoring water quality to local waterways and the Bay.

Rich received his Bachelors of Science in Environmental Science from the University of New Hampshire and his Masters of Science in Environmental Toxicology from American University in Washington D.C.

Speaking Your Mind and Moving Forward – Engaging Agriculture and Environmental Groups in Constructive Ways to Achieve Chesapeake Bay Restoration

Kelly Eisenman Shenk, MA, is the Agricultural Advisor for EPA Region III, which is the Mid-Atlantic region of the country including most of the Chesapeake Bay watershed. In her role as Agricultural Advisor, Kelly serves as the liaison between the agricultural community and EPA in addressing policy and programmatic opportunities and challenges facing the region's agricultural communities to achieve well-managed, profitable farms and clean local and Chesapeake Bay waters.

Kelly has over a 20-year history with the Environmental Protection Agency working closely with federal and state agencies and key stakeholders in the Chesapeake Bay Program on both technical and policy fronts addressing agriculture, toxics, and urban stormwater issues. Kelly has devoted her last thirteen years to building partnerships with federal and state agricultural agencies and the agricultural community to find collaborative solutions to achieving the Agency's shared goals of vibrant agriculture and clean water.

Kelly received her Bachelor of Science in Zoology from Duke University and her Masters of Science in water resource management from the University of Vermont.

Collaborative Approaches to Planning, Rule Making, and Dispute Resolution – How to Facilitate the Public's Involvement in Public Policy Development and Implementation

Jeff A. Blair, MA, is an Associate Director with the FCRC Consensus Center at Florida State University. He is highly regarded for his work with commissions, and advisory boards. Jeff's work for the FCRC has included facilitation, negotiation, process design, strategic planning, problem-solving, and consensus-building on a wide range of public policy initiatives.

Jeff has worked with state and local government representatives to design and implement collaborative approaches to planning, rule making, and dispute resolution with an emphasis on the public's involvement in public policy development and implementation. He has facilitated hundreds of rule development workshops and conducted negotiated rulemakings for various state agencies. In addition, Jeff has conducted numerous trainings on a variety of dispute resolution topics.

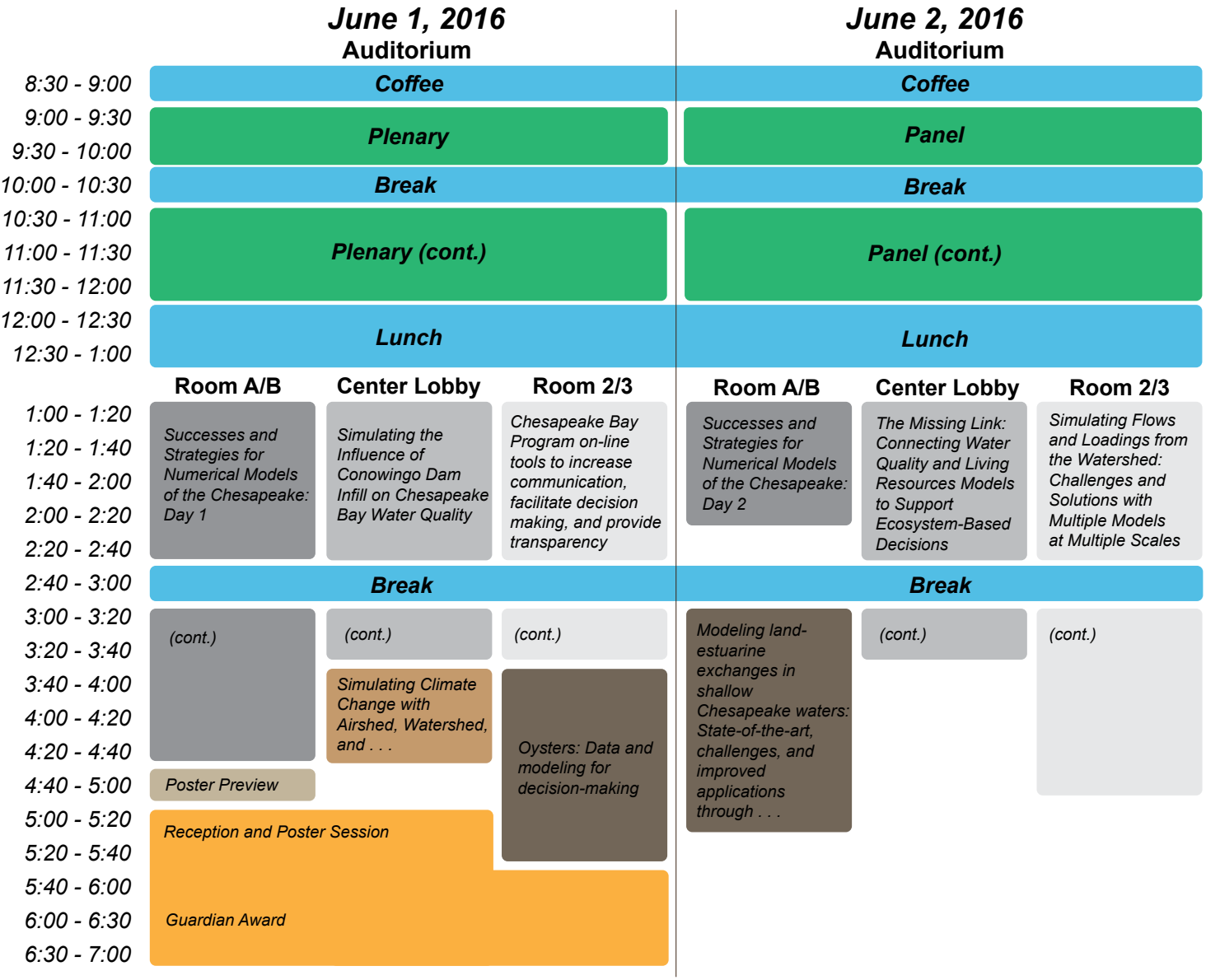
Jeff received his Bachelors of Science in Social Policy from Florida State University and has done graduate work in Conflict Resolution at Florida State University.

Panel Discussion– *The Challenge of Transparency in Management Modeling – What Is Transparency, Why Do We Need It, and How Do We Get There?*

MODERATOR – Dr. Kevin Sellner, ***Chesapeake Research Consortium***

Elizabeth North –	University of Maryland Center for Environmental Science
John Kennedy –	Virginia Department of Environmental Quality
Jim Fitzpatrick –	HDR, Inc.
Bill Street –	James River Association
Ken Staver –	Wye Research and Education Center
Gary Shenk –	U.S. Geological Survey/Chesapeake Bay Program
Kristy Lewis –	George Mason University
Carl Hershner –	Virginia Institute of Marine Science

Chesapeake Modeling Symposium 2016 At a Glance



Sessions

Successes and Strategies for Numerical Models of the Chesapeake: Day 1

Session Date: June 1st 2016

Session Time: 1:00

Session Lead: Courtney Harris

Session Co-Lead(s): Raleigh Hood

Session Abstract:

Over the past decades, numerical models developed for the Chesapeake Bay and its airshed and watershed have become increasingly robust and useful for addressing both applied and fundamental questions. Numerical models are used extensively for research and to guide management efforts in Chesapeake Bay and around the world. Many of these models are increasingly complex, however, and encompass several sub-models that each represents a complex system of equations that have been developed by experts in the relevant sub-field. Though such large modeling frameworks may grow too complex for one person to fully comprehend, we rely on such systems to guide crucial management decisions that directly impact numerous stakeholder groups. Fitting with the theme of the meeting, various research communities have devised a range of strategies for ensuring that their methods and approaches achieve transparency for the end user. Within this session we invite presentations of both well-established and newly developed community models for the Chesapeake Bay system. The session will highlight recent advances in numerical modeling across the domains of the Chesapeake airshed, watershed and bay and the socioeconomic system, and also of the uses of those model results within a broad framework of understanding and managing the Chesapeake System.

Presentations:

TIME	TITLE
1:00	The Chesapeake Bay Model - What's In, What's Out - *Carl Cerco - US Army ERDC*
1:20	Impacts of changing nutrient loads on Chesapeake Bay hypoxia and nitrogen cycling over the past century - *Marjorie Friedrichs - Virginia Institute of Marine Science*
1:40	The impact of TMDL nutrient reductions on dissolved oxygen in the Chesapeake Bay: a comparison of academic and regulatory water quality models - *Isaac Irby - VIMS*
2:00	A Numerical Model Study of the Impact of Channel Deepening on Transport Processes and Dissolved Oxygen Levels in the Lower James River and the Elizabeth River - *YA WANG - Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, VA 23062*
2:20	US-IOOS/COMT Estuarine Hypoxia Nowcast/Forecast Product: Stakeholder Identification and Feedback - *Carl Friedrichs - Virginia Institute of Marine Science, College of William & Mary*
3:00	The Roles of Resuspension and Redistribution on Nutrient Cycling in Coastal Environments: Results From A Coupled Hydrodynamic-Sediment Transport – Biogeochemical Numerical Model - *Julia Moriarty - Virginia Institute of Marine Science*

3:20 Multiple Stressors in an Estuarine Environment: Drivers of changes in the Chesapeake Bay CO2 system - *Elizabeth Shadwick - Virginia Institute of Marine Science*

3:40 Comparison of modeled and observed patterns of bed erodibility in the York River estuary, Virginia, over varying time scales - *Danielle Tarpley - Virginia Institute of Marine Sciences*

4:00 Adaptive Sampling Networks of Autonomous Aerial and Aquatic Vehicles: A New Tool for Augmenting and Validating Water Quality Models - *Yew Teck Tan - Johns Hopkins University*

Simulating the Influence of Conowingo Dam Infill on Chesapeake Bay Water Quality

Session Date: June 1st 2016

Session Time: 1:00

Session Lead: Lewis Linker

Session Co-Lead(s): Rich Batiuk, Robert Hirsch, and Carl Cerco

Session Abstract:

The Conowingo Reservoir has been filling in with sediment for almost a century. Over most of that period the Conowingo has acted like a management practice that has removed a portion of the Susquehanna sediment and nutrient loads, but it is a practice that is losing its effectiveness. The infill of the Conowingo Reservoir results in increased sediment and associated nutrient loads delivered to Chesapeake Bay and creates a challenge in meeting the Chesapeake Bay water quality standards. This session will review the latest modeling and research on Conowingo infill conducted to support 2017 Midpoint Assessment decisions on Conowingo infill impacts on the Chesapeake Total Maximum Daily Load (TMDL).

Presentations:

TIME	TITLE
1:00	Temporal Changes in Net Deposition of Sediment and Nutrients behind Conowingo Dam under Different Flow Conditions: Statistical Evaluation of Monitoring Data between 1987 and 2013 - *Qian Zhang - Johns Hopkins University, Department of Geography and Environmental Engineering*
1:20	Modeling sediment trapping in the Lower Susquehanna River Reservoir System: a simple approach to capture long-term performance trends - -
1:40	Simulating Sediment Transport in the Lower Susquehanna River - Lake Clarke and Lake Aldred - *Marty Teal - WEST Consultants, Inc.*
2:00	Spatial and Temporal Patterns of Sedimentation in Conowingo Reservoir - *Cindy Palinkas - UMCES Horn Point Lab*
2:20	Biogeochemistry of Conowingo Reservoir - -
3:00	Development of a Nutrient Mass Balance Model for the Conowingo Pond - *Jim Fitzpatrick - HDR, Inc.*
3:20	Impacts on Chesapeake Bay Resulting From Infill of the Conowingo Reservoir - Up-to-Date Results - *Carl Cerco - US Army ERDC*

Chesapeake Bay Program on-line tools to increase communication, facilitate decision making, and provide transparency

Session Date: June 1st 2016

Session Time: 1:00

Session Lead: Olivia Devereux

Session Co-Lead(s): Lewis Linker

Session Abstract:

The December 2010 Chesapeake Bay Total Maximum Daily Load (Bay TMDL) calls for an assessment in 2017 to review progress toward meeting the nutrient and sediment pollutant load reductions identified in the 2010 Bay TMDL. The driving purpose of the Bay TMDL's 2017 midpoint assessment is to streamline implementation and to make challenges to implementation more understandable for the Chesapeake Bay Program partnership as we move towards 2017 and 2025.

The Chesapeake Bay Program has developed multiple on-line decision-support tools that guide implementation, and consider lessons learned. These help to:

- Provide decision support
- Increase transparency with stakeholder groups
- Increase communication

These tools include: CAST (Chesapeake Assessment Scenario Tool), BayFAST, BayTAS and ChesapeakeStat.

- CAST, a web-based nitrogen, phosphorus and sediment load estimator designed to allow for rapid analysis of BMPs, helps jurisdictions prepare Phase III WIPs, which will guide milestones and implementation from 2018 to 2025. CAST approximates loads using similar logic, rules and assumptions as the Watershed Model, which was used in determining the TMDL and allocations. This ensures consistency with the TMDL so that when progress is measured using the Watershed Model, the loads are comparable to CAST's predicted loads. However, CAST does not actually "run" the Watershed Model, but rather approximates that model's output for rapid online scenario development. The approximations are calculated using linear equations with coefficients generated through the Watershed Model using factorial inputs over combinations of BMPs and land use change. Loads are estimated for each land use and each modeling segment. Validation with the Watershed Model showed 99% agreement for TN with urban land uses.
- BayFAST is a site-specific tool built on the CAST platform that allows users to specify the boundaries of an area (parcel up to watershed), and then select BMPs to apply on that site. BayFAST allows users to understand which BMPs provide the greatest load reduction benefit and the extent to which these BMPs can be implemented. Based on the scenario outputs, users can refine their BMP choices in their milestone and WIP planning. The site-specific nature of BayFAST provides flexible use for federal facilities, developments, and small watersheds.

- BayTAS provides access to nutrient load, BMP, and supporting data specific to implementation of and progress toward the Chesapeake Bay TMDL. Future versions of BayTAS will provide access to additional data, including point source, facility, and permitting data.
- ChesapeakeStat improves information-sharing and decision-making at the Chesapeake Bay Program. It provides information on the goals and outcomes of the Chesapeake Bay Watershed Agreement, with a focus on accountability for this work.

The speakers on this session will discuss these modeling/decision support tools including plans for their future improvement. On-line decision support tools facilitate meeting the goals of the Chesapeake Bay TMDL and the Watershed Agreement.

Presentations:

TIME	TITLE
1:00	New roles of CAST and BayFAST with the Phase 6 Watershed Model - *Olivia Devereux - Devereux Consulting*
1:20	BayTAS: providing access to model results and data - *Megan Thynge - Chesapeake Bay Program*
1:40	Using BayFAST for Chesapeake Bay Pollution Reduction Plan Development and MS4 Compliance in Pennsylvania - *Bryan Seipp - Center for Watershed Protection*
2:00	Use of MAST in Developing the Maryland Phase II Statewide WIP - *Robin Pellicano - Maryland Department of Environment*
2:20	Improving Stakeholder Participation by Incorporating Locally-Derived Land Use Data - *Jeff White - Maryland Department of the Environment*
3:00	The art of using BayFAST to estimate load reduction in National Parks - *Suzanne Dee - George Mason University and National Park Service*

Oysters: Data and modeling for decision-making

Session Date: June 1st 2016

Session Time: 3:40

Session Lead: Howard Townsend

Session Abstract:

The once abundant Eastern Oyster population of the Chesapeake has declined to less than 1% of historic levels because of decades of overharvest, disease, poor water quality, and the loss of hard bottom habitat. Federal and state agencies, industry, academic institutions, and non-profit groups are all working in collaboration to restore the native oyster population to levels that will once again provide significant ecosystem services such as fish habitat, water clarification, and nutrient processing. At the same time, oyster restoration efforts face pressure from climate change, ocean acidification, and fishing. In the Chesapeake Region, a wide array of scientists are collecting data and building models to inform management on oyster issues such as oyster reef ecosystem services, stakeholder-collaborative population modelling, developing an oyster-based BMP, and the impacts of climate change and ocean acidification. This session is designed to be an opportunity for researchers involved with modelling and data used for these issues to provide updates on their work, get feedback, and find opportunities to collaborate and cross-pollinate.

Presentations:

TIME	TITLE
3:40	Age-Structured, Spatially-Explicit Model for Oyster Reef Restoration - *Rom Lipcius - VIMS, W&M*
4:00	Ecological Forecasting for Vibrio spp. - *John Jacobs - NOAA/ The Cooperative Oxford Laboratory*
4:20	Investigation of artificial reefs settlement in the Bohai Bay - *Xiaofu Xu - Horn Point Lab*
4:40	Uncertainty in modeled estimates of nutrient removal from oyster restoration - *Mark Brush - Virginia Institute of Marine Science*
5:00	Combining an oyster larval transport model with observations of mortality rates to estimate the footprints of spatfall in the Choptank and Little Choptank Rivers - *Elizabeth North - University of Maryland Center for Environmental Science, Horn Point Laboratory*
5:20	Social Indicators of Oyster Reef Health for Decision-makers - *Amy Freitag - VASG/NCBO*
5:40	OysterFutures: integrating and applying three-dimensional models in a stakeholder-centric modeling effort - *Rasika Gawde - University of Maryland Center for Environmental Science*

Simulating Climate Change with Airshed, Watershed, and Estuary and Living Resource Models

Session Date: June 1st 2016

Session Time: 3:40

Session Lead: Lewis Linker

Session Co-Lead(s): Rich Batiuk, Ray Najjar, and Carl Cerco

Session Abstract:

This session examines the approaches taken to simulate climate change in the Chesapeake with airshed, watershed, estuary, and living resource models. Examination of climate change effects in other coastal and estuarine systems as well as the consideration of the long term observational history in the Chesapeake are other key features of this session. A survey and synthesis of climate change research and modeling in other coastal and estuarine systems will be examined. A significant portion of the session will be directed toward the 2017 Midpoint Assessment of the Chesapeake restoration which will include an assessment of the influence of climate change on achievement of Chesapeake TMDL water quality standards. To support the assessment the Chesapeake Bay Program (CBP) partners are developing modeling tools to quantify the effects of climate change on watershed flows and loads, storm intensity, increased watershed and estuarine temperatures, sea level rise, and ecosystem influences including the loss of tidal wetland attenuation with sea level rise. Ultimately, in 2017 the CBP partnership will need to decide if, when, and how to incorporate climate change considerations into the Phase III Watershed Implementation Plans (WIPs).

Presentations:

TIME	TITLE
3:40	Evaluating the Impact of Climate Change on the Performance and Resiliency of Ponds in City of Virginia Beach - *Nasrin Alamdari - PhD Student*
4:00	Wave Climate in the Chesapeake Bay from 1979 to 2015 - *Gangfeng Ma - Old Dominion University*
4:20	Integrating Climate Change into the CBP Watershed Model - *Kyle Hinson - CRC/CBPO*

Poster Session

Session Date: June 1st 2016

Session Time: 6:00

Session Lead: Raleigh Hood

Session Abstract:

Poster Presentations:

TIME	TITLE
6:00	The seasonal algal bloom in Back River and the role of pH, temperature in regulating internal phosphorus and ammonium loading - *Zhengui Wang - Virginia Institute of Marine Science*
6:00	Radioisotopic tracers within a sediment transport model: exploration of test cases - *Courtney Harris - Virginia Institute of Marine Sciences*
6:00	Project Overview: Impacts of Climate Change on the Phenology of Linked Agriculture-Water Systems - *William Ball - Johns Hopkins University, Dept. of Geography and Environmental Engineering*
6:00	A Model of oyster reef nitrogen cycling - *Kevin Kahover - UMCES Chesapeake Biological Laboratory*
6:00	Quantifying Carbon Fluxes at the Marsh-Estuarine Interface - *Amanda Knobloch - Virginia Institute of Marine Science*
6:00	Lower Susquehanna River Reservoir System Bathymetry and Geotechnical Analysis - *Gary Lemay - Gomez and Sullivan Engineers*
6:00	Impacts of direct atmospheric deposition of nitrogen on Chesapeake Bay hypoxia - *Fei Da - VIMS*
6:00	Inclusion of Surface Gravity Waves in Vertical Mixing Parameterizations with Application to Chesapeake Bay, USA - *Alexander Fisher - UMCES Horn Point Laboratory*
6:00	Modeling Primary Production and Chlorophyll Variability in Chesapeake Bay - *Hao Wang - University of Maryland Center for Environmental Science, Horn Point Laboratory*

Successes and Strategies for Numerical Models of the Chesapeake: Day 2

Session Date: June 2nd 2016

Session Time: 1:00

Session Lead: Courtney Harris

Session Co-Lead(s): Raleigh Hood

Session Abstract:

Over the past decades, numerical models developed for the Chesapeake Bay and its airshed and watershed have become increasingly robust and useful for addressing both applied and fundamental questions. Numerical models are used extensively for research and to guide management efforts in Chesapeake Bay and around the world. Many of these models are increasingly complex, however, and encompass several sub-models that each represents a complex system of equations that have been developed by experts in the relevant sub-field. Though such large modeling frameworks may grow too complex for one person to fully comprehend, we rely on such systems to guide crucial management decisions that directly impact numerous stakeholder groups. Fitting with the theme of the meeting, various research communities have devised a range of strategies for ensuring that their methods and approaches achieve transparency for the end user. Within this session we invite presentations of both well-established and newly developed community models for the Chesapeake Bay system. The session will highlight recent advances in numerical modeling across the domains of the Chesapeake airshed, watershed and bay and the socioeconomic system, and also of the uses of those model results within a broad framework of understanding and managing the Chesapeake System.

Presentations:

TIME	TITLE
1:00	A cross-scale baroclinic model of the Chesapeake Bay and the coastal ocean - *Fei Ye - VIMS*
1:20	Large N-Dimensional Eulerian Analsyis of Chesapeake Bay - *Kevin Mcilhany - US Naval Academy*
1:40	A study of the influences of a storm-surge barrier on hydrodynamics and transport processes in the Chesapeake Bay - *Jiabi Du - Virginia Institute of Marine Science*
2:00	Hydrodynamic Modeling Strategies for Forecasting Street-Level Inundation in the Chesapeake Bay: Past Successes, Current Approaches, and Plans for the Future - *Jon Derek Loftis - Virginia Institute of Marine Science*
2:20	Leveraging a water quality model and monitoring data set to test sampling schemes that support evaluation of water quality criteria in the Chesapeake Bay - *Dong Liang - CBL/UMCES*

The Missing Link: Connecting Water Quality and Living Resources Models to Support Ecosystem-Based Decisions

Session Date: June 2nd 2016

Session Time: 1:00

Session Lead: Donna Bilkovic

Session Co-Lead(s): Tom Ihde and Lisa Wainger

Session Abstract:

The Chesapeake Bay is an extensively studied system, with a wide base of knowledge on physical, chemical, and biological processes and their interactions. This information is codified in a number of models, including a linked watershed-hydrodynamic-water quality modeling system that supports current restoration efforts in the region. However, far less attention and effort has been dedicated to coupling water quality with habitat, fisheries, and socio-economic models. Because the physical and biogeochemical habitat along with human activities strongly influence habitat and fisheries production in the Chesapeake Bay estuarine ecosystem, consideration of these linkages and feedbacks is essential to implement ecosystem-based management. One major challenge is to generate, dynamic living resource models that can respond to spatially explicit physical and biogeochemical drivers, capturing the spatial and temporal variability in system responses that are likely to occur in a system as large as the Chesapeake Bay. Studies considering the consequences of spatial distribution of changes are particularly needed for enhancing the understanding of the system as a whole and in the face of novel changes that may occur with climate change.

For this session, we will invite presentations of models that either do or could integrate water quality and living resources into models of estuaries and their watersheds, including, but not limited to, the Chesapeake Bay system. In addition, socio-economic models that evaluate economic or social benefits of changes in fisheries or habitat are also welcome for their ability to enhance the management-relevant information that could emerge from coupled models.

Presentations:

TIME	TITLE
1:00	Modeling dynamical feedbacks between flow, SAV, and water quality, with application to Susquehanna Flats - *Larry Sanford - UMCES, Horn Point Laboratory*
1:20	Using Hierarchical Bayesian Models to understand SAV-Water Quality Relationships across Space and Time - *Michael Hannam - Smithsonian Environmental Research Center*
1:40	Linking bivalve and seagrass models with reduced complexity watershed and estuarine models to support nutrient management, aquaculture production, and climate mitigation - *Mark Brush - Virginia Institute of Marine Science*
2:00	"Modeling Tidal Marsh Evolution Using a High-resolution Ecomorphological Model" - *Karinna Nunez - Virginia Institute of Marine Science*
2:20	Using coupled estuarine food web-hydrodynamic models to guide resource management decisions: Two distinct applications currently applied in coastal Louisiana - *Kristy Lewis - George Mason University*

3:00 The Interaction of Hydrodynamics and Phytoplankton Bloom in the Tidal James River, Virginia - *Jian Shen - Virginia Institute of Marine Science*

3:20 Integrating multiple system stressors and predicting cumulative effects of change in the Chesapeake - *Thomas Ihde - ERT, Inc. (NCBO)*

Simulating Flows and Loadings from the Watershed: Challenges and Solutions with Multiple Models at Multiple Scales

Session Date: June 2nd 2016

Session Time: 1:00

Session Lead: Bill Ball

Session Co-Lead(s): Gary Shenk, Zachary Easton, and Ciaran Harman

Session Abstract:

Watershed models have been used to inform decision-making by the Chesapeake Bay Program (CBP) partnership since the early 1980s. The current development version of the CBPs Watershed model is constructed to incorporate knowledge from other modeling efforts. Many questions exist as to how future changes in the CB system or its boundary conditions (e.g. climate, land cover, land use and management, changing conditions in lakes, reservoirs, and rivers) might affect changes in the timing, amounts, and spatial distributions of both water and pollutant loads. Answering such questions will require the application of new modeling tools developed for application at a wide variety of spatial and temporal scales and tuned to new kinds of calibration data that allow the models to capture basic mechanisms related to those aspects of the system that are most fundamentally critical to its performance in processing water, nutrients, sediments, and other types of pollutants. This symposium session invites scientific talks about new models andor new approaches to model application and use (particularly calibration and verification) that will address any one or more of the above defined issues. Presentations that address issues of model and data accessibility, interoperability and transparency will be especially encouraged.

Presentations:

TIME **TITLE**

1:00 Nutrient and Sediment Trends from the Nontidal Chesapeake Bay Watershed: Synthesis of Progress by Season for the Nine Major Tributaries - *Qian Zhang - Johns Hopkins University, Department of Geography and Environmental Engineering*

1:20 Long-term Transport and Capacity change in 3 Reservoirs, Lower Susquehanna River Basin - *Michael Langland - USGS*

1:40 Increasing Community Participation with Chesapeake Bay Program Watershed Modeling - *Gary Shenk - USGS / CBPO*

2:00 Modeling nitrate removal in cropland riparian buffers throughout the Chesapeake watershed: Lessons for model calibration, error analysis and multiple modeling - *Donald Weller - Smithsonian Environmental Research Center*

2:20 Modeling nitrate-N load responses to watershed N controls - *Keith Eshleman - University of Maryland Center for Environmental Science*

3:00 Watershed Modeling for the James River Chlorophyll-a Study - *Nikolai Gurdian - Tetra Tech, Inc.*

3:20 Land-water modeling in the Potomac River Basin - *Jinliang Huang - Xiamen University*

3:40 Coupling the Short-Term Global Forecast System Weather Data With Distributed Watershed Models: Implication for Real-time Landscape Management - *Andrew Sommerlot - Virginia Tech*

4:00 Development of a Mechanistic Nitrous Oxide Routine for the SWAT Model to Assess Greenhouse Gas Emissions from Agroecosystems - *Moges Wagena - Virginia Tech*

4:20 Evaluating the Impact of Climate Change on the Performance and Resiliency of Ponds in City of Virginia Beach - *Nasrin Alamdari - PhD Student*

Modeling land-estuarine exchanges in shallow Chesapeake waters: State-of-the-art, challenges, and improved applications through community modeling

Session Date: June 2nd 2016

Session Time: 3:00

Session Lead: Maria Tzortziou

Session Co-Lead(s): Blake Clark, Raleigh Hood, and Marjy Friedrichs

Session Abstract:

Despite recent advances in modeling hydrodynamic, biogeochemical, water quality and fliving resources in watershed and estuarine environments, a large gap still exists in our ability to link these systems and model processes at the shallow terrestrial-aquatic interface. Improved, high-resolution, 3D mechanistic models with appropriate parameterizations for the key physical, chemical, and biological processes are critical for predicting potential responses of estuarine ecosystems to future anthropogenic pressures and assessing how the services these ecosystems provide may be altered in a changing climate. The development and application of such complex, coupled, mechanistic modeling frameworks requires the engagement of both scientists (modelers and experimentalists) as well as stakeholders to efficiently incorporate the new modeling approaches into enhanced scenario forecasting tools and decision support systems. This session aims to bring together modelers, experimentalists, managers and stakeholders to exchange information on current and future directions in modeling and understanding of the complex hydrodynamic, water quality and biogeochemical processes in the shallow waters of the Chesapeake Bay.

Presentations:

TIME	TITLE
3:00	Comparison of Shallow-water Models for Use in Supporting Chesapeake Bay Management Decision-making - *Marjorie Friedrichs - VIMS*
3:20	Modeling light and primary production in shallow, turbid tributaries - *John Klinck - Old Dominion University*
3:40	Shallow-water simulation of Chester River Estuary using coupled FVCOM and ICM water quality model. - *Richard Tian - UMCES*
4:00	Development of a HAB Model for the James River Estuary - *Jim Fitzpatrick - HDR, Inc.*
4:20	Chesapeake Bayes: Big Data and Probabilistic Modeling - *Pasky Pascual - US EPA*
4:40	Modeling the marsh-estuary organic carbon cycle in the Rhode River, MD, USA - *J. Blake Clark - Horn Point Laboratory, UMCES*