Abstracts

Thursday, May 1

Session M1: Regional Scale Monitoring Strategies

3:30 – 5:00 pm | Room 263

Assessing the Quality of Groundwater used for Public Supply across the Glacial Aquifer System

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Abstract
The Glacial Aquifer System (GAS) consists of unconsolidated sediments of glacial origin that overlie bedrock or older, unconsolidated sediments north of the line of glaciation. The GAS is the largest principal aquifer in areal extent and volume of water withdrawn for public and domestic supplies in the United States. In 2000, 3,560 million gallons per day were withdrawn from the GAS to meet the water-supply needs of about 41 million people. Since 1993, the U.S. Geological Survey's National Water-Quality Assessment (NAWQA) program has assessed the chemical quality of groundwater across the GAS, and has developed a framework for interpreting water quality based on two primary characteristics - aquifer intrinsic susceptibility and vulnerability to contamination. During the first two decades of the program, emphasis was placed on sampling both monitoring and domestic-supply wells to better understand the chemical quality of recently recharged water underlying specific hydrogeologic and land use settings as well as deeper groundwater used for domestic supply. As the NAWQA program enters its third decade, sampling of monitoring and domestic wells will continue in order to assess trends in water quality. In addition, a new objective is to assess the quality of groundwater at depths used for public supply across selected principal aquifers. To meet this objective in the GAS, a stratified-random sampling design that utilized equal-area grid cells was used to select 90 public-supply wells for sampling – providing a spatially unbiased assessment of water-quality conditions across the GAS. An additional 30 public-supply wells were selected within the mid-west region of the GAS to provide an enhanced understanding of water-quality conditions in an area with large population centers and intensive applications of agrichemicals. Samples from all public-supply wells are being analyzed for a comprehensive suite of chemical constituents including nutrients, volatile organic compounds, pharmaceuticals, hormones, pesticides, trace elements, radionuclides, microbial indicators and age-tracers. This assessment of the quality of groundwater withdrawn for public supply has implications for human health and economic development and will provide vital data for managing this water resource. Preliminary results from sampling public-supply wells across the GAS will be presented.

The Midwest Stream Quality Assessment: A Collaboration between the U.S. Environmental Protection Agency and the U.S Geological Survey

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Abstract
In 2013, the U.S. Geological Survey (USGS) National Water-Quality Assessment Program (NAWQA) and USGS Columbia Environmental Research Center (CERC) collaborated with the U.S. Environmental Protection Agency (USEPA) National Rivers and Streams Assessment (NRSA) to assess stream quality across the Midwestern United States. The goals of the Midwest Stream Quality Assessment (MSQA) are to characterize major water-quality stressors-contaminants, nutrients, and suspended sediment-and ecological conditions in streams throughout the Midwest and to determine the relative effects of these stressors on aquatic organisms in the streams. The joint study builds upon the ongoing NRSA study and attempts to incorporate the strengths of the USEPA and USGS programs and improve the effectiveness of both programmatic designs. This collaborative study enhances

information provided to the public and policymakers and minimizes costs by leveraging and sharing data gathered under existing programs.

A total of 100 sites were sampled jointly by MSQA study partners across the region between early May and early August 2013. These sites included 50 random sites selected by the USEPA using a probabilistic design, which are a subset of the approximately 150 NRSA sites in the Temperate Plains ecoregion, and about 50 sites selected by the USGS using a targeted design to ensure coverage of a wide range of land-use conditions. In combination, the sites sampled provide the data necessary to assess the water quality and ecological condition of streams and to support empirical modeling of factors affecting those conditions for extrapolation to unsampled streams in the region. The 50 USGS targeted sites were added to complete coverage of stressor levels found in the region, mainly by adding reference sites, low-intensity agricultural sites, and urban sites. The NRSA study samples sites one time for water chemistry, biological community (algae, invertebrates, and fish), and stream habitat. The USGS sampled these same 100 sites 12 times over three months for pesticides, nutrients, and suspended sediment to better assess the stressors affecting the biological communities. Additionally, bed sediment was collected and analyzed for contaminants at all 100 sites to assess another environmental compartment that can dramatically impact biological communities.

Design Basis for the Gulf Monitoring Network (GMN): Integrating Key Elements of Remote Sensing, Sampling, and Modeling

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Abstract
The Gulf of Mexico Alliance (GOMA) was formed by the five U.S. Gulf state Governors to identify and work on resolving issues identified as most important. One of these priorities is improving the integration of water quality monitoring in the estuarine, coastal, and offshore waters of the Gulf. The GOMA Water Quality Team has worked over the last five years with state, federal, private, and NGO monitoring entities to develop an integrated water quality monitoring program to support a wide range of Gulf needs, including management, regulation, and oil-spill restoration. The result is the Gulf Monitoring Network (GMN). We will lay out the process and rationale that evolved. The design revolves around the combination of remote sensing, modeling, and *in situ* sampling. Because of the wide range of scale required of the monitoring and the necessity for cost effectiveness, the GMN relies upon all three elements working together. These are 1) in-situ measurements (both continuous and periodic) and the collection of analytical samples to provide "anchor points" for continuous truthing and feedback to 2) hydrodynamic and water quality models that provide estimates of conditions both spatially (between the sample points) and temporally (between the sampling events). 3) Remote sensing serves the dual role of providing initial data for model development, and then serves to continually validate model output and provide input for model adjustment. Remote sensing also directly provides spatial and temporal information to better estimate water quality between the in-situ sampling locations. The combination of the three approaches will provide the best information at the lowest cost in support of the Gulf priorities.

Design and Implementation of Regional Monitoring Networks to Detect Climate Change Effects in Freshwater Streams

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Abstract

Few monitoring agencies have collected adequate time-series data to support analyses of long-term trends or shifts in the biological, thermal, and hydrological regimes of minimally disturbed, unregulated freshwater streams. Such data are necessary to further our understanding of how changing conditions will affect these sites, their ability to be used in assessments, and to inform state and federal agencies on the relative importance of climate change compared to other stressors. To help address these data gaps, the United States Environmental Protection

Agency (US EPA) has been collaborating with states and US EPA regional offices to develop connected regional monitoring networks in the northeast, mid-Atlantic and southeast. Here, we describe how the monitoring network sites were selected, the biological, temperature and flow data that are being collected at these sites, the methods being used to collect the data, plans for housing and sharing the data, and possible avenues for future research.