

Session J3: Innovative Techniques for Monitoring, Session 1

Room B117-119

1:00 – 2:30 pm

0187

J3-1

Telediagnosis: A New Concept for Rapid Assessment of Accidental or Intentional Water Resource Contamination

Estelle Baurès¹, Bertrand Vergne², Benoit Roig¹ and Olivier Thomas¹

¹*Environment and Health Research laboratory (LERES), Advanced School of Public Health (EHESP), Rennes, France,* ²*HOCER, Nantes, France*

During intentional or accidental contamination of water resource, several scenarios can be considered depending on pollution nature (known or unknown) and location (at source, during treatment, storage or distribution). Whatever the case, a rapid decision and remediation actions are required if any, in order to preserve the integrity of the resource, maintain the efficiency of the treatment systems and manage the risk to deliver contaminated water to the population.

In this context the telediagnosis concept has been developed to quickly access to relevant information. Its implementation consists on the on-site use of a measurement module coupled to a communication system. The measurement part is designed to establish a first diagnosis of contamination (presence and nature) from the exploitation of non-parametric data (*e.g.*, UV-visible and fluorescence spectra) in addition to classical physico-chemical measurements (conductivity, turbidity, temperature, dissolved oxygen...). The communication system allows remote exchanges with an expert who can interact with field operators for sampling or measurement optimizations for example, up to deliver his diagnosis from data exploitation.

The concept of telediagnosis has been tested and validated from several field exercises by implementing a Measurement and Communication System (MCS) designed for the purpose. Compared to the conventional procedure based on sampling and laboratory analysis, the telediagnosis brings advantages in term of cost and rapidity. Concerning the time of response was 2 hours at maximum after the MCS deployment, for the different exercises.

As an alternative method, the telediagnosis is not dedicated to replace the conventional methods but aims at accelerating the process of contamination identification for a more rapid decision making.

Such innovative tool corresponds to the current technological efforts performed by the actors of the security in particular, in the field of the detection of agents of the chemical and biological threats.

0289

J3-2

Water-Quality Mapping in the Caloosahatchee River, San Carlos Bay, Matlacha Pass, and Pine Island Sound, Florida

Amanda Booth

US Geological Survey, Ft. Myers, Fla., USA

Water-quality surveying/mapping protocols for a moving boat system have been modified to incorporate multiple instruments adding additional water-quality parameters using optical sensors and fluorimeters. Parameters surveyed include salinity, temperature, dissolved oxygen, pH, turbidity, chlorophyll a, cyanobacteria (phycoerythrin) and colored dissolved organic matter. Water-quality data (collected using an onboard pump system) along with latitude and longitude are gathered every 10 seconds with the boat traveling at approximately 20 mph. Verifications, with reference probes deployed in the water column, are conducted periodically throughout the mapping trip to ensure that bubbles, turbulence, or other factors related to water movement through the pump system do not introduce bias. Calibration verifications are performed on all water-quality instrumentation less than 24 hours prior to data collection. Location data along with water-quality data are imported into Environmental Systems Research Institute (ESRI) ArcMap Geographical Information System (GIS) program. Survey data is then interpolated using the inverse distance weighted (IDW) method within Arc Spatial Analyst to create contoured water quality maps.

Water-quality maps are produced on a quarterly basis and in response to environmental events such as freshwater releases, algal blooms and hypoxia that occur in the Caloosahatchee River, San Carlos Bay, Matlacha Pass, and Pine Island Sound. These data will assist in determining effects that large volume freshwater releases from Lake Okeechobee may have on the overall environmental health of downstream estuarine environments, allowing water managers to make better informed decisions regarding the release of

freshwater from Lake Okeechobee. Water- quality survey data can assist in evaluating monitoring efforts and are extremely advantageous for proper installation of new continuous water-quality stations. Additionally, survey data offer spatially intensive coverage providing an enhanced comprehension of aforementioned environmental events.

0288
J3-3

Mobile Environmental Monitoring Platform: Water Monitoring on Wheels

Ryan Pugh¹, Renée Paterson¹ and Joe Pomeroy²

¹*Government of Newfoundland and Labrador, Dept. of Environment and Conservation, St. John's, Newf., Canada,* ²*Environment Canada, Dartmouth, N.S., Canada*

Storm events, spills, flooding and other water emergencies tax even the most thorough response plans of environmental agencies. Time frames for such events can be critical according to the proximity to people and property and also to the scale of the emergency. Some spills and floods may be small and localized while others may be very large and wide spread. In reacting to these emergencies, it is prudent to have the most up-to-date and current information available such that certain predictions can be made (In which direction is the wind likely to push an oil spill? Are air temperatures low enough that freezing flood waters are likely?). The more variables that are understood, the more effective a response can become.

Generally, traditional monitoring stations are deployed before an emergency becomes apparent and the stations are unlikely to be optimally located to monitor such events. At best, monitoring stations somewhat removed from a water emergency can provide estimates of conditions in an area facing a water emergency. An elegant solution to such an issue is a mobile monitoring station.

In 2010, the Provincial Government of Newfoundland and Labrador, in conjunction with Environment Canada, first deployed the Mobile Environmental Monitoring Platform in the town of Logy Bay-Middle Cove-Outer Cove near St. John's. This deployment was made after concerns were voiced by the town council regarding damage to infrastructure by above normal water levels on Outer Cove Brook. Whereas the origin of Outer Cove Brook was once marshland, it has since been developed for commercial use and has been largely filled and paved.

The MEMP specialises in rapid deployment with specific goals in mind, and is armed with climate instrumentation, water quality and hydrometric instrumentation, autosamplers, and multiply-redundant telemetry.

0567
J3-4

Assessing the Nearshore Waters of the Great Lakes with a Towed Sensor Array

Glenn Warren and Jeffrey May

US Environmental Protection Agency, Great Lakes National Program Office, Chicago, Ill., USA

The nearshore region of the Great Lakes is subject to localized inputs of nutrients and contaminants, as well as large scale water movements caused by winds and storms. These influences contribute to an area that is much more heterogeneous than the offshore waters of the lakes. In order to assess the nearshore area for chemical and biological constituents, we have employed a sensor array towed behind our research vessel at the 20 meter depth contour of each lake. In 2011, we were able to sample the nearshore of Lake Michigan and the majority Lake Superior. Optical measurements of zooplankton, measurements of chlorophyll a, nitrate, particulates and other limnological parameters were measured continuously during the transects along the nearshore. Data from the sensors are analyzed for variability and for identification of features that occur along the nearshore. We will use the data to associate terrestrial and riverine input to the observed measurements in the local nearshore area.