

Paul Celicourt, PhD.

Montréal, QC H2B 2P7, Canada | www.paulcelicourt.ca | 514-400-3720 | me@paulcelicourt.ca

Education

- Post-doctoral Researcher, Soil and Agri-Food Engineering** July 2019-Present
Faculty of Agriculture and Food Sciences
Laval University— Quebec City, Quebec, Canada
Advisors: Silvio J. Gumiere and Alain N. Rousseau
- Ph.D., Water Resources and Environmental Engineering (Hydroinformatics)** 2017
The City College of New York – New York, NY, USA
Dissertation: Development of an End-To-End Automated Environmental Data Collection System Using Open Source Software and Off-the-Shelf Cost-Effective Hardware.
Advisor: Michael Piasecki
- Master of Science, Urban Sustainability** 2011
The City College of New York – New York, NY, USA
Thesis: Using Natural Zeolite Based Sorbents to Remove Contaminants during Groundwater Recharge with Reclaimed Wastewater.
Advisor: Pengfei Zhang
- Bachelor of Science, Electromechanical Engineering** 2009
Faculté des Sciences, Université d'Etat d'Haïti – Port-au-Prince, Haïti

Past Research Experiences

- Graduate Research Assistant** Jan 2012 to Dec 2016
The City College Of New York – New York, NY
Water Resources Assessment in Haiti and Dominican Republic
I was responsible for deploying hydrometeorological stations (3 piezometers and 2 weather stations) in Leogane (Haiti), two piezometers in Lake Azuei (Haiti) and Lake Enriquillo (Dominican Republic) and a meteorological station in Jimani (Dominican Republic). I automated the transmission of the in-situ data collected via satellite or cellular data network to a web server. I also developed software components to automatically download and process the streaming data files before loading into the CUAHSI Observations Data Model (ODM). I served as the scientific leader of the Bathymetric Survey for Lake Azuei in Haiti.
- Evaluation of Channel Bed Stability in Rouyonne River under Hurricane Sandy, Leogane, Haiti**
I used the Aquaveo, LLC's Watershed Modelling System (WMS) to automate watershed delineation task, create the centerline and the banks of the channel, and extract channel cross-sections from a Light Detection and Ranging (LiDAR)-based Digital Elevation Model (DEM) data. I simulated Rainfall-Runoff processes based on precipitation, land use and soil type data using the HEC-1 Flood Hydrograph package. I computed bed and overbanks shear stress, wetted perimeter and stream power from the HEC-1 and WMS results using HEC-RAS. I used WMS as a HEC-RAS post-processing tool to simulate geometric and flow data for two reaches and a tributary of the Rouyonne River.
- Trans-African Hydro-Meteorological Observatory (TAHMO), Kenya, Africa**
I developed software components to automatically harvest and process streamed data from the weather sensor network. I implemented data management infrastructures to allow proper storage and free access to the TAHMO data. I communicated with partners at Oregon State University and GeoSysNet which implemented a customized data portal for data visualization.

Algorithms and Cyberinfrastructure for High-Precision Automated Quality Control of Hydro-Meteorological Sensor Networks, New York, NY

I was responsible for developing software components to process datasets from the Oklahoma MESONET Earth Networks “WeatherBug network” the Andrews Long-Term Ecological Network sites and TAHMO network before uploading them into an instance of the CUAHSI ODM database using the Streaming Data Loader tool. I travelled occasionally throughout the United States of America for scientific group meetings and participated remotely in bi-weekly meetings. I participated in the design and development of an open-source standards-compliant software system named SENSOR-DX that implements automated data quality control.

National Energy-Water System Assessment Framework (NEWS, New York, NY

I developed the data management infrastructure to support stand-alone models so that team members can access, archive and withdraw data as needed. I integrated into the NEWS framework a capacity to enable automatic updates of data and new data uploads. I created support documentation for all the data management routines and systems put in place. I communicated with partners at the University of New Hampshire and support their efforts on the design and execution of the some of the foundational computer codes associated with the NEWS framework.

Teaching Experience

Guest Lecturer

Nov 11, 2019

Université Laval – Québec, QC, Canada

GAE-1003: Energy, instrumentation et control (Prof. Sebastien Fournel)

Title: Introduction to Irrigation Systems Instrumentation

This lecture introduced the different components of a typical irrigation system with an emphasis on the sensing system (sensors and dataloggers) deployment and communication. An overview of the different communication protocols, particularly physical and digital interfaces, data frames for common protocols such as SDI-12 and ModBus, has been presented. The lecture also included sensor calibration techniques and data access and retrieval from controllers and dataloggers. The second part of the lecture comprised a laboratory session on hydraulic information measurement for irrigation management.

Teaching Assistant

Jan 2014 to Dec 2016

The City College Of New York – New York, NY, USA

ENGRG 59910: Introduction to Geographic Information Systems (GIS)

I conducted laboratory sessions, guides, monitored and graded the lab assignments and their grading for the courses. I held regular office hours and attendance sheets, addressed the concerns of students in a responsible manner, and acted as liaison between the instructor and students. I also presented the lecture in the absence of the course instructor.

Hydrology Seminar

April 2014

Faculté des Sciences, Université d'Etat d'Haïti – Port-au-Prince, Haïti

I presented a two-week-long seminar to students in senior year at the engineering school of the Université d’Etat d’Haïti. The course focused on a comprehensive understanding of major hydrologic processes such as precipitation, evaporation, transpiration, percolation, interception and storage. Particular attention has been granted to data acquisition systems for environmental monitoring. Following the completion of this workshop, I stayed in contact with the students to answer follow-up questions and provide additional content for the course.

Teaching Assistant

Sep 2008 to Aug 2010

Faculté des Sciences, Université d'Etat d'Haïti – Port-au-Prince, Haïti

I provided tutorials for students taking undergraduate level Physics courses. I participated in exam supervision and grading. I conducted study and review sessions and acted as liaison between the instructor and students.

Past Research Projects

Fonds de Recherche du Québec - Nature et technologies (FRQNT) & Quebec Water Research Centre: *Irrigatinati: A self-managed sensing system for irrigation management in horticultural farms*, Celicourt, P., Gumiere, S. J., Rousseau, A. N., \$ 10,000 CAD, 03/01/2020-08/01/2020.

Entrepreneurial Activities

Co-Founder & Senior Scientist

Dec 2016 to Present

SENSAQ Startup (www.sensaq.com)— Syosset, NY, USA

I developed the requirements, design and architecture for a sensor-to-data-dissemination environmental data acquisition and cyberinfrastructure system named **Integrated Sensor Data Management System** (ISDMS). It is an extension of my PhD thesis work at the City University of New York into a commercial product (hardware and software) intended to simplify the processes of collecting environmental data, capturing the deployment context metadata, annotating the data with the captured metadata and ultimately delivering the annotated data to end users in standardized formats. The system enhances the ability of both humans and machines to automatically discover, use, and reuse environmental data. I have also developed an online environment that emulates the full process of configuring and programming the ISDMS hardware for deployment. It is available at: <http://bit.ly/pyteds>. In addition, I introduced ISDMS as speaker or exhibitor at various international scientific conferences.

Winter 2020 Cohort Participant

Feb 2020 to Jun 2020

Québec Scientific Entrepreneurship Program (www.qcse.ca)— QC, Canada

It is a 13-week (3hr/week) online lab-to-market program to prepare Québec's scientists to build world-changing technological companies derived from their academic research. Throughout the program, participants develop skills through courses, networking events, and workshops that are instrumental in helping them to refine their ideas and explore potential problems and viable applications for their scientific research. The program is supported by the Fonds de recherche du Québec (FRQ) and the District 3 Innovation Centre at Concordia University.

Awards

1. City University of New York's Environmental CrossRoads Initiative Fellowship, 2012-2017.
2. Research Foundation of the City University of New York (RFCUNY) fellow student, 2010-2011.
3. Association des Ingenieurs Haitiens et Americains (ADIHA)'s Gerard Marc Scholarship, Dec. 2015.
4. PowerUp Kreyol! Business Plan Competition, October 2016.
5. IEEE Region 9 Foundation Humanitarian, Research and Development Grant, Dec. 2014.
6. The City College of New York's Career and Professional Development Institute (CPDI) Student Professional Development Grant, March 2014.

Journal Publications

Celicourt, P., Gumiere, S. J., Rousseau, A. N. (2020). Agricultural hydroinformatics: A blueprint for an emerging framework to foster water-management-centric sustainability transitions in farming systems [Perspective Paper]. Research Topic: Hydroinformatics for Sustainable Water Management in Agrosystems. *Frontiers in Water*, 2:586516. doi: 10.3389/frwa.2020.586516.

Jacques, M., Gumiere, S. J., Gallichand, J., Celicourt, P., Gumiere, T. (2020). Impacts of water stress severity on potato photosynthetic activity and yields. Research Topic: Global Food and Nutrition Security under Changing Climates. *Frontiers in Agronomy*, 2:590312. doi: 10.3389/fagro.2020.590312.

Celicourt, P., Gumiere, S. J., Lafond, J. A., Gumiere, T., Gallichand, J., Rousseau, A. N. (2020). Mapping spatio-temporal water table for cranberry subirrigation management: comparison of three spatial interpolation methods. Special Issue: Assessment of Spatial and Temporal Variability of Water Resources. *Water (MDPI)*, 12, 3322.

Bredy, J, Gallichand, J., **Celicourt, P.,** Gumiere, S. J. (2020). Water table depth forecasting in cranberry fields using two decision-tree-modeling approaches. *Agricultural Water Management*, 233 (2020): 106090.

Celicourt P., Sam R., Piasecki M. (2016). Development of a Wireless Environmental Data Acquisition Prototype: An Experience Report. *Journal of Software Engineering and Applications*. October 2016, 9, pp479-490.

Celicourt, P. and Piasecki, M. (2015). HydroUnits: Supporting Dimensional Analysis in Hydrologic Computing Systems using Sensor-based Standards. Special Issue on Online Water Data Networks: methods, standards, tools, and technologies. *Journal of Hydroinformatics*, 18(2), 168-184.

Celicourt P. and Piasecki M. (2015). An IEEE 1451.0-based Platform Independent TEDS Creator using Open Source Components. *International Journal of Sensors and Sensor Networks*, Vol.3, No.1, March 2015.

Celicourt, P., Sam, R. and Piasecki, M. (2021). Rapid Prototyping of an Automated Sensor-to-Server Environmental Data Acquisition System using a FAIR-data approach. *Journal of Environmental Informatics*. Under Revision.

Matteau, J., **Celicourt, P.,** Létourneau, G., Gumiere, T., Walter, C., Gumiere, S. J. (2021). Identification of critical periods for soil organic carbon dynamics under different precision irrigation thresholds. *Scientific Reports*. Under Review.

Matteau, J., **Celicourt, P.,** Létourneau, G., Gumiere, T., Gumiere, S. J. (2021). Precision irrigation thresholds effect on potato yield: critical period or critical threshold? *Agricultural Water Management*. Under Review.

Matteau, J., **Celicourt, P.,** Létourneau, G., Gumiere, T., Gumiere, S. J. (2021). Potato cultivar response to soil matric potential based irrigation. *Agronomy (MDPI)*. Under Review.

Gumiere, S. J., Periard, Y., Lafond, J. A., Gumiere, T., **Celicourt, P.,** Rousseau, A. N., Gallichand, J. (2021). A computational method for modelling spatiotemporal variability in hydrodynamic properties of sandy soil under drainage and recharge cycles. *In preparation*.

Celicourt, P., Rousseau, A. N., Gumiere, S. J. (2021). Hydroinformatics and Sociohydrology: A sociotechnical synergy for human-water systems research. *In preparation*.

Matteau, J., **Celicourt, P.,** Gumiere, T., Gumiere, S. J. (2021). Guidelines for environmentally responsible potato irrigation management to enhance productivity and optimize water use. *In preparation*.

Conference Proceedings and Abstracts

Celicourt, P., Gumiere, S. J. and Rousseau, A. N. (2021). Hydroinformatics in multi-colours--part orange: agricultural hydroinformatics. In: 14th International Conference on Hydroinformatics, Mexico City, Mexico, January 11-15, 2021.

Celicourt, P., Gumiere, S. J. and Rousseau, A. N. (2020). Agricultural hydroinformatics: agricultural water systems management as a new application for hydroinformatics. EGU General Assembly 2020, Abstract No. EGU2020-9398. May 3-8, 2020.

Gumiere, S. J., **Celicourt, P.**, and Rousseau, A. N. (2020). Modelling the impacts of cranberry farms on the hydrologic regimes of the Beacancour River watershed in Quebec, Canada. EGU General Assembly 2020, Abstract No. EGU2020-9933. May 3-8, 2020.

Celicourt, P., Sam, R. and Piasecki, M. (2017). Hydromet Sensing: the next generation sensor-to-data management system using open source technologies. Society for Freshwater Science Conference, Abstract No. 6063. Raleigh, NC, USA, June 4-8, 2017.

Celicourt, P., Sam, R. and Piasecki, M. (2016). Towards a cross-platform software framework to support end-to-end hydrometeorological sensor network deployment. AGU Fall Meeting Abstracts, Abstract No: IN23D-1792. San Francisco, CA, December 12-16, 2016.

Celicourt, P. and Piasecki, M. (2015). HydroUnits: A Python-based Physical Units Management Tool in Hydrologic Computing Systems. American Geophysical Union, Fall Meeting 2015, Abstract No: IN11C-1788. San Francisco, CA, December 14-18, 2015.

Piasecki, M. and **Celicourt, P.** (2015). Towards a Software Framework to Support Deployment of Low Cost End-to-End Hydroclimatological Sensor Network. American Geophysical Union, Fall Meeting 2015, Abstract No: H23G-1654. San Francisco, CA, December 14-18, 2015.

Prousevitch A., Corsi, F., Glidden, S., Piasecki, M., **Celicourt, P.**, Miara, A., Fekete, B. M., Vorosmarty, C. J., Macknick, J. and Cohen, S. M. (2015). Data Management System for the National Energy-Water System (NEWS) Assessment Framework. American Geophysical Union, Fall Meeting 2015, Abstract No: GC31E-1233. San Francisco, CA, December 14-18, 2015.

Vorosmarty, C. J., Miara, A., Rosenzweig, B., Corsi, F., Piasecki, M., **Celicourt, P.**, Fekete, B. M., Macknick, J., Melillo, J. M., Newmark, R. L., Tidwell, V. C., Suh, S. and Prousevitch A. (2015). Overview of the National Energy-Water System (NEWS) Assessment Framework Study. American Geophysical Union, Fall Meeting 2015, Abstract No: GC34D-04. San Francisco, CA, December 14-18, 2015.

Celicourt, P. and M. Piasecki (2015). Towards a Sensor-to-End-User Ambient Data Acquisition System. In: 2015 Bloomberg Data for Good Exchange Conference. New York, NY, September 28, 2015.

Celicourt, P. and M. Piasecki (2014). Hydrometeorological Data Collection, Publication and Analysis using Open-Source Hardware and Software. In: 11th International Conference on Hydroinformatics, New York, NY, USA, August 17-21, 2014.

Celicourt, P. and Piasecki, M. (2014). An End-to-End System to Enable Quick, Easy and Inexpensive Deployment of Hydrometeorological Stations. American Geophysical Union, Fall Meeting 2014, vol 1, pp. 1190. San Francisco, CA, December 15-19, 2014.

Oral Presentations

Celicourt, P., Rousseau, A. N., and Gumiere, S. J. (2020). Agricultural hydroinformatics: an emerging approach to water sustainability transitions in farming systems. AGU Fall Meeting Abstracts, Virtual Meeting, December 1-17, 2020.

Celicourt, P., Etienne, E., Sam, R. Gedeon N., and Piasecki, M. (2019). Crossing a new frontier in hydrometeorological data management with an Integrated Sensor Data Management System (ISDMS). MOXXI Conference 2019. New York, NY, USA. March 11-13, 2019.

Celicourt, P., Etienne, E., Sam, R. Gedeon N., and Piasecki, M. (2018). An Integrated Sensor Data Management System with Application in Hydrology. American Geophysical Union, Fall Meeting 2018, Abstract No: H51E-01. Washington, DC, USA. December 10-14, 2018.

Celicourt, P. (2018). An Integrated Sensor Data Management System. Australian Research Data Commons 2018 Monthly Tech Talk in November: Environmental Sensor Data (QA/QC). Online.

Celicourt, P., Sam, R. and Piasecki, M. (2017). TranscodX: A Generation of Full Stack Environmental Data. IAHS Measurements and Observations in the XXI Century (MOXXI) and WMO Hydrohub Joint Meeting (Innovation in Hydrometry: from ideas to operation). WMO Headquarters, Geneva, Switzerland, December 4-5, 2017.

Patents

Celicourt, P. (2016). Integration of Transducer Data Collection. Location: U.S. Patent and Trademark Office. Application No. 15,362,937, filed November 29, 2016.

Celicourt, P. (2018). Transducer Programmer. Location: U.S. Patent and Trademark Office. Application No. 15,983,931, filed May 18, 2018.

Professional Affiliations

- Member, Canadian Water Resources Association (CWRA)
- Member, American Geophysical Union (AGU)
- Member, European Geosciences Union (EGU)
- Member, International Association of Hydrological Sciences (IAHS)
- Member, IAHS-MOXXI: Measurements and Observations in the 21st Century
- Member, EnviroSensing Cluster of the Federation of Earth Science Information Partners (ESIP)

Computer Skills

Computer Programming Languages	: Python, C, C++, C#, CRBasic.
Operating System Development	: Yocto Project
Version Control System Software	: git
Database Server	: MySQL, MSSQL, SQLite, PostgreSQL/PostGIS.
GIS & Hydrologic Modelling Software	: AnAqSim, FEFLOW, QGIS, ArcGIS Suite, MODFLOW, HEC-RAS, HEC-HMS, TauDEM.
Web Programming and Frameworks	: Django, Tastypie, Electron, PHP, JavaScript.
Scientific Data and File Formats	: NetCDF, WaterML.

Professional and Scientific Services

Guest Associate Editor

- Journal: Frontiers in Water (June 2020-March 2021)
- Research Topic: Hydroinformatics for Sustainable Water Management in Agrosystems
- Co-Guest Editors: Prof. Silvio J. Gumiere (Université Laval, QC, Canada), Prof. Alain N. Rousseau (Institut National de Recherche Scientifique, QC, Canada) and Prof. Matteo Camporese (University of Padova, PD, Italy).

Manuscripts Reviewer for:

- Journal of Hydroinformatics (2013-present)
- IEEE Software Magazine (2016-present)
- IWA Open Water Journal (2016-present)
- Sustainability (MDPI; 2020-present)
- International Journal of Environmental Research and Public Health (MDPI; 2020-present)
- Agriculture (MDPI; 2021-present)
- Conference Proceedings on Scientific Computing with Python (2017-present)
- International Water Association (IWA) World Water Congress and Exhibition (2017-present)

Languages

1. English
 2. French
 3. Haitian Creole
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