

Robin Thibaut

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WORK EXPERIENCE

PhD Fellow at Ghent University

Mar 2019 - present

The aim of this work revolves around developing a new framework for experimental design in Earth Sciences using Bayesian Evidential Learning. Throughout, I have to deepen my knowledge in hydrology and geophysics, as well as learning and applying new skills in computer programming, using state-of-the-art machine learning and artificial intelligence techniques. I am also responsible for disseminating my research by publishing in peer-reviewed journals, attending international conferences, and sharing my open-source software with the community.

Project Engineer at G-tec

Mar 2018 - Jan 2019

I participated in marine geophysical surveys for the purpose of detecting unexploded ordnance, determining the thickness of various geological layers beneath the seabed, and mapping the bathymetry. It involved working on ships 12 hours-shifts, night or day, for weeks at a time. Interpersonal skills and proficiency in the English language were required. Fundamental responsibilities: planning, equipment mobilization, data acquisition and processing. Methods used: magnetometry, seismic refraction, side-scan sonar, multibeam.

EDUCATION

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| 2019–present | PhD Fellow in the Laboratory for Applied Geology and Hydrogeology, Department of Geology, Ghent University – expected graduation date: March 2023 | |
| 2014–2017 | Master's Degree in Geological Engineering at University of Liege | Cum Laude |
| 2010–2014 | Bachelor's Degree in Geological Sciences at Free University of Brussels | Cum Laude |

PROJECTS

A new framework for Experimental Design in Earth Sciences using Bayesian Evidential Learning. 2019 – ongoing. Earth Sciences predictions are facing large uncertainty related to the complexity and the lack of knowledge of the subsurface. Acquiring the most informative data set to reduce uncertainty is therefore highly valuable. However, its identification rapidly becomes intractable for large scale problems. We propose to stochastically solve this problem under large uncertainty using our newly developed Bayesian Evidential Learning framework. This project is funded by BOF (Bijzonder Onderzoeksfonds) at Ghent University.

Impact of saltwater intrusion on water resources and irrigation in the Southern Central region of Vietnam under climate change. 2019 – ongoing. The Southern Central region of Vietnam includes a strip of narrow coastal plains that stretches along the Vietnamese coast. Groundwater aquifers in this region have been contaminated by saltwater intrusions. This process is accelerated further by groundwater pumping for irrigation, sea-level rise, and more frequent and prolonged droughts, all of which are direct consequences of climate change. Saltwater intrusion reduces the quality and quantity of water resources and poses a direct threat to rice production due to agriculture's reliance on groundwater resources for irrigation. This project aims to strengthen research capacities as well as provide scientific databases and management solutions for the sustainable exploitation and utilization of groundwater resources for the agro-food sector in the Southern Central region, thereby contributing to climate change mitigation and the region's long-term socioeconomic development. This research is supported in part by VLIR-UOS and the Belgian Development Cooperation.

Induced Polarisation investigation of the Orman's gold deposit in Mondulkiri Province, Cambodia. 2017. The time-domain induced polarisation technique was used to assess Cambodia's largest gold resource. One of the mission's goals was to develop new guidelines for implementing a sharp inversion scheme that used the *Minimum Gradient Support* approach to recover resistivity and chargeability models. The University of Liège, the Institute of Technology of Cambodia (Phnom Penh), and Renaissance Minerals (Cambodia) Limited collaborated on the project. The Académie de Recherche et d'Enseignement Supérieur (ARES) funded my travels between Belgium and Cambodia.

PUBLICATIONS

- Thibaut, Robin**, Ty Ferré, Eric Laloy, and Thomas Hermans (In preparation). “Sequential optimization of flux measurement to estimate groundwater-surface water interactions”. In: *(Journal to be determined)*.
- Thibaut, Robin**, Nicolas Compaire, Nolwenn Lesparre, Maximilian Ramgraber, Eric Laloy, and Thomas Hermans (Nov. 2022). “Comparing Well and Geophysical Data for Temperature Monitoring Within a Bayesian Experimental Design Framework”. In: *Water Resources Research* 58 (11). ISSN: 0043-1397. DOI: 10.1029/2022WR033045. URL: <https://onlinelibrary.wiley.com/doi/10.1029/2022WR033045>.
- Thibaut, Robin**, Eric Laloy, and Thomas Hermans (Dec. 2021). “A new framework for experimental design using Bayesian Evidential Learning: The case of wellhead protection area”. In: *Journal of Hydrology* 603, p. 126903. ISSN: 00221694. DOI: 10.1016/j.jhydrol.2021.126903. URL: <https://linkinghub.elsevier.com/retrieve/pii/S0022169421009537>.
- Cong-Thi, Diep, Linh Pham Dieu, **Robin Thibaut**, Marieke Paepen, Huu Hieu Ho, Frédéric Nguyen, and Thomas Hermans (June 2021). “Imaging the Structure and the Saltwater Intrusion Extent of the Luy River Coastal Aquifer (Binh Thuan, Vietnam) Using Electrical Resistivity Tomography”. In: *Water* 13 (13), p. 1743. ISSN: 2073-4441. DOI: 10.3390/w13131743. URL: <https://www.mdpi.com/2073-4441/13/13/1743>.
- Thibaut, Robin**, Thomas Kremer, Annie Royen, Bun Kim Ngun, Frédéric Nguyen, and Thomas Hermans (Apr. 2021). “A new workflow to incorporate prior information in minimum gradient support (MGS) inversion of electrical resistivity and induced polarization data”. In: *Journal of Applied Geophysics* 187, p. 104286. ISSN: 09269851. DOI: 10.1016/j.jappgeo.2021.104286. URL: <https://linkinghub.elsevier.com/retrieve/pii/S0926985121000331>.

SOFTWARE AND DATASETS

- Lesparre, Nolwenn, Nicolas Compaire, Thomas Hermans, and **Robin Thibaut** (2022). *4D Temperature Monitoring*. [Dataset]. DOI: 10.34740/kaggle/dsv/3819983. URL: <https://www.kaggle.com/dsv/3819983>.
- Deleersnyder, Wouter and **Robin Thibaut** (2022). *Scale-dependent wavelet-based regularization scheme for geophysical 1D inversion*. [Software]. DOI: 10.5281/zenodo.6552695. URL: <http://dx.doi.org/10.5281/zenodo.6552695>.
- Thibaut, Robin** (2021). *WHPA Prediction*. [Dataset]. DOI: 10.34740/kaggle/dsv/2648718. URL: <https://www.kaggle.com/dsv/2648718>.
- Thibaut, Robin** and Maximilian Ramgraber (Sept. 2021). *SKBEL - Bayesian Evidential Learning framework built on top of scikit-learn*. [Software]. Version v2.0.0. DOI: 10.5281/zenodo.6205242. URL: <https://doi.org/10.5281/zenodo.6205242>.
- Thibaut, Robin** and Guillaume Vandekerckhove (May 2021). *pysgems-Use SGeMS (Stanford Geostatistical Modeling Software) within Python*. [Software]. Version v1.3. DOI: 10.5281/zenodo.4773587. URL: <https://doi.org/10.5281/zenodo.4773587>.

CONFERENCES AND TALKS

- Thibaut, Robin**, Nicolas Compaire, Nolwenn Lesparre, Maximilian Ramgraber, Eric Laloy, and Thomas Hermans (2022). *Comparing well and geophysical data for temperature monitoring within a Bayesian Experimental Design framework*. eng. Gdansk, Poland.
- Thibaut, Robin**, Thomas Hermans, and Eric Laloy (2021a). *A new framework for experimental design using Bayesian Evidential Learning : the case of wellhead protection area*. eng. New Orleans, U.S.A.
- (2021b). *Bayesian Evidential Learning combined with experimental design : the case of wellhead protection area prediction*. eng. Brussels, Belgium. URL: <https://iah2021belgium.org/wp-content/uploads/2021/09/IAH-2021-Book-of-Abstracts.pdf>.

Hermans, Thomas, Nicolas Compaire, **Robin Thibaut**, and Nolwenn Lesparre (2021). *Bayesian evidential learning : an alternative to hydrogeophysical coupled inversion*. online. URL: <http://dx.doi.org/10.1190/segam2021-3580979.1>.

Thibaut, Robin, Thomas Hermans, and Eric Laloy (2020). *A new framework to reduce uncertainty in Wellhead Protection Area prediction using Bayesian Evidential Learning*. eng. Online. URL: <https://iemss2020.com/>.

Thibaut, Robin, Thomas Kremer, Annie Royen, Bun Kim Ngun, Frederic Nguyen, and Thomas Hermans (2019). *A new approach to incorporate prior information in MGS inversion of ERT/IP data*. eng. The Hague, The Netherlands. URL: <http://dx.doi.org/10.3997/2214-4609.201902391>.

TEACHING

2019–present Teaching assistant for the course **Groundwater Modeling** at **Universiteit Gent**
March 2022 Organizer and speaker for the **Python Workshop** at **Universiteit Gent**
2016–2019 Private tutoring in Mathematics and Physics for university students

PEER-REVIEW

2021–present

I have been a reviewer for the following journals:

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| Journal of Hydrology (Elsevier) | 4 reviews |
| Geophysics (Society of Exploration Geophysicists) | 2 reviews |
| Pure and Applied Geophysics (Springer) | 2 reviews |
| Geophysical Research Letters (American Geophysical Union) | 1 review |

LANGUAGES

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|-------------------|--------------|
| English | Fluent |
| French | Fluent |
| Dutch | Intermediate |
| Vietnamese | Intermediate |

SKILLS

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| Programming | Python, Matlab, Wolfram Mathematica |
| Software | Git, PyCharm, MODFLOW, MT3DMS, MODPATH, ModelMuse, CRTOMO, RES2DINV, SGEMS, GMS, Microsoft Office, Adobe Illustrator, LaTeX, BibTeX |
| Other | Linux, Windows, Mac OS |

MEMBERSHIPS AND AFFILIATIONS

International Association of Hydrogeologists (IAH)
American Geophysical Union (AGU)
Society of Exploration Geophysicists (SEG)
Institute of Electrical and Electronics Engineers (IEEE)
International Association for Mathematical Geosciences (IAMG)

LICENSES AND CERTIFICATIONS

Basic Offshore Safety Induction & Emergency Training (BOSIET)

Issued Feb. 2018 – Exp. Feb. 2022

Helicopter Underwater Escape Training (HUET)

Issued Feb. 2018 – Exp. Feb. 2022