Bart Rogiers

I am a research scientist and the R community lead at the Belgian Nuclear Research Centre, and also have a seat in the board of the International Association of Hydrogeologists' Belgian chapter.

My research interests are currently focused around the introduction of probabilistic programming in radiological characterization and hydrogeology, and leveraging procedural solid texture synthesis for porous media reconstruction, targeting natural and engineered barrier materials considered in the framework of radioactive waste disposal.

I furthermore really enjoy introducing people to the modern side of R, and help them adopt it as their main workhorse for more reproducible science.

💼 PROFESSIONAL EXPERIENCE

Board member	
IAH Belgium (BCH-CBH)	📍 Brussels, Belgium

Present | 2015

Research scientist	
Belgian Nuclear Research Centre (SCK CEN)	📍 Mol, Belgium

Present | 2013

Internship	
Flanders Environment Agency	📍 Brussels, Belgium

2009 | 2008

Topic River restoration of the Zwarte Beek between Beringen and Diest: Evaluation of the impact on the groundwater system.

Supervisor Lermytte J

ᚚ TEACHING EXPERIENCE

2023 ● **R: Create command line tools with {optparse}**
SCK CEN Learning & development   📍 Mol, Belgium

Format 1-day course

Topics Environment variables, Git Bash, R in a terminal,
redirections, command line arguments and options, automated
execution.

2023 ● **R: Handle your data with the {tidyverse}**
SCK CEN Learning & development   📍 Mol, Belgium

Format 3-day course

Topics Data reading, cleaning, manipulation and
visualization, handling specific types, and iteration and
nesting.

2023 ● **R: Get started**
SCK CEN Learning & development   📍 Mol, Belgium

Format 1-day course

Topics Installing the required software, tweaking the RStudio
IDE, managing contributed packages, binding names to values,
working with vectors, subsetting R objects, using control flow

2021
|
2020 ● **Modern R for data science: Up your data viz game**
SCK CEN Learning & development   📍 Mol, Belgium

Format 1-day course, with editions in 2020 and 2021.

Topics More details on {ggplot2}, {scales} and extensions -
Figure design principles - Data visualization types -
Animation

2021
|
2019 ● **Modern R for data science: The core tidyverse, good
practices and our corporate environment**
SCK CEN Learning & development   📍 Mol, Belgium

Format 4-day course, with editions in 2019, 2020 and 2021.

Topics Data reading, cleaning, manipulation and visualization
- Iteration with functional programming - Exporting tables and
figures - Literate computing - Reproducible workflow

2024
|
2017

Training course on radioactive waste management
SCK CEN Academy   ⦿ Mol, Belgium

Format 45-min lecture "Characterization techniques used at
SCK CEN - Uncertainty quantification" during the 1.5-week
radioactive waste management course. Contributed to the
editions in 2017, 2021 and 2024.

Topics Taylor expansion - Monte Carlo error propagation -
Probabilistic programming - State of the art in radiological
waste characterization

📖 JOURNAL PAPERS

2023 • Probabilistic radwaste characterization: findings of a multi-method, multi-mockup exercise using interpolation-based surrogate efficiencies.
Annals of Nuclear Energy   📍 194: 110065

Authors Laloy E, Rogiers B, Bielen A, Borella A, Kubinski W, Carasco C, Mathonat C, Boden S.

2023 • Improving Bayesian radiological profiling of waste drums using Dirichlet priors, Gaussian process priors, and hierarchical modeling.
Applied Radiation and Isotopes   📍 194: 110691

Authors Laloy E, Rogiers B, Bielen A, Borella A, Boden S.

2023 • Estimation of soil radioactivity-depth profiles using Bayesian inversion of borehole gamma spectrometry data.
Journal of Environmental Radioactivity   📍 257: 107077

Authors Hasan MM, Rogiers B, Laloy E, Camps J, Rutten J, Huysmans M.

2022 • Characterizing groundwater heat-transport in a complex lowland aquifer using paleo-temperature reconstruction, satellite data, temperature-depth profiles, and numerical models.
Hydrology and Earth System Sciences   📍 26: 5577–5604

Authors Casillas-Trasvina A, Rogiers B, Beerten K, Wouters L, Walraevens K.

2023 • 2D Inversion of in situ gamma-ray spectrometric measurements of 137Cs for site characterization.
Journal of Environmental Radioactivity   📍 256: 107052

Authors Hasan MM, Camps J, Rogiers B, Laloy E, Rutten J, Boden S, Huysmans M.

See orcid, scholar, or our institutional repository for more extensive and up to date overviews of my scientific output.

2022 • Using helium-4, tritium, carbon-14 and other hydrogeochemical evidence to evaluate the groundwater age distribution: the case of the Neogene aquifer, Belgium.
Journal of Hydrology X   📍 17: 100132

Authors Casillas-Trasvina A, Rogiers B, Beerten K, Pärn J, Wouters L, Walraevens K.

2022 • Exploring river—aquifer interactions and hydrological system response using baseflow separation, impulse response modelling and time series analysis in three temperate lowland catchments.
Hydrology and Earth System Sciences   📍 26: 3629—3649

Authors Lu M, Rogiers B, Beerten K, Gedeon M, Huysmans M.

2022 • Soil radioactivity-depth profiles from regularized inversion of borehole gamma spectrometry data.
Journal of Environmental Radioactivity   📍 243: 106807

Authors Hasan MM, Rogiers B, Laloy E, Rutten J, Camps J, Vidmar T, Huysmans M.

2021 • Exploring the hydrological effects of normal faults at the boundary of the Roer Valley Graben in Belgium using a catchment-scale groundwater flow model.
Hydrogeology Journal   📍 30: 133-149

Authors Casillas-Trasvina A, Rogiers B, Beerten K, Wouters L, Walraevens K.

2021 • Towards a scientific-based assessment of long-term durability and performance of cementitious materials for radioactive waste conditioning and disposal.
Journal of Nuclear Materials   📍 557: 153201

Authors Jacques D, Phung QT, Perko J, Seetharam SC, Maes N, Liu S, Yu L, Rogiers B, Laloy E

2021 • Bayesian inference of 1D activity profiles from segmented gamma scanning of a heterogeneous radioactive waste drum.
Applied Radiation and Isotopes   📍 175: 109803

Authors Laloy E, Rogiers B, Bielen A, Boden S.

2020 INSIDER UC2: the BR3 biological shield preliminary
results and future work.
EPJ Nuclear Sciences & Technologies　　📍 6: 14

Authors Broeckx W, Rogiers B, Mangelschots N, Vandyck R,
Verstrepen G, Boden S.

2020 Development of a user-friendly guideline for data
analysis and sampling design strategy.
EPJ Nuclear Sciences & Technologies　　📍 6: 16

Authors Desnoyers Y, Rogiers B.

2020 The relation between petrophysical and transport
properties of the Boom Clay and Eigenbilzen Sands.
Applied Geochemistry　　📍 114: 104527

Authors Jacops E, Rogiers B, Frederickx L, Swennen R, Krooss
BM, Amann-Hildenbrand A, Littke R, Bruggeman C.

2019 Nested multiresolution hierarchical simulated
annealing algorithm for porous media reconstruction.
Physical Review E　　📍 100(5): 053316

Authors Lemmens L, Rogiers B, Jacques D, Huysmans M, Swennen
R, Urai JL, Desbois G, Laloy E

2018 Metrology for decommissioning nuclear facilities:
Partial outcomes of joint research project within the
European Metrology Research Program.
Applied Radiation and Isotopes　　📍 134: 351-357

Authors Suran J, Kovar P, Smoldasova J, Šolc J, Van Ammel R,
Miranda MG, Russell B, Arnold D, Zapata-Garcia D, Boden S,
Rogiers B, Sand J, Peräjärvi K, Holm P, Hay B, Failleau G,
Plumeri S, Beck YL, Grísa T.

2017 Bayesian inversion of a CRN depth profile to infer
Quaternary erosion of the northwestern Campine Plateau
(NE Belgium).
Earth Surface Dynamics　　📍 5: 331-345

Authors Laloy E, Beerten K, Vanacker V, Christl M, Rogiers B,
Wouters L.

2017 Model-based classification of CPT data and automated
lithostratigraphic mapping for high-resolution
characterization of a heterogeneous sedimentary
aquifer.
PLOS One   📍 12(5): e0176656

Authors Rogiers B, Mallants D, Batelaan O, Gedeon M, Huysmans
M, Dassargues A.

2017 Episodic activity of a dormant fault in tectonically
stable Europe: The Rauw fault (NE Belgium).
Tectonophysics   📍 699: 146-163

Authors Verbeeck K, Wouters L, Vanneste K, Camelbeeck T,
Vandenberghe D, Beerten K, Rogiers B, Schiltz M, Burow Ch,
Mees F, De Graeve J, Vandenberghe N.

2014 The usefulness of outcrop analogue air permeameter
measurements for analysing aquifer heterogeneity:
Quantifying outcrop hydraulic conductivity and its
spatial variability.
Hydrological processes   📍 28: 5176-5188

Authors Rogiers B, Beerten K, Smeekens T, Mallants D, Gedeon
M, Huysmans M, Batelaan O, Dassargues A.

2014 Multi-scale aquifer characterization and groundwater
flow model parameterization using direct push
technologies.
Environmental Earth Sciences   📍 72(5): 1303-1324

Authors Rogiers B, Vienken T, Gedeon M, Batelaan O, Mallants
D, Huysmans M, Dassargues A

2014 High resolution saturated hydraulic conductivity
logging of borehole cores using air permeability
measurements.
Hydrogeology Journal   📍 22(6): 1345-1358

Authors Rogiers B, Winters P, Huysmans M, Beerten K, Mallants
D, Gedeon M, Batelaan O, Dassargues A

2013 The usefulness of outcrop analogue air permeameter
measurements for analysing aquifer heterogeneity:
testing outcrop hydrogeological parameters with
independent borehole data.
Hydrology and Earth System Sciences   📍 17: 5155-5166

Authors Rogiers B, Beerten K, Smeekens T, Mallants D, Gedeon
M, Huysmans M, Batelaan O, Dassargues A.

2014 ● Demonstrating large-scale cooling in a Variscan terrane by coupled groundwater and heat flow modelling.
Geothermics   ⚲ 51: 71-90

Authors Rogiers B, Huysmans M, Vandenberghe N, Verkeyn M

2013 ● Derivation of flow and transport parameters from outcropping sediments of the Neogene aquifer, Belgium.
Geologica Belgica   ⚲ 16(3): 129-147

Authors Rogiers B, Beerten K, Smeekens T, Mallants D, Gedeon M, Huysmans M, Batelaan O, Dassargues A

2013 ● Efficient posterior exploration of a high-dimensional groundwater model from two-stage MCMC simulation and polynomial chaos expansion.
Water Resources Research   ⚲ 49(5): 2664-2682

Authors Laloy E, Rogiers B, Vrugt JA, Mallants D, Jacques D

2013 ● Determination of Cs-137 contamination depth distribution in building structures using geostatistical modelling of ISOCS measurements.
Applied Radiation and Isotopes   ⚲ 79: 25-36

Authors Boden S, Rogiers B, Jacques D

2013 ● A critical review of laboratory and in-situ hydraulic conductivity measurements for the Boom Clay in Belgium.
Applied Clay Science   ⚲ 75-76: 1-12

Authors Yu L, Rogiers B, Gedeon M, Marivoet J, De Craen M, Mallants D.

2012 ● Estimation of hydraulic conductivity and its uncertainty from grain-size data using GLUE and artificial neural networks.
Mathematical Geosciences   ⚲ 44(6): 739-763

Authors Rogiers B, Mallants D, Batelaan O, Gedeon M, Huysmans M, Dassargues A

2011 ● Evaluating the impact of river restoration on the
local groundwater and ecological system: a case study
in NE Flanders.
Geologica Belgica   ♥ 14(3-4): 265-276

Authors Rogiers B, Lermytte J, De Bie E, Batelaan O.

🎓 EDUCATION

2013
|
2009

PhD in Geology
SCK CEN & KU Leuven   📍 Mol, Belgium

Thesis Conditional Stochastic Simulation of Groundwater Flow and Contaminant Transport in a Sandy Aquifer at Mol/Dessel.

Supervisory committee Batelaan O, Mallants D, Gedeon M, Huysmans M, Dassargues A

Additional members of the jury Vandenberghe N, Swennen R, Vanderborght J, Dietrich P

2009
|
2007

Master of Science in Geology
KU Leuven, magna cum laude   📍 Leuven, Belgium

Thesis Interpretation of the heat-flow density in the deep wells Soumagne, Grand-Halleux and Havelange in Belgium, by means of a numerical coupled heat transport and groundwater flow model.

Promoters Vandenberghe N, Huysmans M

2007
|
2004

Bachelor of Science in Geology, Option Physics
KU Leuven, cum laude   📍 Leuven, Belgium

Thesis The meaning of heat-flow density measurements in the wells Grand-Halleux, Soumagne, Meer and Havelange.

Promoters Vandenberghe N, Huysmans M

⌕ PEER REVIEWING

- Hydrogeology Journal (3)
- Water Resources Research (3)
- Computers & Geosciences (2)
- Journal of Hydroinformatics (2)
- Mathematical Geosciences (2)
- Toxics (2)
- Advances in Water Resources (1)
- Earth Science Informatics (1)
- Environmental Earth Sciences (1)
- Frontiers in Earth Science (1)
- Journal of African Earth Sciences (1)
- Journal of Environmental Quality (1)
- Journal of Hydrology and Hydromechanics (1)
- Vadose Zone Journal (1)

See orcid for an up to date overview.

🌱 PROFESSIONAL DEVELOPMENT

2023 ● Learning facilitator (Train the trainer)
Ceelen N, Progress Consulting, --01-16, ---23, --02-16
📍 Mol, Belgium

2021 ● Train-The-Trainer webinars
Clarijs T & Van Puyvelde L, SCK CEN learning &
development, --05-28,--06-03, ---15, ---21, ---25, ---28,
---30
📍 Online

2019 ● Email - Go for 0 Inbox
Loontiens S, Shortcuts, --06-06   📍 Mol, Belgium

2019 ● Organize your time
Loontiens S, Shortcuts, --05-06   📍 Mol, Belgium

2018 ● Querying Data with transact-SQL
RealDolmen, --11-14/15, ---27   📍 Mol, Belgium

2018 ● Making 3D drawings with Sketchup | Fundamentals
Mangelschots N, SCK CEN Learning & development, --11-12
📍 Mol, Belgium

2017 ● Git version control
Van Robbroeck K, RealDolmen, --09-27/28   📍 Mol, Belgium

2016 ● MCNP - basic training course
SCK CEN Academy, --11-08   📍 Mol, Belgium

2014 ● An introduction to Bayesian computing with INLA
Rue H, --07-08   📍 Mines ParisTech, France

2014 ● Advanced stochastic simulations
Lantuéjoul C, Romary T, --07-07   📍 Mines ParisTech, France

2014 ● Short course on underlying R&D for the disposal of
radioactive waste
SCK CEN Academy, --03-19/20   📍 Mol, Belgium

2013 ● Version control with subversion
Bex G-J, ICTS KU Leuven, --02-26   📍 Leuven, Belgium

2013 ● HPC introduction
Oldenhof M, ICTS KU Leuven, --02-19   📍 Leuven, Belgium

2012 ● Advanced R programming topics
Wijffels J, BNOSAC, --10-18/19   📍 Leuven, Belgium

Note I am using the ISO
8601:2000 standard for
truncated date (interval)
notation.

2012 ● Upgrade your written English
Vermeire A, --04-19, --05-03/04   ◉ Mol, Belgium

2012 ● LaTeX - introduction
ICTS KU Leuven, --03-29/30   ◉ Leuven, Belgium

2012 ● Data mining in practice
CS KU Leuven, --02-06/07   ◉ Leuven, Belgium

2011 ● Speedreading
Lernout B, --10-11   ◉ Mol, Belgium

2011 ● Scientific writing & speaking
Vermeire A, --03-02, ---09, ---21, ---28   ◉ Mol, Belgium

2010 ● Global sensitivity analysis techniques for
probabilistic groundwater modeling
Mishra S, --09-21   ◉ Valencia, Spain

2010 ● 2nd summer school on flow and transport in porous and
fractured media
CNRS, --08-16/28   ◉ Cargèse, France

2010 ● Inverse modelling in earth and environmental sciences
Vrugt J, Huisman S, --07-26/29   ◉ Leuven, Belgium

2010 ● Meet the expert in hydrology - Round tables among
young and established scientists
Carrera J, --05-05   ◉ Vienna, Austria

2010 ● Short course on geostatistical analysis of
environmental data
Goovaerts P, --03-08/12   ◉ Gainesville, FL, USA

2010 ● Introduction to R
ICTS KU Leuven & LStat, --02-22/23   ◉ Leuven, Belgium

2010 ● Multivariate data analysis, with applications
ICTS KU Leuven & LStat, --02-08/10   ◉ Leuven, Belgium

2010 ● Hydrological modelling and uncertainty analysis
Buytaert W, --01-18   ◉ Louvain-la-Neuve, Belgium

⚜ GRANTS

2013
|
2009

● **SCK CEN PhD scholarship**
SCK CEN Academy PhD program   📍 Mol, Belgium

✈ STAYS ABROAD

2013 ● **CSIRO Land & Water and Flinders University**
Scientific visit, --05-22/06-15   ⚲ Adelaide, Australia

🎓 STUDENT SUPERVISION

Present | 2023

Aouf A, PhD
SCK CEN & UCLouvain

Topic Deep learning for 3D porous media reconstruction of clay and cement-based materials

Supervisors *De Vleeschouwer Ch*, Laloy E, Rogiers B

Present | 2023

Casas Molina V, PhD
SCK CEN & Ghent University

Topic Machine learning for accurate and efficient uncertainty quantification in radiological waste characterization

Supervisors *Couckuyt I*, Laloy E, Rogiers B

2022 | 2018

Casillas A, PhD
SCK CEN & Ghent University

Topic Assessment of unconventional state variables to constrain groundwater flow models of the Neogene Aquifer in the Campine Basin in Belgium

Supervisors *Walraevens K*, Rogiers B, Beerten K, Wouters L

Present | 2017

Lu M, PhD
SCK CEN & KU Leuven

Topic Quantifying and predicting river-aquifer exchange in lowland floodplains (Nete, Demer and Dijle).

Supervisors *Huysmans M*, Gedeon M, Beerten K, Rogiers B

2022 | 2017

Moudud H, PhD
SCK CEN & Vrije Universiteit Brussel

Topic In situ methods for high resolution mapping of radioactive soil contamination

Supervisors *Huysmans M*, Vidmar T, Rogiers B

Present | 2016

Lemmens L, PhD
SCK CEN & KU Leuven

Topic 3D Porous media reconstruction for natural and engineered radioactive waste confinement barriers — A multiresolution-multiphase approach.

Supervisors *Huysmans M*, Rogiers B, Laloy E

University promoter in italic.

2016 ● Neyens C, MSc thesis
Faculty of Science, KU Leuven

Topic Analysis of pumping tests in a sandy aquifer in
Northern Belgium.

Supervisors *Huysmans M*, Gedeon M, Laloy E, Rogiers B

2015 ● Janssens L, BSc thesis
Faculty of Science, KU Leuven

Topic Omzetting van digitale foto's van ontsluitingen in
hydraulische conductiviteit, met behulp van beeldanalyse en
luchtpermeameter datasets.

Supervisors *Huysmans M*, Rogiers B

2015 ● Hoedemaekers T, BSc thesis
Faculty of Science, KU Leuven

Topic Slug- en dilutietesten in de Neogene aquifer, in en
rond de nucleaire zone te Mol-Dessel- Geel.

Supervisors *Huysmans M*, Rogiers B, Gedeon M

2014 ● Bennett G, MSc thesis
Faculty of Engineering, Vrije Universiteit Brussel

Topic Integration of detailed borehole core measurements and
pump test data from the aquifers below the Boom Clay in a
groundwater flow model.

Supervisors *Huysmans M*, Rogiers B, Vandersteen K

2014 ● Potums L, BSc thesis
Faculty of Science, KU Leuven

Topic Gedetailleerde karakterisatie van boorkernen uit de
diepe aquifers rond de Boomse klei, met behulp van een
luchtpermeameter.

Supervisors *Huysmans M*, Rogiers B

2012 ● Winters P, BSc thesis
Faculty of Science, KU Leuven

Topic Haalbaarheidsstudie voor de gedetailleerde opmeting van
de hydraulische conductiviteit op boorkernen, met behulp van
een luchtpermeameter.

Supervisors *Huysmans M*, Rogiers B

🏛 EXAMINATION COMMITTEES

2022 ● Nick Janssens, PhD
Department of Earth and Environmental Sciences, KU Leuven

Thesis Three-dimensional superresolution models for fluid
flow simulation, developed for computed tomography (CT) scans
for continental carbonates.

2022 ● George Bennett, PhD
Department of Geology, Ghent University

Thesis Hydrogeological investigation of a volcanic aquifer
system on the flanks of Mount Meru, Northern Tanzania.

2016 ● Nhu Viet Ha, PhD
Department of Hydrology and Hydraulic Engineering, Vrije
Universiteit Brussel

Thesis Spatio-temporal prediction of land subsidence using
GIS-based 3D geological, geotechnical and groundwater flow
models in Hanoi city (Vietnam).

2013 ● Nafyad Serre Kawo, MSc
Interuniversity programme: Master of Science in Physical
Land Resources, Universiteit Gent - Vrije Universiteit
Brussel

Thesis Model Based Evaluation of the Protection Zones around
the WaterGroep Public Drinking Water Well Field in Huiskens
(Korbeek-Lo), Belgium.