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Rowan Cockett, PhD

I am interested in the intersection of education, industry, and research, and am on a mission to make powerful scientific data, visualization and communication tools accessible through the web. My current startup, Curvenote, is working on writing and publishing tools for computational researchers; we work on open, foundational tools to reimagine how computational science is written, communicated and published – including *MyST Markdown* and *JupyterBook*.

My PhD developed open-source modelling tools for computational geophysics and open-educational tools, which won multiple awards for Innovative Dissemination of Research. I was a Vanier Scholar and Killam Laureate, recieved the top doctoral prize in Canada in 2015, and won an early career achievement award from UCalgary in 2018.

I started and sold my previous web-based 3D visualization startup, 3point Science, while finishing my PhD in computational geophysics; I then ran the cloud team at Seequent ($1.05B exit, 2021). I started Curvenote in 2019 and went through YCombinator in 2021, we work with top universities and publishers for communicating scientific research.

Entrepreneurship

Curvenote, Founder — curvenote.com

Science communication & open-science publishing

CEO & Founder 2019 — Present
YCombinator (W21) 2021

In the future, every scientific report will feature interactive graphs with live data and computation that will make it significantly easier to share, attribute and reproduce the work.

We started Curvenote because we believe that the introduction of tools and platforms that provide feedback loops between working and sharing will accelerate the speed of scientific discovery.

At Curvenote we create writing and communication tools for computational researchers, including traditional scientific journals.

Awarded Data-science collaboration platform for engineering teams (Alberta Innovates, 2022)

Seequent — Technology Leadership

Collaborative geoscience modelling & cloud visualization

VP of Cloud Architecture 2019
Director of Cloud Architecture 2017 — 2019
Chief Technology Officer (3point Science) 2016 — 2017

Development of cloud and enterprise products for collaboration, visualization and version control in geoscience; oversaw direction of 65 people; reported to the CEO. Developed standard interchange formats for geoscience mining data (Open Mining Format). Developed, documented, and maintained the strategic technology plan for Seequent ($1.05B exit, 2021) (*read more*).

3point Science, Founder — Sold to Seequent 2016

Web-based three-dimensional visualization for geoscience

Founder 2013 — 2016

Developed collaborative online, 3D graphics tools for geoscience. Sold company in 2016; didn't drop out of my PhD! (*read more*)

Awarded Accelerating training of geoscience professionals through immersive web-based exploration tools (Alberta Innovates, 2015)

Visible Geology, Founder — visiblegeology.com

Web-based geoscience modelling tool for undergraduate education

Founder 2010 — 2019

Design & development of 3D visualization tool for structural geology. Over one million geoscience undergraduate students & teachers have created their own geologic block models (*read more*).

Awarded *Innovative Dissemination of Research Award (UBC, 2013)*
Outstanding Student Paper Award (AGU, 2010)

Education

PhD in Computational Geophysics — GPA 4.0

Vanier Scholar, Killam Laureate

University of British Columbia 2012 — 2017

Thesis A framework for geophysical inversions with application to vadose zone parameter estimation (*read more*)
Topics Geophysical Inversion, Fluid Flow, Subsurface Imaging
Awarded *National Doctoral Prize for Interdisciplinary Research (2014)*
Innovative Dissemination of Research Award (UBC, 2016)
Science Achievement Award (UBC, 2013)

BSc in Applied and Environmental Geology — GPA 3.8

Honours, First Class

University of Calgary 2006 — 2010

Thesis Two Approaches to Improving the Utility of Electrical Conductivity in Time Varying Porous Media (*read more*)
Awarded *Best Undergraduate Thesis Award (UCalgary, 2010)*
Leadership in Research Award (UCalgary, 2010)

Selected Open Source Contributions

See *GitHub profile* for technical contributions.

MyST Markdown, Development Team — mystmd.org

Helped develop the MyST Markdown language and community, which supports over 15% of active Python projects and *11K public JupyterBooks*. Developed Javascript based CLI that includes export to Word, PDF, JATS XML, and interactive websites (*read more*).

SimPEG, Founder — simpeg.xyz

Simulation and Prameter Estimation in Geophysics

Developed open source framework and community that supports large scale numerical simulations and inversions for geophysics and hydrogeology. Algorithms include: meshing, finite-volume simulation, optimization, data storage, parallel algorithms, inversion directives, and visualization tools. Used widely across academia, industry, and education (*read more*).

Awarded *Innovative Dissemination of Research Award (UBC, 2016)*
Top downloaded papers (*Computers & Geosciences*, 2015-2018)

GeoSci, Founder — geosci.xyz

Online interactive textbooks for geophysics

Created content and infrastructure for online textbooks reaching over 650K users. Including *Geophysics for Practicing Geoscientists* (introductory resource), *Electromagnetic Geophysics* (graduate level) and *GeoSci Labs*: a collection of Jupyter notebooks for exploring concepts in geophysics.

Selected Awards & Achievements

See *online profile* for complete list of awards.

YCombinator, Curvenote (Winter, 2021)

YCombinator is the premier technology accelerator in Silicon Valley and had over 16,000 companies apply in 2021 with an acceptance rate of less than 1.5% (*read more*).

Early Career Achievement Award (2018)

University of Calgary

Recognizes professional accomplishment or creative leadership in any field by a graduate aged 30 or younger. The award honors recent UCalgary graduates whose career success has brought distinction to themselves and credit to the university (*read more*).

Gilles Barssard Doctoral Prize (2014)

for Interdisciplinary Research in Canada

Awarded to the top two graduate scholars in Canada who best exemplify interdisciplinary research. Award ceremony in Ottawa presided by The Governor General of Canada (*read more*).

Innovative Dissemination of Research (2016)

UBC Library Award

Awarded for the SimPEG framework and community development (*read more*).

Vanier Scholarship (2014 — 2017)

Top graduate scholarship in Canada

Vanier Scholars demonstrate leadership skills and a high standard of scholarly achievement in the sciences (*read more*).

UBC Killam Doctoral Scholarship (2014 — 2017)

Top graduate scholarship at UBC

The most prestigious merit based award awarded to the top 15 of the 6000+ graduate students at UBC.

Innovative Dissemination of Research (2013)

UBC Library Award

Awarded for Visible Geology's innovative ways of communicating knowledge (*read more*).

Open Science Leadership

Executable Books executablebooks.org

Open source tools for publishing computational narratives

Steering Council 2023 — Present
Team Member 2021 — Present

ExecutableBooks is an international collaboration to build open source tools that facilitate publishing computational narratives using the Jupyter ecosystem. I contributed to the development of MyST Markdown through new command line tools (`mystmd`), bringing in development funding, stewarding the community, and developing standards documents.

Software Underground, Board softwareunderground.org

Community of digital subsurface professionals

Board 2022 — Present

Society runs conferences, workshops and online community. I was involved in governance and improving the online conferences.

Selected Presentations

See *online profile* for more presentations and videos.

Deploying a Reproducible Course (*JupyterCon, 2017*)

We presented on techniques to deliver computational online textbooks for computational electromagnetics. We integrated research code, live-apps, and reproducible tutorials and delivered the course in over 30 locations worldwide.

Improving metadata & reproducibility during the research process (*RDA, 2022*)

We designed research workflows that show direct benefits to the author to adding scholarly metadata during the writing process, including hover-references and integrating scholarly services.

Selected Publications

See *Google Scholar profile* for complete list of publications.

SimPEG (*Cockett* et al, *2015*)

An open source framework for simulation and gradient based parameter estimation in geophysical applications

We proposed a framework for geophysical simulations and gradient-based inversions. Including open source Python implementation of discretizations, physics simulations using finite-volume, optimization and model parameterizations.

Vadose Zone Inversions (*Cockett* et al, *2018*)

A numerical method for efficient 3D inversions using Richards equation

We developed an efficient algorithm for large-scale Richards equation inversions and completed the first large-scale inversion to recover a 3D distribution of saturated hydraulic conductivity using Richards Equation.

Electromagnetics Simulations (*Heagy* et al, *2017*)

A framework for simulation and inversion in electromagnetics

We proposed a modular framework for simulating and inverting electromagnetic data. Time and frequency domain inversions were organized using an object oriented approach and included in the SimPEG framework.

Visible Geology (*Cockett* et al, *2016*)

Creative online tools for teaching, learning, and communicating geologic concepts

We created an interactive learning tool, Visible Geology, that was useful for structural geology students to explore different processes in 1D, 2D, and 3D, using block models and steronets.

Numerical Rock Physics (*Cockett* et al, *2014*)

Simulated electrical conductivity response of clogging mechanisms for managed aquifer recharge

We proposed different rock-physics models for clogging mechanisms in a managed aquifer recharge pond in California.

Open Source in Geophysics (*Oldenburg* et al, *2019*)

3D electromagnetic modelling and inversion: a case for open source

We present arguments for adopting an open-source methodology for geophysics. Immediate benefits are the reduced time required to carry out research, improved collaboration, reproducible results, and disseminate results quickly.