# Francis Rossmann

*Vancouver, BC, Canada**

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## *currently:*

I am a planetary scientist and coder driven by my curiosity, attention to fine-detail, and fascination with the natural world. I specialize in quantitative scientific programming with a focus in geospatial analyses and remote sensing. I make beautiful data visualizations and develop open-source programs for teaching and learning. I am interested in the application of data science and machine learning to geospatial problems at the intersection of data access, and social / environmental justice.

## *education:*

2021-23 **Master of Science,** Geophysics, *University of British Columbia*
Supervisor: Dr. Catherine L. Johnson

- Quantitative analysis of asteroid Bennu's surface roughness using LiDAR from the NASA OSIRIS-REx mission.
- Funding provided by the Canadian Space Agency.
- 2022-2023 EOAS Outstanding Teaching Assistant Award.

2015-20 **Bachelor of Science,** Geophysics,
*University of British Columbia*

- Completed all academic EGBC Geoscientist-in-Training requirements.
- 2017 and 2019 Thomas and Marguerite Mackay Memorial Scholarship.

## *research:*

2020-now **Graduate Research Assistant**, *University of British Columbia*
Supervisor: Dr. Catherine L. Johnson

- Conducted comprehensive study of the LiDAR-derived surface roughness of asteroid Bennu.
- Contributed major results to an OSIRIS-REx team investigation to characterize the surface morphology of Bennu's impact craters.
- Developed tools for fast spatially explicit analysis and visualization of large, disorganized LiDAR point clouds in MATLAB and python.

* The unceded traditional territories of the xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh (Squamish), and səlilwətaɬ (Tsleil-Waututh) Nations.

2018-20 **Undergraduate Research Assistant,**
*University of British Columbia*
Supervisor: Manar Al Asad and Dr. Catherine L. Johnson

- Conducted research to characterize and classify boulders on asteroid Bennu using of altimetry derived data from the NASA OSIRIS-REx mission.

***teaching:***

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2023 **Sessional Lecturer,** *University of British Columbia*
*EOSC 211: Computer Methods in Earth, Ocean, Atmospheric Science*

- Co-instructor (50/50).
- Wrote and maintained CLI software using python to automate Jupyter Notebook grading.

2021-2023 **Graduate Teaching Assistant,** *University of British Columbia*
*EOSC 211: Computer Methods in Earth, Ocean, Atmospheric Science*

- Designed and produced 6 out of 8 programming assignments.
- Wrote software in Python to auto-grade student code submissions.
- Wrote and helped finalize exam questions.
- Ran two 2-hr lab sections (60 students/lab) & one office hour per week.
- Hosted and maintained the course GitHub repository, refactored legacy code with minimal dependencies.

*EOSC 310: The Earth and the Solar System*

- Built and deployed an interactive python dashboard of a numerical climate model (‘Daisyworld’) as part of a major student assignment.
- Wrote code to translate LATEX-formatted exams to Canvas during COVID-19 when in-person exams were cancelled on short notice.

*EOSC 110 V01: The Solid Earth: A Dynamic Planet*

- Guest lecturer for topics on exoplanet detection, geologic time, and metamorphic rock cycles.
- Wrote a python program to read and grade scanned multiple-choice exams using optical mark recognition.

*EOSC 511: Numerical Methods for Earth, Ocean, Atmospheric Science*

- Supported with python environment setup (miniconda) and version control (Git/GitHub).

## *technical skills:*

Programming:

- Python: teaching, remote sensing, numerical modelling, data visualization, machine learning. (6 years)
- MATLAB: remote sensing, signal processing, parallel computing, machine learning. (8 years)
- C++: numerical modelling, scientific computing. (1 year)
- Julia: Compute Canada Federation National Training (parallel programming course)
- Web development: HTML, CSS, JavaScript (2 years)
- Version control: Git and GitHub (4 years)
- Unix command line: Bash and Z-shell (4 years)

Field work:

- Introduction to geological field techniques
- Wilderness first aid (24h)
- Avalanche safety training AST-1; AST-2; Companion rescue
- Glacier travel and crevasse rescue.

## *volunteering:*

2021-22 **Volunteer**, *Downtown Eastside Neighbourhood House, Vancouver*

- Provided kitchen support, cooking breakfast and lunch prep for a community kitchen in the Vancouver DTES.

2018-20 **Build Team Member,** *UBC Voyage*

- Helped with woodworking, fiberglass & carbon fiber layup to build a solar-powered research boat designed to autonomously cross the Atlantic Ocean.

2014-17 **Volunteer,** *Calgary Drop-In, and Rehabilitation Center*

- Helped with plating, serving meals and clean-up.

## *publications:*

2024 F. M. Rossmann. Metre-Scale Roughness of Asteroid (101955) Bennu from the OSIRIS-REx Laser Altimeter. [thesis]

2023 E. B. Bierhaus, F. M. Rossmann, and 13 others. A Subsurface Layer on Asteroid (101955) Bennu and Implications for Rubble Pile Asteroid Evolution. [paper]

***abstracts:***

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|---|---|
| 2023 | F. M. Rossmann, C. L. Johnson, E.B. Bierhaus, et al., Meter-Scale Topographic Roughness of Asteroid (101955) Bennu from the OSIRIS- REx Laser Altimeter. Lunar and Planetary Science Conference MMXXIII. [abstract] |
| 2022 | F. M. Rossmann, C. L. Johnson, E.B. Bierhaus, et al., Topographic Roughness Profiles Across Impact Craters on Asteroid (101955) Bennu from the OSIRIS-REx Laser Altimeter. Lunar and Planetary Science Conference MMXXII. [abstract] [poster] |
| 2020 | F. M. Rossmann, M. Al Asad, C. L. Johnson, et al., Multi-Component Classification of Bennu's Boulders: Results from Topographic Variability and OLA Reflectance. Lunar and Planetary Science Conference MMXXI. [abstract] |