

# Rodrigo Chi Durán

Geophysics · Seismology · Geomagnetism · Signal Processing · Data Science

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## Personal Information

Full Name Rodrigo Kimyen Chi Durán  
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## Education

August 2023 **University of California, Berkeley.** Ph.D. Earth and Planetary Sciences.  
June 2015 **Universidad de Chile.** B.S. Electrical Engineering.

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## Academic Appointments

- 2018 - 2023 **Graduate Student Researcher - University of California, Berkeley**
- Created and implemented a joint inversion technique using seismic waveform and ground deformation data based on satellite radar observations induced by the 2016 and 2017 North Korea nuclear tests. This new technique enabled us to re-estimate the magnitude of the events, relocate the sources, and propose a new geological model of the nuclear test site (Supervisor: Prof. Douglas Dreger).
  - Developed and implemented advanced data-driven techniques to analyze Earth's geomagnetic field observations, resulting in the discovery of short-period waves that align with theoretical models of Earth's outer core. (Supervisor: Prof. Bruce Buffett)
- 2017 - 2018 **Coordinator of Beauchef Proyecta - Universidad de Chile**
- Led a new multidisciplinary project area for the Faculty of Physical and Mathematical Sciences as part of the initiative "A New Engineering for 2030".
  - Gained experience in project management, team leadership, and interdisciplinary collaboration. (Supervisor: Prof. Viviana Meruane).
- 2015 - 2017 **Research Engineer - Advanced Mining Technology Center, Universidad de Chile**
- Conducted research on new techniques for analysis of seismic signals. This involved developing new algorithms for seismic tomography and testing their effectiveness.
  - Gained experience in research, data analysis, and algorithm development (Supervisor: Prof. Diana Comte).

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## Publications

### Refereed Publications

- [6] **Chi-Durán, R.**, Dreger, D. S., & Rodgers, A. J. (in prep) Joint regional waveform, first motion polarity, and surface displacement inversion using a layered elastic model with topography for North Korean Nuclear explosions.
- [5] **Chi-Durán, R.**, & Buffett, B. A. (2023). Extracting spatial-temporal coherent patterns in geomagnetic secular variation using dynamic mode decomposition. *Geophysical Research Letters*. <https://doi.org/10.1029/2022g1101288>
- [4] **Chi-Durán, R.**, Dreger, D. S., Rodgers, A. J., & Nayak, A. (2021). Joint regional waveform, first-motion polarity, and surface displacement moment tensor inversion of the 3 September 2017 North Korean nuclear test. *The Seismic Record*, 1(2), 107–116. <https://doi.org/10.1785/0320210022>
- [3] **Chi-Durán, R.**, Avery, M. S., & Buffett, B. A. (2021). Signatures of high-latitude waves in observations of geomagnetic acceleration. *Geophysical Research Letters*. <https://doi.org/10.1029/2021g1094692>
- [2] **Chi-Durán, R.**, Avery, M. S., Knezek, N., & Buffett, B. A. (2020). Decomposition of Geomagnetic Secular Acceleration Into Traveling Waves Using Complex Empirical Orthogonal Functions. *Geophysical Research Letters*, 47(17), 1. <https://doi.org/10.1029/2020GL087940>
- [1] **Chi-Durán, R.**, Comte, D., Díaz, M., & Silva, J. F. (2017). Automatic detection of P-and S-wave arrival times: new strategies based on the modified fractal method and basic matching pursuit. *Journal of Seismology*, 21(5), 1171–1184. <https://doi.org/10.1007/s10950-017-9658-0>

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## Fellowships and Awards

2015 Ph.D. Fulbright - ANID Fellowship. Beca Igualdad de Oportunidades.

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## Teaching Experience

### Lecturer

Spring 2020, **Interdisciplinary module: Earth Data Science in Python**  
2021, 2022 Faculty of Physical and Mathematical Sciences, Universidad de Chile.

Spring 2017, **Project I: Development of Projects**  
Fall 2018 Faculty of Physical and Mathematical Sciences, Universidad de Chile.

Fall 2016, **Project Workshop: Projects in Arduino**  
2017, 2018 Faculty of Physical and Mathematical Sciences, Universidad de Chile.

### Teaching Assistant

Spring 2023 **Geodynamics**  
Department of Earth and Planetary Science, UC Berkeley.

2011 - 2016 **Electromagnetism**  
Department of Physics, Faculty of Physical and Mathematical Sciences, Universidad de Chile.

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## Conference Presentations and Invited Talks

- July 2023 “Hydromagnetic Waves in the Equatorial Region: Analysis Using Dynamic Mode Decomposition and Complex Empirical Orthogonal Functions”. IUGG, Berlin, Germany.
- June 2023 “Joint regional waveform, first motion polarity, and surface displacement inversion using a layered elastic model with topography for North Korean Nuclear explosions”. CTBT: Science and Technology Conference, Vienna, Austria.
- June 2022 “Extracting spatial-temporal coherent patterns in geomagnetic secular variation using dynamic mode decomposition”. SEDI, Zurich, Switzerland.
- December 2021 “Signatures of High-Latitude Waves in Observations of Geomagnetic Acceleration”. AGU Fall Meeting. New Orleans, Louisiana, USA.
- October 2021 “Joint Moment Tensor Inversion of Regional Waveforms, First-motion Polarity and SAR Deformation for the September 3, 2017 DPRK Declared Nuclear Test”. Lawrence Livermore National Laboratory. Livermore, California, USA.
- April 2021 “Developing a Joint Regional Waveform-INSAR Moment Tensor Inversion: Application to 6th North Korean Nuclear Test”. SSA Annual Meeting. Remote.
- December 2020 “Joint regional waveform and surface displacement inversion for the seismic moment tensor: Application to September 3, 2017 declared North Korean nuclear test”. AGU Fall Meeting. Remote.
- December 2019 “Complex wave decomposition of geomagnetic secular acceleration in the equatorial region Earth’s core”. AGU Fall Meeting. San Francisco, California, USA.
- December 2017 “Automatic detection of P-and S-wave arrival times: new strategies based on the modified fractal method and basic matching pursuit”. AGU Fall Meeting. New Orleans, Louisiana, USA.

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## Service

Paper reviews Geophysical Journal International

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## Software

OS Windows, Mac OS X, UNIX/Linux  
Programming C, Java, Python, R  
Scientific Matlab, Latex

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## Languages

Spanish (native) and English (advanced)

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## Leadership and Outreach

2021 - 2022 The Latino/a Association of Graduate Students in Engineering and Science (LAGSES)  
Communications Chair

2011 - 2016 NGO La Ruta Solar

Organizer, observer and judge for solar car competition that takes place in the Atacama desert.

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## References

Professor Bruce Buffett, UC Berkeley. E-mail: [bbuffett@berkeley.edu](mailto:bbuffett@berkeley.edu)

Professor Douglas Dreger, UC Berkeley. E-mail: [ddreger@berkeley.edu](mailto:ddreger@berkeley.edu)

Professor Diana Comte, Universidad de Chile. E-mail: [dcomte@dgf.uchile.cl](mailto:dcomte@dgf.uchile.cl)