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April 20, 2018

Department of Statistics, Faculty of Science
3182 Earth Sciences Building, 2207 Main Mall
Vancouver, BC, Canada, V6T1Z4

Dear Members of the Search Committee:

I am writing to apply for the position of Lecturer in the Masters of Data Science Program of the University of British Columbia, as advertised on the website of the Department of Statistics. I am currently a Visiting Research Scholar at the University of Hawai'i in the Department of Geology and Geophysics. My research interests include geophysical inverse problems, scientific software development, and geospatial data visualization.

My research training was in the development of computationally efficient algorithms for solving geophysical inverse problems. The focus of my graduate research was in estimating subsurface density variations from observation of disturbances in the Earth's gravity field (e.g., Uieda and Barbosa, 2012, 2017). Recently, I have been investigating the application of machine learning and data science techniques to geophysical datasets, in particular to long-term GPS measurements (Uieda and Wessel, 2018; github.com/leouieda/aogs2018-gps). I intend to continue my research program in the intersection of geophysics and data science and would welcome collaborations with the Data Science Lab. I would also use this opportunity to establish a relationship the members of the Department of Earth, Ocean and Atmospheric Sciences and the UBC Geophysical Inversion Facility.

To support my research and teaching efforts, I have created the open-source Python library *Fatiando a Terra* (www.fatiando.org). The project uses software development best practices, such as version control and the Github pull request workflow, automated tests and continuous integration, and packaging and distribution through the Python Package Index and conda-forge. My current work at the University of Hawai'i is to develop a Python wrapper library for the *Generic Mapping Tools* (GMT; gmt.soest.hawaii.edu), an open-source software packaged widely used across the Earth, Atmospheric, and Ocean Sciences to process and visualize geospatial data. I have also contributed to other open-source projects, all of which can be accessed through my Github profile (github.com/leouieda).

As a proponent of open and reproducible science, I publish all of the source-code and data

for my first author publications through my research group's Github page (github.com/pinga-lab). To promote reproducible research best practices within the group, I maintain a template (github.com/pinga-lab/paper-template) which is used for creating new research projects. I am interested in exchanging information and learning from the experiences of the Data Science Workflows course of the MDS program.

I have three years of teaching experience from my work as Assistant Professor at the State University of Rio de Janeiro (UERJ), Brazil. I had the opportunity to design two geophysics courses for the Geology program (leouieda.com/teaching/geofisica1.html and leouieda.com/teaching/geofisica2.html) and a programming and numerical methods course for the Oceanography program (leouieda.com/teaching/matematica-especial.html). All three are based on active learning principals and rely heavily on hands-on exercises using Jupyter notebooks, numerical simulations, and real world datasets. Each module of the geophysics courses includes a Jupyter notebook with interactive simulations or real datasets to guide the students through a series of formative and summative assessments (e.g., nbviewer.jupyter.org/github/leouieda/geofisica2/blob/master/notebooks/1-ondas-sismicas.ipynb). The programming course was entirely implemented using Github repositories and Github Classroom (classroom.github.com). Each module has a repository with a group project containing instructions, a Jupyter notebook, and data (github.com/mat-esp). The students submit their work as repositories in a separate Github organization (e.g., github.com/mat-esp-2016). Grading and feedback are provided through Github issues (e.g., github.com/mat-esp/about/issues/259). This workflow allowed me to manage a project-based class with over 70 students as the sole instructor. I have also taught short workshops on Python programming and inverse problems in geophysics. All of my teaching material is available on Github and on my personal website (leouieda.com/teaching). Evidence of my public speaking skills is also publicly available through my talks at the Scipy Conference, which have been recorded and uploaded to YouTube (see leouieda.com/talks).

I look forward to the opportunity to learn from the experience of the MDS faculty and to use my geoscience expertise to expand and enrich the program. I am particularly interested in the Capstone projects, for which I see great potential for collaboration with the mining and oil and gas industries.

Thank you for your consideration,

Leonardo Uieda

P.S. Please find attached the contact information for three references.

References for Leonardo Uieda

Dr. Valéria C. F. Barbosa
Full Researcher, Departamento de Geofísica, Observatório Nacional
Rua Geneneral José Cristino, 77
Rio de Janeiro, RJ, Brazil, 20921-400
phone: +55 21 35049235
email: valcris@on.br

Dr. Paul Wessel
Department of Geology and Geophysics, SOEST, University of Hawai'i at Mānoa
1680 East-West Rd., POST 806
Honolulu, HI, USA, 96822
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Dr. Matt Hall
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Leonardo Uieda

Curriculum Vitæ — April, 2018

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EDUCATION

2016 **PhD in Geophysics**, Observatório Nacional, Brazil
Thesis: *Forward modeling and inversion of gravitational fields in spherical coordinates*

2011 **MSc in Geophysics**, Observatório Nacional, Brazil
Thesis: *Robust 3D gravity gradient inversion by planting anomalous densities*

2009 **BSc in Geophysics**, Universidade de São Paulo, Brazil

2008 **International Exchange**, York University, Canada

PROFESSIONAL EXPERIENCE

2017– **Visiting Research Scholar**, Department of Geology and Geophysics, School of Ocean and Earth Science and Technology, University of Hawai'i at Mānoa, USA

2014–2018 **Assistant Professor**, Departamento de Geologia Aplicada, Faculdade de Geologia, Universidade do Estado do Rio de Janeiro, Brazil

HONORS & AWARDS

2017 Brazilian Geophysical Society (SBGf) Award for **Best PhD Thesis** of 2015 – 2017

2016 Universidade do Estado do Rio de Janeiro, Brazil, School of Geology **Teaching Award** given by the graduating class of 2016

2014–2018 QUALITEC/UERJ Grant for training a technician for the Laboratory of Exploration Geophysics - Universidade do Estado do Rio de Janeiro

2011–2015 Brazilian Ministry of Education CAPES **PhD Research Scholarship**

2011 SEG Near Surface Geophysics Section **Student Travel Grant** to present at the SEG Annual Meeting, San Antornio, TX, USA

2011 EAGE **PACE Student Travel Grant** to present at the 73rd EAGE Conference & Exhibition, Vienna, Austria

2010–2011 Brazilian Ministry of Education CAPES **Masters Research Scholarship**

2008 Brazilian Geophysical Society (SBGf) **Undergraduate Research Scholarship**

2005 São Paulo Research Foundation (FAPESP) **Undergraduate Research Scholarship**

PUBLICATIONS

Source code, data, and PDFs for most articles are available at leouieda.com/papers

PEER-REVIEWED

In prep. Soler, SR, Pesce, A, **Uieda, L**, Gimenez, ME. Tesseroid gravity field calculations using variable densities in depth.

Zhao, G, Liu, J, **Uieda, L**, Chen, B, Guo, R, Chen, L. A fast algorithm for forward modeling of gravitational fields in spherical coordinates with 3D Gauss-Legendre Quadrature.

2017 **Uieda, L**, Barbosa, VCF. Fast non-linear gravity inversion in spherical coordinates with application to the South American Moho, *Geophysical Journal International*, doi:10.1093/gji/ggw390.

2016 **Uieda, L**, Barbosa, VCF, Braitenberg, C. Tesseroids: forward modeling gravitational fields in spherical coordinates, *Geophysics*, doi:10.1190/geo2015-0204.1.

Carlos, DU, **Uieda, L**, Barbosa, VCF. How two gravity-gradient inversion methods can be used to reveal different geologic features of ore deposit - A case study from the Quadrilátero Ferrífero (Brazil), *Journal of Applied Geophysics*, doi:10.1016/j.jappgeo.2016.04.011.

2015 Oliveira Jr, VC, Sales, DP, Barbosa, VCF, **Uieda, L**. Estimation of the total magnetization direction of approximately spherical bodies, *Nonlinear Processes in Geophysics*, doi:10.5194/npg-22-215-2015.

2014 Carlos, DU, **Uieda, L**, Barbosa, VCF. Imaging iron ore from the Quadrilátero Ferrífero (Brazil) using geophysical inversion and drill hole data, *Ore Geology Reviews*, doi:10.1016/j.oregeorev.2014.02.011.

2013 Melo, FF, Barbosa, VCF, **Uieda, L**, Oliveira Jr, VC, Silva, JBC. Estimating the nature and the horizontal and vertical positions of 3D magnetic sources using Euler deconvolution, *Geophysics*, doi:10.1190/geo2012-0515.1.

Oliveira Jr, VC, Barbosa, VCF, **Uieda, L**. Polynomial equivalent layer, *Geophysics*, doi:10.1190/geo2012-0196.1.

2012 **Uieda, L**, Barbosa, VCF. Robust 3D gravity gradient inversion by planting anomalous densities, *Geophysics*, doi:10.1190/geo2011-0388.1.

PEER-REVIEWED CONFERENCE PROCEEDINGS

2014 Melo, FF, Barbosa, VCF, **Uieda, L**, Oliveira Jr, VC, Silva, JBC. A Single Euler Solution Per Anomaly, *76th EAGE Conference and Exhibition 2014*, doi:10.3997/2214-4609.20140891.

2013 **Uieda, L**, Oliveira Jr, VC, Barbosa, VCF. Modeling the Earth with Fatiando a Terra, *Proceedings of the 12th Python in Science Conference*.

2012 **Uieda, L**, Barbosa, VCF. Use of the "shape-of-anomaly" data misfit in 3D inversion by planting anomalous densities, *SEG Technical Program Expanded Abstracts*, doi:10.1190/segam2012-0383.1.

Carlos, DU, **Uieda, L**, Li, Y, Barbosa, VCF, Braga, MA, Angeli, G, Peres, G. Iron ore interpretation using gravity-gradient inversions in the Carajás, Brazil. *SEG Technical Program Expanded Abstracts*, doi:10.1190/segam2012-0525.1.

2011 **Uieda, L**, Bomfim, EP, Braitenberg, C, Molina, E. Optimal forward calculation method of the Marussi tensor due to a geologic structure at GOCE height, *Proceedings of the 4th International GOCE User Workshop*.

Uieda, L, Barbosa, VCF. Robust 3D gravity gradient inversion by planting anomalous densities, *SEG Technical Program Expanded Abstracts*, doi:10.1190/1.3628201.

Uieda, L, Barbosa, VCF. 3D gravity inversion by planting anomalous densities. *12th International Congress of the Brazilian Geophysical Society*, doi:10.1190/sbgf2011-179.

Uieda, L, Barbosa, VCF. 3D gravity gradient inversion by planting density anomalies. *73th EAGE Conference and Exhibition incorporating SPE EUROPEC*, doi:10.3997/2214-4609.20149567.

Carlos, DU, **Uieda, L**, Barbosa, VCF, Braga, MA, Gomes, AAS. In-depth imaging of an iron orebody from Quadrilatero Ferrifero using 3D gravity gradient inversion, *SEG Technical Program Expanded Abstracts*, doi:10.1190/1.3628219.

Carlos, DU, Barbosa, VCF, **Uieda, L**, Braga, MA. Inversão de Dados de Aerogradiometria Gravimétrica 3D-FTG Aplicada a Exploração Mineral na Região do Quadrilátero Ferrífero, *12th International Congress of the Brazilian Geophysical Society*, doi:10.1190/sbgf2011-243.

OTHER PUBLICATIONS

2017 **Uieda, L**. Step-by-step NMO correction, *The Leading Edge*, doi:10.1190/tle36020179.1.

2014 **Uieda, L**, Oliveira Jr, VC, Barbosa, VCF. Geophysical tutorial: Euler deconvolution of potential-field data, *The Leading Edge*, doi:10.1190/tle33040448.1.

OPEN DATASETS

2017 **Uieda, L**, Barbosa, VCF. A gravity-derived Moho model for South America: source code, data, and model results from "Fast non-linear gravity inversion in spherical coordinates with application to the South American Moho". doi:10.6084/m9.figshare.3987267

OPEN-SOURCE SOFTWARE

I work on several open-source projects, all of which are available through my Github profile github.com/leouieda. My main projects are:

GMT/Python – www.gmtpython.xyz
A Python interface for the Generic Mapping Tools.

Fatiando a Terra – www.fatiando.org
A Python library for geophysical data analysis, modeling, and inversion.

Tesseroids – www.tesseroids.org
Command-line programs for forward modeling of gravitational fields in spherical coordinates.

TEACHING

All educational material developed for these courses is available at leouieda.com/teaching

UNDERGRADUATE – UNIVERSIDADE DO ESTADO DO RIO DE JANEIRO

2014–2016 Special Mathematics I: Introduction to Programming and Numerical Analysis

2014–2016 Geophysics I: Gravity and magnetic methods

2014–2016 Geophysics II: Exploration Seismology

2015 Introduction to Geology

WORKSHOPS AND SHORT COURSES

2017 Introduction to Python (6 hour workshop)
Department of Geology and Geophysics – University of Hawai'i at Mānoa, USA

2016 Python for Geologists (6 hour workshop)
School of Geology – Universidade do Estado do Rio de Janeiro, Brazil

Python for Earth Scientists (30 hour short course)
Department of Geophysics – Universidade de São Paulo, Brazil

2014 Introduction to Geophysical Inversion (16 hour short course)
Institute of Geosciences – Universidade de Brasília, Brazil

2011 Introduction to Geophysical Inversion (30 hour short course)
Department of Geophysics – Universidade de São Paulo, Brazil

PRESENTATIONS

Slides, posters, and abstracts for all presentations are available at leouieda.com/talks and leouieda.com/posters

Future **Uieda, L**, et al. Joint Interpolation of 3-component GPS Velocities Constrained by Elasticity, *AOGS* 15^{th} *Annual Meeting*, Honolulu, USA.

Uieda, L, et al. Integrating the Generic Mapping Tools with the Scientific Python Ecosystem, *AOGS* 15^{th} *Annual Meeting*, Honolulu, USA.

2017 [**Invited**] – **Uieda, L**, et al. Nurturing reliable and robust open-source scientific software, *AGU Fall Meeting 2017*, New Orleans, USA. [recording: youtu.be/0GO4ZZ5Ry6M]

Uieda, L, et al. A modern Python interface for the Generic Mapping Tools, *AGU Fall Meeting 2017*, New Orleans, USA.

Uieda, L, et al. Bringing the Generic Mapping Tools to Python, *Scipy 2017*, Austin, USA. [recording: youtu.be/93M4How7R24]

Uieda, L. Inverting gravity to map the Moho: A new method and the open source software that made it possible, *Department of Geology and Geophysics, University of Hawai'i at Mānoa*, Honolulu, USA.

2016 [**Invited**] – **Uieda, L**. Fatiando a Terra: construindo uma base para ensino e pesquisa de geofísica, *Observatório Nacional*, Rio de Janeiro, Brazil.

2015 [**Invited**] – **Uieda, L**. Fatiando a Terra: construindo uma base para ensino e pesquisa de geofísica, *Universidade de São Paulo*, São Paulo, Brazil.

2014 **Uieda, L**, et al. Using Fatiando a Terra to solve inverse problems in geophysics, *Scipy 2014*, Austin, USA.

Uieda, L, et al. Gravity inversion in spherical coordinates using tesseroids, *EGU General Assembly 2014*, Vienna, Austria.

2013 **Uieda, L**, et al. Modeling the Earth with Fatiando a Terra, *Scipy 2013*, Austin, USA. [recording: youtu.be/Ec38h1oB8cc]

Uieda, L, et al. 3D magnetic inversion by planting anomalous densities, *AGU Meeting of the Americas*, Cancun, Mexico.

2012 Carlos, DU, **Uieda, L**, et al. Iron ore interpretation using gravity-gradient inversions in the Carajás, Brazil, *SEG Annual Meeting 2012*, Las Vegas, USA.

Uieda, L, et al. Use of the "shape-of-anomaly" data misfit in 3D inversion by planting anomalous densities, *SEG Annual Meeting 2012*, Las Vegas, USA.

Uieda, L, et al. Rapid 3D inversion of gravity and gravity gradient data to test geologic hypotheses, *International Symposium on Gravity, Geoid and Height Systems*, Venice, Italy.

2011 **Uieda, L**, et al. Robust 3D gravity gradient inversion by planting anomalous densities, *SEG Annual Meeting 2011*, San Antonio, USA.

Uieda, L, et al. 3D gravity inversion by planting anomalous densities, *Internation Congress of the Brazilian Geophysical Society*, Rio de Janeiro, Brazil.

Uieda, L, et al. Optimal forward calculation method of the Marussi tensor due to a geologic structure at GOCE height, *4th International GOCE User Workshop*, Munich, Germany.

Uieda, L, et al. 3D gravity gradient inversion by planting density anomalies, *73th EAGE Conference and Exhibition incorporating SPE EUROPEC*, Vienna, Austria.

2010 **Uieda, L**, et al. Computation of the gravity gradient tensor due to topographic masses using tesseroids, *AGU Meeting of the Americas*, Foz do Iguaçu, Brazil.

2008 **Uieda, L**, et al. Utilização de tesseróides na modelagem de dados de gradiometria gravimétrica, *XIII Simpósio de Iniciação Científica do IAG-USP*, São Paulo, Brazil.

2006 **Uieda, L**, et al. Paleomagnetismo e mineralogia magnética dos diques cambrianos de Maravilhas e Prata (PB), *XI Simpósio de Iniciação Científica do IAG/USP*, São Paulo, Brazil.

ACADEMIC SERVICE & AFFILIATIONS

COMMITTEES

2015 Chairman of the Election Committee for the deans of the University and the School of Geology, Universidade do Estado do Rio de Janeiro

REVIEWER

Geophysical Journal International – Journal of Geodesy – Pure and Applied Geophysics – Journal of Applied Geophysics – Geophysical Prospecting – Geophysics – Central European Journal of Geosciences – Computers & Geosciences

AFFILIATIONS

American Geophysical Union – Society of Exploration Geophysicists – Geological Society of America

LANGUAGES

Portuguese	Native
English	Fluent (TOEFL iBT score 115/120)