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Professional Appointments

2019 – Present **Post-Doctoral Research Scientist** at NASA Jet Propulsion Laboratory

Joint Institute for Regional Earth System Science and Engineering, UCLA/
NASA Jet Propulsion Laboratory, Pasadena, CA, USA.

2018 – 2019 **Post-Doctoral Research Fellow** at INRAE

Joint Research Unit Functional Ecology & Soil Biochemistry & Agro-
Ecosystems, INRAE, Campus SupAgro, Montpellier, France.
Fellowship: Horizon 2020, European Union.

Education

2013 – 2017 **Philosophy Doctor** in Atmosphere, Oceans and Climate

Department of Meteorology, University of Reading, Reading, UK.
Project title: “Improving the treatment of vegetation canopy architecture in
Land Surface Models”
Supervisor: Dr. Tristan Quaife; Co-supervisor: Dr. Emily Black
Sponsorship: “Sciences without Borders”, CAPES, Brazilian Federal
Government.

2011 – 2013 **Master of Science** in Atmospheric Sciences

Department of Atmospheric Sciences, University of São Paulo, São Paulo,
Brazil.
with fieldwork period in the Amazon rainforest, Uatumã Biological Reserve,
AM, Brazil.
Dissertation title: “Evaluation of CO₂, Sensible and Latent Heat Turbulent
Fluxes as Function of Aerosol Optical Depth over the Deforestation Arch in the
Legal Brazilian Amazon”
Supervisor: Prof. Dr. Márcia Akemi Yamasoe
Sponsorship: CAPES, Brazilian Federal Government.

2007 – 2010 **Bachelor of Science** in Meteorology

Department of Atmospheric Sciences, University of São Paulo, São Paulo,
Brazil.
Scholarship: CAPES, Brazilian Federal Government.

Visiting Scientist

Sept, 2019 **Visiting Scientist** at ORNL

The Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA.

Apr – Jun, 2015 **Visiting Scientist** at ICTP

The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy.

Honours and Awards

2014 **Outstanding M.Sc. Dissertation** – Department of Meteorology

University of São Paulo, Brazil.

Grants

2020 **Postdoctoral NASA/ABOVE fellowship** – NASA JPL, USA.

2019 **Postdoctoral DOE/NASA fellowship** – NASA JPL, USA.

2017 **Postdoctoral EU H2020 fellowship** – INRA, France.

2013 **Ph.D. CAPES fellowship** – University of Reading, United Kingdom.

2011 **M.Sc. CAPES fellowship** – University of São Paulo, Brazil.

2009 **Undergraduate CAPES fellowship** – University of São Paulo, Brazil.

2008 **Undergraduate Santander fellowship** – University of São Paulo, Brazil.

Publications

Braghiere, R. K., Wang, Y., Doughty, R., Sousa, D., Magney, T., Widlowski, J.-L., ... et al. (2021). Accounting for canopy structure improves hyperspectral radiative transfer and sun-induced chlorophyll fluorescence representations in a new generation Earth System model. *Remote Sensing of Environment*, 261, 112497. doi:10.1016/j.rse.2021.112497

Braghiere, R. K., Quaife, T., Black, E., Ryu, Y., Chen, Q., Kauwe, M. G. De, & Baldocchi, D. (2020). Influence of sun zenith angle on canopy clumping and the resulting impacts on photosynthesis. *Agricultural and Forest Meteorology*, 291(May), 108065. doi:10.1016/j.agrformet.2020.10065

Braghiere, R. K., Gérard, F., Evers, J., Pradal, C. and Pages, L., 2020: Simulating the effects of water limitation on plant biomass using a 3D functional-structural plant model of shoot and root driven by soil hydraulics, *Annals of Botany*, doi:10.1093/aob/mcaa059

Braghiere, R. K., Yamasoe, M. A., do Rosário, N. M., da Rocha, H., de Souza Nogueira, J. and de Araújo, A. C., 2020: Characterization of the radiative impact of aerosols on CO₂ and energy fluxes in the Amazon deforestation arch using artificial neural networks, *Atmos. Chem. Phys.*, 20(6), 3439–3458, doi:10.5194/acp-20-3439-2020

Braghiere, R. K., Quaife, T., Black, E., He, L. and Chen, J. M., 2019: Underestimation of Global Photosynthesis in Earth System Models Due to Representation of Vegetation Structure, *Global Biogeochem. Cycles*, 33(11), 1358–1369, doi:10.1029/2018GB006135

Hogan, R. J., Quaife, T., and **Braghiere, R.**, 2018: Fast matrix treatment of 3-D radiative transfer in vegetation canopies: SPARTACUS-Vegetation 1.1, *Geosci. Model Dev.*, 11, 339-350. *doi:10.5194/gmd-11-339-2018*

Braghiere, R.K., Yamasoe, M.A., 2013.: Evaluation of CO₂ flux modification as a function of aerosol optical depth at Bananal Island, Tocantins, Brazil, in: AIP Conference Proceedings. pp. 552–555. *doi:10.1063/1.4804829*

Under review

Wang, Y., Köhler, P., He, L., **Braghiere, R. K.**, Doughty, R., Wood, J., Frankenberg, C. Testing a stomatal optimization model at stand level in deciduous angiosperm and evergreen gymnosperm forests. *Under review Geoscientific Model Development*

Wang, Y., Bloom, A. A., **Braghiere, R. K.**, Longo, M., Doughty, R. GriddingMachine.jl: A tool to process and distribute global datasets. *Under review Methods in Ecology and Evolution*

Braghiere, R. K., Fisher, J., Allen, K., Brzostek, E., Shi, M., Yang, X., Ricciuto, D. M., ... et al. Global carbon cost of plant nitrogen and phosphorus acquisition. *Under review New Phytologist*.

Book chapter _____

Yamasoe, M. A., Rosario, N. E., Costa, T. S., **Braghiere, R. K.**, Leiva, E. A., Zanchi, F. B., Silva, B. L., Morais, J. C., 2015. Medições e Estimativas Numéricas da Irradiância Solar Descendente em Superfície – Estudos de Casos em Humaitá, AM, in: *Ciência das mudanças climáticas e sua interdisciplinaridade* by Ambrizzi, T., Jocobi, P. R., Dutra, L. M. Annablume, São Paulo, p. 282.

Expert Reviewer _____

IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

Languages _____

- **Portuguese** Native speaker
- **English** Advanced
- **Spanish** Advanced
- **French** Intermediate
- **Italian** Basic
- **German** Basic

Programming skills _____

- **Python** Advanced
- **Fortran** Advanced
- **C++** Advanced
- **MATLAB** Intermediate
- **Java** Intermediate
- **R** Intermediate

Research/Data Experience _____

- **Land Surface Models** – e.g., JULES, SiB2, CLM, ELM
- **Satellite data** – e.g., MODIS, GOME-2, OCO-2/3
- **Flux tower data** – e.g., AmeriFlux, ICOS, FLUXNET
- **Earth System Models** – e.g., UKESM, CESM, E3SM, CliMA

Lecturing Experience

2017/2018 Monitor, Department of Meteorology, University of Reading.

Internship in module “*Surface Energy Exchange*”.

2nd sem. 2012 **Internship** (Program of Teaching Improvement), Department of Atmospheric Sciences, University of São Paulo.

Internship in module “*Agrometeorology*”.

1st sem. 2012 **Internship** (Program of Teaching Improvement), Department of Atmospheric Sciences, University of São Paulo.

Internship in module “*Introduction to the Atmospheric Sciences*”.

2nd sem. 2011 **Internship** (Program of Teaching Improvement), Department of Atmospheric Sciences, University of São Paulo.

Internship in module “*Meteorology by Satellites*”.

1st sem. 2011 **Demonstrator**, Department of Atmospheric Sciences, University of São Paulo.

Demonstrator in module “*Physics Meteorology II*”.

2009 - 2010 **Scientific Initiation** in Radiation, Aerosols, Amazon, Plant Productivity under supervision of Prof. Dr. Marcia Akemi Yamaose.

2008 - 2009 **Scientific Initiation** in Atmospheric Chemistry, Tropospheric Ozone under supervision of Dr. Claudia Boian. Fellowship from Santander/SA.

Synergistic Activities & Professional Development

Mar, 2020 **CLM/CTSM Workshop**
NCAR, USA.

Feb, 2019 **CLM/CTSM Tutorial**
NCAR, USA.

Jun, 2017 **4th ICOS Summer School**
Hyytiälä, Finland.

Jun, 2016 **Flux Course 2016**
Boulder, Colorado, USA.

Apr – Jul, 2015 Visiting period at the **International Centre for Theoretical Physics, UN Trieste, Italy.**

Oct, 2014 Environment YES **NERC Workshop**
Syngenta, Bracknell, UK.

Jun, 2014 **INRA Summer School 2014**, Transfer and Interactions between ecosystems
University of Bordeaux, France.

Apr, 2014 Earth System Science **NERC Spring School 2014**
University of Lancaster, UK.

Oct, 2012 **Workshop** in Hydrological Modelling.
By Texas A&M University, USA, at University of São Paulo.

Oct, 2012 **Workshop** in Chemical Modelling.
By NOAA, USA, at University of São Paulo.

Presentations

2021

CMIP6 Carbon Cycle Uncertainties in Arctic-Boreal Ecosystems. **ABOVE Science Team Meeting**. Virtual meeting, USA. 11 May

Simulating the effects of water limitation on crop biomass production using a functional-structural plant 3D model of shoot and root driven by soil hydraulics. **Invited Speaker** SupAgro, Virtual INRAE, Montpellier, France. 06 May

Global Carbon Costs of Phosphorus Acquisition: Outcomes from the P-enabled FUN model. **Invited Speaker** NGE-E-Tropics, Virtual Lawrence Berkeley National Laboratory. 19 April

Better representing vegetation canopy structure in Earth System Models. **European Geophysical Union virtual meeting 2021**. 19 April

Climate Change Impacts on Mycorrhizae Amplify Nitrogen Limitation on Global Plant Growth. **CESM Land Model and Biogeochemistry working group virtual meeting**. 25 February

2020

Considering the effects of canopy structure on hyperspectral radiative transfer and terrestrial photosynthesis. **American Geophysical Union meeting 2020**. Online Everywhere. 9 December

Better representing vegetation canopy structure in Earth System Models. NASA-JPL, Pasadena, California, USA. **Invited Speaker**. [https://youtu.be/ D9g0Nt8LFs](https://youtu.be/D9g0Nt8LFs) 10 September

Adding different explicit spatial representations of plant symbiotic status in CLM. Boulder, Colorado, USA. **CLM Group Meeting 2020**. 03 March

2019

Considering carbon costs of plant phosphorus acquisition in Earth System Models. **American Geophysical Union meeting 2019**. San Francisco, CA, USA. 9 December

From the atmosphere to the land surface: improving representations of atmosphere-biosphere interactions. NASA-JPL, Pasadena, California, USA. **Invited Speaker**. 11 February

2017

Improving the treatment of vegetation canopy architecture in radiative transfer schemes. Department of Meteorology, University of Reading, UK. **Departmental Seminar**. 27 June

2016

Evaluating radiative transfer schemes treatment of vegetation canopy architecture in land surface models. **European Geophysical Union meeting 2016**. Vienna, Austria. 28 April

2015

Improving Land Surface Model treatment of vegetation canopy architecture. **Quo Vadis**. Department of Meteorology. University of Reading, UK. March

Improving Land Surface Model treatment of vegetation canopy architecture. ICTP, Trieste, Italy. (**Invited**) <http://indico.ictp.it/event/7444/> . 20 March.

2014

The Effects of Canopy Stand Structure on Ecosystem Functioning. University of Lancaster, Lancaster, UK. **Spring School**

2012

Evaluation of CO₂ Flux Modification as Function of Aerosol Optical Depth in the Bananal Island, Tocantins, Brazil. Poster. **International Radiation Symposium**. Berlin, Germany. 10 August

2011

Avaliação da Fração da Radiação Fotossinteticamente Ativa Absorvida pela Floresta Tropical Primária na Amazônia. Poster. **XV Simpósio Brasileiro de Sensoriamento Remoto**. Curitiba, Brazil. 4 May

2010

Evaluation of Photosynthetically Active Radiation Fraction Absorbed by Primary Tropical Forest in the Amazon during the Dry Season of 2007. Poster. **AGU - The Meeting of the Americas**. Foz do Iguaçu, Brazil. 12 August

Avaliação da Fração da Radiação Fotossinteticamente Ativa Absorvida pela Floresta Tropical Primária na Amazônia. Poster. **XV Simpósio de Iniciação Científica do IAG**. Sao Paulo, Brazil

2009

Avaliação da Qualidade do Ar para a Região Metropolitana de Campinas. Poster. 17º Simpósio Internacional de Iniciação Científica da USP. Avaliação da Qualidade do Ar para a Região Metropolitana de Campinas. **XIV Simpósio de Iniciação Científica do IAG**. Sao Paulo, Brazil

Professional Services

Reviewer for: Journal of Geophysical Research: Biogeosciences; Remote Sensing of Environment; Climate Resilience and Sustainability; Water Resources Research; NASA Carbon Program Panel

Public Outreach & Volunteer Experience

[Including vegetation structure improves photosynthesis in land surface models](#) 17 June 2020

[Trees have ‘more power’ to fight climate change](#) 20 December 2019

[4th ICOS Summer School](#) 7 July 2017

[The impact of vegetation structure on global photosynthesis](#) 30 June 2017

Instructor, ‘Alegria de Crescer’ High School, Capivari, Sao Paulo, Brazil September 2016

Taught ‘*Science as a career*’

Instructor, Sao Paulo State University, UNESP-Bauru, Sao Paulo, Brazil September 2016

Taught ‘*PhD: Each is a unique journey*’

Memberships & Affiliations

European Geophysical Union; American Geophysical Union

List of Referees

1) Individual Referee

Name: Dr. Joshua Fisher

Position: Research Scientist at NASA JPL

Associate Project Scientist at JIFRESSE UCLA

Address: NASA Jet Propulsion Laboratory

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4800 Oak Grove Dr.

Pasadena CA, 91109

USA

Telephone number: +1 (821) 354-0934

E-mail address: joshua.b.fisher@jpl.nasa.gov

2) Individual Referee

Name: Dr. Frédéric Gerard

Position: Junior Scientist (CRN)

Address: Eco&Sol - Department of Environment and Agronomy

French National Institute for Agricultural Research

2, Place Pierre Viala – Campus SupAgro

Montpellier 34060

France

Telephone number: +33 (0) 499 613 024

E-mail address: frederic.gerard@inrae.fr

3) Individual Referee

Name: Dr. Tristan Quaife
Position: Associate Professor
Address: Department of Meteorology
5th floor Lyle Building University of Reading
Reading RG6 6BX
United Kingdom
Telephone number: +44 (0) 118 378 8743
E-mail address: t.l.quaife@reading.ac.uk

4) Individual Referee

Name: Dr. Emily Black
Position: Senior Research Scientist (NCAS-Climate)
Address: Department of Meteorology
5th floor Lyle Building University of Reading
Reading RG6 6BX
United Kingdom
Telephone number: +44 (0) 118 378 6608
E-mail address: e.c.l.black@reading.ac.uk

5) Individual Referee

Name: Prof. Dr. Marcia Akemi Yamasoe
Position: Professor Doctor
Address: Instituto de Astronomia, Geofísica e Ciências Atmosféricas
Universidade de São Paulo
Rua do Matão, 1226 - Cidade Universitária
São Paulo – SP 05508-900
Brazil
Telephone number: +55 (11) 3091 4682
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