

CURRICULUM VITAE

PERSONAL DETAILS

Bruna Borges Carvalho (Carvalho, B. B.)

Date of birth: 06/05/1985

Nationality: *Brazilian*

E-mail: bruna.borgescarvalho@unipd.it

Language skills: **Portuguese:** *Native language* / **English:** *Advanced*. / **French:** *Intermediate*. / **Italian:** *Advanced*.



EDUCATION

2012 – 2016: Doctor of philosophy (PhD.) degree from the Université du Québec à Chicoutimi, Canada

Title: Reworking of a granitic continental crust: from anatexis to granite magma. (grade: excellent). Supervisor: Prof. Dr. Edward W. Sawyer.

Obs: Equipollenza by the MIUR obtained on the 26th November 2020

2009 – 2011: Master in Sciences (MSc.) degree from the Geosciences Institute, São Paulo University, Brazil

Title: Origin of the geochemical diversity of the Pedra Branca Syenite (MG) from textural evolution and mineral chemistry (grade: excellent). Supervisor: Prof. Dr. Valdecir de Assis Janasi.

Obs: On the 3rd September 2020 my master diploma was recognized by the Università degli Studi di Padova as equivalent to "Laurea Magistrale in Geologia e Geologia Tecnica (LM-74 Classe delle Lauree magistrali in Scienze e tecnologie geologiche – D.M. 270/04)" with a grade "110/110 e lode".

2004 – 2008: Bachelor of Science (BSc) degree in Geology from the Geosciences Institute, São Paulo University, Brazil

Monograph: Geology and magmatic evolution of the saturated to oversaturated syenites from Pedra Branca pluton, MG. Supervisor: Prof. Dr. Valdecir de Assis Janasi.

GRANTS AND AWARDS (myself as PI)

Bachelors

- **Scientific Initiation Scholarship** awarded by the CNPq Brazilian funding agency (from August 2007 to July 2008). Project: Magmatic Evolution of the Pedra Branca Syenite, South Minas Gerais, Brazil. **Total = 4.500,00 Brazilian Reais**
- **Scientific Initiation Scholarship** awarded by the CNPq Brazilian funding agency (from August 2006 to July 2007). Project: Petrogenesis of the Pedra Branca Syenite: geology and crystallization conditions. **Total = 4.500,00 Brazilian Reais**

Masters

- **Scholarship** awarded by the Brazilian funding agency CAPES – Coordination for the Improvement of Higher Education Personnel (2009-2011), **Total = 28.800,00 Brazilian Reais**

PhD

- **Excellence scholarship Lucien Bouchard** (2012-2013) awarded by Fondation UQAC – **Total = 3.000,00 Canadian dollars**

- *Excellence scholarship Mecfor, Cegerco, Cegertec WorleyParsons édition (2013-2014) awarded by Le Groupe CEGER, Total = 4.000,00 Canadian dollars*
- *Merit Scholarship program for Foreign Students (2014-2016) awarded by the Ministère de l'Éducation, du Loisir et du Sport du Québec, Total = 37.000,00 Canadian dollars*

Postdoc

- **Research grant** *Programma Nazionale di Ricerca in Antartide (Bando PNRA 25 maggio 2018, n 1314, PNRA18_00103 - HOTAntarctica - Linea A – Studio e Analisi di dati e campioni esistenti) Total = 92.474,00 Euros*

PROFESSIONAL EXPERIENCE

Researcher (RTDA)

Dipartimento di Geoscienze, Università degli Studi di Padova, Padova, Italy (April 2021 – March 2024)

- Lecturer for course *Petrography* (64 working hours per year) and researcher on melt inclusions (PNRA HOT ANTARCTICA “Crustal anatexis up to ultra-high temperature conditions in Antarctica” and rhyolites from the Atesino Volcanic Group)

Postdoctoral fellow

Dipartimento di Geoscienze, Università degli Studi di Padova, Padova, Italy (June 2017 – March 2021)

- Three projects on the investigation of anatexis and fluid regime using melt and fluid inclusions in migmatites and granulites.

Geologist for companies

CAP – Engenharia (geological engineering), São Paulo, Brazil (Sep. – Nov. 2011). This work was related to *geological engineering in São Paulo city*.

- *Main activities:* Core logging / description of drilling (rotary and SPT) of sediments, granite and gneiss; production of geological profile; compilation of drill campaign results; final reports.

Armando Reis Consultoria (geological engineering company in Rio de Janeiro, Brazil) (Mar. – Jul. 2011). This work was related to *geological engineering in Rio de Janeiro*.

- *Main activities:* Core logging / description of drilling (rotary and SPT) of granite and gneiss; description of thin sections.

Tratch-Mundi sustainable technologies in environmental engineering, São Paulo, Brazil (Jan. – Dec. 2009). This work was related to the *construction of the subway in São Paulo city*.

- *Main activities:* Core logging / description of drilling (rotary and SPT) of sediments, granite and gneiss; production of geological profiles (related to the construction of the subway in São Paulo); compilation of drill campaign results; final reports.

ACADEMIC ACTIVITIES

PEER REVIEWED ARTICLES

As first author:

Carvalho, B.B. & Janasi, V.A., 2012. Crystallization conditions and controls on trace element residence in the main minerals from the Pedra Branca Syenite, Brazil: an electron microprobe and LA-ICPMS study. **Lithos** 153, 208-223.

<https://doi.org/10.1016/j.lithos.2012.05.003> (citations: 13)

Carvalho, B.B.; Janasi, V.A. & Henrique-Pinto, R. 2014. Geochemical and Sr-Nd-Pb isotope constraints on the petrogenesis of the K-rich Pedra Branca Syenite: implications for the Neoproterozoic post-collisional magmatism in SE Brazil. **Lithos** 205, 39-59.

<https://doi.org/10.1016/j.lithos.2014.06.016> (citations: 13)

Carvalho, B.B.; Sawyer, E.W. & Janasi, V.A. 2016. Crustal reworking in a shear zone: transformation of metagranite to migmatite. *Journal of Metamorphic Geology* 34, 237-264. <https://doi.org/10.1111/jmg.12180>

Carvalho, B.B.; Janasi, V.A. & Sawyer, E.W. 2017. Evidence for Paleoproterozoic anatexis and crustal reworking of Archean crust in the São Francisco Craton, Brazil: A dating and isotopic study of the Kinawa migmatite. *Precambrian Research* 291, 98-118. <https://doi.org/10.1016/j.precamres.2017.01.019>

Carvalho, B.B.; Sawyer, E.W. & Janasi, V.A. 2017. Enhancing Maficity of Granitic Magma during Anatexis: Entrainment of Infertile Mafic Lithologies. *Journal of Petrology* 58, 1333-1362. <https://doi.org/10.1093/petrology/egx056> **Carvalho, B.B.**, Bartoli, O., Ferri, F., Cesare, B., Ferrero, S., Remusat, L., Capizzi, L. & Poli, S. 2019 Anatexis and fluid regime of the deep continental crust: new clues from melt and fluid inclusions in metapelitic migmatites from Ivrea Zone (NW Italy). *Journal of Metamorphic Geology* 37, 951-975. <https://doi.org/10.1111/JMG.12463> (citations: 15)

Carvalho, B.B., Bartoli, O., Cesare, B., Tacchetto, T., Gianola, O., Ferri, F., Aradi, L.E., Szabó, C. 2020. Primary CO₂-bearing fluid inclusions in granulitic garnet usually do not survive. *Earth and Planetary Science Letters* 536, 116170. <https://doi.org/10.1016/j.epsl.2020.116170>

As a co-author:

Henrique-Pinto, R.; Janasi, V.A.; **Carvalho, B.B.**; Calado, B.O. & Grohmann, C.H.; 2014. Integrated Geological Map of the São Roque Domain, North of São Paulo City – Brazil. *Journal of Maps* <https://doi.org/10.1080/17445647.2014.883338>

Henrique-Pinto, R.; Janasi, V.A.; Tassinari, C.C.G.; **Carvalho, B.B.**; Cioffi, C.R. & Stríkis, N.M. 2015 Provenance and sedimentation environments of São Roque Group, Brazil: contributions from petrography and geochemistry of metasediments. *Journal of South America Earth Sciences* 63, 191-207. <https://doi.org/10.1016/j.jsames.2015.07.015>

Ou, Q., Lai, J.-Q., **Carvalho, B.B.**, Zi, F., Kong, H., Li, B., Jiang, Z.-Q., 2018. Different response to Middle Paleozoic magmatism during intracontinental orogenic processes: Evidence from southeastern South China Block. *International Geology Review* 61, 1504-1521. <https://doi.org/10.1080/00206814.2018.1522518>

Henrique-Pinto, R., Guilmette, C., Bilodeau, C., Stevenson, R., **Carvalho, B.B.**, 2019. Petrography, geochemistry and Nd systematics of metaconglomerates and matrix-rich metasedimentary rocks: Implications on provenance and tectonic setting of the Labrador Trough, Canada. *Canadian Journal of Earth Sciences* 56, 672-687. <https://doi.org/10.1139/cjes-2018-0187>

Liu., Z., Tong, L., Bartoli, O., **Carvalho, B.B.**, Li, C. 2020. Low–pressure Granulite–facies Metamorphism in The Southern Chinese Altay Orogenic Belt, NW China: P–T Estimates, U–Pb Ages And Tectonic Implications in Geochemistry. *Geochemistry* 80, 125603. <https://doi.org/10.1016/j.chemer.2020.125603>

Liu., Z., Bartoli, O., Tong, L., **Carvalho, B.B.**, Xu, Y.-G., Gianola, O., Li, C. 2020. Anatexis and metamorphic history of Permian pelitic granulites from the southern Chinese Altay: constraints from petrology, melt inclusions and phase equilibria modelling. *Lithos* 360-361, 105432. <https://doi.org/10.1016/j.lithos.2020.105432>

Ou, Q., Lai, J.-Q., **Carvalho, B.B.**, Zi, F., Jiang, Z.-Q., Liu, Y.-Z., 2021. Early Silurian granitic rocks and associated enclaves as evidence of rapid cooling in cognate magma system: the case of the Xuehuading–Panshanchong pluton, South China Block. *Geological Magazine*. <https://doi.org/10.1017/S0016756820001144>

Bartoli, O. & **Carvalho, B.B.** (2021). S-type granites in their source region: experiments, thermodynamic modeling and nanogranitoids. *Lithos*. <https://doi.org/10.1016/j.lithos.2021.106046>

ABSTRACTS AT CONFERENCES (SELECTED)

Carvalho, B.B., Bartoli, O., Satish-Kumar, M., Kawakami, T., Hokada, T., Gilio, M., Alvaro, M., Cesare, B. 2021. Generation of highly silicic magmas at ultra-high temperature conditions: evidence from melt inclusions in peritectic garnet. In: EGU virtual 2021.

March, S., Tamblyn, R., Hand, M., **Carvalho, B.B.**, Clark, C. 2021 Timescales of continental subduction: Constraints from ultrahigh-pressure metapelites in the Western Gneiss Region, Norway. In: EGU virtual 2021.

Carvalho, B.B. 2021. Fate of CO₂-bearing fluids trapped in granulites – old perspectives and new insights. Metamorphic Studies Group (40th anniversary) Research in Progress Meeting (virtual) (**oral presentation solicited**)

Carvalho, B.B., Bartoli, O.; Cesare, B.; Tacchetto, T.; Gianola, O.; Ferri, F.; Aradi, L. E.; Szabó, C. Fluids during (ultra)-high temperature metamorphism: new perspectives and changes in paradigm. In: AGU, 2020, online. (**oral presentation solicited**)

Carvalho, B.B., Bartoli, O.; Cesare, B.; Tacchetto, T.; Gianola, O.; Ferri, F.; Aradi, L. E.; Szabó, C. Fluids during (ultra)-high temperature metamorphism: new perspectives and changes in paradigm. EMC 2020, Krakow, Poland (**oral presentation solicited – postponed to 2021 due to Covid-19**)

Carvalho, B.B.; Bartoli, O.; Cesare, B.; Tacchetto, T.; Gianola, O.; Ferri, F.; Aradi, L. E.; 2019. Fate of primary COH fluid inclusions in garnet from high-grade rocks. In: SIMP-SGI 2019, Parma, Italy (*oral presentation*).

Carvalho, B.B.; Bartoli, O.; Ferri, F.; Cesare, B.; Ferrero, S.; Remusat, L.; Capizzi, L. S.; Poli, S.; 2019. Melt and fluid inclusions in migmatites: unravelling anatexis and fluid regime of the deep crust. In: EGU 2019, Vienna, Austria (**oral presentation solicited**).

Bartoli, O.; Acosta-Vigil, A.; **Carvalho, B.B.**; Cesare, B.; Ferri, F.; Gianola, O.; Tacchetto, T.; 2018. Changing the viewpoint: entrapment of melt inclusions upon heating. In: AGU 2018, Washington, USA.

Carvalho, B.B.; Bartoli, O.; Ferri, F.; Cesare, B.; Ferrero, S.; Remusat, L.; Capizzi, L. S.; Poli, S.; 2018. Melt inclusions from the deep continental crust: recovering the starting composition of crustal melts. In: AGU 2018, Washington, USA.

Carvalho, B.B.; Bartoli, O.; Ferri, F.; Cesare, B.; Ferrero, S.; Capizzi, L. S.; Poli, S.; 2018. Melt and fluid inclusions in metapelitic migmatites from Ivrea Zone: anatexis and fluid regime of a high-grade terrane. In: Granulites & Granulites 2018, Ullapool, Scotland (*oral presentation*).

Carvalho, B.B.; Sawyer, E.W.; Janasi, V.A.; 2017. From anatectic melt to granite magma: enhancing maficity by assimilating mafic rocks at the source. In: Goldschmidt, Paris, France (*oral presentation*).

Janasi, V.A.; Martins, L.; Alves, A.; Henrique-Pinto, R.; **Carvalho, B.B.**; Andrade, S.; 2016. Datação U-Pb e isotopia Hf em zircão herdado de granitos do SE brasileiro: implicações petrológicas e tectônicas. Anais: as geotecnologias e o século XXI, Congresso Brasileiro de Geologia, São Paulo, Brazil.

Carvalho, B.B.; Sawyer, E.W.; Janasi, V.A.; 2016. The connection between crustal reworking and petrological diversity in the deep crust: clues from migmatites. In: EGU (European Geosciences Union General Assembly), Vienna, Austria (*oral presentation*).

Henrique-Pinto, R., Janasi, V.A., Martins, L., **Carvalho, B.B.** 2015. Petrogenesis of the syn-orogenic calc-alkaline magmatism in the Agudos Grandes Batholith, SE Brazil. In: VIII Hutton Symposium on Granites and Related Rocks, 2015, Florianópolis, Brazil. Abstracts Book with Attendees Addresses.

Carvalho, B.B.; Sawyer, E.W.; Janasi, V.A.; 2015. Controls on the geochemistry of leucogranites produced by water-fluxed melting of a granitic protolith. In: VIII Hutton Symposium on Granites and Related Rocks, 2015, Florianópolis, Brazil. Abstracts Book with Attendees Addresses (*oral presentation*).

Henrique-Pinto, R., Janasi, V.A., Barnes, S.-J., **Carvalho, B.B.**, Tassinari, C.C.G., Basei, M.A.S. 2014. Provenance and tectonic setting of Proterozoic metasedimentary sequences of the São Roque Domain, Ribeira Fold Belt, Brazil: a combination of whole-rock geochemistry, Sm-Nd isotopic systematics and detrital zircon U-Pb geochronology. In: European Geosciences Union General Assembly, 2014, Vienna, Austria.

Carvalho, B.B.; Sawyer, E.W.; Janasi, V.A.; 2014. Melting granites to make granites. In: EGU (European Geosciences Union General Assembly), Vienna, Austria (*oral presentation*). (citations: 2)

PARTICIPATION AT CONFERENCES, COURSES AND FIELD TRIPS

- 29th-31st March 2021: **Oral presentation solicited** at the Metamorphic Studies Group, Research in progress Meeting (virtual), UK.
- 1st-17th December 2020: **Oral presentation solicited** at the AGU Fall Meeting (virtual), USA.
- 16th-19th October 2019: Oral presentation at the SIMP, Parma, Italy.
- 13th-18th April 2019: Field trip to the Western Gneiss Region, NW Norway.
- 8th-12th April 2019: **Oral presentation solicited** at the European Geosciences Union - General Assembly, Vienna, Austria.
- 10th-14th December 2018: Poster presentation at the AGU fall meeting, Washington, USA.
- 10th-13th July 2018: Oral presentation at the Granulites & Granulites Conference, Ullapool, Scotland. Participation on the pre- and post-conference field trips to the Lewisian Gneiss Complex, Scotland (6th to 10th July) and the Sveconorwegian Province, SW Norway (13th to 18th July), respectively.
- 16th-20th October 2017: Attended to the course “Lake Como School of Advanced Studies: Carbon forms, paths and processes in the Earth”, Como (Italy).
- 13th-18th August 2017: Oral presentation at the Goldschmidt Conference, Paris, France. Participation on the post-conference field trip to “The Variscan Velay migmatite-granite Dome: growth and reworking of the crust through magmatic-metamorphic processes in an orogenic root” (19th to 22nd August).
- 17th-22nd April 2016: Oral presentation at the European Geosciences Union - General Assembly, Vienna, Austria.
- 20th-25th September 2015: Oral presentation at the 8th Hutton on Granites and Related Rocks, Florianópolis, Brazil. Participation on the pre-conference field trip to the TTG Archean basement of the Quadrilátero Ferrífero Province, Brazil.
- 26th-29th July 2015: Attended to the Granulites & Granulites Conference, Windhoek, Namibia. Participation on the pre- and post-conference field trips to the Mesoproterozoic Aus granulite terrain, southern Namibia (22nd to 26th July) and the Central Zone of the Damara Belt western Namibia (30th July to 3rd August), respectively.

- 27th April to 2nd May 2014: Oral presentation at the European Geosciences Union - General Assembly, Vienna, Austria.
- 30th September to 5th October 2012: Oral presentation at the 46° Congresso Brasileiro de Geologia, Santos, Brazil.
- 04-11th July 2011: Poster presentation at the 7th Hutton Symposium on Granites and Related rocks, Ávila, Spain.
- 28th March to 1st April 2010: Oral presentation at the X Congresso de Geoquímica dos Países de Língua Portuguesa, Oporto, Portugal.
- 18-22th October 2009: Oral presentation at the XII Congresso Brasileiro de Geoquímica, Ouro Preto, Brazil.
- 6-7th November 2008: Poster presentation at the XVI Simpósio Internacional de Iniciação Científica, São Paulo, Brazil.
- 26-31th October 2008: Poster presentation at the 44° Congresso Brasileiro de Geologia, Curitiba, Brazil.
- 28-29th November 2007: Poster presentation at the XV Simpósio Internacional de Iniciação Científica, São Carlos, Brazil.
- 1st-4th November 2007: Poster presentation at the X Simpósio de Geologia do Sudeste, Diamantina, Brazil.
- 21-26th October 2007: Poster presentation at the XI Congresso Brasileiro de Geoquímica, 2007, Atibaia, Brazil.

INVITED TALKS

- **March 2021** – Metamorphic Study Group, Research in Progress (MSG-RIP) meeting, virtual (**Key-note speaker**). “Fate of CO₂-bearing fluids trapped in granulites – old perspectives and new insights”.
- **January 2021** – University of Cambridge, UK. Virtual seminar. “Fluid regime of the deep crust: clues from melt and fluid inclusions”
- **December 2020** – Solicited speaker AGU, U.S.A. “Fluids during (ultra-)high temperature metamorphism: new perspectives and changes in paradigm”.
- **October 2020** – Universidade de São Paulo. **Lecture** (virtual): “Granitic magmas in their source region : perspective from melt and fluid inclusions.”
- **September 2020** (Postponed to 2021 due to Covid-19): Solicited speaker EMC2020, Poland. “Fluids during (ultra-)high temperature metamorphism: new perspectives and changes in paradigm”.
- **June 2020** – EGU-GMPV Webinar series 1, virtual. “Fate of COH fluid inclusions in granulites : new perspectives and changes in paradigm”.
- **November 2019** – University of Leeds, UK. “Working with melt inclusions in high grade rocks : step by step approach and a case study”.
- **October 2019** – Università di Pavia, Italy. **Lecture**: “Fluid regime during anatexis of the deep crust: clues from melt and fluid inclusions”
- **April 2019** – Solicited speaker EGU, Austria. “Melt and fluid inclusions in migmatites: unravelling anatexis and fluid regime of the deep crust”.
- **June 2018** – Università degli Studi di Catania, Italy. “Working with migmatites: unravelling anatexis and formation of granite magma.”
- **April 2016** – Università degli Studi di Padova, Italy. “Processes involved in the formation of migmatites derived from granitic protoliths”.
- **October 2015** – Universidade de São Paulo, Brazil. “Controle na geoquímica de leucogranitos produzidos pela fusão em presença de água de um protólito granítico”

TEACHING ACTIVITIES

- **Teaching assistant for the undergraduate course “GMG-0220 Mineralogia” [Mineralogy] at the Geosciences Institute, Universidade de São Paulo, Brazil** (second semester 2009; 60 working hours).
- **Teaching assistant for the undergraduate course “GMG-0106 Cristalografia Fundamental” [Fundamental Crystallography] at the Geosciences Institute, Universidade de São Paulo, Brazil** (second semester 2010; 48 working hours).
- **Teaching assistant for the undergraduate course “6GLG408-01 Pétrologie Métamorphique” [Metamorphic Petrology] at the Département des Sciences Appliquées, Université du Québec à Chicoutimi, Canada** (winter session 2016; 30 working hours).

- Teaching assistant for the undergraduate course “Petrografia e Laboratorio di analisi petrografiche (laboratorio microscopia)” [Petrography and laboratory of petrographic analysis (microscopy laboratory)], at the Geosciences Department, Università degli studi di Padova, Italy (first semester 2019; 48 working hours).
- Lecturer at the *International School Structure and Composition of the Lower Continental Crust* “Fluid regime during anatexis of the deep crust: clues from melt and fluid inclusions” organized by the Università di Pavia, Italy (October 2019; 1 working hour).
- Invited lecturer at the course GMG5869 – Magmatismo Acido e Processos de Evolução Crustal given at the Instituto de Geociencias, Universidade de São Paulo, Brazil (virtual due to Covid-19 – 29th October 2020; 1h30 working hour).

SCIENTIFIC JOURNAL REFEREE

2017 – Present: *International Journal of Earth Sciences* (2)

2017 – Present: *Lithos* (5)

2018 – Present: *Brazilian Journal of Geology* (2)

2019 – Present: *Minerals* (4)

2019 – Present: *Precambrian research* (2)

2019 – Present: *Gondwana research* (1)

2019 – Present: *Journal of Metamorphic Geology* (2)

2020 – Present: *Rendiconti Lincei* (1)

2020– Present: *Geological Magazine* (1)