

# Dr. Marco Aurélio de Menezes Franco

**Citizenship:** Brazilian

**Marital Status:** Single

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**Lattes curriculum:**

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**Google Scholar:**

<https://scholar.google.com.br/citations?user=MhoVcG0AAAAJ&hl=pt-BR&oi=ao>

## CAREER SUMMARY

Marco Aurélio de Menezes Franco holds a Ph.D. in Physics, with emphasis on Atmospheric Physics, from the Institute of Physics of the University of São Paulo, Brazil. Master in Applied Physics from the São Carlos Institute of Physics, University of São Paulo, and Bachelor of Physics from the Federal University of São Carlos, Brazil. The researcher has been investigating the life cycle characteristics and physicochemical properties of secondary organic aerosols in remote regions of Central Amazonia. In addition, he has experience in using remote sensing products to characterize aerosol and cloud physical properties in the Amazon rainforest. The researcher has experience of international cooperative work, with an internship at the Max Planck Institute of Chemistry (MPIC) in Mainz, Germany, for 13 months.

## EDUCATION

- **2017/07 – 2021/09** – Doctor of Science (equivalent to Ph.D.), concentration area: Physics. University of São Paulo, São Paulo – SP, Brazil, with Sandwich Doctorate at Max Planck Institute for Chemistry, Mainz, Germany. Thesis title: *Vertical transport, growth processes, and aerosol characterization in Amazonia*. Advisor: Dr. Paulo Artaxo. Scholarship: CNPq (in Brazil) and CAPES (in Germany). **Title obtained on September 15<sup>th</sup>, 2021.**
- **2015/07 – 2017/06** - Master of Science, concentration area: Applied Physics. University of São Paulo, São Carlos – SP, Brazil, and Brazilian Agricultural Research Corporation (Embrapa) in São Carlos. Dissertation title: *Matrix effects in the LIBS plasma properties for carbon quantification*. Advisor: Dr. Paulino Ribeiro Villas Boas. Scholarship: CAPES-EMBRAPA. Title obtained on June 26<sup>th</sup>, 2017.
- **2010/03 – 2015/06** - Bachelor of Physics. Federal University of São Carlos. Undergraduate thesis: *Adjustment of LIBS system parameters for total soil carbon measurement*. Advisor: Dr. Paulino Ribeiro Villas Boas. Scholarship for junior research: CNPq.

## RESEARCH, TEACHING, AND PROFESSIONAL EXPERIENCE

- **2019/10-2020/10 – Max-Planck-Institut für Chemie (MPIC), Mainz, Germany. Position:** visiting researcher (Sandwich Doctorate). **Activities:** integration, processing, and analysis of data measured at the ATTO tower in Central Amazonia, Brazil, of aerosol physicochemical properties. Dr. Christopher Pöhlker supervised the study. **Scholarship:** CAPES (6 months) and Germany Stipendium from the MPIC (7 months). Total period: 13 months.
- **2018-2021 – Institute of Physics – University of São Paulo, São Paulo, Brazil. Position:** Assistant Professor of Experimental Physics I and II, and Introduction to Atmospheric Physics at the Institute of Physics of the University of São Paulo. **Activities:** correction of notebooks, exams, exercise lists, face-to-face assistance to students, and extra-curricular classes. **Scholarship:** University of São Paulo.
- **2016-2016 – São Carlos Institute of Physics – University of São Paulo, São Carlos, Brazil. Position:** Assistant Professor of Solid-State Physics for undergraduate students in Physics from USP of São Carlos. **Main Activities:** preparation and correction of tests and lists of exercises, face-to-face assistance to students with doubts, and extra-curricular classes. **Scholarship:** USP-São Carlos;
- **2013-2017 – Brazilian Agricultural Research Corporation – Instrumentation, Brazil. Positions:** Junior research and student assistant (extra-curricular trainee, 2013 - 2015), and master's student (2015-2017). **Activities:** operation of spectroscopic techniques based on laser-induced plasma to characterize carbon in soils and nutrients in fertilizers. The student developed multivariate statistical models in R, Matlab, and Python platforms for carbon data processing and the investigation of physical properties of plasmas obtained with different soil matrices. **Scholarship:** CNPq and CAPES-Embrapa.
- **2012-2013 – Open Laboratory of Interactivity – Federal University of São Carlos, Brazil. Position:** Producer of didactic material for scientific dissemination. **Main Activities:** production of didactic material in digital media (videos and posters) for scientific dissemination and application in various scientific branches. **Scholarship:** Federal University of São Carlos.
- **2011-2012 – Federal University of São Carlos, Brazil. Position:** Junior research. **Main Activities:**

optical characterization by photoluminescence techniques and characterization of semiconductor devices containing InAs quantum dots. Operation of instrumentation for optical alignment of lasers.  
**Scholarship:** CNPq;

## QUALIFICATIONS AND SKILLS

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- Language Skills: Portuguese - Native, English - Fluent (TOEFL certification), Spanish - Intermediate (B1); German - Basic (A2);
- Programming languages and computing environments skills: R, Python, MATLAB, Arduino environment, Shell Linux, Igor, and Weka statistical environment. In addition, experience with statistical modelings in Data Science (Big Data).
- Experience with *in-situ* scientific instrumentation applied to aerosol physicochemical properties and clouds (e.g., SP2, MAAP, aethalometers, nephelometer, CPCs, SMPS, Q-ACSM, Teledyne, CCN-Counters).
- Experience with remote sensing products from satellites and the AERONET network applied to characterize aerosols and clouds.
- Experience with big field campaigns and big collaborations to study aerosol physicochemical properties: Amazon Tall Tower Observatory (Central Amazonia) and Rio Branco Campaign.
- Experience with optical techniques based on laser, such as laser-induced breakdown spectroscopy (LIBS), fluorescence spectroscopy, Raman spectroscopy, and photoluminescence spectroscopy for different materials and soil characterization.

## MAIN PARTICIPATIONS IN INTERNATIONAL CONFERENCES

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1. American Geophysical Union - Fall Meeting 2020, San Francisco, USA. Oral talk: The Vertical Gradient of Aerosols in the Amazonian ATTO Tower: Optical Properties and Size Distributions.
2. General Assembly 2019 of the European Geosciences Union (EGU), Viena, Austria, 2019. Poster presentation: Aerosol physical properties at different heights of the ATTO tower in the central Amazon rainforest.
3. São Paulo School of Advanced Science on Atmospheric Aerosols: Properties, Measurements, Modeling, and Effects on Climate and Health, São Paulo, Brazil. Poster presentation: Aerosol physical properties at the vertical profile of the ATTO tower in the central Amazon rainforest.
4. International Aerosol Conference, IAC, St. Louis, USA, 2018. Poster presentation: Evaluation and Comparison of Aerosol Properties at Two Background Sites in the Central Amazon Rainforest.
5. X Workshop Lidar Measurements in Latin America (WLMLA). Medellín, Colombia, 2018. Poster presentation: Statistical approach to assess the impact of polluted regions on the Aerosol Optical Depth measured by AERONET photometers.

The complete list of posters (18) and abstracts (22) can be accessed at:  
<http://lattes.cnpq.br/4378847535126616>

## PUBLICATIONS - PEER-REVIEWED JOURNAL ARTICLES

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**Total number of publications: 10**

**Citations:**

- i. **Google Scholar: 111. H-index: 5.**
- ii. **Scopus: 64. H-index: 4.**

1. **FRANCO, M. A.**, DITAS, F., KREMPEL, L. A., MACHADO, L. A. T., ANDREAE, M. O., ARAÚJO, A., BARBOSA, H. M. J., DE BRITO, J. F., CARBONE, S., HOLANDA, B. A., MORAIS, F. G., NASCIMENTO, J. P., PÖHLKER, M. L., RIZZO, L. V., SÁ, M., SATURNO, J., WALTER, D., WOLFF, S., PÖSCHL, U., ARTAXO, P., AND PÖHLKER, C.: Occurrence and growth of sub-50 nm aerosol particles in the Amazonian boundary layer, *Atmos. Chem. Phys. Discuss.* [preprint], <https://doi.org/10.5194/acp-2021-765>, in review, 2021.
2. TOLEDO MACHADO, L. A., **FRANCO, M. A.**, KREMPEL, L. A., DITAS, F., ANDREAE, M. O., ARTAXO, P., CECCHINI, M. A., HOLANDA, B. A., PÖHLKER, M. L., SARAIVA, I., WOLFF, S., PÖSCHL, U., AND PÖHLKER, C.: How weather events modify aerosol particle size distributions in the Amazon boundary layer, *Atmos. Chem. Phys. Discuss.* [preprint], <https://doi.org/10.5194/acp-2021-314>, in review, 2021.
3. PRASS, M. ; ANDREAE, MEINRAT O. ; ARAUJO, A. C. ; ARTAXO, PAULO ; DITAS, F. ; ELBERT, W. ; FORSTER, J. ; **FRANCO, MARCO A.** ; ANGELIS, I. H. ; KESSELMEIE, J. ; KLIMACH, T. ; KREMPEL, L. ; THINES, E. ; WALTER, DAVID ; WEBER, J. ; WEBER, B. ; FUCHS, B. M. ; PÖSCHL, ULRICH ; POHLKER, C. . Bioaerosols in the Amazon rain forest: temporal variations and vertical profiles of Eukarya,

Bacteria, and Archaea. BIOGEOSCIENCES, v. 18, p. 4873-4887, 2021. <https://bg.copernicus.org/articles/18/4873/2021/>.

4. NASCIMENTO, J. ; BELA, M. M. ; MELLER, B. ; BANDUCCI, A. L. ; RIZZO, L. V. ; VARA-VELA, A. L. ; BARBOSA, H. ; GOMES, H. ; RAFEE, S. A. A. ; **FRANCO, M. A. M.** ; Carbone, S. ; CIRINO, G. G. ; SOUZA, R. A. F. ; MCKEEN, S. A. ; ARTAXO, PAULO . Aerosols from anthropogenic and biogenic sources and their interactions - modeling aerosol formation, optical properties, and impacts over the central Amazon basin. ATMOSPHERIC CHEMISTRY AND PHYSICS, v. 21, p. 6755-6779, 2021. <https://acp.copernicus.org/articles/21/6755/2021/>.
5. MORAIS, F.; SAKANO, V. K.; LIMA, L. N.; **FRANCO, MARCO A.**; REIS, D. C.; ZANCHETTA, L. M.; JORGE, F.; LANDULFO, E.; CATALANI, L. H.; BARBOSA, H.; JOHN, V. M.; ARTAXO, P. . Filtration efficiency of a large set of COVID-19 face masks commonly used in Brazil. Aerosol Science and Technology, v. 55, p. 1028 - 1041, 2021. <https://doi.org/10.1080/02786826.2021.1915466>.
6. HOLANDA, BRUNA A.; PÖHLKER, MIRA L.; WALTER, DAVID; SATURNO, JORGE; SÖRGEL, MATTHIAS; DITAS, JEANNINE; DITAS, FLORIAN; SCHULZ, CHRISTIANE; **FRANCO, MARCO AURÉLIO**; WANG, QIAOQIAO; DONT, TOBIAS; ARTAXO, PAULO; BARBOSA, HENRIQUE M. J.; et al.; Influx of African biomass burning aerosol during the Amazonian dry season through layered transatlantic transport of black carbon-rich smoke. ATMOSPHERIC CHEMISTRY AND PHYSICS, v. 20, p. 4757-4785, 2020. <https://doi.org/10.5194/acp-20-4757-2020>.
7. PALÁCIOS, RAFAEL DA SILVA ; ROMERA, KELLY SOUSA ; CURADO, LEONE FRANCISCO AMORIM ; BANGA, NELSON MARIO ; ROTHMUND, LUCAS DOUGLAS ; SALLO, FERNANDO DA SILVA ; MORAIS, DENES ; SANTOS, ANNA CAROLINNA ALBINO ; MORAES, TONNY JADER ; MORAIS, FERNANDO GONÇALVES ; LANDULFO, EDUARDO ; **FRANCO, MARCO AURÉLIO DE MENEZES** ; KUHNEN, IGOR ANTONIO ; MARQUES, JOÃO BASSO ; NOGUEIRA, JOSÉ DE SOUZA ; JÚNIOR, LUIZ CLAUDIO GALVÃO DO VALLE ; RODRIGUES, THIAGO RANGEL . Long Term Analysis of Optical and Radiative Properties of Aerosols in the Amazon Basin. Aerosol and Air Quality Research, v. 20, p. 139-154, 2019. <https://doi.org/10.4209/aaqr.2019.04.0189> .
8. VILLAS-BOAS, PAULINO RIBEIRO ; **DE MENEZES FRANCO, MARCO AURÉLIO** ; MARTIN-NETO, LADISLAU ; GOLLANY, HERO T. ; MILORI, DEBORA MARCONDES BASTOS PEREIRA . Applications of Laser-Induced Breakdown Spectroscopy for Soil Analysis, Part I: Review of Fundamentals and Chemical and Physical Properties. EUROPEAN JOURNAL OF SOIL SCIENCE, v. 71, p. 789-804, 2019. <https://doi.org/10.1111/ejss.12888>.
9. VILLAS-BOAS, PAULINO RIBEIRO ; DE MENEZES FRANCO, MARCO AURÉLIO ; MARTIN-NETO, LADISLAU ; GOLLANY, HERO T. ; MILORI, DEBORA MARCONDES BASTOS PEREIRA . Applications of Laser-Induced Breakdown Spectroscopy for Soil Characterization, Part II: Review of Elemental Analysis and Soil Classification. EUROPEAN JOURNAL OF SOIL SCIENCE, v. 71, p. 805-818, 2019. <https://doi.org/10.1111/ejss.12889>.
10. VILLAS-BOAS, PAULINO RIBEIRO ; ROMANO, RENAN ARNON ; **DE MENEZES FRANCO, MARCO AURÉLIO** ; FERREIRA, EDILENE CRISTINA ; FERREIRA, EDNALDO JOSÉ ; CRESTANA, SILVIO ; MILORI, DÉBORA MARCONDES BASTOS PEREIRA . Laser-induced breakdown spectroscopy to determine soil texture: A fast analytical technique. GEODERMA, v. 263, p. 195-202, 2016. <https://doi.org/10.1016/j.geoderma.2015.09.018>.

## PUBLICATIONS IN PROCEEDINGS OF CONFERENCES

1. DA SILVA, JONATAN ; MORAIS, FERNANDO G. ; **FRANCO, MARCO A.** ; LOPES, FÁBIO J. S. ; ARRUDA, GREGORI DE A. ; YOSHIDA, ALEXANDRE C. ; CORREIA, ALEXANDRE ; LANDULFO, EDUARDO . Exploring the Twilight Zone: A Multi-Sensor Approach. EPJ WEB OF CONFERENCES, v. 237, p. 07015, 2020. <https://doi.org/10.1051/epjconf/202023707015> .
2. **FRANCO, M. A. M.**; CAMPOS, M. ; VILLAS BOAS, P. R. ; DÉBORA M. B. P . Modelagem multivariada de espectros LIBS para detecção de traço de cobre em amostras de solo. In: Simpósio Nacional de Instrumentação Agropecuária, 2014, São Carlos. Anais do SIAGRO : Ciência, Inovação e Mercado 2014. São Carlos: Embrapa Instrumentação, 2014. p. 635-638. <https://bit.ly/3IRQikp>

## SUBMITTED PUBLICATIONS TO PEER-REVIEWED JOURNALS

1. Artaxo, P., Hansson, H.-C., Andreae, M. O., Bäck, J., Alves, E. G., Barbosa, H. M. J., **Franco, M.A.**, et al.: Tropical and Boreal Forest – Atmosphere Interactions: a Review, submitted to Tellus, 2021. Ms. No. ZELB-2020-0011.
2. Milena Ponczek, **Marco A. Franco**, Samara Carbone, Luciana V. Rizzo, Djacinto Santos Junior, Fernando G. Moraes, Alejandro Duarte, Henrique M. J. Barbosa, Paulo Artaxo. Linking chemical composition and optical properties of biomass burning aerosols in Amazonia. Submitted to Environmental Science Atmospheres. 2021. Ms. No. EA-ART- 07-2021-000055.

## HONORS AND AWARDS

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1. 1st place in the classification for the Sandwich Doctoral Scholarship by the PrInt USP/Capes Program (bid No. 01/2019), USP/Capes.
2. In recognition of valuable contributions to observations of Near-Earth objects and Main Belt asteroid discoveries by participating in the International Astronomical Search Colaboration., NASA, Pan - Starrs : Asteroid Search Campaign.

## SELECTED FIELD CAMPAIGNS AND EXPERIMENTS

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- **Since 2017:** Participation in multiple intensive campaigns at the Amazon Tall Tower Observatory (ATTO) site, in the central Amazon Basin. Currently, I am data mentor of aerosol optical instruments at the ATTO site: MAAP, aethalometers, nephelometer, CPCs, SMPS, and AERONET photometer. At the ATTO site I also helped taking care of the SP2.
- **September to November 2018:** Biomass burning aerosol measurements campaign in Rio Branco - Brazil. Data mentor of aerosol instruments during the campaign: MAAP, aethalometer, nephelometer, CPCs, SMPS, AERONET photometer, and Total Carbon Analyzer.