João de Teixeira da Encarnação

Scientist Associate, Center for Space Research, University of Texas at Austin

Personal Information

Full Name:	João Gregório de Teixeira da Encarnação
Birth:	25^{th} of February 1977 at Funchal, Portugal
Nationality:	Portuguese
Address:	3925 W Braker Lane Ste 200 - WPR 2.9076 Austin TX 78759-5316, USA
Telephone:	+1 (512) 232-6897
Email:	teixeira@csr.utexas.edu
Web:	University of Texas, TU Delft, LinkedIn, ResearchGate, Google Scholar, ORCID, Mendeley, SCOPUS, Publons, GitHub

Education

2015 **PhD in Space Geodesy**
Geoscience and Remote Sensing (GRS), Delft University of Technology (TU Delft)
Dissertation: *Next-generation satellite gravimetry for measuring mass transport in the Earth system*
Promotor: Prof. Dr-Ing. habil. Roland Klees
Supervisor: Dr. Ir. Pavel Ditmar

2004 **Master of Sciences in Aerospace Engineering**
Astrodynamics and Space missions (AS), TU Delft
Final Thesis: *Numerical Simulation of Launch Vehicles*
Supervisor: Prof. Ir. B.A.C. Ambrosius

2000 **Licenciatura (Licenciate) in Aerospace Engineering**
Instituto Superior Técnico (IST), Technical University of Lisbon (UTL)
5^{th} year concluded at TU Delft, through the ERASMUS program
Report: *Optimum Aerodynamic Shape for a High Altitude Long Endurance Aerostatic Platform*
Supervisor: Prof. Dr. Ir. Theo van Holten

Academic and Work Experience

present – Jun. 2018 **Research Engineering/Scientist Associate** at Center for Space Research (CSR), University of Texas at Austin (UTexas), USA:

- Refinement of the last gravity field solutions from the Gravity Recovery And Climate Experiment (GRACE) mission;
- Assess signal continuity between GRACE and GRACE-FO;
- GRACE mission-complete reprocessing;
- Time-varying gravity fields estimated from Kinematic Orbits;
- In-house software development in Matlab and Ruby.
- MSc student supervision and mentoring.

May 2018
Aug. 2016

Postdoctoral Fellow at Center for Space Research (CSR), University of Texas at Austin (UTexas), USA:

- Improvements in the calibration of the accelerometers on-board the GRACE satellites, in particular in what relates to temperature effects;
- Determination of the (non-linear) long-term trends in the GRACE gravity field solutions and their prediction during the GRACE/GRACE-FO gap;
- Time-varying gravity fields estimated from Kinematic Orbits;
- In-house software development in Matlab and Ruby.

Jul. 2016
Sep. 2011

Research Associate at Astrodynamics and Space missions, TU Delft, the Netherlands:

- Calibration of the accelerometers on-board the Swarm satellites;
- Improvements in the modelling of non-conservative forces acting on satellites;
- Exploiting Digital Signal Processing (DSP) techniques to merge the measurement of non-gravitational accelerations from different sources: GPS-driven and accelerometer non-gravitational observations;
- Time-varying gravity fields estimated from Kinematic Orbits;
- Research project: Assessment of Satellite Constellations for Monitoring the Variations in Earth's Gravity Field;
- Research project: GOCE+ Theme3: Air density and wind retrieval using Gravity field and steady-state Ocean Circulation Explorer (GOCE) data;
- Research project: Development of the Swarm Level 2 Algorithms and Associated Level 2 Processing Facility;
- In-house software development in Fortran, Matlab and Ruby;
- Student supervision and mentoring.

Dec. 2015
Jan. 2007

PhD Candidate at GRS, TU Delft, the Netherlands:

- Simulation of future gravimetric satellite missions and noise budget of low-low satellite-to-satellite tracking gravimetric data;
- Impact of orbit position modelling errors in the quality of satellite gravimetric data;
- Retrieval of the high-frequency time-variable gravity field of the Earth with numerous satellites;
- Research project: Assessment of a Next Generation Gravity Mission for Monitoring the Variations of Earth's Gravity Field;
- Research project: Monitoring and Modelling Individual Sources of Mass Distribution and Transport in the Earth System by Means of Satellites;
- In-house software development in Fortran and Matlab;
- Student supervision and mentoring.

Nov. 2006
Apr. 2005

Stress Engineer at Global Technics, Leiden, the Netherlands:

- Automated design (for weight and stress minimization) of fuselage panels for the Airbus A380 aircraft (in-house implementation of a tool in C++);
- Trainees supervision and mentoring.

Jan. 2005
Oct. 2004

Aerospace Engineer at Delta-Utec, Leiden, the Netherlands:

- Contractor Work: Implementation of a Sub-Orbital Optimization Module into the Simulation Tool *COLVET* (developed in-house at TU Delft).

Apr. 2004 – Mar. 2004

Trainee at the Prins Maurits Laboratorium, TNO, the Netherlands
Supervisor: Ir. Berry Sanders, Rocket Technology Research Group:

- Implementation of the Launch Vehicle Simulation and Optimisation Tool *COLVET*;
- Numerical Simulations on Laser Propulsion (appendix of MSc thesis);
- Collaboration with international colleagues (PT and NL) on a European Space Agency (ESA)-funded project to determine the feasibility of Laser Propulsion.

Dec. 2001 – Sep. 2001

Trainee at European Space Research and Technology Centre (ESTEC), ESA, Noordwijk, the Netherlands
Supervisor: Prof. Wubbo Ockels:

- Collaboration with fellow MSc colleagues on a space mission design project: *Lunar Exploration with Ariane 5*;
- Simulation of rocket ascent trajectories (implemented a 2D orbit integrator in Matlab);
- Optimization or rocket trajectories, thrust and attitude program, fuel consumption and payload;
- Preliminary lunar mission design.

Funding

Dec. 2018 – Sep. 2017

Multi-approach gravity field models from Swarm GPS data

- European Space Agency (Noordwijk, Netherlands)
- 100k €
- Contract: SD-ITT-1.1 (part of contract 4000109587/13/I-NB)

Teaching Experience

2016 – 2013

Tutor for the Test, Analysis & Simulation project, TU Delft
Undergraduate practical project on data analysis and scientific writing, TU Delft

2011 – 2007

Tutor for the Design Synthesis Exercise, TU Delft
Undergraduate final project

Research Supervision

2019

Co-supervisor, visiting TU Delft student, CSR
MSc thesis

2016

Co-supervisor, one external student from the Aeronautical Engineering at Inholland University of Applied Sciences, TU Delft
Bachelor of Engineering final project

2011 – 2007

Co-supervisor, Design Synthesis Exercise, TU Delft
Undergraduate final projects (yearly), groups of 7 - 9 students

Awards

2017 H2020 Marie Skłodowska-Curie Individual Fellowship Seal of Excellent to the proposal on *Direct Gravimetric data assimilation into Geophysical models*

Skills

Communication: Numerous presentations of research results
- 8 oral
- 8 poster

Teaching:
- MSc thesis supervision
- Student supervision in the context of individual and group assignments
- Introductory lectures to the practical projects

Theoretical:
- Parametric inversion
- Statistical analysis
- Stochastic modelling
- Spherical harmonic functions
- Digital signal processing
- Coordinate transformations/quaternion arithmetic
- Fourier analysis

Articles review: Reviewed 16 scientific articles in 10 journals, cf. Publons

Computational:
- Algorithm development and implementation
- Data management, analysis and visualisation
- Automation, robustness, fault recovery
- Problem resolution/solution optimization/hacking

Software: Latex, MS Office, Git, SVN

Programming:
1996 – present : Bash
1998 – present : Matlab
2002 – present : Fortran
2006 – 2008 : C/C++
2011 – present : Ruby
2017 – present : Python

Operating Systems: OSX, MS Windows, Unix/Linux

Fields of Interest

Space geodesy
Earth System Science
Mathematical Modelling
Digital signal processing
Numerical Simulation
Big data
Rocket Motion and Orbital Mechanics
System Analysis and Design
Aerodynamics
Structural Mechanics

Collaborations

present – 2017: Collaboration with Dr. Guillaume Ramillien from Centre National de la Recherche Scientifique (CNRS) and Dr. Aleš Bezděk the Astronomical Institute (ASU) of the Czech Academy of Sciences (AVCR) to **drive surface mass variations directly from "reduced" gravimetric data** (i.e. observations "cleaned" of non-gravitational and trivial gravitational effects).

present – 2015: International collaboration with Prof. Torsten Mayer-Gürr of the Institute of Geodesy (IfG) of the Graz University of Technology (TUG), Dr. Aleš Bezděk of the ASU of the Czech Academy of Sciences (AVCR), Prof. Adrian Jäggi of the Astronomical Institute of the University of Bern (AIUB), Prof. Pieter Visser of the Aerospace Faculty of the TU Delft and Prof. C.K. Shum of the School of Earth Science (SES) of the Ohio State University (OSU) for the **study of the time-variable gravity field of the Earth estimated from GPS data collected by the Swarm Satellite mission**. These activities have started before we were awarded the funding ITT posted by the ESA-funded DISC consortium.

present – 2014: Collaboration with TU Delft on the DopTrack project, consisting of a **satellite tracking radio station that exploits the Doppler effect**; co-initiated and promoted the project, secured departmental funding, selected and assembled the hardware, developed software, engaged students and mentored practical undergraduate projects.

Research Projects

2016 – 2019: GRACE data processing at CSR (NASA contract NNL14AA00C)

2017 – 2018: Multi-approach gravity field models from Swarm GPS data (DISC contract SD-ITT-1.1, part of ESA contract 4000109587/13/I-NB)

2013 – 2015: Assessment of Satellite Constellations for Monitoring the Variations in Earth's Gravity Field (ESA contract 4000108663/13/NL/MV)

2013: GOCE+ Theme3: Air density and wind retrieval using GOCE data (ESA contract 400010284/11/NL/EL)

2011 – 2016: Development of the Swarm Level 2 Algorithms and Associated Level 2 Processing Facility (ESA Contract 4000102140/10/NL/JA)

2010: Assessment of a Next Generation Gravity Mission for Monitoring the Variations of Earth's Gravity Field (ESTEC contract 22643/09/NL/AF)

2008: Monitoring and Modelling Individual Sources of Mass Distribution and Transport in the Earth System by Means of Satellites (ESA contract 20403)

Languages

	Speaking	Reading	Writing
Portuguese		mother tongue	
English[a]	excellent	excellent	excellent
Spanish	good	good	fair
Italian	good	good	fair
Dutch	fair	fair	limited
French	fair	fair	limited

[a] holding the Certificate of Proficiency in English

Personal development

Sep. 2017	Dealing with Difficult People, Jeff Stellmach, UTexas
Sep. 2017	Conflict Management Foundations, Kimberly Sullivan, UTexas
Jul. 2017	Leading without formal authority, Emil Kresl, UTexas
Jul. 2017	Meeting effectiveness, Emil Kresl, UTexas
Sep. 2015	Scientific Writing, Sören Johnson, TU Delft

Sports

1991 – 2009	Basketball
Apr. 2006	Finalist of the 26th International Fortis Marathon of Rotterdam
Sep. 2016 – present	Sailing

Other Activities

1991 – 2001	Scout at the 92^{nd} Scout-group of the Association of Portuguese Escoteiros
1993 – present	Radio Amateur, call sign CT3IU, class B

References

Prof. Byron Tapley	Research advisor at Center for Space Research of University of Texas at Austin +1 512 471 5573 tapley@csr.utexas.edu
Prof. Dr. Frank Flechtner	PhD committee member +49 331 288 1130 frank.flechtner@gfz-potsdam.de
Prof. Dr. Ir. Pieter Visser	Research advisor at Astrodynamics and Space missions of Delft University of Technology +31 15 27 82595 P.N.A.M.Visser@tudelft.nl