

Marcos Arroyo Álvarez de Toledo

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Current position

2012- Associate professor, Universidad Politecnica de Catalunya, UPC, Barcelona, Spain

Previous work experience

Period	Position	Institution
01/2007 - 12/2011	Research Fellow (“Ramón y Cajal”)	UPC, Barcelona, Spain
12/2004 – 12/2006	Researcher	CIMNE, Barcelona, Spain
7/2004 – 11/2004	Research assistant	UCL, Dept. of Civil Env. Eng., London, UK
7/2003 – 6/2004	Research assistant	Politecnico di Milano, Dept. Struct. Eng, Milan, Italy
9/2001 – 6/2003	Senior design engineer	IBERINSA, Madrid, Spain
11/1997 – 8/2001	PhD student	University of Bristol, Dept. of Civil Eng.
7/1992 – 10/1997	Design Engineer / PhD student	Uriel y Asociados, Madrid, Spain
10/1991 – 6/1992	Design Engineer	INECO, Madrid, Spain

Degrees

2001 – PhD University of Bristol

1991 – Ingeniero de Caminos (equivalent MSc Civil Eng), Madrid, UPM

Recent Publications (full list included with statement; see also [scholar](#))

Medina, L., Arroyo, M. & Cano, M.M. (2017) Use of tire derived aggregate in tunnel cut-and-cover, accepted for publication in the Canadian Geotechnical Journal

Jiang, M., Xi, B., Arroyo, M. & Rodriguez-Dono, A. (2017) DEM simulation of soil-tool interaction under extraterrestrial environmental effects, Journal of Terramechanics 71 (2017) 1–13, DOI: 10.1016/j.jterra.2017.01.002

Monforte, L., Arroyo, M., Carbonell, J. M., & Gens, A. (2017). Numerical simulation of undrained insertion problems in geotechnical engineering with the Particle Finite Element Method (PFEM). Computers and Geotechnics, 82, 144-156. DOI:10.1016/j.compgeo.2016.08.013

Gens, A ; Arroyo, M ; Butlanska, J., Carbonell, J.M; Ciantia, M., Monforte, L & O’Sullivan, C. (2016). Simulation of the cone penetration test: discrete and continuum approaches, Australian Geomechanics, 51, 4, 169-182

Monforte, L; Carbonell, J.M; Arroyo, M & Gens, A. (2016) Performance of mixed formulations for the Particle Finite Element Method in soil mechanics problems, Computational Particle Mechanics, DOI 10.1007/s40571-016-0145-0

Pérez Romero, J., Ciantia, M., Arroyo, M. & Vaunat, J. (2016) Impermeable membranes for slab-track settlement mitigation, Environmental Geotechnics DOI: 10.1680/jenge.15.00056

Participation in publicly funded research projects

<i>Dates</i>	<i>Title</i>	<i>Funding body</i>	<i>Award (k€)</i>	<i>Role</i>
2017-2020	THM couplings in landfill engineering	GENCAT - ProGeo	60 (+ separate industry funds for a PhD)	Principal investigator
2016-2017	SUBDRILL	MICIN	90	Scientific in charge, UPC - CIMNE
2015-2018	SIMGESUB Advanced simulation for geotechnical subsea inspection	MICIN	135 (+ separate funds for a PhD)	Principal investigator
2015 – 2019	GEO-RAMP. MSC-RISE	EU	450 (only UPC)	Scientific in charge, UPC
2013-2015	CIMAVA Advanced deep foundations	MICIN – COMSA (contractor)	350 (only UPC)	Principal investigator UPC
2013-2015	Heave compensation for geotechnical drilling	GENCAT - IGeotest	60 (+ separate industry funds for a PhD)	Principal investigator
2012-2016	GEO-IRSES. Asian-European research exchange network	EU	150 (only UPC)	Scientific in charge, UPC
2012 - 2015	Granular conminution and interface strength: application to off-shore piled foundations	MICIN	135 (+ separate funds for a PhD)	Originator. Participant.
2010-2012	Advanced geotechnical sampling of soft soils	MICIN	119	Originator. Principal investigator
2009-2011	Advanced modeling of soil treatment by erosion and mixture: jet grouting	MICIN	135 (+ separate funds for a PhD)	Originator. Participant
2006-2007	TDA (tire derived aggregate) for drainage applications in landfills	MMA	180	Originator. Participant
2005-2008	In situ testing in structured and unsaturated soils	MICIN	99 (+ separate funds for a PhD)	Originator. Participant
2005-2007	Mechanical properties of TDA (tire derived aggregate)	MMA	65	Originator. Participant
2004	Wavelet analysis of pulse tests in soil samples	EPSRC	10 (GBP)	Originator. Participant
2003	Degradation and instabilities of geomaterials with application to hazard mitigation	EU RTN	1365 (whole network)	Participant
Notes: MICIN = Spanish Ministry of Science; MMA = Spanish Ministry of the Environment; GENCAT = Catalonia Regional Government				

Participation in privately funded research projects

<i>Dates</i>	<i>Title</i>	<i>Funding body</i>	<i>Award (k€)</i>	<i>Role</i>
2017-2018	Triaxial testing of geogrid reinforced soils	Tensar UK	24	Scientific in charge, UPC - CIMNE
2016-2017	MD-WIND	ERA NET DEMOWIND	110	Scientific in charge, UPC - CIMNE
2014-2015	MD-WIND WP0	KiC Innoenergy	30	Scientific in charge, UPC
2014	Numerical analysis of sand mobilization near producing wells	IESL	10	Principal investigator
2013-2014	Monopile lateral behavior	ALSTOM Wind	60	Principal investigator
2013-2014	Deep mine tunnel support	CEMI	60	Principal investigator
2010-2012	AZIMUT. Direct foundations for offshore wind	Acciona Energía	130	Originator. Principal investigator

<i>Dates</i>	<i>Title</i>	<i>Funding body</i>	<i>Award (k€)</i>	<i>Role</i>
2010-2013	OCEANLIDER. Geotechnical investigation for renewable energy converters	Igeotest	180	Originator. Principal investigator
2010-2011	In situ test interpretation tools	Igeotest	30	Originator. Principal investigator
2009-2010	High-speed link Madrid-Barcelona-France. Girona tunnels and station	ADIF	150	Participant
2008-2009	Numerical simulation of a deep excavation	UTE Tuneladora	30	Originator. Principal investigator
2007	TDA fill for a water retention deposit	Signus Ecovalor	15	Originator. Principal investigator
2005-2007	High-speed link Madrid-Barcelona. Barcelona entry tunnels	ADIF	150	Participant
2006	Ultrasonic testing of sand during 1D high pressure loading	ENI-AGIP	15	Originator. Participant

Research supervision

PhD (completed)

UPC, N.A. González, Development of a family of constitutive models for geotechnical applications (2011)

FEUP; UPorto. M. Fonseca do Amaral, Experimental behaviour of unsaturated cemented compacted residual soil (2012)

UPC J. Butlanska, Cone penetration tests in a virtual calibration chamber (2014)

UPC C. González, Tool wear during mechanized tunnel excavation in soils and rocks (2014)

UPC N. Climent, Numerical modeling of sand production coupling DEM and CFD (2016)

UPC A.G. Arriaga, Advanced control mechanisms to improve offshore geotechnical drilling (2017)

PhD (ongoing)

UPC L. Monforte, Soil-tool interaction using the particle finite element method (ongoing, submission expected 2018)

UPC I. Benet, Effective quality control for hollow piles (ongoing, submission expected 2018)

UPC N. Zhang, Discrete element models of pile driving (ongoing, expected 2018)

UPC R. Rorato, Granular shape effects on soil-tool interaction problems (ongoing, expected 2019)

UPC A. Isus, Termo-hydro-mechanical couplings in landfill geotechnical design (ongoing, expected 2020)

UPC S. Collico, Bayesian updating of site investigation: application to submarine landslides

MSc (30 ECTS):

FEUP, (UPorto, Portugal), Mariana Dinis, (2014) Efeitos das condições atmosféricas em aterros ferroviários: análise Hidrotérmica e Análise Mecânica

UPC, Lluís Monforte, (2014) Numerical Analysis of cone penetration in clay

UPC, Josep Raventós, Contributions to design and specification of geotechnical instrumentation (2014)

UPC, David Abadías, Soil-structure interaction for offshore wind on direct foundations (2013)

UPC, Nuria Sau, CAT Scanner as a tool for geotechnical sample inspection, (2013)

UPC, Jordi Serret, Fatigue analysis of foundation loads in offshore wind towers, (2012)

FEUP (UPorto, Portugal) Joao Borlido Fonte, Numeric models of excavations below the water table, 2010

UPC, Ignacio San Martín Valdor, TDA aggregate characterization for civil engineering uses September 2009

Minor theses (12 ECTS) 10 (7 at UPC; 3 at Politecnico Milano)

Teaching

Since 2012-2013 “Geotechnics for airports” 4 ETCS module for BSc students of airport eng. (two sessions per year)

Since 2009-2010: “Soil mechanics” 6 ETCS module to MSc students

Since 2007-2008: “Geosynthetics” 1ETCS module within the subject “Geotechnical Engineering” offered to MSc and postgraduate students

Dissemination

2008-2011 Technical Manager of the industry-sponsored “Paymacotas workshops on tunnel engineering”. Organised 10 one-day symposiums on tunnel-related subjects addressed to a mixed academic and industrial audience. Average attendance: 150 persons. For details see [Aula Payma](#)

I have also organized another 6 industry oriented courses at UPC and at CEDEX (Madrid).

Other professional activities

Since 2017 - Member CEN M515/ Task Group 7.3 in charge of redrafting Eurocode EC7.2 “Geotechnical design. Ground Investigation”

Since 2015 - Member CEN M515/ Task Group 7.2 in charge of redrafting Eurocode EC7.1 “Geotechnical design. General Rules”

2011 – 2015 Member Eurocode- EC7 evolution group EC11 “Characterization”

Since 2010- Member of Technical Committee 103 “In situ testing” of the International Society for Soil Mechanics and Geotechnical Engineering

Since 2011- Member of CEN TC341 “Geotechnics – geotechnical investigation and testing”

I act regularly as consultant in a variety of geotechnical problems. A list of my previous consultancy and professional work is available upon request.

Research evaluator: ANEP (Spain): panel member Architecture & Civil Engineering; IREX (France); Italian Research and University Evaluation Agency (ANVUR)

Memberships

Colegio de Ingenieros de Caminos, Canales y Puertos (Spanish equivalent to ICE)

International Society for Soil Mechanics and Geotechnical Engineering

International Society for Rock Mechanics

International Geosynthetics Society

Other

Session reporter: Fifth International Conference on Site Characterization, ISC'5 GoldCoast, Australia 2016; Fourth International Conference on Site Characterization, ISC'4. Recife, Brasil, September 2012,

Invited panelist at the XVII International Conference of Soil Mechanics and Foundation Engineering (2013); XV European Conference of Soil Mechanics and Foundation Engineering (2011); 7th International Symposium on "Geotechnical Aspects of Underground Construction in Soft Ground (2011).

Session chair at: IV International Conference on Particle-Based Methods (2015); XI International Conference on Computational Plasticity. Fundamentals and Applications, COMPLAS XI (2011); Scrap tire derived geomaterials: opportunities and challenges (2007).

Chairman EYGEC 2014, European Young Geotechnical Engineers Conference, Barcelona
Technical secretary UNSAT 2010 International Conference on Unsaturated Soil Mechanics, Barcelona

Scientific Committee: Tunnel Boring Machines in Difficult Grounds; 7th International Symposium on Deformation Characteristics of Geomaterials (ISDCG) in 2019, Glasgow, UK

Session organizer Alert workshop (2007).

Invited seminars at the universities of Tongji, Bristol, Cambridge, Innsbruck, Milano, Torino, Bari, Grenoble and Madrid

PhD examiner in 12 different occasions: UCLM (1), Universidad de Cantabria (1), Universidad de Valencia (1), Université de Clermont-Ferrand (1), Universidade da Coruña (1), Imperial College (2), UPC (1), Universidad de Barcelona (1), Politecnico di Bari (1) and Porto University (2).

Member of the editorial committee: Soils and Foundations, Geotecnia, Gèotechnique

Guest editor Italian Geotechnical Journal (2010).

Regular reviewer for Soils & Foundations, Computers & Geotechnics, Gèotechnique; ASTM Geotechnical Testing Journal; ASCE J. of Geotechnical and Geoenv. Eng.; Int. Journal of Geomechanics; Gèotechnique Letters.

Fluent in English, French and Italian, apart from Spanish.