



PhD Marco A. Lopez-Sanchez

Short bio: Marco is a postdoctoral researcher at [Géosciences Montpellier - CNRS](#) in France. He holds a *PhD* in Geology from the University of Oviedo in Spain. In the past, he combined jobs outside the academy as a Geology teacher and freelance geologist with postdoctoral training in the research group of [Sergio Llana-Fúnez](#) located in Oviedo. Since the beginning of 2018, he is working with [Andréa Tommasi](#) in the *Manteau et Interfaces* research group in Montpellier, where his research focuses on characterisation of deformation and annealing processes at the microscale using in-situ monitoring.

Marco research interests include different aspects of geodynamics, from microscopic to orogen-scale processes. His primary interests include rock deformation and rheology, crustal-scale shear zones, crustal strength modelling, characterization of rock microstructure using image analysis and EBSD, and understanding strain localization in nature. Others are geological mapping and evolution of ancient orogens, the interaction between rock deformation, fluids and metamorphism, and the establishment of the absolute time at which deformation processes occur. I also enjoy programming for data analysis and the creation of [tools for doing science](#).

Personal details

Full name: Marco Antonio López Sánchez

Work address:

Géosciences Montpellier - CNRS
Université de Montpellier
Campus Triolet cc060
Place Eugène Bataillon
34095 Montpellier Cedex05
France
Tel: (33) 4 67 14 30 64

e-mails:

&&& @umontpellier.fr (replace ampersand symbols with *marco-antonio.lopez-sanchez*)

On the web

Personal website: <https://marcoalopez.github.io/>
CV (pdf): [Resume_pdf](#)
Orcid-ID: <http://orcid.org/0000-0002-0261-9267>
Research-ID: [A-4290-2015](#)
Scopus author ID: [56320859100](#)
Google scholar: [scholargoogle](#)
Github page: <https://github.com/marcoalopez>
At Géosciences Montpellier: [link](#)

Education

Jul 2013 - PhD in Geology, *cum laude* honours, [Department of Geology, Univ. of Oviedo](#).

Advisor: Sergio Llana-Fúnez. Co-advisors: Profs. Alberto Marcos and Francisco J. Martínez

Thesis: *Análisis tectónico de la Falla de Vivero (Galicia, NW of Spain)*

Sep 2007 - DEA (Masters of Science - [M.Sc.](#)) in Geology, Department of Geology, University of Oviedo.

Project advisor: Prof. A. Marcos

Jan 2006 - Bachelor of Science ([B.Sc.](#)) in Geology, Department of Geology, University of Oviedo.

Research

Professional experience (only academic related)

Jan 2018 - present - Postdoctoral researcher, Géosciences Montpellier, Université de Montpellier

Oct 2015 - Nov 2017 - Postdoctoral researcher, Dpto. de Geología, Universidad de Oviedo

2013 - 2015 - Research assistant (non-paid volunteer), Dpto. de Geología, Universidad de Oviedo

2007 - 2013 - *PhD candidate*, Departamento de Geología, Universidad de Oviedo

Fellowship/Awards

2017 - Postdoctoral fellowship [Clarín-COFUND](#) (Marie Skłodowska-Curie Actions 7th FW) (2 years)

2017 - [Marie Skłodowska-Curie Actions Seal of Excellence Award with the research project proposal IDEA](#)

2016 - Early Career Scientist's Travel Award for EGU General Assembly 2016

2007 - Predoctoral fellowship in the Severo Ochoa Program (FICYT, Principality of Asturias, Spain) (4 years)

Publications

In review, accepted or available as a pre-print

Lopez-Sanchez MA and Llana-Fúnez S. A cavitation-seal mechanism for ultramylonite formation in quartzfeldspathic rocks within the semi-brittle field (Vivero fault, NW Spain). Accepted in *Tectonophysics*

Lopez-Sanchez MA. GrainSizeTools: a Python script for grain size analysis and paleopiezometry based on grain size. In review in *The Journal of Open Source Software* [pre-print](#)

Published or in press (citable) peer-reviewed publications

A6 - Lopez-Sanchez MA, García-Sansegundo J, and Martínez, FJ (2018) The significance of early Permian and early Carboniferous U-Pb zircon ages in the Bossòs and Lys-Caillaouas granitoids (Pyrenean Axial Zone). *Geological Journal* **XX**: xxx-xxx; <http://dx.doi.org/10.1002/gj.3283>

A5 - Lopez-Sanchez MA and Llana-Fúnez S (2016) An extension of the Saltykov method to quantify 3D grain size distributions in mylonites *Journal of Structural Geology* **93**: 149-161;

<http://dx.doi.org/10.1016/j.jsg.2016.10.008>

A4 - Lopez-Sanchez MA, Aleinikoff J, Marcos A, Martínez FJ, and Llana-Fúnez S. (2016) An example of low Th/U zircon overgrowths of magmatic origin in a late orogenic Variscan intrusive: the San Ciprián Massif (NW Spain). *Journal of the Geological Society* **173**: 282-291; <http://dx.doi.org/10.1144/jgs2015-071>

A3 - Lopez-Sanchez MA and Llana-Fúnez S (2015) An evaluation of different measures of dynamically recrystallized grain size for paleopiezometry or paleowattmetry studies. *Solid Earth* **6**: 475-495, Special issue: Deformation mechanisms and ductile strain localization in the lithosphere; <http://dx.doi.org/10.5194/se-6-475-2015>

A2 - Lopez-Sanchez MA, Marcos A, Martínez FJ, Llana-Fúnez S, and Iriondo A (2015) Setting new constraints on the age of crustal-scale normal fault (Vivero Fault): Implications for the evolution of Variscan orogeny in the Iberian Massif. *International Journal of Earth Sciences* **104**(4): 927-962; <http://dx.doi.org/10.1007/s00531-014-1119-1>

A1 - Lopez-Sanchez MA, Iriondo A, Marcos A, and Martínez FJ (2015) A U-Pb zircon age (479 ± 5 Ma) from the uppermost layers of the Ollo de Sapo Fm near Viveiro (NW Spain): implications for the duration of rifting-related Cambro-Ordovician volcanism in Iberia. *Geological Magazine* **152**(2): 341-350; <http://dx.doi.org/10.1017/S0016756814000272>

A0 - López-Sánchez MA (2007) Estudio geológico de la Falla de Vivero y estructuras asociadas en la región de Guntín (Lugo, NO de la Península Ibérica). *Trabajos de Geología* **27**: 97-157

Field Trip guides

FT1 - Marcos A, Bastida F, Aller J, Fernández FJ, Llana-Fúnez S and Lopez-Sanchez MA (2011) DRT post-conference Fieldtrip Guide: West Asturian Leonese Zone, Cabo Ortegal, Malpica-Lamego Line. *Deformation, Rheology and Tectonics (DRT - Oviedo) meeting* 42 pp + map.

Meeting proceedings

- 2017 - Llana-Fúnez S, Alonso JL, Caldera N and **Lopez-Sanchez MA**. Fault rocks at the base of the Somiedo Nappe (Variscan Orogen, NW Spain). *Deformation mechanisms, Rheology and Tectonics (DRT) 2017 (Inverness, Scotland)*
- 2017 - Llana-Fúnez S, de Paola N, Pozzi G and **Lopez-Sanchez MA**. Slip events propagating along a ductile mid-crustal strike-slip shear zone (Malpica-Lamego line, Variscan Orogen, NW Iberia). *European Geoscience Union General Assembly*
- 2016 - **Lopez-Sanchez MA** and Llana-Fúnez S. Characterizing 3D grain size distributions from 2D sections in mylonites using a modified version of the Saltykov method (Oral). *European Geoscience Union General Assembly*
- 2016 - **Lopez-Sanchez MA** and Llana-Fúnez S. Caracterización de la distribución 3D de tamaños de grano en milonitas a partir de secciones usando el método Saltykov y una extensión del mismo (Oral). *Congreso Geológico Nacional de España*
- 2012 - **Lopez-Sanchez MA**, Llana-Fúnez S, Marcos A and Martínez FJ. Deformation of quartz and feldspar at mid-crustal depths in an extensional normal fault (Vivero Fault, NW Spain) (*Poster*). *European Geoscience Union General Assembly*
- 2012 - **Lopez-Sanchez MA**, Iriondo A, Marcos A and Martínez FJ. Una edad de 478,7 Ma (U-Pb Shrimp-RG) en la Formación Ollo de Sapo: implicaciones para el volcanismo Cambro-Ordovícico de la Península Ibérica (*Poster*). *Congreso Geológico Nacional de España*
- 2011 - **López-Sánchez MA**, Llana-Fúnez S, Martínez FJ and Marcos A. Strain gradient recorded in the

Penedo Gordo granite during extensional movement of crustal-scale Vivero Fault (NW Spain) (*Poster*). *European Geoscience Union General Assembly*

- 2011 - **López-Sánchez MA**, LLana-Fúnez S, Martínez FJ and Marcos A. Changes in deformation mechanism and neocrystallisation in granite during a MT-LP deformation (Vivero Fault, NW Spain) (*Poster*). *Deformation, Rheology and Tectonics meeting (Oviedo)*
- 2011 - **López-Sánchez MA**, Llana-Fúnez S, Martínez FJ and Marcos A. Microstructural Evolution in Quartz and Feldspar During Medium T Deformation (Vivero Fault, NW Spain) (*Poster*). *The Interrelationships Between Deformation and Metamorphism*
- 2011 - **López-Sánchez MA**, Marcos A, Martínez FJ and Llana-Fúnez S. Hangingwall Metamorphism Related to an Extensional Orogen-scale Shear Zone: The Vivero Fault (NW of Spain) (*Poster*). *The Interrelationships Between Deformation and Metamorphism*
- 2010 - **López-Sánchez MA**, Marcos A, Martínez FJ and Llana-Fúnez S. Microstructures from the footwall to the hangingwall in the Viveiro Shear Zone (NW of Iberian Peninsula) (**Oral - by invitation**). *Sociedade Geológica de Portugal, VIII Congresso Nacional de Geología*.
- 2009 - **López-Sánchez MA**. Deformation partitioning patterns and metamorphism of the Viveiro shear zone (Guntín, NW of Iberian Peninsula) (*Poster*). *Deformation, Rheology and Tectonics meeting (Liverpool)*

Scripts developed

GrainSizeTools: A free and open-source Python script for estimating the grain size from thin sections

Developed and maintained by **Lopez-Sanchez MA** (stable)

Info. & download: <http://marcoalopez.github.io/GrainSizeTools/>

Strength envelopes: A Python script to generate crust and lithosphere strength envelopes

Developed and maintained by **Lopez-Sanchez MA** (under development)

Info. & download: https://github.com/marcoalopez/Strength_envelopes

JASPE: *Just Another Stereoplot (in a) Python Environment*

Developed and maintained by **Lopez-Sanchez MA** (under development)

Info. & download: <https://github.com/marcoalopez/JASPE>

Nearest neighbour: A Python script to estimate nearest neighbour distance and perform nearest neighbour Monte Carlo simulations

Developed and maintained by **Lopez-Sanchez MA** (stable)

Info. & download: https://github.com/marcoalopez/nearest_neighbour

Chemical age script: A free and open-source script to estimate the 'chemical' ages in monazites analyzed in electron microprobes

Developed by **Lopez-Sanchez MA** (currently abandoned)

Info. & download: https://github.com/marcoalopez/chemical_age_script/

Selected training courses

2016 - Thematic School – Recrystallization Mechanism in Materials

Duration: 5 days (32 hours), Sète, France

Coordinator: Maurine Montagnat

Organized by the CNRS "Groupement de Recherche" on Recrystallization (GDR3436). [Certificate](#)

2015 - Introduction to R Programming

Duration: 10 hours

Instructor: Filip Schouwenaars
Microsoft edx course (DAT204x). [Certificate](#)

2013 - *Introduction to computer science and programming using Python*

Duration: 210 hours

Prof. Eric Grimson, Prof. John Guttag, Dr Chris Terman and Dr Larry Rudolph
Massachusetts Institute of Technology edx course (MITx - 6.00x). [Certificate](#)

2012 - *Scanning Electron Microscopy and its applications to analyses of Rocks*

Duration: 30 hours

Prof. John Wheeler, Dr Elisabetta Mariani and Dr Dan Tatham
Department of Earth, Ocean and Ecological Sciences, University of Liverpool

2008 - *Training course in microtectonics*

Duration: 30 hours

Prof. Cees W. Passchier
Institut für Geowissenschaften; Johannes Gutenberg-Universität Mainz (Germany).

Analytical/technical skills

- **Scientific computing and programming.** Experience with [Python](#) programming language and the scientific libraries [Numpy](#), [Scipy](#), [Matplotlib](#), and [Pandas](#). I am also familiar with the basics of [R](#) and [Matlab](#) programming languages, version control systems such as Git, and code repositories such as GitHub.
- **Image analysis** ([ImageJ](#), Photoshop). Image enhancement, grain segmentation, shape descriptors, grain size, and spatial analysis.
- **Scanning Electron Microscopy** (BSD, **Backscatter diffraction - EBSD**). **MTEX Matlab toolbox**, *AZtechKL/Channel 5*, and the *PFch5 script*
- **Grain size analysis.** I use my own tools/scripts. See an example in <http://marcoalopez.github.io/GrainSizeTools/>
- ****Electron Probe Micro-analyser ****(EPMA). Including monazite chemical dating (see https://github.com/marcoalopez/chemical_age_script)
- Good theoretical background in interpreting experimental data (i.e. statistics, interpolation and regression)
- Experience in geological mapping and **Geographical Information Systems** (GIS)
- U-Pb geochronological data treatment

Participation in Research Projects

2018 - present ANR DREAM - Dynamic REcrystallization in Anisotropic Materials. Project led by Maurine Montagnat. Ref. *ANR-13-BS09-0001-01*

2016 - 2017

Cataclasis y fracturación en rocas de la corteza continental (*Cataclasis and rock fracturing in the continental crust*). Project led by [Sergio Llana-Fúnez](#) Ref. *MINECO-15-CGL2014-53388-P*

2015

Procesos geológicos modeladores del relieve de la cordillera cantábrica. Project led by [Sergio Llana-Fúnez](#) Ref. *FC-15-GRUPIN14-44*

2010 - 2014

La transición frágil-dúctil de la corteza del NO peninsular (*The brittle-ductile transition in the continental crust in North-western Iberia*). Project led by [Sergio Llana-Fúnez](#) Ref. MICINN-10-CGL2010-14890

2007 - 2010

The tectonic evolution of an orogen in the transition between the internal and external zones: A comparison between the Variscan orogen in the NW of Iberian Peninsula and the Pyrenean Axial Zone (original title in Spanish). Project led by Alberto Marcos. Ref. CGL2006-08822/BTE

Teaching (at university level)

Accredited as an assistant teacher by the National Agency for Quality Assessment and Accreditation of Spain (ANECA) in 2016

Graduate teaching assistant from **2009 to 2011** and in **2017** at Universidad de Oviedo

Laboratory sections taught: *Plate Tectonics (30 hours)*; *Structural Geology (20 hours)*; *Geophysical and Geochemical prospecting (10 hours)*; *Interpretation of geological maps (10 hours)*

Field Camp taught: *Geodynamics (10 hours)*; *Structural Geology (10 hours)*; *Fieldwork (geological mapping) (12.5 hours)*; *Tectonics (10 hours)*; *Structural analysis (5 hours)*

Administrative experience

Deformation mechanisms, Rheology and Tectonics (DRT2011) meeting organizing committee. DRT meetings are a series of biannual international meetings dedicated to the study of deformation processes in rocks at different scales, from the microscale to the study of bulk deformation of the lithosphere

Languages

Spanish and Galician - mother tongue

English - fluent

French and Portuguese - elementary

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