



# PhD Marco A. Lopez-Sanchez

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**Short bio:** Marco is a postdoctoral researcher in the Dept. of Geology at University of Oviedo (Spain). He received his *Ph.D.* in Geology from the University of Oviedo in 2013 supervised by [Sergio Llana-Fúnez](#). His thesis dealt with the study of a deep crustal-scale shear zone located in the hinterland of the Iberian massif. From 2013 till now, he combined jobs outside academia as Geology teacher and self-employed geology consultant with post-doctoral training in the Sergio Llana-Fúnez research group. So far, Marco has participated in four research projects.

His research interests range from different aspects of geodynamics, from microscopic to orogen-scale processes. Primary interests are rock deformation and rheology, crustal-scale shear zones, crustal strength modelling, characterization of rock microstructure using image analysis and EBSD techniques, and understanding strain localization in nature. He also has academic interests in the 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. Marco also enjoys doing statistics, scientific computing, and programming to create scientific tools.

## Personal details

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**Full name:** Marco Antonio López Sánchez

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## On the web

Personal website: <https://marcoalopez.github.io/>

CV (pdf): [Resume\\_pdf](#)

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Research-ID: [A-4290-2015](#)

Scopus author ID: [56320859100](#)

Google scholar: [scholar.google](#)

Microsoft academic: [2116864491](#)

Github page: <https://github.com/marcoalopez>

# Education

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

Advisor: Sergio Llana-Fúnez. Co-advisors: Profs. A. Marcos and F. 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

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## Professional experience (only academic related)

**Jun 2017 - present** - Post-doctoral researcher, Dept. of Geology, University of Oviedo

**Apr 2016 - Dec 2016** - Post-doctoral researcher, Dept. of Geology, University of Oviedo

**Oct 2015 - Nov 2015** - Post-doctoral researcher, Dept. of Geology, University of Oviedo

**2013 - 2015** - Research assistant (not-paid volunteer), Dept. of Geology, University of Oviedo

**2007 - 2013** - *Ph.D. candidate*, Dept. of Geology, University of 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. *Ultramylonite Formation in Quartz-feldspathic Rocks within the Semi-brittle Field (Vivero fault, NW Spain)*. Submitted to the Journal of Geophysical Research: Solid Earth

Published or in press (citable) peer-reviewed publications

**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; doi: [10.1016/j.jsg.2016.10.008](#)

**A4 - Lopez-Sanchez MA**, Aleinikoff J, Marcos A, Martínez FJ, 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; doi: [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; doi: [10.5194/se-6-475-2015](https://doi.org/10.5194/se-6-475-2015)

**A2 - Lopez-Sanchez MA**, Marcos A, Martínez FJ, Llana-Fúnez S, Iriondo A (2015) Setting new constrains 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; doi:[10.1007/s00531-014-1119-1](https://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 ( $479 \pm 5$  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; doi:[10.1017/S0016756814000272](https://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 Geologia*.
- 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 and maintained

**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** (currently under development)

Info. & download: [https://github.com/marcoalopez/Strength\\_envelopes](https://github.com/marcoalopez/Strength_envelopes)

**JASPE**: JASPE stands for *Just Another Stereoplot 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](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/](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 programming language](#), the version control system [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, **EBSD**); Familiar with the use of **MTEX Matlab toolbox**, *HKL 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](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

### 2016 - present

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)

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**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 University of 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

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**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

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Spanish and Galician - mother tongue

English - fluent

Portuguese - reading fluently and listening comprehension

French - elementary proficiency

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