PhD Marco A. Lopez-Sanchez

Short bio: I am a postdoctoral researcher at [Géosciences Montpellier - CNRS](#) in France. I hold a *PhD* in Geology from the University of Oviedo in Spain. In the past, I combined jobs outside the academy as a geology teacher and freelance geologist with postdoctoral training in [Sergio Llana-Fúnez](#) research group. Since the beginning of 2018, I have been working with [Andréa Tommasi](#) in the *Manteau et Interfaces* research group in Montpellier, where my research focuses on the characterisation of microstructure and texture during deformation and annealing processes using in-situ monitoring. Although in the past I worked mainly with quartz-feldspathic rocks, the materials I currently work with are olivine, ice, and magnesium.

My research interests include different aspects of geodynamic processes from the microscopic to the orogenic scale. My primary interests include rock deformation and rheology, crustal-scale shear zones, crustal strength modelling, characterization of rock microstructure/texture through EBSD and image analysis, and understanding strain localization in nature. Other interests are the 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 other cool [things](#).

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 the triple ampersand symbol 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](#)

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)

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

2015 - 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

Fellowships/Awards

2017 - Postdoctoral fellowship Clarín-COFUND (Marie Sklodowska-Curie Actions 7th FW) (2 years)

2017 - Marie Sklodowska-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)

Scientific activities as visitor researcher

2019 - **Grenoble (France)**. Duration: 1.5 months. Experimental ice deformation (creep) using digital image correlation methods at Institut des Géosciences de l'Environnement under the supervision of Maurine Montagnat.

2018 - **Saint-Étienne (France)**. Duration: 1 week. High temperature experimental deformation of magnesium alloys in a channel-die compression rig at École des Mines de Saint-Étienne (collab. R. Quey).

Publications

In review or available as a pre-print

%-%-%

Published or in press (citable) peer-reviewed publications

PDF-08 **Lopez-Sanchez MA** (2018) GrainSizeTools: a Python script for grain size analysis and paleopiezometry based on grain size. *Journal of Open Source Software* **3**(30): 863, https://doi.org/10.21105/joss.00863

PDF-07 **Lopez-Sanchez MA** and Llana-Fúnez S (2018) A cavitation-seal mechanism for ultramylonite formation in quartzfeldspathic rocks within the semi-brittle field (Vivero fault, NW Spain). *Tectonophysics* **745**: 132-153 https://doi.org/10.1016/j.tecto.2018.07.026

PDF-06 **Lopez-Sanchez MA**, García-Sansegundo J, and Martínez, FJ (2018) The significance of early Permian and early Carboniferous U-Pb zircon ages in the Bossòts and Lys-Caillaouas granitoids (Pyrenean Axial Zone). *Geological Journal - in press*; https://doi.org/10.1002/gj.3283

PDF-05 **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; https://doi.org/10.1016/j.jsg.2016.10.008

PDF-04 **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; https://doi.org/10.1144/jgs2015-071

PDF-03 **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; https://doi.org/10.5194/se-6-475-2015

PDF-02 **Lopez-Sanchez MA**, Marcos A, Martínez FJ, Llana-Fúnez S, and 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; https://doi.org/10.1007/s00531-014-1119-1

PDF-01 **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; https://doi.org/10.1017/S0016756814000272

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 link

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

- 2019 - **Lopez-Sanchez MA**, Tommasi A, Barou, F and Quey R. Preliminary results on magnesium (AZ31) in situ annealing experiments in the SEM-EBSD. *Final CREEP workshop (Les Houches - France)*
- 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)*

Selected scripts & codes

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/

mtex_scripts: matlab scripts for use with the MTEX toolbox
Developed and maintained by **Lopez-Sanchez MA** (under development)
Info. & download: https://github.com/marcoalopez/mtex_scripts

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

Image analysis: Python code snippets for image analysis
Developed and maintained by **Lopez-Sanchez MA** (under development)
Info. & download: https://github.com/marcoalopez/image_analysis

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 / workshops

2018-19 - *4th Innovative Training Network CREEP workshop (EU-H2020)*
Duration: 5 days, École de physique des Houches, Les Houches, France
Coordinator: Andrea Tommasi This was a workshop focused on the rheology of geological materials. For details see here

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 Rock*s
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**. Wide experience using Python programming language and the scientific libraries Numpy, Scipy, Matplotlib, and Pandas. I am also familiar with the basics of R and Matlab, version control systems such as Git, and code repositories such as GitHub.
- **Image acquisition and analysis**.

- Good theoretical background and practical experience with cameras and digital image acquisition. [Dcraw](#) knowledge (for raw image extraction).
- Experience using [ImageJ](#) and [Scikit-Image](#) (Python library) for image analysis, as well as developing my own codes. Noise reduction, image enhancement, grain segmentation, shape descriptors, grain size, and spatial analysis. For **grain size analysis** I use my own tools/scripts. See an example in http://marcoalopez.github.io/GrainSizeTools/
- Experience with **Digital Image Correlation** (DIC) methods. Generation and quality analysis of speckle patterns (via image autocorrelation). DIC software's used: [DICe](#), 7D and [DICToolbox](#).
- **Experimental deformation**. Experience in experimental deformation including in-situ monitoring. Experience in sample preparation (ice, magnesium, rocks). Basic experience with LabVIEW engineering software. Welding skills.
- **Scanning Electron Microscopy** (BSD, **Backscatter diffraction - EBSD**) data treatment.
  - **Wide experience using the MTEX Matlab toolbox**. I contributed to the MTEX through community scripts. See also https://github.com/marcoalopez/mtex_scripts
  - Others: *AZtecHKL/Channel 5*, *PFch5 script*, and own codes.
- **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 península (*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 Pyreneean 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 - assez pour me faire comprendre et survivre! :)