Dr. Marco A. Lopez-Sanchez

Geoscientist

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Links of interest

Personal website: https://marcoalopez.github.io/
ORCID: http://orcid.org/0000-0002-0261-9267
Scopus author ID: 56320859100
Google scholar: scholar.google
Research-ID: https://www.webofscience.com/wos/author/record/A-4290-2015
Github page: https://github.com/marcoalopez

Education

- **2013** - **PhD in Geology with *cum laude* honours** from University of Oviedo (Spain). Thesis title: *Tectonic analysis of the Vivero fault (Galicia, NW of Spain) (original in Spanish)*. Advisors: Sergio Llana-Fúnez, Alberto Marcos and Francisco J. Martínez.
- **2007** - Diploma of Advanced Studies (DEA). Program: "*Exploration, analysis and modelling of basins and orogenic systems*" from the University of Oviedo and University of Barcelona. Project advisor: Alberto Marcos.
- **2006** - **Bachelor of Science in Geology** from the University of Oviedo (Spain).

Appointments (only academic related)

- **2025 - present** - Hired researcher at the Andalusian Earth Sciences Institute (IACT-CSIC)
- **2021 - 2023** - Research associate in the Department of Geology at the University of Oviedo (Spain) (2 years, full-time)
- **2020 - 2021** - CNRS research associate in Géosciences Montpellier at the Université de Montpellier (2 years, full-time)
- **2018 - 2020** - Marie Sklodowska-Curie Clarín-COFUND postdoctoral researcher in Géosciences Montpellier at the Université de Montpellier, France. (2 years, full-time).
- **2015 - 2017** - Postdoctoral researcher in the Department of Geology at the University of Oviedo (Spain). *This includes several full and part-time postdoc contracts that add up to a year of experience within this period*
- **2007 - 2013** - *PhD candidate*, Department of Geology at the University of Oviedo.

Fellowships and Awards

- Marie Sklodowska-Curie Actions Seal of Excellence Award with the research project proposal OUTCROP Year: 2022. Score: 90.4/100.
- Programa “In Itineras”: Grants for the recruitment of research staff at research centres in the Principality of Asturias. Two-year contract to develop the project OUTCROP as principal investigator (only 3 projects funded in the call). Year: 2021. Budget: €166 000.
- Programa “In Itineras”: Margarita Salas joven Grant . Two-year contract to develop the project OUTCROP as principal investigator (10 projects funded in the call). Year: 2021. Budget: €104 000. Rejected in favor of other funding.
- Marie Sklodowska-Curie Actions Seal of Excellence Award with the research project proposal START. Year: 2021. Score: 85.8/100.
- Postdoctoral fellowship Clarín-COFUND (Marie Sklodowska-Curie Clarín-COFUND Actions FP7) (2 years). Year: 2017.
- Marie Sklodowska-Curie Actions Seal of Excellence Award with the research project proposal IDEA. Year: 2017. Score: 88.6/100.
- Early Career Scientist’s Travel Award for EGU General Assembly 2016.
- Predoctoral fellowship in the Severo Ochoa Program (FICYT, Principality of Asturias, Spain) (4 years). Year: 2007.

Scientific activities as a visitor researcher

- European Synchrotron Radiation Facility (ESRF) (Grenoble, France). **Duration**: 1 week (2025). **Goal**: Conduct experiments to determine the physical properties of Earth materials under high pressure and temperature conditions using the ID06-LVP (Large Volume Press) beamline (ERC-OZ project, PI: J.A. Padrón-Navarta).
- IACT-CSIC (Granada, Spain). **Duration**: 1 week (2022). **Goal**: Learn thermodynamic modelling (Perple_X tool) and planning of research project in collaboration with J.A. Padrón-Navarta.
- Geosciences Montpellier (Montpellier, France). **Duration**: 1 week (2022). **Goal**: Experimental deformation of Mg alloys in simple shear with in situ EBSD monitoring (collaboration as member of the RhEoVOLUTION project)
- Institut des Géosciences de l'Environnement (Grenoble, France). **Duration**: 1.5 months (2019). **Goal**: Experimental ice deformation (creep) using digital image correlation methods under the supervision of Maurine Montagnat.
- École des Mines de Saint-Étienne (Saint-Étienne, France). **Duration**: 1 week (2018). **Goal**: High temperature experimental deformation of magnesium alloys in a channel-die compression rig (collab. Dr. Romain Quey).

Peer-reviewed publications

- Lopez-Sanchez, M.A., Cárdenes, V., Barou, F., Llana-Fúnez, S., 2025. Predictive modelling of seismic properties in single-foliated slates. Tectonophysics 908, 230765. https://doi.org/10.1016/j.tecto.2025.230765
- Boissonneau, G., Tommasi, A., Barou, F., Lopez-Sanchez, M.A., Montagnat, M., 2025. Dynamic recrystallization and mechanical behavior of Mg alloy AZ31: Constraints from tensile tests with in-situ EBSD analysis. Comptes Rendus. Mécanique 353, 235–259. https://doi.org/10.5802/crmeca.267
- Lopez-Sanchez, M.A., Chauve, T., Montagnat, M., Tommasi, A., 2023. Decoupling between strain localisation and the

microstructural record revealed by in-situ strain measurements in polycrystalline ice. Earth and Planetary Science Letters 611, 118149. https://doi.org/10.1016/j.epsl.2023.118149

- Wang, X., Zhang, J.F., Tommasi, A., Lopez-Sanchez, M.A., Jing, Z.C., Shi, F., Liu, W.L., Barou, F., 2023. Experimental Evidence for a Weak Calcic-Amphibole-Rich Deep Crust in Orogens. Geophysical Research Letters 50, e2022GL102320. https://doi.org/10.1029/2022GL102320
- Lopez-Sanchez, M.A., Demouchy, S., Thoraval, C., 2022. Comment on “If Not Brittle: Ductile, Plastic, or Viscous?” by Kelin Wang. Seismological Research Letters 93, 1960–1965. https://doi.org/10.1785/0220210191
- Lopez-Sanchez, M.A., Tommasi, A., Ismail, W.B., Barou, F., 2021. Dynamic recrystallization by subgrain rotation in olivine revealed by electron backscatter diffraction. Tectonophysics 815, 228916. https://doi.org/10.1016/j.tecto.2021.228916
- Ismail, W.B., Tommasi, A., Lopez-Sanchez, M.A., Rutter, E.H., Barou, F., Demouchy, S., 2021. Deformation of upper mantle rocks with contrasting initial fabrics in axial extension. Tectonophysics 815, 228997. https://doi.org/10.1016/j.tecto.2021.228997
- Cardenes, V., Lopez-Sanchez, M.A., Barou, F., Olona, J., Llana-Fúnez, S., 2021. Crystallographic preferred orientation, seismic velocity and anisotropy in roofing slates. Tectonophysics 808, 228815. https://doi.org/10.1016/j.tecto.2021.228815
- Lopez-Sanchez, M.A., Tommasi, A., Barou, F., Quey, R., 2020. Dislocation-driven recrystallization in AZ31B magnesium alloy imaged by quasi-in situ EBSD in annealing experiments. Materials Characterization 165, 110382. https://doi.org/10.1016/j.matchar.2020.110382
- Wenk, H.-R., Yu, R., Cárdenes, V., Lopez-Sanchez, M.A., Sintubin, M., 2020. Fabric and anisotropy of slates: From classical studies to new results. Journal of Structural Geology 138, 104066. https://doi.org/10.1016/j.jsg.2020.104066
- Lopez-Sanchez, M.A., 2020. Which average, how many grains, and how to estimate robust confidence intervals in unimodal grain size populations. Journal of Structural Geology 135, 104042. https://doi.org/10.1016/j.jsg.2020.104042
- Lopez-Sanchez, M.A., García-Sansegundo, J., Martínez, F.J., 2019. The significance of early Permian and early Carboniferous U–Pb zircon ages in the Bossòst and Lys-Caillaouas granitoids (Pyrenean Axial Zone). Geological Journal 54, 2048–2063. https://doi.org/10.1002/gj.3283
- Lopez-Sanchez, M.A., 2018. GrainSizeTools: a Python script for grain size analysis and paleopiezometry based on grain size. JOSS 3, 863. https://doi.org/10.21105/joss.00863
- Lopez-Sanchez, M.A., Llana-Fúnez, S., 2018. A cavitation-seal mechanism for ultramylonite formation in quartzofeldspathic rocks within the semi-brittle field (Vivero fault, NW Spain). Tectonophysics 745, 132–153. https://doi.org/10.1016/j.tecto.2018.07.026
- Lopez-Sanchez, M.A., 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
- Lopez-Sanchez, M.A., Aleinikoff, J.N., Marcos, A., Martínez, F.J., Llana-Fúnez, S., 2016. An example of low-Th/U zircon overgrowths of magmatic origin in a late orogenic Variscan intrusion: the San Ciprián massif (NW Spain). JGS 173, 282–291. https://doi.org/10.1144/jgs2015-071
- Lopez-Sanchez, M.A., Llana-Fúnez, S., 2015. An evaluation of different measures of dynamically recrystallized grain size for paleopiezometry or paleowattometry studies. Solid Earth 6, 475–495. https://doi.org/10.5194/se-6-475-2015
- Lopez-Sanchez, M.A., Marcos, A., Martínez, F.J., Iriondo, A., Llana-Fúnez, S., 2015. Setting new constrains on the age

of crustal-scale extensional shear zone (Vivero fault): implications for the evolution of Variscan orogeny in the Iberian massif. Int J Earth Sci (Geol Rundsch) 104, 927–962. https://doi.org/10.1007/s00531-014-1119-1

- Lopez-Sanchez, M.A., Iriondo, A., Marcos, A., Martínez, F.J., 2015. A U–Pb zircon age (479 ± 5 Ma) from the uppermost layers of the Ollo de Sapo Formation near Viveiro (NW Spain): implications for the duration of rifting-related Cambro-Ordovician volcanism in Iberia. Geol. Mag. 152, 341–350. https://doi.org/10.1017/S0016756814000272

Geological Excursion Guides

- Tilhac R, Lopez-Sanchez, MA, Llana-Fúnez, S, Padrón-Navarta JA. 2024. Field guide to the mantle section of the Cabo Ortegal Complex. Available from https://github.com/lherzolite2024/fieldguide/
- 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. PDF

Meeting proceedings (only talks in the last 10 years)

For a full list of meeting proceedings see here

- Seismic modelling using EBSD data: why, how, limitations and good practices. *Freiberg MTEX Workshop 2023*. **Invited keynote speaker**. https://mtex-toolbox.github.io/workshop23
- Evolution of strain field and microstructure in polycrystalline ice using in situ experiments. *6th International Workshop on Rock Physics (A Coruña, 3 -17 June)* https://lameroc.eu/
- Dynamic recrystallization by subgrain rotation in olivine revealed by EBSD. *Microanalysis Society (MAS) EBSD2022 Topical Conference (Virtual June 7-9)* https://the-mas.org/events/topical-conferences/ebsd-2022/
- Unravelling dynamic recrystallization by subgrain rotation in olivine using MTEX. *Freiberg online MTEX Workshop 2022*. **(Invited)**.
- Texture evolution during dynamic recrystallization in olivine-rich rocks. *GDR Recrystallization and Grain Growth workshop 2020 (Les Houches, School of Physics, France)*
- Dislocation-driven static recrystallization in AZ31B magnesium alloy imaged by quasi-in-situ EBSD experiments. *GDR Recrystallization and Grain Growth workshop 2020 (Les Houches, School of Physics, France)*.
- Lopez-Sanchez MA, Tommasi A, Barou, F and Quey R. EBSD in-situ annealing experiments on magnesium alloy (AZ31): how dislocations and interfaces affect recrystallization and final grainsize (Talk). *Deformation mechanisms, Rheology and Tectonics (DRT) 2019 (Tübingen, Germany)*.
- 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 (Talk). *European Geoscience Union General Assembly 2016*.

Peer review and editorial activity

- **Journal articles:** *Geology, Journal of Geophysical Research: Solid Earth, Tectonophysics, Journal of Structural Geology, American mineralogist, Ultramicroscopy, Solid Earth, Image Analysis & Stereology, Geosciences Journal, Tektonika, Journal of marine science and application and Italian Journal of Geosciences*.
- **Research grants:** US National Science Foundation (NFS) grant reviewer
- **Editorial activity**: Since 2023, I am co-editor of the journal Trabajos de Geología. From 2023 to 2025, I served as a review editor in Frontiers in Earth Science (Solid Earth Geophysics).

Research tools developed

- GrainSizeTools: A free and open-source Python script for estimating the grain size from thin sections
- PyRockWave: Python codes for modelling elastic properties and seismic velocities in rocks (**in active development**!)
- Jupyter4DICe: a series of Jupyter notebooks written in Python for post-processing digital image correlation (DIC) data obtained with the open-source digital image correlation tool DICe

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Participation in Research Projects

- **From 2025 to today**: Deep Earth's Oxygen recycling at subduction Zones (OZ). **Grant agreement ID**: 101088573. **Funded under**: HORIZON 1.1 - European Research Council (ERC). **PI**: José Alberto Padrón Navarta. **Host institution:** IACT-CSIC. **Dates**: 12/2023 – 11/2028. **Total cost**: €2.000.000 **Link**: https://doi.org/10.3030/101088573 **Role**: Full-time CSIC researcher contract.

- **From 2022 to 2023**:OUTCROP project: From the Lower Crust to the mantle: elastic properties, anisotropy, and water content of the Cabo Ortegal complex. **Grant agreement ID**: SV-PA-21-AYUD/2021/57163. **Funded under**: Plan de Ciencia, Tecnología e Innovacion 2018-2022 Asturias, Programa "In Itineras". **PI**: Marco A. Lopez-Sanchez. **Host institution:** Department of Geology, University of Oviedo. **Dates**: 12/2021 – 12/2023. **Total cost**: €166.000 **Role**: Principal investigator.

- **From 2021 to 2025**: ERC Advanced Grant RhEoVOLUTION project: Micro-scale dependent, time- and space-evolving rheologies: the key for generating strain localization in the Earth **Grant agreement ID**: 882450. **Funded under**: EXCELLENT SCIENCE - European Research Council (ERC). **PI**: Andrea Tommasi. **Host institution:** CNRS, Geosciences Montpellier. **Dates**: 11/2020 – 10/2025. **Total cost**: €2.500.000 **Link**: https://doi.org/10.3030/882450 **Role**: One-year full-time CNRS researcher contract as part of the main team (Jan 2021 to Jan 2022). Currently external collaborator.

For a full list of past participation in research projects see here

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Selected training courses

- 2021: Advanced workshop on digital image correlation (120 hours) Virtual EBSD 2021 meeting
- 2019:4th Innovative Training Network CREEP workshop (EU-H2020) (5 days) École de physique des Houches, Les Houches, France. For details see here
- 2016: Thematic School – Recrystallization Mechanism in Materials (32 hours). Sète, France. Organized by the CNRS "Groupement de Recherche" on Recrystallization (GDR3436). Certificate
- 2015: Introduction to R Programming (10 hours). Microsoft edx course (DAT204x). Certificate
- 2013: Introduction to computer science and programming using Python (210 hours). Massachusetts Institute of Technology EDX course (MITx - 6.00x). Certificate
- 2012: Scanning Electron Microscopy and its applications to analyses of Rocks (30 hours). Department of Earth, Ocean and Ecological Sciences, University of Liverpool
- 2008: Training course in microtectonics (30 hours). Institut für Geowissenschaften; Johannes Gutenberg-Universität Mainz (Germany).

Teaching

University courses (University of Oviedo)

- **From 2022 to 2023**. Degree in Geology: 100 hours of laboratory practice: *Structural Geology* (60 hours) and *Interpretation of Geological Maps* (40 hours). Degree in Mining Engineering: 20 hours of theory in *Geology and its Applications to Engineering*.
- **From 2009 to 2011**: Teaching assistant (pre-doctoral stage) at the University of Oviedo (~130 hours of experience, Degrees in Geology and Mining Engineering).
    - Laboratory practice 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)*

Workshops and courses

- **Introduction to the Python programming language for data analysis in Earth sciences**: an introductory course to the Python programming language for data analysis using examples from the earth sciences. Website: https://github.com/marcoalopez/Python_course
- **EBSD data treatment with MTEX** taught at the *GRD Recrystallization and Grain Growth workshop 2020* (Les Houches, School of Physics, France)

Organisation of R&D activities

- Organizing committee of the **7th International Orogenic Lherzolite meeting 2024** to be held in Oviedo and Cabo Ortegal (fieldtrip) from 30 September to 6 October. These are a series of international meetings that aims to bring together specialists in mantle processes to key orogenic mantle (and related rocks) outcrops worldwide and to share and discuss the latest advances in the processes operating in the upper mantle and at the transition between the upper mantle and the lower crust. https://lherzolite2024.github.io
- Organizing committee of the **Deformation mechanisms, Rheology and Tectonics (DRT2011) meeting** . 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. Archived website Committees

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Languages

Spanish and Galician - mother tongue
English - C1, fluent
French - B1