

Nicolas Luca Celli

seismologist - postdoctoral researcher



About me

Born 1990 - Italy

I am a computational seismologist, specialised in modelling and imaging the Earth's interior using seismic data. Currently, my main interest is in using fibre-optic (Photonic) seismology using telecommunication fibre cables as geo-sensors. With a strong background in seismic wavefield simulation, inversion, fibre sensing and tectonophysics, I am working to devise techniques and methodologies to probe the deep Earth's structure using fibre optic cables as sensors.

Areas of specialization

- seismology
- fibre optic seismology
- computational seismology
- seismic imaging
- numerical modelling
- DSP
- big data

Reviewer for

- Journal Of Geophys. Research
- Geochem., Geophys., Geosystems
- Phys. of the Earth and Plan. Int.
- Lithosphere
- Volcanica
- Science Advances
- Geophys. Journal International
- Tectonophysics
- Geology

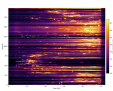
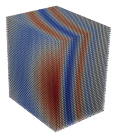
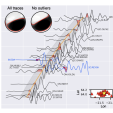
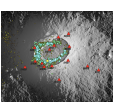
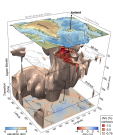
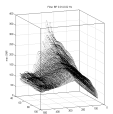
Personal interests

- hardware/software audio
- improvisational music
- photography
- anthropology
- traditional cooking

Find me online

- @ nicolas.celli@dias.ie
- wix ncseismology
- google scholar
- nlscelli.github

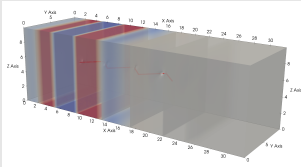
EXPERIENCE

2025–now	IMAGFib: IMAGFib: multiscale seismic IMAGING with optical fibre telecom cables RESEARCH IRELAND PATHWAYS FELLOW · DIAS 📍 Use telecom fibre cables as regional-scale geosensors for deep Earth imaging and sea monitoring using fibre optic sensing technology	
2024-2025	Detection and Monitoring Groundwater Flow in Karst Using Distributed Acoustic Sensing SENIOR POSTDOC RESEARCHER · DIAS 📍 using Distributed Acoustic Sensing to map and monitor subterranean groundwater flow.	
2022-2024	Full-waveform modelling of DAS cables POSTDOC RESEARCHER · DIAS 📍 Development of a full-waveform numerical tool to simulate Distributed Acoustic Sensing (DAS) records.	
2021-2022	Moment tensor inversion POSTDOC RESEARCHER · DIAS 📍 Construction of a database of microseismicity Moment Tensor solutions for the COSEISMIQ project.	
2020–2021	Waveform analysis in volcanic settings POSTDOC SCHOLAR · DIAS 📍 Identification of material nonlinearity in seismic data collected at the Sierra Negra Volcano, Galapagos (IGUANA project) and comparison to numerical simulations of nonlinear media.	
2019–2020	Waveform tomography with massive datasets POSTDOC SCHOLAR · DIAS 📍 Relating regional-scale seismic tomography to volcanic activity, plate reconstructions and topography in the North Atlantic region.	
2014	Surface wave detection INTERNSHIP · NORSAR 📍 Development of an automatic teleseismic Surface Wave detector for the NORSAR array in the Comprehensive nuclear-Test-Ban Treaty Organization (CTBTO) context.	

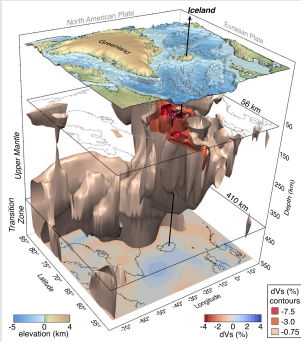
EDUCATION

2015-2019	Seismology PHD · DIAS & Trinity College Dublin 🏛️ Regional-scale structure and dynamics of the crust, upper mantle and transition zone from waveform tomography with massive datasets -supervisor: Sergei Lebedev	 Trinity College Dublin Coláiste na Tríonóide, Baile Átha Cliath The University of Dublin
2012-2015	Geosciences MSc · University of Trieste, Italy 🏛️ The DPEP Long Period Detector: a tool for Surface Wave detection and parameter extraction -supervisor: Johannes Schweitzer	 UNIVERSITY OF TRIESTE
2009-2012	Geology BACHELOR · University of Trieste, Italy 🏛️ GPR study of the western sector of the Monte Canin glacier - supervisor: Michele Pipan	 UNIVERSITY OF TRIESTE

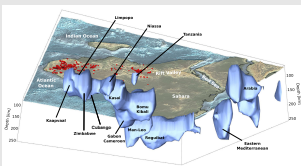
Sample images



Numerical model of a plane wave propagating in a 10x10x32 m medium with a weakly coupled virtual DAS cable (in red)



3D plot of the Iceland Plume as imaged by NAT2021 tomographic model. From [5]



3D representation of cratonic lithosphere beneath Africa from AF2019 tomographic model, seen from below. From [9]

SKILLS

- Geophysics
- Comp. Seismology
- Waveform Modelling
- Waveform Inversion
- Fibre-optic Seismology
- Digital Signal Processing
- Big Data management
- Parallel computing
- Tectonophysics

LANGUAGES

Italian	
English	
German	
Portuguese	
Spanish	

PROGRAMMING

Python	
C	
Fortran	
shell	
Matlab	

PUBLICATIONS

1. Celli, N. L., Bean, C. J. & O'Brien, G. Full-waveform simulation of DAS records, response, and cable-ground coupling. *Geophysical Journal International*, ggad449. ISSN: 0956-540X. <https://doi.org/10.1093/gji/ggad449> (2023) (Nov. 2023).
2. Civiero, C., Celli, N. L. & Tesaro, M. Revisiting the geodynamics of the Middle East region from an integrated geophysical perspective. *Journal of Geodynamics*, 102005. ISSN: 0264-3707. <https://www.sciencedirect.com/science/article/pii/S0264370723000455> (2023).
3. De Laat, J. I. *et al.* Structure and evolution of the Australian plate and underlying upper mantle from waveform tomography with massive data sets. *Geophysical Journal International* **234**, 153–189. ISSN: 0956-540X. <https://doi.org/10.1093/gji/ggad062> (2023) (July 2023).
4. Civiero, C., Lebedev, S. & Celli, N. L. A Complex Mantle Plume Head Below East Africa-Arabia Shaped by the Lithosphere-Asthenosphere Boundary Topography. en. *Geochemistry, Geophysics, Geosystems* **23**. ISSN: 1525-2027, 1525-2027. <https://onlinelibrary.wiley.com/doi/10.1029/2022GC010610> (2023) (Nov. 2022).
5. Celli, N. L., Lebedev, S., Schaeffer, A. J. & Gaina, C. The tilted Iceland Plume and its effect on the North Atlantic evolution and magmatism. en. *Earth and Planetary Science Letters* **569**, 117048. ISSN: 0012821X. <https://linkinghub.elsevier.com/retrieve/pii/S0012821X21003034> (2023) (Sept. 2021).
6. Fullea, J., Lebedev, S., Martinec, Z. & Celli, N. L. WINTERC-G: mapping the upper mantle thermochemical heterogeneity from coupled geophysical–petrological inversion of seismic waveforms, heat flow, surface elevation and gravity satellite data. en. *Geophysical Journal International* **226**, 146–191. ISSN: 0956-540X, 1365-246X. <https://academic.oup.com/gji/article/226/1/146/6166785> (2023) (Apr. 2021).
7. Haas, P., Ebbing, J., Celli, N. L. & Rey, P. F. Two-step Gravity Inversion Reveals Variable Architecture of African Cratons. en. *Frontiers in Earth Science* **9**, 696674. ISSN: 2296-6463. <https://www.frontiersin.org/articles/10.3389/feart.2021.696674/full> (2023) (Dec. 2021).
8. Celli, N. L., Lebedev, S., Schaeffer, A. J., Ravenna, M. & Gaina, C. The upper mantle beneath the South Atlantic Ocean, South America and Africa from waveform tomography with massive data sets. en. *Geophysical Journal International* **221**, 178–204. ISSN: 0956-540X, 1365-246X. <https://academic.oup.com/gji/article/221/1/178/5697204> (2023) (Apr. 2020).
9. Celli, N. L., Lebedev, S., Schaeffer, A. J. & Gaina, C. African cratonic lithosphere carved by mantle plumes. en. *Nature Communications* **11**, 92. ISSN: 2041-1723. <https://www.nature.com/articles/s41467-019-13871-2> (2023) (Jan. 2020).
10. Carvalho, J. *et al.* Evidence for high temperature in the upper mantle beneath Cape Verde archipelago from Rayleigh-wave phase-velocity measurements. en. *Tectonophysics* **770**, 228225. ISSN: 00401951. <https://linkinghub.elsevier.com/retrieve/pii/S0040195119303403> (2023) (Nov. 2019).
11. Bonadio, R. *et al.* Hot Upper Mantle Beneath the Tristan da Cunha Hotspot From Probabilistic Rayleigh-Wave Inversion and Petrological Modeling. en. *Geochemistry, Geophysics, Geosystems* **19**, 1412–1428. ISSN: 15252027. <http://doi.wiley.com/10.1002/2017GC007347> (2023) (May 2018).

SELECTED TALKS

- 2023** *Modelling of DAS cables and ground coupling response using Discrete Particle Particle Schemes*, IUGG 2023, Berlin
- 2023** *regional-scale Seismic waveform tomography with global, massive datasets*, University of Utah "SeismoTea" talk, Invited
- 2021** *Images of the Iceland Plume from seismic tomography*, AGU online webinar: "Mount Fagradalsfjall Eruption", Invited
- 2020** *African cratonic lithosphere carved by mantle plumes*, GFZ "Rifts and Rifted Margins" seminar series, Invited
- 2020** *Imaging the African lithosphere and it's evolution with waveform tomography*, ETH SWP group seminar, Invited

ORGANISED ACTIVITIES

- 2023** *Seismic tomography and the lithosphere*, course for the Irish Mantle Group, Dublin
- 2023** *Cratons: Structure, Evolution, Chemistry and Life on the early Earth*, EGU 2023 session, Vienna
- 2023** *What is Geophysics?*, Dublin Culture Night 2023
- 2022** *Evolution of cratonic lithosphere: Variability, geodynamic interactions and resource potential*, EGU 2022 session, Vienna
- 2022** *Beginning BASH course for geoscience*, internal course for DIAS researchers, Dublin
- 2022** *What is Seismology?*, Dublin Culture Night 2022

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