

Chiara Nardoni

Curriculum Vitae

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Research Experience

- 2024 - present **Post-Doc**, Dipartimenti di Fisica e Astronomia, Alma Mater Studiorum Università di Bologna
Advisor: Prof. Luca De Siena
Project: thermo-mechanical modelling of the magma migration across the Campi Flegrei caldera to understand the variations in the stress field for future seismic response modelling.
- 2022 - 2023 **Post-Doc**, Department of Geology and Geophysics, Louisiana State University
Advisor: Prof. Patricia Persaud
Project: obtaining the first 3D attenuation model across the northern Los Angeles area using nodal array data from the Basin Amplification Seismic Investigation (BASIN) experiment. The attenuation model combined with the existing velocity models aims at improving the understanding of this high seismic hazard region by characterizing rock properties near faults.

Education

- 2018 - 2022 **Ph.D. in Physics**, Roma Tre University, Rome
Supervisors: Prof. Elisabetta Mattei, Prof. Fabio Cammarano
Co-Supervisor: Prof. Luca De Siena
Thesis Title: "*Imaging oceanic basins with wave equation and radiative transfer models*"
Topic: modelling seismic attenuation and wavefield across Italy and the Tyrrhenian Sea through radiative transfer theory and finite difference method.
(Thesis defence in July 2022)
- 2016-2018 **M.Sc. in Physics**, Roma Tre University, Rome
Final mark: 110/110 cum Laude
Thesis Title: "*Seismic attenuation in the Tyrrhenian Sea: estimation of the coda quality factor Q_c* "
Supervisors: Prof. Elisabetta Mattei, Prof. Fabio Cammarano
- 2016-2018 **B.Sc. in Physics**, Roma Tre University, Rome
Final mark: 110/110 cum Laude
Thesis Title: "*Seismic wave and Earth Internal structure: inner core*"
Supervisors: Prof. Elena Pettinelli

Research activity

My research field focuses on imaging the solid Earth from regional to local scale by modeling seismic attenuation (both absorption and scattering). I have applied radiative transfer and wave-equation modeling across a continental-oceanic crust to better understand and characterize the seismic wavefield response to crustal structures, such as the crust-mantle interface. To accomplish this, wave-equation modeling was first used to characterize seismic source parameters by investigating the sensitivity of far-field and

long-period data to variations of the moment tensor, source time function, and focal depth. The used modeling approaches implement the effects of both coherent and stochastic seismic wave propagation. The project I worked on during my first post-doc concerns seismic attenuation and fault network imaging across the metropolitan area east of Los Angeles (California, USA) and aims to identify fault/fracture networks and potential fluid migration across the shallow crust providing complementary observations on seismic source distribution and wave propagation effects. The current project aims to model the magma migration across the Campi Flegrei caldera (Italy) to understand the variation in the stress field for future seismic wavefield modelling.

Scientific papers and proceedings

Nardoni C., Persaud P., *Evidence for faulting and fluid-driven earthquake processes from seismic attenuation variations beneath metropolitan Los Angeles*. Scientific Reports, 2024. <https://doi.org/10.1038/s41598-024-67872-3>.

Nardoni C., De Siena L., Magrini F., Cammarano F., Maeda T., Mattei E., *Earthquake Characteristics and Structural Properties of the Southern Tyrrhenian Basin from Full Seismic Wave Simulations*. Surveys in Geophysics, 2023. <https://doi.org/10.1007/s10712-023-09769-w>

Nardoni C., De Siena L., Cammarano F., Magrini F., Mattei E., *Modelling regional-scale attenuation across Italy and the Tyrrhenian Sea*. Physics of the Earth and Planetary Interior, 2021. <https://doi.org/10.1016/j.pepi.2021.106764>.

Nardoni C., De Siena L., Cammarano F., Magrini F., Mattei E., *Modelling seismic attenuation across Italy and the Tyrrhenian basin*, selected for publication in Il Nuovo Cimento.

Nardoni C., Cammarano F., De Siena L., Mattei E., Seismic attenuation in the Tyrrhenian Sea: estimation of coda quality factor Q_c . GNGTS Gruppo Nazionale di Geofisica della Terra Solida, Atti del 38° Convegno Nazionale, 2019

Invited talk and organized session

Nardoni C., De Siena L., Cammarano F., Magrini F., Mattei E., Modelling Seismic Attenuation across Italy and the Tyrrhenian Basin, AGU Fall Meeting 2021, New Orleans (LA), USA, December 2021

SSA Meeting, Puerto Rico, April 2023. Crustal Imaging of High Seismic Hazard Regions. Nardoni C., Gabrielli S., Persaud P., Sandvol E.

Conferences attendance

Nardoni C., De Siena L., Thermo-mechanical simulations to model magma-induced seismicity at Campi Flegrei, 110th National Congress of the Italian Physics Society, Bologna, Italy, September 2024 - *Oral Presentation*

Nardoni C., Persaud P., Imaging Fracture Networks beneath the Los Angeles Metropolitan Area using High-Frequency Seismic Attenuation Tomography, EGU 2024, Vienna, Austria, April 2024 - *Poster*

Nardoni C., Persaud P., Fault Imaging beneath the Los Angeles Metropolitan Area with High-Frequency Seismic Attenuation Tomography, AGU Fall Meeting 2023, San Francisco (CA), USA, December 2023 - *Oral Presentation*

Persaud P., Nardoni C., Fault Zone Images in the Chino-San Bernardino Area, Southern California from Seismic Attenuation, GSA Connects 2023, Pittsburgh (PA), USA, October 2023 - *Oral Presentation*

Nardoni C., Persaud P., 3D Seismic Attenuation Model: Scattering and Absorption Imaging beneath the Los Angeles Metropolitan Area, SSA Meeting, Puerto Rico, April 2023 - *Oral Presentation*

Nardoni C., Persaud P., Clayton R., 3D Seismic Attenuation Model for Ground Motion Predictions in the Los Angeles Metropolitan Area, AGU Fall Meeting 2022, Chicago (IL), USA, December 2022 - *Oral Presentation*

Nardoni C., Persaud P., Omojola J., Clayton R., Imaging Seismic Attenuation across the Northern Los Angeles Basins with Dense Arrays, SCEC (Southern California Earthquake Center) meeting, Palm Springs (CA), USA, September 2022 - *Poster*

Nardoni C., De Siena L., Cammarano F., Magrini F., Mattei E., Imaging oceanic basins with wave equation and radiative transfer models, EGU General Assembly, Wien, Austria April 2022 - *Oral Presentation*

Nardoni C., De Siena L., Cammarano F., Mattei E., Magrini F., Modelling seismic attenuation across Italy and the Tyrrhenian basin, 107th National Congress of the Italian Physics Society, September 2021

Nardoni C., De Siena L., Cammarano F., Mattei E., Magrini F., Finite differences forward modelling across the Tyrrhenian basin, EGU General Assembly, April 2021 - *Online*

Nardoni C., Cammarano F., Mattei E., De Siena L., Coda waves simulations across the Tyrrhenian Basin using radiative transfer, EGU General Assembly, May 2020 - *Online*

Nardoni C., Cammarano F., De Siena L., Mattei E., Seismic attenuation in the Tyrrhenian Sea: estimation of coda quality factor Q_c , NGTTS 38th national conference, Rome, Italy, November 2019 - *Oral presentation*

Nardoni C., Cammarano F., De Siena L., Mattei E., Seismic attenuation in the Tyrrhenian Sea: estimation of coda quality factor Q_c , EGU General Assembly, Vienna, Austria, April 2019 - *Poster*

Research skills

Computer and programming skills:

- Operating system: Linux, Windows, Unix.
- Software and Programming Languages: Matlab, Python, C++, Fortran, OpenMPI, Latex, Paraview, Inkscape
- Code Packages for Geophysics applications:
 - OpenSWPC (Open Source Seismic Wave Propagation Code)*: software for seismic wave propagation simulation using the finite difference method to solve equations of motion with constitutive equations of linear elastic/viscoelastic medium, under message passing interface (MPI) environment.
 - Radiative3D*: a radiative transport algorithm based on ray tracing to simulate propagation dynamics in large-scale structures, and a stochastic multiple scattering process to simulate the effects of statistically-described small-scale structures.
 - MuRAT3D*: code for seismic attenuation, scattering and absorption tomography using body and coda waves.

Languages: Italian, English

Awards

107th National Congress of the Italian Physics Society, September 2021. Presentation awarded with the publication on *Il Nuovo Cimento*

Teaching and outreach activity

Mathematics (substitute teacher), Istituto di Istruzione Superiore Cristoforo Colombo, Rome, February 2022

Laboratory classes of Mechanics and Thermodynamics - Tutorial Sessions, Department of Mathematics and Physics, Roma Tre University, Rome, 2021

Physics I - Tutorial Sessions, Department of Mathematics and Physics, Roma Tre University, Rome, October 2019 - June 2020

Speaker at Masterclass in Earth Physics, Department of Mathematics and Physics, Roma Tre University, Rome, April 2019, February 2022

Speaker at European Researchers' night 2019, Department of Mathematics and Physics, Roma Tre University, Rome, September 2019

Part-time collaboration activities, Department of Mathematics and Physics, Roma Tre University, Rome, 2017-2018