

Dear Professor Igel,

I am a post-doctoral fellow at the Delft University of Technology, the Netherlands, working on seismic interferometry with Dr. Deyan Draganov, and on CO₂ sequestration with Prof. Ranajit Ghose. As for the first project, it focuses on ambient noise tomography and on recognition of non-volcanic tremors. Within the framework of that subject, I spent a month at Los Alamos National Laboratory (LANL, New Mexico, U.S.A.), working with Dr. Monica Maceira on the identification and characterization of non-volcanic tremors. Preliminary results were presented at the 2013 AGU Fall Meeting in San Francisco, CA, U.S.A. The second project concerns the monitoring of the storage of supercritical CO₂ in reservoirs made of poroelastic rocks filled with brine. The analysis of ambient noise represents a very important tool to investigate seismic hazard in a certain area, even in the presence of a low seismicity. Beyond that, studies in progress are investigating whether CO₂ storage can be monitored through ambient noise cross-correlation in addition to computational poroelasticity. During the current year I plan to publish at least three peer-reviewed papers of my present work on both subjects.

Now, I want to present myself, starting with my cursus studiorum, and then, my PhD. As a basis, I am a physicist. In the course of my academic studies, I acquired strong bases in Mathematics, by attending several courses in which infinitesimal calculus, vector algebra, differential equations, vector analysis, tensor analysis, Fourier analysis, and calculus of variations were treated. Furthermore, I attended advanced courses in Applied Geophysics, Earth Physics, and Seismology. During that time, I studied Earthquake source dynamics, Rock Rheology, Seismic Risk, Physics of the Earth mantle and core, Signal processing techniques, and Seismic inverse methods. To get my M.Sc. (four-year Laurea) in Physics, I carried out the following experimental thesis in Seismology: "A methodology for the determination of the detection level of a seismic network". That thesis was aimed at the determination of the detection level of the earthquakes at a seismic station. In describing a methodology that sets this level, it is important to define the spectral characteristics of ambient noise and of earthquakes, as well as a detection threshold criterion to distinguish earthquakes from ambient noise.

After the Laurea, I was, for about a year, at Seismic Risk Laboratory of the Department of Earth Sciences, University of Naples Federico II, collaborating with Professor Antonio Rapolla. During that time, I worked in Seismology, and specifically on the "Features of seismic microtremors signals within a building", using the LABVIEW software produced by the National Instruments. The purpose of that work was to describe how a building changes the characteristics of microtremor signals, moving from the free earth outside the building to its basement and to the upper floors. That kind of study is important in that it may have key applications in civil engineering investigations.

In 2007, I started my PhD in Geophysics at the Department of Earth Sciences, University of Naples Federico II, and, in 2011, I discussed my doctoral thesis, "Numerical simulations and Geochronology of explosive volcanic eruptions: multidisciplinary approaches for the study of the Campanian volcanism", developed under the direction of Dr. Claudio Scarpati. Then, as Research Assistant in Geophysics, I continued that work for about two years at the same department. The numerical simulations were carried out by means of the GMFIX code, derived from MFIX (Multiphase Flow with Interphase eXchanges, <https://mfix.netl.doe.gov/>) by Dr. Sebastian Darteville (Los Alamos National Laboratory, New Mexico, U.S.A.). To improve the numerical modelling of multiphase flows, and particularly of pyroclastic density currents, in 2009 I was at the University at Buffalo (New York, U.S.A.), working with Professor Gregory Valentine. Moreover, I performed dating measurements of prehistorical Neapolitan deposits. To that, in 2008 I was at Menlo Park Laboratory (California, U.S.A.) of the U.S. Geological Survey, working with Dr. Andrew Calvert on the ⁴⁰Ar/³⁹Ar geochronological dating technique of volcanic pyroclastic deposits, and learning how to use the high-sensitivity ⁴⁰Ar/³⁹Ar mass spectrometer.

All over these years, I have learnt how to program in FORTRAN, to use MATLAB and SAC (Seismic Analysis Code), as well to work in a Linux environment. I can write scientific reports and papers, and communicate results in oral presentations. In Delft, as well as in Buffalo, Menlo Park, and Naples, I have been interacting constructively and proactively with external and internal collaborators of different research teams. I think I have acquired a strong experience in quantitative seismology, particularly in ambient noise analysis and in the solution of seismic inverse problems. I would really like to continue working in this field, and that is why I would be very glad if I could be a member of your research group at the University of Munich.

Sincerely,
Simone Lepore