SamuelBignardi

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Personal Profile

The main focus of my research for more than twelve years has been 1) solving very hard image/shape reconstruction and data-inversion problems, 2) solving these problems using complex datasets collected from a multitude of non-invasive sensors, and 3) solving these problems using advanced computational techniques. My expertise spans from Geophysics, signal processing, inversion, programming, to computer sciences and Machine Learning. My most significant contributions have been made in my research in the development of Geophysical algorithms for modeling and inversion applied to seismic signals (acoustic/elastic propagation) in solids and electromagnetic signals (air/solid propagation). Additionally, I have also investigated remote sensing techniques, such as radar-based shape reconstruction, Synthetic Aperture Radar (SAR) and I have employed (and published) machine learning techniques for medical imaging. The result of this work has been 21 publications in refereed journals, almost 40 conference contributions, and two state-of-the-art software packages I've developed that have been cited 29 times and are currently being used by 40 groups all across the world. I am a passionate researcher who enjoys collaborating with other researchers through the full spectrum of innovation, going from ideas conceived on the whiteboard, to publication, to working software tools and prototypes.

Relevant Professional Skills

Physics and Engineering: Signal analysis, Computational Modeling, Inversion, Algorithms engineering and implementation
Geophysical methods: HVSR, SASW, MASW, ReMi, ESAC, ERT, GPR, P-wave tomography, Seismic Reflection, FWI
Programming: C/C++, Matlab, Python, Fortran, Basic, Tcl/Tk, LabVIEW, Bash
Computational Mechanic: Finite Element Method (FEM), Boundary element Method (BEM), Spectral Finite Elements (Spec-FEM), Finite Differece Method (FDM)
Additional techniques: Active Contours, Level set Method, Machine Learning, Neural Networks (NN), Convolutional Neural Networks (CNN)
Languages Italian, English.

Scopus: 55152395400
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www.ece.gatech.edu/faculty-staff-directory/samuel-bignardi

Education

Ph.D.	Earth Sciences. Obtained in 2011 *University of Ferrara (Italy)* Title: Complete waveform inversion approach to seismic surface waves and adjoint active surfaces Evaluation: Excellent
M. Sc.	in Physics, Obtained in 2006 *University of Ferrara (Italy)* Evaluation: 105/110

Professional qualifications

2020 — May 14. **National Scientific Qualification (ASN)**
Discipline 04/A4: **Geophysics** Role: Associate Professor. Valid through: 2029.
Scientific qualification (art.16 of the law 30 Dec. 2010, n.240) granted to scholars holding the requisites to function as associate or full professor in Italian Universities
https://abilitazione.miur.it/public/index.php?lang=enghttps://abilitazione.miur.it

Work Experience

2017 — May 2017 - Present. **RESEARCH ENGINEER II**
Georgia Institute of Technology (USA). Dep. of Electrical and Computer Engineering (ECE)
Geometric PDE methods (i.e. active surfaces and level set methods) and their use in connection with radar signals for remote sensing, shape reconstruction and reflectivity analysis.
Standard Occupation Classification:
* Remote Sensing Scientists and Technologists, January 2020 - Present.
* Computer and Information Research Scientist, May 2017 - December 2019.

2016 — October 2016 - April 2017. **Postdoctoral Researcher**
University of Ferrara (Italy). Dept. of Physics and Earth Sciences
Development of numerical methods and algorithms for the two- and three-dimensional modeling and inversion of surface waves

2014 — September 2014 – July 2016. **Postdoctoral Researcher**
University of Ferrara (Italy). Dept. of Physics and Earth Sciences (Italy)
Development of numerical methods and algorithms for the two- and three-dimensional modeling and inversion of surface waves

2014 — March 2014 – August 2014. **POST DOCTORAL FELLOW**
Georgia Institute of Technology (USA). Joint position: Dept. of Electrical and Computer Engineering (ECE) & Dept. of Civil and Environmental Engineering (CEE)
Boundary Element Method Adjoint-based Active Surfaces for Next-Generation Surface Wave Testing

2011 — February 2011 – February 2014. **Postdoctoral Researcher**
University of Ferrara (Italy). Dept. of Physics and Earth Sciences
Development of numerical methods and algorithms for the two- and three-dimensional modeling and inversion of surface waves

2010 — January 2010 - July 2010. **RESEARCH SCHOLAR (visiting)**
Georgia Institute of Technology (USA). Dept. of Civil and Environmental Engineering (CEE)

2009 — March 2009 - August 2009. **SHORT-TERM SCHOLAR (visiting)**
Georgia Institute of Technology (USA). Dept. of Civil and Environmental Engineering (CEE)

2008 — January, 2008 – December 2010. **Ph. D. student**
University of Ferrara (Italy). Dept. of Physics and Earth Sciences
Corso di Dottorato in Scienze della Terra

2007 — May 2007 – October 2007. **Research fellowship for Ms. graduates in Physics**
University of Ferrara (Italy) Joint position: Department of Earth Sciences and Department of computer Sciences (Italy) University of Ferrara (Italy).
Development of elaboration algorithms of electric and acoustic tomography for the Hydro-Geology

Consulting activity

2017 November 18-30.
Activity: Unconventional data processing surface waves at a test site.
Client: Future in Research Consortium (Ferrara, Italy)

2016 August 2016 – September 2016.
Activity: Construction of subsurface models for the production of seismic shaking scenarios in the area of the upper Ferrarese.
Client: Future in Research Consortium (Ferrara, Italy)

Scientific Software Created

OpenHVSR-Processing-Toolkit (Matlab) **Published as open-source** Signal processing, and visualization, toolkit for microtremor (HVSR method), evaluation of the signal's directionality, accelerated creation of maps for the seismic microzonation, and investigation of bedrock morphology in the sedimentary context

OpenHVSR-Inversion (Matlab) **Published as open-source** Modeling and inversion of microtremor spectral ratio curves for 2D and 3D subsurface elastic parameters evaluation

DIPL (Matlab) Direct interpretation of surface waves propagation phase lags for (2D and 3D) subsurface characterization of Ryleigh waves velocity.

S3D / S3Di (C++ and QT) Spectral finite element (Galerkin) method-based software for the Full wavefield simulation in geometrically complex solids (Full waveform inversion under development). The software handles propagation in 3D mesh with high degree of geometrical complexity and heterogeneous materials.

OpenSW (Matlab) Laterally constrained Inversion of surface waves dispersion curves (MASW, ReMi) for reconstructing 2D/3D subsurface models.

B2D (Matlab, and C++) Boundary element-based modeling and Full waveform inversion of elastic and acoustic wave propagation in 2D.

PTOMO (Matlab) Huygens principle-based P waves first arrival simulation P-waves simulator. Tomographic inversion under development. Propagation in 3D mesh with high degree of geometrical complexity is included.

OpenSPlaneTEM (Matlab) Modeling and inversion of Transient Electromagnetic (TEM) curves for 2D and 3D characterization of the subsurface electromagnetic parameters.

Patents and Intellectual Property

2018 **Intellectual property (sole holder)** of the "OpenHVSR - Processing Toolkit" software.
https://www.github.com/sedysen/OpenHVSR-Processing-Toolkit
Published as OPEN-SOURCE, License: GNU General Public License v3.0

2016 **Intellectual property (sole holder)** of the "OpenHVSR - Inversion" software.
https://www.github.com/sedysen/OpenHVSR-Inversion
Published as OPEN-SOURCE, License: GNU General Public License v3.0

2014 **Patent:** Method for the evaluation of the mechanical properties of soil. **S. Bignardi**, F. Fischangher, D. Gualerzi, G. Morelli, A. Occhi, M. Occhi, M. Russo, G. Santarato. Application PD2014A000001(IT) submitted on January 3, 2014. Patent granted on March 29, 2016 with code 0001421631 (UIBM).

Honors and Awards

2022 | Recipient of the "EB-1 Outstanding Professor or Researcher".
Petition for Employment-Based Immigration: First Preference EB-1 approved by the USCIS on January 6, 2022

2016 | Invited speaker at the 29^{th} Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP 2016). March 20-24, Denver CO, USA
Section: The best of the Near Surface 2015

2015 | Best paper at "Near Surface Geoscience 2015 - 21st European Meeting of Environmental and Engineering Geophysics". September 6-10. Turin (Italy).

Publications

Books

2015 | Lectures of applied Geophysics (In italian)
G. Santarato, N. Abu Zeid, **S. Bignardi**. Editor: libreriauniversitaria.it ISBN:8862926405

Journal Articles (✉ Corresponding Author)

2021 ✉ | **Transactions on Pattern Analysis and Machine Intelligence (TPAMI).** [Awaiting Decision]
S. Bignardi, R. Sandhu, A. Yezzi. *Radar-Based Shape and Reflectivity Reconstruction Using Active Surfaces and the Level Set Method.*

2021 ✉ | **Inverse Problems.** Vol. 37 (2), Article number 025004
S. Bignardi, A. J. Yezzi, A. Yildirim, C. F. Barnes, R. Sandhu. *A Feasibility Study of Radar-Based Shape and Reflectivity Reconstruction Using Variational Methods.* DOI:10.1088/1361-6420/abd299
Scopus:2-s2.0-85100589342 WOS:000610055200001

2021 | **Journal of Applied Geophysics.** Vol. 185, Article number 104246
S. Maghami, A. Sohrabi-Bidar, **S. Bignardi**, A. Zarean, M. Kamalian. *Extracting the Shear Wave Velocity Structure of Deep Alluviums of "Qom" Basin (Iran) Employing HVSR Inversion of Microtremor Recordings.* DOI:10.1016/j.jappgeo.2020.104246
Scopus:2-s2.0-85099862850

2020 | **Structural Health Monitoring**. Vol. 19 (3), pp 838-853
M.R. Gallipoli, T.A. Stabile, G. Massolino, M. Mucciarelli, N. Abu Zeid, L. Chiauzzi, **S. Bignardi**, A. Rebez. *Structural health monitoring of the Ferrara University building by ambient vibration tests and earthquake recordings before the 2012 Emilia (Italy) earthquake, after the damage and after the damage repair intervention.* DOI:10.1177/1475921719866439
Scopus:2-s2.0-85071145894

2020 | **Computers in Biology and Medicine.** Vol. 120, May 2020, 103701
A. Comelli, **S. Bignardi**, A. Stefano, G. Russo, M. G. Sabini, M. Ippolito, A. Yezzi. *Development of a new fully three-dimensional methodology for tumours delineation in functional images.* DOI:10.1016/j.compbiomed.2020.103701
Scopus:2-s2.0-85081755872

2020 **Diagnostics (MDPI)** 2020, 10 (5)
A. Stefano, M. Gioè, G. Russo, S. Palmucci, S. E. Torrisi, **S. Bignardi**, A. Basile, A. Comelli, V. Benfante, G. Sambataro, D. Falsaperla, A.G. Torcitto, M. Attanasio, A. Yezzi, C. Vancheri. *Performance of Radiomics Features in the Quantification of Idiopathic Pulmonary Fibrosis from HRCT.* DOI: 10.3390/diagnostics10050306
Scopus:2-s2.0-85084826257

2019 **Bollettino di Geofisica Teorica ed Applicata.** Vol. 60, pp s61-s67
N. Abu Zeid, **S. Bignardi**, G. Santarato. *Expeditious seismic methods for noninvasive diagnostics of the dynamic characteristics of the subsoil in urban centers using Rayleigh waves: The case of the city of Ferrara.* Scopus:2-s2.0-85089273431

2019 **Journal of Archaeological Science: Reports.** Vol. 27, Oct. 2019, 101976
N. Abu Zeid, **S. Bignardi**, P. Russo, M. Peresani. *Deep in a Paleolithic archive: Integrated geophysical investigations and laser-scanner reconstruction at Fumane Cave, Italy.* DOI:10.1016/j.jasrep.2019.101976
Scopus:2-s2.0-85070828474 WOS:000498920800041

2019 ✉ **Pure and Applied Geophysics**, Vol. 176 (6), pp 2321–2347.
A. Mantovani, N. Abu Zeid, **S. Bignardi**, G. Tarabusi, G. Santarato, R. Caputo. *Seismic noise-based strategies for emphasizing the recent tectonic activity of blind thrusts: the case of the Ferrara Arc, Northern Italy.* DOI:10.1007/s00024-019-02120-8
Scopus:2-s2.0-85067605649 WOS:000472228900006

2019 **Artificial Intelligence in Medicine**, Vol. 94, pp. 67-78.
A. Comelli, A. Stefano, **S. Bignardi**, G. Russo, M. G. Sabini, M. Ippolito, S. Barone, A. Yezzi. *Active Contour Algorithm with Discriminant Analysis for Delineating Tumors in Positron Emission Tomography.* DOI:10.1016/j.artmed.2019.01.002.
Scopus:2-s2.0-85060845265 WOS:000462694600006

2019 **Engineering Applications of Artificial Intelligence**, Vol. 81, pp. 133-144.
A. Comelli, A. Stefano, G. Russo, **S. Bignardi**, M. G. Sabini, G. Petrucci, M. Ippolito, A. Yezzi. *K-Nearest Neighbor driving Active Contours to Delineate Biological Tumor Volumes.* DOI:10.1016/j.engappai.2019.02.005.
Scopus:2-s2.0-85062149434 WOS:000468721700011

2018 **Computers in Biology and Medicine**, Vol. 102, pp. 1-15.
A. Comelli, A. Stefano, G. Russo, M. G. Sabini, M. Ippolito, **S. Bignardi**, G. Petrucci, A. Yezzi. *A Smart and Operator Independent System to delineate the Biological Tumor Volume.* DOI:10.1016/j.compbiomed.2018.09.002.
Scopus:2-s2.0-85053215870 WOS:000449892200001

2018 ✉ **Computers & Geosciences**, Vol. 120, pp. 10-20.
S. Bignardi, A. Yezzi, S. Fiussello, A. Comelli. *OpenHVSR - Processing Toolkit: Enhanced HVSR processing of distributed microtremor measurements and spatial variation of their informative content.* DOI:10.1016/j.cageo.2018.07.006.
Scopus:2-s2.0-85050984805 WOS:000447577900002

2017 ✉ **Journal of Applied Geophysics**, Vol. 145C, pp. 28-38.
S. Bignardi. *The uncertainty of estimating the thickness of soft sediments with the HVSR method: A computational point of view on weak lateral variations.* DOI:10.1016/j.jappgeo.2017.07.017
Scopus:2-s2.0-85026922763 WOS:000412251800004

2017 **Archaeological Prospection**
N. Abu Zeid, E. Corradini, **S. Bignardi**, V. Nizzo, G. Santarato. *The passive seismic technique "HVSR" as a reconnaissance tool for mapping paleo-soils: the case of the Pilastri archaeological site, Northern Italy.* DOI:10.1002/arp.1568.
Scopus:2-s2.0-85011955327 WOS:000409863300005

2016 **Forma Urbis**. (Italian Journal)
V. Nizzo, N. Abu Zeid, S. Bergamini, **S. Bignardi**, M. Boschetti, E. Corradini, L. Dal Fiume, R. Guerzoni, C. Milanesi, G. Santarato, S. Tassi. *Archeologia e Società.*

2016 **Journal of Applied Geophysics**, Vol. 133, pp. 16-24.
V. Y. Hallbauer-Zadorozhnaya, G. Santarato, N. Abu Zeid, **S. Bignardi**. *A non-linear induced polarization effect on transient electromagnetic soundings.* DOI:10.1016/j.jappgeo.2016.07.014.
Scopus:2-s2.0-84979955535 WOS:000383937300003

2016 ✉ **Computers & Geosciences**, Vol. 93, pp. 103-113.
S. Bignardi, N. Abu Zeid, A. Mantovani. *OpenHVSR: Imaging the subsurface 2D/3D elastic properties through multiple HVSR modeling and inversion.* DOI:10.1016/j.cageo.2016.05.009.
Scopus:2-s2.0-84969664329 WOS:000379561600012

2014 **Annals of the University of Ferrara**, Section: Earth Sciences, Vol. 2(1), pp. 1-11.
N. Abu Zeid, A. Afattato, L. Baradello, **S. Bignardi**, D. Nieto Yabar, G. Santarato. *High resolution shallow geophysical methods for the investigation of the liquefaction phenomena: case study of the ML 5.9 May 20th, 2012 Emilia earthquake (Italy).*

2013 ✉ **Journal of engineering mechanics**, Vol. 139 (9), pp. 1158-1165.
S. Bignardi, F. Fedele, G. Santarato, A. J. Yezzi, G. J. Rix. *Surface waves in laterally heterogeneous media.* DOI:10.1061/(ASCE)EM.1943-7889.0000566.
Scopus:2-s2.0-84883208685 WOS:000325214400002

2012 **Annals of Geophysics**, Vol. 55, pp. 713-716.
N. Abu Zeid, **S. Bignardi**, R. Caputo, G. Santarato, M. Stefani. *Electrical Resistivity Tomography investigation on co-seismic liquefaction and fracturing at San Carlo, Ferrara Province, Italy.* DOI:10.4401/ag-6149.
Scopus:2-s2.0-84868106454 WOS:000311455400027

2012 ✉ **Bulletin of the Seismological Society of America**, Vol. 102, pp. 802-811.
S. Bignardi, F. Fedele, A. Yezzi, G. Rix, G. Santarato. *Geometric Seismic-Wave Inversion by the Boundary Element Method.* DOI:10.1785/0120110091.
Scopus:2-s2.0-84859129749 WOS:000302071800026

2010 **Geophysical Research Abstracts**, Vol. 12, pp. 13138-13138.
M. Stefani, **S. Bignardi**, R. Caputo, L. Minarelli, N. Abu Zeid, G. Santarato. *Late Quaternary activity along the Ferrara thrust inferred from stratigraphic architecture and geophysical surveys.*

Conferences (Ⓢ Speaker Ⓘ International)

2022 ⓈⒾ **ICIAP 2021**. [Accepted] Workshop AIRCAD 2022, in conjunction with the 21^{st} International Conference on Image Analysis and Processing. May 2022, Lecce, IT.
S. Bignardi, A.Y. Yezzi, N. Dahiya, A. Comelli, A. Stefano., M. Piccinelli, E. Garcia. *Combining Convolutional Neural Networks and Anatomical Shape-Based priors for Cardiac Segmentation.*

2020 Ⓘ **ICPR 2020**. 25^{th} International Conference on Pattern Recognition. January 10-15, Milan, IT.
N. Dahiya, Y. Fan, **S. Bignardi**, R. Sandhu, A. Yezzi. *Dependently Coupled Principal Component Analysis for Bivariate Inversion Problems.*

2020 Ⓘ **ICPR 2020**. 25^{th} International Conference on Pattern Recognition. January 10-15, Milan, IT.
Y. Fan, N. Dahiya, **S. Bignardi**, R. Sandhu, A. Yezzi. *Directionally Paired Principal Component Analysis for Bivariate Estimation Problems.*

2019 Ⓢ Ⓘ **SAGEEP 2019**. 32^{nd} Symposium on the Application of Geophysics to Engineering and Environmental Problems. March 17-21, Portland, Oregon, USA.
S. Bignardi, A. Mantovani, N. Abu Zeid, R. Caputo, G., A. Yezzi. *Emphasizing the recent tectonic activity of blind thrusts using natural seismic noise: the case of the Ferrara Arc.* DOI:10.4133/sageep.32-039
Scopus:2-s2.0-85070832982

2019 Ⓢ Ⓘ **SAGEEP 2019**. 32^{nd} Symposium on the Application of Geophysics to Engineering and Environmental Problems. March 17-21, Portland, Oregon, USA.
S. Bignardi, A. Mantovani, D. Rapti, S. Valkaniotis, R. Caputo, A. Yezzi. *Mapping and investigating directional effects through analysis of microtremors: the case of palaeo-Piniada valley, central Greece.* DOI:10.4133/sageep.32-040
Scopus:2-s2.0-85070806796

2019 Ⓘ **MIUA**. 23^{rd} Conf. on Medical Image Understanding and Analysis. July 24-26, Liverpool, UK.
In: Communications in Computer and Information Science, Vol. 1065 CCIS, 2020, pp 3-14
A. Comelli, A. Stefano, **S. Bignardi**, C. Coronnello, G. Russo, M. G. Sabini, M. Ippolito, A. Yezzi. *Tissue Classification to Support Local Active Delineation of Brain Tumors* DOI:10.1007/978-3-030-39343-4_1
Scopus:2-s2.0-85079100937

2019 Ⓘ **EANM**. 32^{nd} Annual Congress of the European Association of Nuclear Medicine (EANM). October 12-16, Barcelona, SPAIN.
In: European Journal Of Nuclear Medicine And Molecular Iimaging, Vol. 46 (1), pp S764-S764
P. Alongi, A. Stefano, A. Comelli, **S. Bignardi**, M. Sabini, A. Yezzi, M. Ippolito, G. Russo. *A Machine Learning Segmentation Approach For The Extraction Of Radiomic Features In PET Studies* WOS:000492444407055

2018 Ⓢ Ⓘ **AGU Fall meeting**. December 10-14, Washington D.C., USA. Section: A tour of open-source software packages for the geosciences.
S. Bignardi, A. J. Yezzi. *OpenHVSR: Processing Toolkit and Inversion; Two Computer Programs engineered for the complete workflow of the Horizontal-to-Vertical Spectral Ratio (HVSR) Method and for the Investigation of Lateral Variation of the Informative Content of Data.*

2018 Ⓘ **16ECEE**. 16^{th} European Conference on Earthquake Engineering. June 18-21, Thessaloniki, Greece.
M. R. Gallipoli, T. A. Stabile, G. Massolino, N. Abu Zeid, L. Chiauzzi, **S. Bignardi**, A. Rebez, M. Mucciarelli. *Ambient Vibration Tests on a Building Before and After the 2012 Emilia (Italy) Earthquake, and After Seismic Retrofitting.*

2018 Ⓢ Ⓘ **SAGEEP 2018**. 31^{st} Symposium on the Application of Geophysics to Engineering and Environmental Problems. March 25-29, Nashville, Tennessee, USA.
S. Bignardi, A. Yezzi, S. Fiussello. *Free and improved computer codes for HVSR processing and inversions.*
Scopus:2-s2.0-85048396173

2018 Annals online of the University of Ferrara, Museologic Scientific and Naturalistic section. Vol. 13, pp. 50-52
N. Abu Zeid, M. Obradović, **S. Bignardi**, M. Bolognesi, A. Furini, P. Russo, G. Santarato, M. Peresani. *Deep into a Paleolithic archive. Results from an integrated 3D geophysical and topographic survey at Fumane Cave. (Italy). DOI:10.15160/1824-2707/1508*

2017 Ⓢ Ⓘ **SEG**. International Exposition and 87^{th} Annual Meeting. September 24-29, Houston, Texas, USA.
S. Bignardi, N. Abu Zeid, E. Corradini, G. Santarato. *The HVSR technique from array data, speeding up mapping of paleo-surfaces and buried remains. The case of the Bronze-Age site of Pilastri (Italy).* Technical Program Expanded Abstracts 2017: pp. 5119-5124. DOI: 10.1190/segam2017-17746745.1
Scopus:2-s2.0-85037156825

2017 Ⓢ Ⓘ **SEG**. International Exposition and 87^{th} Annual Meeting. September 24-29, Houston, Texas, USA.
N. Abu Zeid, **S. Bignardi**, G. Santarato, M. Peresani. *Exploring the paleolithic cave of Fumane (Italy): Geophysical methods as planning tool for archaeology.* Technical Program Expanded Abstracts 2017: pp. 5125-5129. DOI: 10.1190/segam2017-17729320.1
Scopus:2-s2.0-85039973322

2017 Ⓘ **EGU**. 19^{th} General Assembly, 23-28 April, Vienna, Austria.
N. Abu Zeid, L. Dall'Olio, **S. Bignardi**, G. Santarato. *Past, present and future improvements of the efficiency of the local seismic network of the geothermal reservoir of Casaglia, Ferrara (North Italy).* Proceedings, pp.19172

2017 GNGTS. 36^{th} National Conference. National Institute of Oceanography and Experimental Geophysics, November 16-17, Trieste, Italy.
G. Massolino, M. R. Gallipoli, T. A. Stabile, N. Abu Zeid, L. Chiauzzi, **S. Bignardi**, A. Rebez, M. Mucciarelli. *Ambient seismic noise and Earthquake records at a building of the Ferrara University, before and after the 2012 Emilia seismic sequence. (In Italian)*

2016 Ⓘ **EAGE**. 22^{nd} European Meeting of Environmental and Engineering Geophysics; Near Surface Geoscience 2016, September 4-8, Barcelona, Spain.
N. Abu Zeid, E. Corradini, **S. Bignardi**, N. Morandi, V. Nizzo, G. Santarato. *Unusual Geophysical Techniques in Archaeology-HVSR and Induced Polarization, A Case History.* DOI:10.3997/2214-4609.201602027
Scopus:2-s2.0-85007385376

2016 Ⓢ Ⓘ **SAGEEP 2016 (Invited)**. 29^{st} Symposium on the Application of Geophysics to Engineering and Environmental Problems, March 20-24, Denver, Colorado, USA.
S. Bignardi. *Near foundation soil stiffening evaluation after resins injection by a novel 3d interpretation of surface waves data.*

2015 GNGTS. 34^{th} National Conference. National Institute of Oceanography and Experimental Geophysics, November 17-19, Trieste, Italy.
A. Mantovani, N. Abu Zeid, **S. Bignardi**, G. Santarato. *A geophysical transect across the central sector of the Ferrara arc: passive seismic investigations - part II.* Proceedings, pp. 114-120. DOI:10.13140/RG.2.1.3213.7687

2015 Ⓢ GNGTS. 34^{th} National Conference. National Institute of Oceanography and Experimental Geophysics, November 17-19, Trieste, Italy).
S. Bignardi, N. Abu Zeid, G. Santarato. *Direct interpretation of surface waves for 2-D and 3-D subsurface imaging.* Proceedings, pp. 82-88. ISBN: 978-88-940442-7-0, DOI: 10.13140/RG.2.1.1182.1527

2015 Ⓢ Ⓘ **SEG**. International Exposition and 85th Annual Meeting, 18-23 Novembernovembre 18-23 New Orleans, Louisiana, USA.
S. Bignardi, N. Abu Zeid, G. Santarato. *Direct interpretation of phase lags of MASW data: An example for evaluation of jet grouting for soil stiffening enhancement against soil liquefaction. Technical Program Expanded Abstracts 2015: pp. 2218-2223.* DOI: 10.1190/segam2015-5925998.1.
Scopus:2-s2.0-84978035595

2015 Ⓢ Ⓘ **EAGE**. Near Surface Geoscience 2015 - 21^{st} European Meeting of Environmental and Engineering Geophysics. September 6-10, Turin, Italy.
S. Bignardi, N. Abu Zeid, M. D'Attoli, G. Morelli, M. Occhi, M. Russo, G. Santarato. *Near foundation soil stiffening evaluation after resins injection by a novel 3D interpretation of surface waves data* DOI: 10.3997/2214-4609.201413799.
Scopus:2-s2.0-84958087603

2015 Ⓘ **EAGE**. Near Surface Geoscience 2015 - 21st European Meeting of Environmental and Engineering Geophysics. September 6-10, Turin, Italy.
M. Obradović, N. Abu Zeid, **S. Bignardi**, M. Bolognesi, P. Russo M. Peresani, G. Santarato. *High Resolution Geophysical and Topographical Surveys for the Characterization of Fumane Cave Prehistoric Site, Italy.* DOI: 10.3997/2214-4609.201413676.
Scopus:2-s2.0-84958057231

2015 Ⓘ **EAGE**. Near Surface Geoscience 2015 - 21st European Meeting of Environmental and Engineering Geophysics. September 6-10, Turin, Italy.
V. Zadorozhnaya, N. Abu Zeid, **S. Bignardi**, L. Maré, R. Mantsa e G. Santarato. *Observed Linear and Non-linear IP Effects - A Summary of Joint Italy-South Africa Bilateral Projects 2007-2014.* DOI: 10.3997/2214-4609.201413778.
Scopus:2-s2.0-84958068893

2014 GNGTS. 33th National Conference. National Institute of Oceanography and Experimental Geophysics, November 25-27, Bologna, Italy.
N. Abu Zeid, **S. Bignardi**, R. Caputo, A. Mantovani, G. Tarabusi, G. Santarato. *Shear-wave velocity profiles across the Ferrara arc: a contribution for assessing the recent activity of blind tectonic structures.* ISBN 978-88-940442-2-5.

2014 GNGTS. 33th National Conference. National Institute of Oceanography and Experimental Geophysics. November 25-27, Bologna, Italy.
V. Hallbauer-Zadorozhnaya, G. Santarato, N. Abu Zeid, **S. Bignardi**. *Membrane polarization by constrictivity of pores: its effects on DC and TEM geo-electromagnetic measurements.* Proceedings Vol. 3, pp. 158-165. ISBN: 978-88-940442-3-2.

2014 Ⓢ Ⓘ **EAGE**. 76th Conference & Exhibition, Experience the Energy. June 16-19, Amsterdam, Netherlands.
S. Bignardi, G. Santarato, N. Abu Zeid. *Thickness Variations in Layered Subsurface Models - Effects on Simulated MASW.* DOI:10.3997/2214-4609.20140540
Scopus:2-s2.0-84907371221

2014 Ⓘ 3rd International Workshop on Induced Polarization. April 6-9, Ile d'Oléron, France.
V. Zadorozhnaya, N. Abu Zeid, G. Santarato, **S. Bignardi**. *New shape of TEM: membrane polarization, mechanism and possible interpretation.*

2013 GNGTS. 32th National Conference. National Institute of Oceanography and Experimental Geophysics. November 19-21, Trieste, Italy.
N. Abu Zeid, F. Albertin, **S. Bignardi**, G. Santarato. *Preliminary HVSR analysis in the historical center of Ferrara, North Italy.* Proceedings Vol. 2, pp. 167-172. ISBN/ISSN: 9788890210174.

2013 Conference at the "Polo Scientifico-Tecnologico", July 14, University of Ferrara, Italy.
N. Abu-Zeid, F. Albertin, **S. Bignardi**, L. dall'Olio, G. Santarato. *Subsurface geophysical reconstruction of the Casaglia urban area.*

2013 Conference at the "Polo Scientifico-Tecnologico", July 14, University of Ferrara, Italy.
N. Abu-Zeid, F. Albertin, **S. Bignardi**, G. Santarato, A. Zecchi. *Subsurface geophysical reconstruction of the northern Ferrara.*

2012 Ⓘ 7th AGE. Applied Geophysics for Environment and Territorial System Engineering. October 10-12, Iglesias, Cagliari, Italy.
N. Abu Zeid, **S. Bignardi**, G. Santarato, R. Caputo. *Geophysical characterization of co-seismic fractures due to liquefaction: case study following the ml 5.9 magnitude earthquake that hit the Emilia on May 20, 2012.* Proceedings Vol. 1, pp. 1-6.

2012 Ⓢ Ⓘ 7th AGE. Applied Geophysics for Environment and Territorial System Engineering. October 10-12, Iglesias, Cagliari, Italy.
S. Bignardi, N. Abu Zeid, G. Santarato, R. Caputo. *Lateral heterogeneity effects on Rayleigh wave dispersion: Investigation on numerically simulated MASW frameworks.*

2012 Ⓢ
AIAR. 7^{th} Congress of the Italian Association of Archaeometry. February 22-24, Bologna, Italy.
S. Bignardi, N. Abu Zeid, G. Santarato. *Non-destructive investigations for characterization of historical walls: the case of the left wall of the 1500a. Cloister of the Certosa of Bologna.* Proceedings pp. 702-713. ISBN: 9788855531665.

2012 Ⓢ
GNGTS, 31^{th} National Conference. National Institute of Oceanography and Experimental Geophysics. November 20-22, Potenza, Italy.
S. Bignardi, N. Abu Zeid, G. Santarato. *Lateral heterogeneity effects on Rayleigh wave dispersion: Investigation on numerically simulated MASW frameworks.* Section 3: Applied Geophysics, pp. 11-17, ISBN/ISSN 9788890210136.

2012 ⓈⒾⓃ
Geo-Congress. American Society of Civil Engineers. March 25-29, Oakland, California, USA.
Bignardi, F. Fedele, A. J. Yezzi, G. J. Rix, G. Santarato. *Two-dimensional Seismic Wave Modeling and Inversion by the Boundary Element Method.* Proceedings, Vol. 225, pp. 2796-2805. ISBN/ISSN:9780784412121.
Scopus:2-s2.0-84888318268

2011 Ⓢ
GNGTS. 30^{th} National Conference National Institute of Oceanography and Experimental Geophysics, November 14-17. Trieste, Italy.
S. Bignardi, F. Fedele, G. Santarato. *Two-Dimensional seismic wave modeling and inversion using the boundary element method.* Proceedings, pp. 466-469.

2011 ⓘⓃ
6^{th} AGE. Applied Geophysics for Environment and Territorial System Engineering. 28-30 April, Iglesias, Cagliari, Italy.
N. Abu Zeid, **S. Bignardi**, G. Santarato, R. Caputo. *On Possible ambiguity of Vs30 estimation by means of spectral analysis of Love and Rayleigh waves.*

2010 ⓘⓃ
EGU General assembly. May 2-7, Vienna, Austria.
S. Bignardi, R. Caputo, L. Minarelli, N. Abu-Zeid, G. Santarato. *Late Quaternary activity along the Ferrara thrust inferred from stratigraphic architecture and geophysical surveys.* Geophysical Research Abstracts. Vol. 12, pp. 13138-13138. ISSN 1607-7962.

2009
Epitome. Italian Federation of Earth Sciences. September 9-11, Rimini, Italy.
M. Stefani, **S. Bignardi**, R. Caputo, L. Minarelli, N. Abu Zeid, G. Santarato. *Late Quaternary activity in the Ferrara area inferred from stratigraphic architecture.* Proceedings, Vol. 3, pp. 176-176.

2009
Seismological projects, annual meeting, DPC-INGV, October 19-21, Roma (Italy).
R. Caputo, M. Stefani, **S. Bignardi**, L. Minarelli, N. Abu Zeid, G. Santarato. *Late Quaternary tectonic activity in the Ferrara area inferred from stratigraphic architecture.* Abstracts Vol. 1, pp. 64.

Seminars

2019
January 25: **(Invited speaker) Georgia Institute of Technology**, School of Earth and Atmospheric Sciences. Atlanta, Georgia, USA. Geophysics and Planetary seminars.
Title: An overview of geophysical methods for the near surface characterization, with special focus on active and passive surface waves in presence of lateral heterogeneity.

2018
December 5: **(Invited speaker) Western University**, Department of Earth Sciences, London, CANADA.
Title: Integrated geophysical methods as low cost and efficient investigation tool at different scales.

2018
November 29: **(Invited speaker) Ottawa-Carleton Geoscience Center (OCGC) in conjunction with the Geological Survey of Canada's Logan Club (NRCAN)**, Ottawa, CANADA. Geoscience Seminar Series.
Title: Integrated geophysical methods as low cost and efficient investigation tool at different scales (Part 1). The Horizontal to Vertical Spectral Ratio technique (HVSR): status of the art, limitations, exploring its true potential (Part 2).

2017 | September 29: **(Invited speaker) Georgia institute of Technology, Atlanta, USA**. CSIP/CeGP Seminar series.
Title: Non-invasive investigation techniques: The contribution of geophysics to engineering.

2009 | September 9: **(Invited speaker) Georgia institute of Technology**, Atlanta, Georgia, USA. Geotechnical Seminars series.
Title: Surface Wave Dispersion in Laterally Heterogeneous Media.

Faculty Services

2020 | **Invited doctoral committee member.** University of Kiel (Christian-Albrechts-Universität zu Kiel), Kiel, Germany. October 5, 2020

2012-15 | **Representative of research fellows in the department council.** University of Ferrara, Department of Physics and Earth Science.

Teaching

Classes

2021 | **Instructor: (Master Degree) Georgia Institute of Technology, Atlanta, Georgia (USA).** Course ECE6560: "Advanced Computer Vision & Image Processing using PDEs and Active Contours", Spring 2021, January - May 2021.

2017 | **Professional upgrading course:** Beyond the Vs30 for seismic microzonation -the combined use of active and passive seismic. Organized by IND.A.G.O. snc. (Italy)

2016-17 | **Instructor: (Master Degree):** Support to the class activity for the course of Applied Geophysics. Theory and field application of geophysical methods. University of Ferrara (Italy).

2015-16 | **Instructor: (Master Degree):** Support to the class activity for the course of Applied Geophysics. Theory and field application of geophysical methods. University of Ferrara (Italy).

2013-14 | **Instructor: (Master Degree):** Support to the class activity for the course of Applied Geophysics. Theory and field application of geophysical methods. University of Ferrara (Italy).

2012-13 | **Instructor: (Master Degree):** Support to the class activity for the course of Applied Geophysics. Theory and field application of geophysical methods. University of Ferrara (Italy).

2007 | Teacher of Math, High School level. "Istituto di Istruzione Superiore C.Colombo", Via S. Francesco 33, 45011 Adria (RO), Italy.

Students Mentoring

2017 Thesis co-advisor for M.S. degree (official)
Master Degree program in Geological Sciences, Georesources and Territory. University of Ferrara (Italy).
Title: Contributing to the seismic subsurface characterization in the urban area of Ferrara (Italy) (In italian).

2016 Thesis co-advisor for M.S. degree (official)
Master Degree program in Geological Sciences, University of Ferrara (Italy).
Title: The contribution of innovating geophysical methodologies for the reconstruction of the geological subsurface model for seismic induced liquefaction risk assessment: the case of the Crevalcore town hall (Bologna, Italy) (In italian).

2015 M.S. Thesis supervision and scientific counseling
Master Degree program in Geology, University of Ferrara (Italy), in collaboration with ENI.
Title: The Ferrara-Casaglia Ridge: seismo-stratigraphic interpretation and reconstruction of the 3D subsurface model in the structural framework of the north-eastern Ferrara arc (In italian).

2015 Scientific counseling
Doctoral program in sciences and technologies for archaeology and cultural heritage. University of Ferrara (Italy).
Title: Interdisciplinary three-dimensional investigation of the Early Prehistoric deposits of Fumane Cave (Verona, Italy)

2015 M.S. Thesis supervision and scientific counseling
Master Degree program in quaternary, prehistory and archaeology. University of Ferrara (Italy).
Title: New, direct and indirect insight on the ”terramare” archaeological site of Pilastri (Bondeno, Ferrara, Italy) (In italian).

2011 M.S. Thesis supervision and scientific counseling
Bachelor Degree program in technologies for cultural heritage, University of Ferrara (Italy).
Title: Electric resistivity tomography on the left wall of the 1500 c.a. Cloister of the historical cemetery of Bologna (In italian).

2011 M.S. Thesis supervision and scientific counseling
Bachelor Degree program in technologies for cultural heritage, University of Ferrara (Italy).
Title: Acoustic and GPR investigations on the left wall of the 1500 c.a. Cloister of the historical cemetery of Bologna (In italian).

Participation in Research Projects

2018-2019 (USA) Army Research Office (ARO). Project W911NF-18-1-0281: Extending Accelerated Optimization into the PDE Framework.
Included as “Senior Personnel”

2017-2019 (USA) National Science Foundation (NSF). Project NSF-2106 DHO: Geometric, Variational Algorithms for Radiometric-Based Shape Reconstruction.

2015-2017 (ITALY) Italian Government (MIUR) sponsored Project for Smart Cities and Communities: CLARA - CLoud plAtform and smart underground imaging for natural Risk Assessment. url: http://www.smartcities-clara.eu/

2014-2017 (ITALY – SOUTH AFRICA) Joint International Project, Italia-South Africa: Estimating key hydrological properties through acquisition and modeling of electrical parameters. Project number M01488, Ministry of Foreign Affairs of Italy.

2014-2015 (ITALY) INGV-DPC, Project S1: Base-knowledge improvement for assessing the seismogenic potential of Italy. url: https://sites.google.com/site/ingvdpcprojects1

2012-2013 (ITALY) INGV-DPC, Project S1: Base-knowledge improvement for assessing the seismogenic potential of Italy. (Deliverable: D15.b2)
url: https://sites.google.com/site/ingvdpcprojects1

2012-2013 International project: Integrated study for the historic village of Apice Vecchia. Part of Unit 2: Preliminary geological analyses

Editorial Activity

Conference organization

(IN International relevance)

2021 Committee member of the 1st International Workshop on Artificial Intelligence and Radiomics in Computer-Aided Diagnosis (AIRCAD 2022), held in conjunction with the with the 21st International Conference on Image Analysis and Processing (ICIAP 2021) May 2022, Lecce, Italy.

2019 Fall Meeting Program Committee member for the conference "American Geophysical Union (AGU) Fall Meeting 2019 e AGU's Centennial", December 9-13, 2019. San Francisco, California (USA).

Reviewer Activity

IEEE - Transactions on Geoscience and Remote Sensing

AGU/WILEY - Journal of Geophysical Research - Solid Earth

SSA - Seismological Research Letters

ELSEVIER - Journal of Applied Geophysics

ELSEVIER - Engineering Geology

SPRINGER - Bulletin of Earthquake Engineering

WILEY - Near Surface Geophysics

SPRINGER - Surveys in Geophysics

MDPI - Geosciences

IOP - Journal of Geophysics and Engineering

IOP - Measurement Science and Technology

UNAL - Earth Sciences Research Journal

SAGE - The Holocene

ELSEVIER - Journal of Archaeological Science: Reports

ELSEVIER - EBioMedicine

Memberships

AGU - American Geophysical Union. url: https://www.agu.org/

SEG - Society of Exploration Geophysicists. url: https://seg.org/

EEGS - Environmental and Engineering Geophysical Society. (2018-20)
url: https://www.eegs.org/

CRUST-Interuniversity Center for 3D Seismotectonics with territorial applications (Italy). Qualification: Applied Geophysicist. url: https://www.crust.unich.it

Laboratory of Computational Computer Vision: Postdoc member. Dept. of Electrical and Computer Engineering (ECE), Georgia Institute of Technology, USA.

Date: November 27, 2021