Pierpaolo Marchesini, Ph.D. | Geophysicist

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PROFESSIONAL PROFILE AND CORE SKILLS

I am a Geophysicist with applied R&D experience and a multi-disciplinary background that covers geophysics, geology, and engineering with emphasis on subsurface investigation, monitoring, surveillance, and time-lapse techniques for site characterization and assessment of subsurface integrity.

My depth of skills covers: 2D/3D/4D surface and cross-well seismic processing, QC/QI, interpretation, subsurface imaging; G&G large/complex dataset integration; geophysical algorithm coding; quantitative analysis through inversion and attributes calculation; survey design, acquisition and field operations; design and development of geophysical instrumentation and data analysis workflows.

I serve as a team leader with a proven record of: project and team management (current Principal Investigator - scientific and EHS lead), scientific communication through peer-reviewed literature, invited and conference talks, and technical reports.

PROFESSIONAL EXPERIENCE

Lawrence Berkeley National Laboratory (LBNL), Energy Geosciences Division, Berkeley, CA (USA)
Project Scientist, 2019 – present 🔗

- Real-time detection and monitoring of near-surface hazards due to fluid migration using multi-depth, multi-azimuth, cross-well Continuous Active-Source Seismic Monitoring (CASSM);
- Seismic monitoring of reservoir integrity and stimulation through fluid injection for enhanced resource recovery (EOR): continuous monitoring with cross-well CASSM, Surface Orbital Vibrator (SOV) in Vertical Seismic Profile (VSP), cross-well seismic tomography, and fiber optic-based Distributed Acoustic Sensing (DAS);
- US Department of Energy's Core Carbon Storage and Monitoring Research Program to advance emergent monitoring technologies for commercial carbon storage: cross-well seismic and EM tomography, surface-to-borehole EM, SOV in vertical seismic profile (VSP), fiber optic-based Distributed Acoustic, Strain, and Temperature Sensing (DAS, DSS, and DTS).

Postdoctoral Research Fellow, 2015 – 2019

- Cross-well and surface seismic and EM for reservoir monitoring of EOR, subsurface integrity assessment, induced fracturing, and geological storage of supercritical carbon dioxide;
- Fiber optic-based DAS, DSS, and DTS for EOR and reservoir integrity monitoring;
- Design and field-scale application of novel piezo-electric borehole seismic systems;
- Design and field-scale application of integrated wireline seismic-EM systems for subsurface imaging;
- Reservoir properties and critical subsurface parameter quantification.

Capital Resources, Inc., Nova Scotia (Canada)
Chief Geophysicist, 2019 – present

Currently serving as Technical Advisor and Head of Seismic & Radar Imaging: development of novel instrumentation and data processing workflows for reservoir active seismic and EM monitoring.

Center for Carbonate Research (CSL), University of Miami/RSMAS, Miami, FL (USA)
Graduate Assistant, 2008 – 2015

- High-resolution 3D subsurface imaging for fractured carbonate reservoir analog characterization; active monitoring during reservoir-scale fluid injections using 4D Ground Penetrating Radar (GPR);
- Geophysical field data acquisition, processing, QC/QI, and interpretation; G&G dataset processing, integration, and interpretation for marine geophysical surveys (multi-beam, sub-bottom profiling, seismic, coring, currents, positioning); processing and interpretation of 2D/3D marine and land seismic datasets; algorithm development for seismic processing and 4D survey cross-equalization;
- CSL's Seismic Processing Laboratory manager; visualization, processing (filtering, de-noising, migration), quantitative analysis, data management of large and complex seismic datasets;
- G&G Project Lead reporting to CSL Consortium, sponsored and annually reviewed by major Energy international industry partners (Sponsors list 🔗).

Applied Geophysics Group, Politecnico di Milano, Milan (Italy)
Research Associate, 2006 – 2008

- Development of hardware components and acquisition software for multi-frequency and multi-component 3D GPR systems for high-resolution near-surface characterization;
- Geophysical algorithm coding, testing, and integration into data analysis workflows.

Witten Technologies, Inc., Somerville, MA (USA)
R&D Intern, 2007 – 2008

- Computer Assisted Radar Tomography (CART) and Induction EM for high-resolution imaging;
- Development of positioning systems for rapid field-scale 3D GPR and EM subsurface evaluation.

EDUCATION

University of Miami
Rosenstiel School of Marine and Atmospheric Science (RSMAS), Coral Gables, FL (USA)
Ph.D., Marine Geology and Geophysics, 2015

Politecnico di Milano
Department of Electrical, Electronic, and Information Engineering, Milan (Italy)
M.S., Electrical and Telecommunication Engineering, 2005

AWARDS AND HONORS

G. Sclocchi Dissertation Award, SPE/EAGE, 2015 🔗
Awarded by SPE (Society of Petroleum Engineers) and EAGE (European Association of Geoscientists and Engineers) for great results with dissertations and doctoral degrees in petroleum engineering, geoscience, and other disciplines related to the Energy industry.

Society of Exploration Geophysicists Travel Award, SEG, 2012
Awarded by SEG (Society of Exploration Geophysicists) to acknowledge relevant scientific results in doctoral studies and support student traveling to the annual SEG/AAPG Student Expo.

Young Researcher Session Award, IEEE, 2010
Awarded by IEEE (Institute of Electrical and Electronics Engineers) at the 13th International Conference on Ground Penetrating Radar.

PROJECT MANAGEMENT AND TEAM LEAD RECORD (SELECTED, MOST RECENT)

Development of best practice, technical tools, and operational templates for real-time detection and monitoring of near-surface hazards due to rapid migration of fluids through complex pathways in saturated and unsaturated sandstone formations (PI, Project Lead; crew of twelve - Geophysicists, Geologists, Reservoir Engineers, Geophysical Technicians). **2019-ongoing**, Chevron USA, San Joaquin Valley Business Unit, McKittrick, CA (USA).

Semi-permanent CASSM system installation for detection of precursory geophysical signals of earthquakes by active monitoring stress changes within an active fault system (co-PI, Field Lead; crew of four - Geophysicists, Geophysical Technicians). **2017-ongoing**, San Andreas Fault Observatory at Depth (SAFOD), United States Geological Survey (USGS) Field Site, Parkfield, CA (USA).

Continuous Active-Source Seismic Monitoring (CASSM), Surface Orbital Vibrator (SOV) in vertical seismic profile (VSP), and cross-well seismic tomography in combination with fiber optic-based DAS for monitoring reservoir stimulation through fluid injection in sandstone and diatomite formations (PI, Project Lead; crew of twelve - Geophysicists, Geologists, Reservoir Engineers, Geophysical Technicians). **2016-ongoing**, Chevron USA, San Joaquin Valley Business Unit, Lost Hills, CA (USA).

US Department of Energy's Core Carbon Storage and Monitoring Research program: cross-well tomography using coupled active-source seismic and EM systems in combination with fiber optic-based DAS, DSS, and DTS for monitoring geological storage of supercritical carbon dioxide (PI, Project Lead; crew of six - Geophysicists, Well Engineer, Geophysical Technicians). **2016-ongoing**, Containment and Monitoring Institute (CaMI), Field Research Station, Brooks, AB (Canada).

Near-surface characterization of induced fracture networks in tight formations for Enhanced Geothermal Systems (EGS) monitoring and optimization (CASSM, electrical resistivity tomography, tracer pumping tests) (Field Lead; crew of four - Geophysicists, Well Engineer, Geophysical Technicians). **2017**, New Mexico Tech's Blue Canyon Dome, Socorro, NM (USA).

Subsurface mapping of sedimentary, back-stepping beach ridge structures using rough-terrain 2D Ground Penetrating Radar (Field Lead; crew of four - Geophysicist, Geologists). **2015**, Nassau, New Providence Island, Bahamas.

FIELD SEMINARS (MOST RECENT)

Field Seminar for academic and industry geologists and geophysicists on "Exploring a Cretaceous Carbonate Delta Drift": geological analysis of the platform margin architecture, stratigraphic presentation of the transition from deep water turbidites to the delta drift (co-Lead). **July 2019**, Majella Mountain (Italy).

SOFTWARE AND CODING SKILLS (SELECTED)

Industry G&G Software:
- *Data Interpretation and Modeling*: Schlumberger Petrel; Landmark GeoProbe; IHS Kingdom Suite.
- *Data Processing*: Schlumberger Vista Seismic; Landmark ProMAX 2D/3D/4D.

Coding & Scripting:
- Matlab; NI LabVIEW; Python; Linux/Unix.

JOURNAL PUBLICATIONS

Marchesini, P., Grasmueck, M., Eberli, G. P., and Weger, R. J., "Visualization and quantification of fluid dynamics in fractured carbonates using 4D Ground Penetrating Radar (4D GPR)", **2020**: *in preparation.*

Um, E., **Marchesini, P.**, Wilt, M., Nichols, E., Alumbaugh, and Jordan, M., "Joint EM and Seismic Monitoring of CO_2 Injection at the Containment and Monitoring Institute Field Site (CaMI): Early Leak Detection and Quantification of Secondary Accumulation", **2020**: *in preparation.*

Marchesini, P., Ajo-Franklin, J. B., and Daley, T. M., "In-situ measurement of velocity-stress sensitivity using cross-well Continuous Active-Source Seismic Monitoring", **2017**: *Geophysics*, 82, D319-D326 🔗.

Marchesini, P. and Grasmueck, M., "The impact of high-density spatial sampling versus antenna orientation on 3D GPR fracture imaging", **2015**: *Near Surface Geophysics*, 13, 197-207 🔗.

CONFERENCE ABSTRACTS AND PROCEEDINGS (SELECTED, MOST RECENT)

Um, E., **Marchesini, P.**, Wilt, M., Nichols, E., Alumbaugh, D., Vasco, D., and Key, K., "Joint Use of Crosswell EM and Seismic for Monitoring CO_2 Storage at the Containment and Monitoring Institute Field Site (CaMI): Baseline Surveys and Preliminary Results", **2020**: *SEG Technical Program Expanded Abstracts.*

Marchesini, P., Guglielmi, Y., "Design of an Active Seismic Monitoring Survey to Capture Fluid Flow Patterns and Stress Variations during a Controlled Fault Activation Experiment by Fluid Injection", **2020**: *Mont Terri Underground Rock Laboratory Technical Workshop.*

Marchesini, P., Alumbaugh, D., Daley, T. M., Wilt, M., Nihei, K., and Um, E., "Geophysical Survey Design for Monitoring CO_2 Injection at the CaMI - Field Research Station", **2019**: *IEAGHG Monitoring & Environmental Research Combined Network Meeting.*

Marchesini, P., Daley, T. M., Wilt, M., Nichols, E., Um, E., Freifeld, B., and Cook, P., "Baseline Datasets for CO_2 Monitoring using Crosswell Seismic and Electromagnetics at CaMI – Field Research Station, Alberta, Canada", **2018**: *Containment and Monitoring Institute (CaMI) Research Integration Workshop.*

Marchesini, P., Ajo-Franklin, J. B., and Daley, T. M., "Measuring the effects of pore pressure changes on seismic amplitude using cross-well Continuous Active-Source Seismic Monitoring (CASSM)", **2017**: *SEG Technical Program Expanded Abstracts*, 5917-5922 🔗.

REFERENCES

Edward A. Nichols – ENichols@lbl.gov
Staff Scientist, Lawrence Berkeley National Laboratory (LBNL)
CEO, Capital Resources, Inc.
Fmr VP, EMI Inc. - Schlumberger, Ltd.

Gregor P. Eberli – GEberli@rsmas.miami.edu
Professor of Marine Geology and Seismic Sequence Stratigraphy, University of Miami
Director, Center for Carbonate Research (CSL)

Luigi Zanzi – Luigi.Zanzi@polimi.it
Professor of Applied and Environmental Geophysics, Politecnico di Milano
Director, Applied Geophysics Group