

# Enrico Caffagni

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## SEISMOLOGIST/MICROSEISMIC DATA ANALYST

- ♦ **Broad experience in microseismic downhole data analysis from Unconventional tight-sand and shale Oil-Gas reservoirs**
- ♦ **Strong background in seismology, Induced Seismicity and programming**
- ♦ **Ability to work in a group and willing to learn, is strongly interested in pursuing a new career as a Post-Doc Position at University of Vienna in Induced Seismicity**
- Highly motivated, hard-working, energetic, goal-oriented, technical and methodical
- Experience in collecting, fully managing and analyzing earthquake and microseismic data
- Broad experience in computer programming, data contouring images and digitized signals processing
- Noted for skills in organization, written and oral communication, critical thinking and troubleshooting
- Loves challenges in life and on fieldwork

## WORKING EXPERIENCE

### Induced Seismicity Project.

- Involved in a national project among several institutions in Canada about Induced Seismicity studies in the Duvernay area (near Fox Creek, AB, where a suspected Main-shock Ml 4.4 occurred on Jan 22, 2015)
- Knowledge of the fundamental mechanisms of Induced Seismicity: pore pressure increase due to injection that reduces the effective normal stress initiating slip on a fault plane, critically stressed faults, stress regimes representation with Mohr circle and Coulomb envelope
- Extensive knowledge in literature of induced seismicity cases by hydraulic fracturing and disposable water injection
- Knowledge of some of the standard mitigating strategies and traffic lights protocols currently working

### Reservoirs Study.

- Involved in several projects for processing microseismic downhole data from some of the main Western Canada plays: Hoadley, Pembina, Cardium
- Fundamental knowledge of the main industrial processes of hydraulic fracturing, flowback and production
- Knowledge of the basic underground geology of North American basins (Montney, Horn River, Duvernay, Cardium, Pembina, Marcellus, etc.)

### Microseismic Data Analysis.

- Analyzed the Microseismicity from hydraulic fracturing in relation to treatment parameters
- Estimated magnitude, location, focal mechanism shear/tensile, time-frequency domain content
- Extensive study on long-period long-duration events and comparison with regional earthquake waveforms

### Microseismic Downhole Data Processing.

- Full management of in-house softwares, from automatic detection to location and magnitude estimation
- Implemented the Matched Filtering Algorithm (MFA) procedure for detecting and locating a higher density of microseismic events, based upon cross-correlation of reference master events with continuous raw data
- Used HNAS, ESG software, for archiving and visualizing datasets

### Seismic Data Management and Processing.

- Collected and measured data on the movement of ground (microseism/earthquake/noise) received by borehole geophones, broad-band, short-period seismometers and strong motion instrumentation.
- Signal processing: Performed quality analysis. Custom Digital Filtering, FFT, Time-frequency representation with the S Transform/Spectrograms, Cross-correlation and Matched Filtering techniques
- Extensive experience in local seismic characterization (site effects): spectral ratios techniques HV, SSR,, investigation of induced Rayleigh waves in small intramountain basins.

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### Chairman and Tutor.

Chairman of sessions in academic/industrial meetings and the CSEG Workshop on Induced Seismicity (held on May 8, 2015 in Calgary, website: <http://cseg.ca/education/category/convention>)

Tutor of some undergraduate and PhD/Master students

### Results Presentation.

Presented results at international meetings using graphic displays and discussion. Written final technical reports, peer review papers and thesis.

### IT AND SOFTWARE SKILLS

**OPERATING SYSTEMS:** Linux Fedora/Debian/Ubuntu and Unix | Windows XP/Vista/7/8/8.1  
**SOFTWARES:** Matlab | GMT (General Mapping Toolbox); ArchView GIS 3.2  
 Extensive use of editors: Open Office and Office; LaTeX;  
 GIMP (images managing) | Internet, Email, Skype  
**SEISMIC AND MICROSEISMIC SOFTWARES:** In-house software developed for downhole data, HNAS (ESG)  
 SAC, PQLX, Seisgram2k | Basic Petrel  
**COMPUTER PROGRAMMING:** Matlab (planning, writing and running scripts) | Fortran/C/C++/  
 Shell scripts (Linux-Unix) | Basic Java

**LANGUAGES:** English, Italian, basic German and French

### WORK HISTORY

**SEISMOLOGIST/MICROSEISMIC DATA ANALYST**  
*Microseismic Industry Consortium (MIC), University of Calgary* From 11/2013  
**RESEARCHER** 01/2009 - 04/2012  
*Doctorate School at the University of Modena and Reggio Emilia, Modena, Italy*

### EDUCATION AND TRAINING

Researcher Post-Doctoral in collaboration with Prof. D.W. Eaton From 11/2013  
 Microseismic Industry Consortium, University of Calgary  
 PhD degree in Earth System Sciences in collaboration with Dr. M. Cattaneo 01/2009 – 04/2012  
 University of Modena and Reggio Emilia, Italy  
 Researcher PhD in collaboration with Prof. S. Parolai 08/2010 – 10/2010  
 GeoForschungsZentrum, Germany  
 Bachelor's Degree in Physics Defense 06/2004  
 University of Modena and Reggio Emilia, Italy

### PROJECTS INVOLVED

Induced Seismicity in collaboration with UWO, UofA, McGill universities, AER, BCO&G From 02/2015  
 VSP Experiment in Brooks, AB, in collaboration with ESG 05/2015  
 Hoadley Flowback Microseismic Experiment (HFME), in collaboration with ConocoPhillips Canada  
 11/2013 – 02/2015

### CERTIFICATIONS OBTAINED

International English Language Testing System (IELTS): General Score: 7.0 11/2014