

# STEFANO PICOTTI: CURRICULUM

## Education

- **Ph.D. in Polar Sciences:** University of Siena (20.12.07), “Applications of the seismic method to Antarctic ice-sheet related problems”.
- **4 years Degree in Physics:** University of Trieste (19.05.00). Experimental thesis in applied geophysics: “Subsurface imaging in thrust-belt oil area (Venezuelan chain) from time and depth data migration”.
- **High school:** Electronics and Telecommunications, (1993).

## Academic and professional courses

- ENI E&P academic course on the investigation of energy and water resources. DISGAM department, University of Trieste (March – June 2007).

## Work Experiences

- Since October 2000 at the “Istituto Nazionale di Oceanografia e di Geofisica Sperimentale” (OGS – [www.ogs.trieste.it](http://www.ogs.trieste.it)), Trieste, Italy: researcher in the field of seismic data processing, tomography, rock physics and wave modelling.
- September – December 2000 at ALCATEL s.p.a. (Trieste – Italy): testing operator of opto-electronic devices for telecommunications.

## Awards

- SCAR Fellowship 2009-11 on the research topic: *Ice properties and basal conditions inferred from seismic data acquired on two fast-flowing ice streams (West Antarctica)*. The final report is posted on [http://www.scar.org/scar\\_media/documents/awards/fellowships/reports/Picotti\\_2009\\_Fellow\\_Rept.pdf](http://www.scar.org/scar_media/documents/awards/fellowships/reports/Picotti_2009_Fellow_Rept.pdf)

## Expeditions

- Participation to the 2010-2011 Antarctic campaign for a geophysical survey on the Whillans Ice Stream (West Antarctica), in the frame of the Wissard USAP project and Wisslake PNRA project (<https://www.researchitaly.it/conoscere/progetti-e-storie-di-successo/interviste-e-testimonianze/>)

## Projects

- **Coordination** at OGS of the following national and international projects:
  1. PNRA-WISSLAKE : Subglacial lake exploration in the Whillans Ice Stream region (West Antarctica).
  2. EU-CO2CARE : CO<sub>2</sub> Site Closure Assessment Research.
  3. CO2-ENEL : Design of an effective seismic monitoring plan at Porto Tolle (Amedea option).
- **Participation** to the following national and international projects:
  1. EU-LIFE-CAMI : Water-Bearing Characterization With Integrated Methodologies.
  2. EU-CASTOR : Capture and geological STORAGE of CO<sub>2</sub>.
  3. EU-CO2GEONET : NETWORK Of Excellence On Geological Storage of CO<sub>2</sub>.
  4. PNRA-WISE : West antarctic ice sheet evolution in the Ross Sea.
  5. EU- Co2ReMoVe : CO<sub>2</sub> Research Monitoring and Verification of CO<sub>2</sub> Geological storage.
  6. ZEPT : Zero Emission at Porto Tolle (Italy).
  7. EU-SITECHAR : Site Characterization for CO<sub>2</sub> Geological storage.
  8. CO2MONITOR : Development of innovative techniques for monitoring CO<sub>2</sub> storage sites.
  9. ECOMAP : Eco sustainable management of marine and tourist ports
  10. DILEMMA : Imaging, Modeling, Monitoring and Design of Earthen Levees.
  11. MALESIA : Methodology of mitigation CO<sub>2</sub> Leakage (overburden study).
  12. ENOS : ENabling Onshore CO<sub>2</sub> Storage in Europe
  13. TYTAN : Totten Glacier dynamics and Southern Ocean circulation impact on depositional processes since the mid-late Cenozoic (Antarctica)

**Skills**

- **Languages:** Italian (mother tongue), English (writing and reading: excellent; speaking: good), Greek (speaking: good).
- **Computer literacy**  
Environments: Basic Unix, Linux and Windows.  
Utilities: Corel, Photoshop, Office, Dreamweaver (for HTML programming), ecc..  
Seismic commercial softwares: Echos and Promax (seismic processing), Geodepth (tomography and imaging), Tesseral (wave field modelling), Seismic Unix (miscellaneous).  
Languages: Fortran and Matlab

**Research Fields**

- Seismic, GPR and geoelectric data acquisition.
- Seismic reflection and refraction data processing, tomography, AVO and imaging for crustal structures exploration and glaciology.
- Development of algorithms for seismic and EM traveltime and attenuation tomography.
- Implementation of rock physics theories for rock properties computation: static and dynamic elastic properties, pore fluids, anisotropy, and attenuation.
- Seismic and EM characterization of hydrocarbon reservoirs and saline aquifers for studies related to CO<sub>2</sub> geological storage monitoring.
- Algorithms for numerical simulations of seismic wave propagation in poroelastic and viscoelastic anisotropic (and fractured) media.

**Publications in National and International Journals**

1. Picotti, S., 2005, *A seismic modelling study for Antarctic subglacial lake exploration*, Bollettino di Geofisica Teorica ed Applicata, **46** (2-3), 217-229.
2. Carcione, J. M., Picotti, S., Gei, D., and Rossi, G., 2006, *Physics and seismic modeling for monitoring CO<sub>2</sub> storage*, Pure and Applied Geophysics, **163**(1), 175-207. DOI: 10.1007/s00024-005-0002-1
3. Carcione, J. M., and Picotti, S., 2006, *P-wave seismic attenuation by slow-wave diffusion: Effects of inhomogeneous rock properties*, Geophysics, **71**(3), O1-O8. DOI: 10.1190/1.2194512
4. Picotti, S., and Carcione, J. M., 2006, *Estimating seismic attenuation (Q) in the presence of random noise*, Journal of Seismic Exploration, **15**(2), 165-181.
5. Rubino, J. G., Santos, J. E., Picotti, S., Carcione, J. M., 2007, *Simulation of upscaling effects due to wave-induced fluid flow in Biot media using the finite-element method*, Journal of Applied Geophysics, **62**(3), 193-203. DOI:10.1016/j.jappgeo.2006.11.003
6. Picotti, S., Carcione, J. M., Rubino, J. G., and Santos, J. E., 2007, *P-wave seismic attenuation by slow-wave diffusion: Numerical experiments in partially saturated rocks*, Geophysics, **72** (4), N11-N21. DOI: 10.1190/1.2740666.
7. Rossi, G., Gei, D., Picotti, S., and Carcione, J. M., 2008, *CO<sub>2</sub> storage at the Aztbach-Schwanenstadt gas field: a seismic monitoring feasibility study*, First Break, **26**, 45-51.
8. Giustiniani, M., Accaino, F., Picotti, S., and Tinivella, U., 2008, *Characterisation of shallow aquifers by high-resolution seismic data*, Geophysical Prospecting, **56**(5), 655-666. DOI: 10.1111/j.1365-2478.2008.00705.x
9. Rossi, G., Picotti, S., Gei, D., e Carcione, J.M., 2009. *Monitorare nel tempo la CO<sub>2</sub> in un sito di stoccaggio geologico: possibilità e limiti*, "Time-lapse CO<sub>2</sub> geological storage monitoring: possibilities and limits", Geoitalia, **27**, 9-13. DOI: 10.1474/Geoitalia-27-06.
10. Böhm, G., Ocañoğlu, N., Picotti, S., De Santis, L., 2009, *Western Ice Sheet evolution: new insights from a seismic tomographic 3D depth model in the Eastern Ross Sea (Antarctica)*, Marine Geology, **266**(1-4), 109-128. DOI:10.1016/j.margeo.2009.07.016
11. Tinivella, U., Giustiniani, M., Accaino, F., and Picotti, S., 2009, *Petro-physical characterisation of shallow aquifers by using AVO and theoretical approaches*, Bollettino di Geofisica Teorica ed Applicata, **50**(1), 71-82.

12. **Picotti, S.**, Giustiniani, M., Accaino, F., and Tinivella, U., 2009, *Depth modelling and imaging of the 4D seismic survey of Basso Livenza*, Bollettino di Geofisica Teorica ed Applicata, **50**(1), 71-82.
13. Giustiniani, M., Accaino, F., Del Negro, E., **Picotti, S.**, and Tinivella, U., 2009, *Characterisation of shallow aquifers by 2D high-resolution seismic data analysis*, Bollettino di Geof. Teorica ed Applicata, **50**(1), 29-38.
14. Giustiniani, M., Accaino, F., **Picotti, S.**, and Tinivella, U., 2009, *3D seismic data for shallow aquifers characterization*, Journal of Applied Geophysics, **68**(3), 394–403. DOI:10.1016/j.jappgeo.2009.03.005
15. **Picotti, S.**, Carcione, J. M., Santos, J. E., and Gei, D., 2010, *Q-anisotropy in finely-layered media*, Geophysical Research Letters, **37**(6), L06302. DOI:10.1029/2009GL042046.
16. **Picotti, S.**, Carcione, J. M., Rubino, J. G., Santos, J. E., and Cavallini, F., 2010, *A viscoelastic representation of wave attenuation in porous media*, Computer & Geosciences **36**(1), 44-53. DOI: 10.1016/j.cageo.2009.07.003
17. Santos, J. E., Carcione, J. M. and **Picotti, S.**, 2011, *Viscoelastic-stiffness tensor of anisotropic media from oscillatory numerical experiments*, Computer Methods in Applied Mechanics and Engineering, **200**(9-12), 896-904. DOI:10.1016/j.cma.2010.11.008.
18. Carcione, J. M., Santos, J. E. and **Picotti, S.**, 2011, *Anisotropic poroelasticity and wave-induced fluid flow. Harmonic finite-element simulations*, Geophysical Journal international, **186**(3), pp. 1245-1254. DOI: 10.1111/j.1365-246X.2011.05101.x
19. Horgan, H. J., Anandakrishnan, S., Jacobel, R. W., Christianson, K., Alley, R. B., Heeszel, D. S., **Picotti, S.** and Jacob I. W., 2012, *Subglacial Lake Whillans - Seismic observations of a shallow active reservoir beneath a West Antarctic ice stream*, Earth and Planetary Science Letters **331-332**, 201-209. DOI:10.1016/j.epsl.2012.02.023
20. **Picotti, S.**, Carcione, J. M., Gei, D., Rossi, G. and Santos, J. E., 2012, *Seismic modeling to monitor CO<sub>2</sub> geological storage - The Atzbach-Schwanenstadt gas field*, JGR Solid Earth **117**(6), B06103, DOI:10.1029/2011JB008540.
21. Carcione, J. M., and **Picotti, S.**, 2012, *Reflection and transmission coefficients of a fracture in transversely isotropic media*, Studia Geophysica et Geodetica, **56**(2), 307-322. DOI: 10.1007/s11200-011-9034-4.
22. **Picotti, S.**, Carcione, J. M., Santos, J. E., 2012, *Oscillatory numerical experiments in finely layered anisotropic viscoelastic media*, Computers & Geosciences **43**, 83-89. DOI:10.1016/j.cageo.2012.02.026
23. Carcione, J. M., **Picotti, S.**, Cavallini, F., and Santos, J. E., 2012, *Numerical test of Schoenberg-Muir theory*, Geophysics, **77**(2), C27-C35. DOI: 10.1190/geo2011-0228.1
24. Carcione, J. M., **Picotti, S.** and Santos, J. E., 2012, *Numerical experiments of fracture-induced velocity and attenuation anisotropy*, Geophysical Journal international, **191**, 1179-1191. DOI: 10.1111/j.1365-246X.2012.05697.x
25. Carcione, J. M., Santos, J. E., and **Picotti, S.**, 2012, *Fracture-induced anisotropic attenuation*, Rock Mechanics and Rock Engineering, **45**(5), 929-942, DOI: 10.1007/s00603-012-0237-y.
26. Santos, J. E., **Picotti, S.** and Carcione, J. M. 2012, *Evaluation of the stiffness tensor of a fractured medium with harmonic experiments*, Computer Methods in Applied Mechanics and Engineering, **247-248**, 130–145. DOI: 10.1016/j.cma.2012.08.004
27. Carcione, J. M., Gei, D., **Picotti, S.** and Michelini, A., 2012, *Cross-hole electromagnetic and seismic modeling for CO<sub>2</sub> detection and monitoring in a saline aquifer*, Journal of Petroleum Science and Engineering, **100**, 162-172. DOI: 10.1016/j.petrol.2012.03.018
28. **Picotti, S.**, Grünhut, V., Osella, A., Gei, D., Carcione, J. M., 2013, *Sensitivity analysis from single-well ERT simulations to image CO<sub>2</sub> migrations along wellbores*, The Leading Edge **32**(5), 504-512. DOI: 10.1190/tle32050504.1.
29. Carcione, J. M., De la Vega, M., Gei, D., Osella, A., **Picotti, S.**, Tassone, A., and Pascollieri, M., 2013, *Seismic characterization of the Quaternary sediments at Llanquanelo-Lake Area, Argentina*, Journal of Seismic Exploration **22**(1), 1-18.
30. Carcione, J. M., Gurevich, B., Santos, J. E. and **Picotti, S.**, 2013, *Angular and frequency dependent wave velocity and attenuation in fractured porous media*, Pure and Applied Geophysics, **170**, 1673-1683, DOI: 10.1007/s00024-012-0636-8.
31. Gauzellino P., Carcione, J. M., Santos, J. E. and **Picotti, S.**, 2014, *A rheological equation for anisotropic-anelastic media and simulation of field seismograms*, Wave Motion **51**(5), 742-757. DOI: 10.1016/j.wavemoti.2014.01.001.

32. Carcione, J. M., Santos, J. E., **Picotti, S.**, Quadrouh, N. A., Almalki, S. H., 2014, *Numerical simulation of two-phase fluid flow*, Journal of Petroleum Exploration and Production Technology **4**(3), 233-243. DOI: 10.1007/s13202-014-0109-y.
33. Böhm, G., Carcione J.M., Gei D., **Picotti S.** and Michelini A., 2015, *Cross-well electromagnetic and seismic tomography for CO<sub>2</sub> detection and monitoring in a saline aquifer*. Journal of Petroleum Science and Engineering, **133**, 245-257. DOI:10.1016/j.petrol.2015.06.010
34. **Picotti S.**, Vuan A., Carcione J. M., Horgan, H. J., Anandakrishnan, S., 2015, *Anisotropy and crystalline fabric of Whillans Ice Stream (West Antarctica) inferred from multicomponent seismic data*, J. Geophys. Res. Solid Earth, **120**, 4237-4262, DOI:10.1002/2014JB011591.
35. Carcione J. M., Zhu T., **Picotti S.**, and D., Gei, 2016, *Imaging septaria geobody in the Boom Clay using Q-compensated reverse-time migration*, Netherland Journal of Geosciences, **95**(3), 283-291, DOI: <http://dx.doi.org/10.1017/njg.2016.2>.
36. Carcione J. M., **Picotti S.**, Francese R., Giorgi M. and Pettenati F., 2017, *Effect of soil and bedrock anelasticity on the S-wave amplification function*, Geophysical Journal International, **208**(1), 424-431, DOI: 10.1093/gji/ggw402.
37. **Picotti S.**, Francese R., Giorgi M., Pettenati F. and, Carcione J. M., 2017, *Estimation of glaciers thicknesses and basal properties using the horizontal-to-vertical component spectral ratio (HVSR) technique from passive seismic data*, Journal of Glaciology, **63**, 229-248, DOI: 10.1017/jog.2016.135.
38. **Picotti S.** and, Carcione J. M., 2017, *Numerical simulation of wave-induced fluid flow seismic attenuation based on the Cole-Cole model*, J. Acoust. Soc. Am., **142**(1), 134-145. DOI: 10.1121/1.4990965.
39. Madrussani G., Rossi G., Rebesco M., **Picotti S.**, Urgeles R., Llopart J., 2017, *Sediment properties in submarine mass-transport deposits using seismic and rock-physics off NW Barents Sea*. Marine Geology, **402**, 264-278. DOI: 10.1016/j.margeo.2017.11.013
40. Carcione J.M., Qadrouh A., Perroud H., Gei D., Ba J., **Picotti S.**, 2018, *Seismic attenuation, NMO stretch and low-frequency shadows underlying BSR events*, Geophys. Prosp., **66**(5), 857-871. DOI: 10.1111/1365-2478.12623.
41. **Picotti S.**, Carcione J. M., Ba J., 2018, *Rock-physics templates based on seismic Q*, Geophysics, **84**(1), MR13-MR23, DOI: 10.1190/geo2018-0017.1.
42. Francese, R. G., Bondesan, A., Giorgi, M., **Picotti, S.**, Carcione, J. M., Baroni, C., Salvatore, M. C., and Nicolis, F., 2019, *Geophysical signature of a World War I Tunnel in the Forni Glacier (Punta Linke, Italian Alps)*, Journal of Glaciology, **65**, 798-812. DOI: 10.1017/jog.2019.59.
43. Alajmi, M. S., Carcione, J. M., Qadrouh, A. N., **Picotti, S.**, and Ba. J., 2019, *Method to simulate wave fields from ambient-noise sources*, Annals of Geophysics, **62**(5), SE563 doi:10.4401/ag-7881.
44. Ba, J., Ma, R., Carcione, J.M., **Picotti, S.**, 2019, *Ultrasonic wave attenuation dependence on saturation in tight oil siltstones*, Journal of Petroleum Science and Engineering, **179**, pp. 1114-1122, DOI: 10.1016/j.petrol.2019.04.099
45. Pang, M., Ba, J., Carcione, J.M., **Picotti, S.**, Zhou, J. and Jiang, R., 2019, *Estimation of porosity and fluid saturation in carbonates from Rock-physics templates based on seismic Q*, Geophysics, **84** (6), pp. 1-51. DOI: 10.1190/geo2019-0031.1
46. Carcione, J. M., Mainardi, F., **Picotti, S.**, Fu, L.-Y., and Ba, J., 2020, *Thermoelasticity and P-wave simulation based on the Cole-Cole model*, J. Thermal Stresses, **43**(4), 512-527, DOI: 10.1080/01495739.2020.1722772.
47. Carcione, J.M., Gei, D., **Picotti, S.**, Misnan, M.S., Rashidi, M.R.A., Bakar, Z.A.A., Harith, Z.Z.T., Bahri, N.H.S., Hashim, N., 2020, *Porosity and permeability of the overburden from wireline logs: a case study from offshore Malaysia*. Geomech. Geophys. Geo-energ. Geo-resour., **6**, 48. DOI:10.1007/s40948-020-00172-y.
48. Rossi, G., Böhm, G., Saraò, A., Cotterle, D., Facchin, L., Giurco, P., Lucchi, R.G., Musco, M.E., Petrera, F., **Picotti, S.**, and Salon, S., 2020, *Focus on glaciers: a geo-photo exposition on the vanishing beauty*. Geoscience Communication, **3**(2), 381-392. DOI: 10.5194/gc-3-381-2020
49. Cheng, W., Carcione, J.M., **Picotti, S.** and Ba, J., 2020, *Effect of pressure and fluid on pore geometry and anelasticity of dolomites*, Rheologica Acta, **59**(10), 707-716. DOI: 10.1007/s00397-020-01231-7
50. **Picotti, S.**, Carcione, J.M., Santos, J.E., Gei, D. and Cavallini, F., 2020, *Finite-element numerical simulations of seismic attenuation in finely layered rocks*, JASA, **148**(4), 1978-1983. DOI: 10.1121/10.0002127

51. Carcione, J. M., Picotti, S., and Ba, J., 2021, *P- and S-wave simulation using a Cole-Cole model to incorporate thermoelastic attenuation and dispersion*, JASA, **149**(3), 1946-1954. DOI: 10.1121/10.0003749
52. Carcione, J.M., Gei, D., Picotti, S., Botelho, M.A.B., 2021, *On the instantaneous frequency and quality factor*. Geophysical Journal International, **227**(2), 735-745. DOI: 10.1093/gji/ggab250
53. Carcione, J. M., Gei, D., Qadrouh, A. N., Alajmi, M. S., Picotti S., 2021, *Rock acoustics of diagenesis and cementation*, Submitted to Rock Mechanics and Rock Engineering.

## Software development

Contributions to the development of the CAT 3D tomographic software ([www.3dtomography.com](http://www.3dtomography.com)). Main features:

- joint travel-time and attenuation inversion of reflected, refracted, direct and diving arrivals;
- interval velocity and quality (Q) factor model reconstruction;
- petrophysical (porosity and gas saturation) model reconstruction;
- irregular adaptive grids;
- arbitrary geometry horizon reconstruction;
- well constraints;
- reliability maps.

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