

CURRICULUM VITAE

GARAMBOIS Stéphane
Born: 25 September 1970
Research Assistant
Laboratory: ISTerre, University Joseph Fourier – Grenoble I
Habilitation for Research since October 2010
Married life, 3 children

1. SCIENTIFIC CAREER

1.1 SUM-UP

- October 2010 **Habilitation to conduct Research** « Geophysical explorations of the subsurface: multiphasic problems and natural hazards », UJF Grenoble.
- January 2007 – Present **Research Assistant** at ISTerre, UJF (UMR 559), team Waves & Structures
- October 2001 - December 2006 **Research Assistant** at LIRIGM, team Natural Hazard, UJF
- October 1999 - September 2001 **Post-doctoral position at CNRS at University of Pau,** « *Geophysical Imaging* » laboratory
- April 1999 **PhD in Geophysics, University Joseph Fourier, Grenoble I**
Title: « Experimental and theoretical studies of seismo-electric wave conversions in poroelastic media ».
- September 1994 - august 1995 **Military service performed in Spatial Geodesy,** Observatoire Midi-Pyrénées, Toulouse.
- June 1994 **MSc in Mechanics of Geophysical media & Environment, UJF Grenoble.**

1.2 MAIN RESEARCH AND SUPERVISING ACTIVITIES

1.2.1. RESEARCH TOPICS

I am working on various problems which share important issues related to subsurface phenomena.

I am interested in the biphasic character (or multiphase) of geological formations encountered, including consideration of the fluid phase in the phenomena of wave propagation (seismic, electromagnetic, seismo-electromagnetic). This quantitative imaging topic has environmental and hydrological impacts but also for natural resources (oil, CO₂) or geotechnical engineering problems.

I am also interested in multi-method geophysical characterization of various natural hazards, such as gravitational instabilities (landslides and rockfall), active faults & seismic site effects and glacial hazards.

This work was carried out mostly based on real data (active or passive) with a large number of field campaigns in France and outside (Italy, Antarctica, New-Zealand, Laos, Ecuador, ..), sometimes including laboratory data. Methodological developments were proposed by combining theoretical and / or numerical direct together with inversion methodology and especially on Full Waveform Inversion (The Seiscope Consortium). In terms of geophysical methods, the main developments have been related to Ground Penetrating Radar, Seismic and Seismo-electromagnetic waves although a large range of geophysical methods have been used in different contexts (Surface waves, seismic noise, Electromagnetics).

This work resulted in more than 10 PHD grants, several academics and companies' grants and about 40 international papers have been published until now.

2.2.2. COMPLETED AND ONGOING PHD SUPERVISING

| Name | PHD Defense | Title | % | Co-supervising |
|---------------|---------------------------------|--|----|--|
| E. Rey | 2005, UJF | Heterogeneous soil characterization using geophysical data | 33 | D. Jongmans & P. Gotteland |
| M. Jeannin | 2005, UJF | Ground Penetrating Radar studies of prone to fall rocks. | 50 | D. Jongmans |
| F. Nguyen | June 2005, Univ. Liège, Belgium | Imaging slow-active faults with combined geophysical methods in Provence, France | 50 | D. Jongmans |
| O. Méric | 2006, UJF | Geophysical studies of landslides | 50 | D. Jongmans |
| J. Deparis | 3 July 2007, UJF | Geophysical studies of rockfall using GPR and seismological data. | 50 | D. Jongmans |
| L. Tatard | 8 February 2010, UJF | Statistical analysis of triggered landslides: implication for earthquake and weathering controls | 33 | J. R. Grasso et T. Davies (Canterbury Univ., NZ) |
| B. Dupuy | 10/2011, UJF - | Full waveform Inversion of seismic waves in poroelastic media | 50 | J. Virieux |
| S. Beauprêtre | 01/2013, UJF | Development of a paleoseismological geophysical method using GPR imaging. Application to strike-slip active faults in New-Zealand. | 50 | I. Manighetti |
| A. Asnaashari | October 2013, UJF - TOTAL | Quantitative 4D seismic in complex media using 2D full-waveform inversion | 33 | J. Virieux & P. Thore |
| F. Lavoué | July 2014 | 2D Full waveform inversion of GPR data. Towards multiparameter imaging from surface data | 50 | J. Virieux |
| H. Pinard | September 2016 | Full waveform inversion of CSEM and GPR data | 33 | L. Métivier & M. Dietrich |
| M. Devi | November 2016 | Electroseismics measurements and numerical developments | 50 | M. Dietrich |

TABLE 1. PHD SUPERVISION

2. SCIENTIFIC AND TEACHING RESPONSABILITIES

2.1 National and local administrative responsibilities

- Joint supervisor of the national French INSU OMIV (Observatory Multi-disciplinary of landslides, <http://omiv.osug.fr/>, with J.-R. Grasso) gathering 4 landslides and 6 different French laboratories [June 2010-December 2012].
- Supervisor of the research monitoring Séchilienne landslide for OMIV [2008-2010]
- Elected member of the expert commission of UJF section 35-36-37 [2003-2006], of Pau University [2004-2008], of Toulouse University [2004-2008] and of Aix-Marseille in 2008.
- Team supervisor « Characterization and behavior of heterogeneous natural materials », LIRIGM laboratory [2003-2006].
- Elected member of the ISTERre advice commission since 2007.

2-2 Participation to main research programs

- National
 - o P.I. of the ANR project SLAMS (2009-2013), ANR RISKMAT 2009 : 700 k€. The Séchilienne Landslide.
 - o ANR CENTURISK (2009-2013) : Supervisor of the ISTERre part of this active fault project conducted in NZ, 500 k€.
 - o Supervisor of a Work-Package of ANR JETPHI (2007-2009), Jet-Grouting, 300 k€
 - o Participation to SIGMA, landslides (2006-2009), HPPP-CO2, CO2 deposits (2008-2011), TRANSEK, seismo-electric coupling (2009-2012)
 - o SAFE EC Project of slow active faults in Europe (2001-2004)
- International
 - European project MOUNTAIN-RISK (6th PCRD), INTERREG Glacial hazard (GLARISKALP, 2010-2011), SELTHEX, submitted to EC in 2014.
 - Collaborations with GNS and University of Canterbury (New-Zealand).
 - Reviewers of PhD in Australia, Switzerland, Italy, Canada
 - Courses in Quito University on Site effects assessment for Seismic amplification problem (2013)
- Private funding and expertise
 - Member of the seiscopes I and II consortiums (for Full waveform Inversion of Seismic data): <http://seiscopes2.osug.fr/>.
 - Expertise performed for EDF and Saint-Gervais city for the Tete-Rousse water pocket characterization.
 - ANR JETPHI project (2007-2009) on JET-GROUTING, Soletanche-Bachy.
 - TOTAL projects on 4D seismics (2009-2013) and carbonates characterization (2014-2016).

2.3 Teaching activities and responsibilities

Since I joined University Joseph Fourier in 2001, I teach about 220 hours per year at “Ecole Polytechnique of Grenoble” in the geotechnical department and at the Physics, Mechanics and Geosciences department.

Subjects taught (C, TD, TP, field): Prospecting and Geophysical imaging, Seismology, finite difference modeling, rock mechanics, signal processing. I am supervising 5 different courses.

Student level: Geotechnical Engineers, Master degree.

European Program Erasmus Mundus: Since 2006, I am the co-supervisor of the Erasmus Mundus Program MEEES with Fabrice Cotton (Master in Earthquake Engineering and Engineering Seismology) of the UJF part, which gathers international students in 4 universities (Pavia, Grenoble, Ankara, Patras).

3. MAIN SCIENTIFIC PRODUCTION

INDICATORS : 39 PUBLISHED PAPERS, 2 IN PRESS, 579 CITATIONS, HINDEX=15.

PH SUPERVISED STUDENTS APPEARS IN BOLD

3.1 DISTINCTIONS

- Invited Conference at AGU, “Garambois S., Deparis J., Lavoué F., Brossier R. & J. Virieux, 2011, Inversion of dispersive multioffset GPR data for thin-layer characterization: application to fracture estimation, AGU Fall meeting, San Francisco, 5-9 december 2011”.
- Top 30 papers of the SEG 2012 Annual meeting in Las Vegas “A.Asnaashari, R. Brossier, S. Garambois, F. Audebert, P. Thore, and J. Virieux, 2012, Time-lapse imaging using regularized FWI: A robustness study , 82th SEG Annual meeting, Las vegas, 4-9 November 2012”.
- Best student paper of the SEG 2011 annual meeting “Asnaashari A., Brossier R., Garambois S., Audebert F., Thore P., and J. Virieux, 2011, Sensitivity analysis of time-lapse images obtained by differential waveform inversion with respect to reference model, Society exploration of Geophysicists, annual meeting, San Antonio, 18-23 September, 2011”.

3.2. A-RANK PAPERS

- (1) GARAMBOIS, S., DIETRICH, M., « Seismo-electric wave conversions in porous media: Field measurements and transfer function analysis », Geophysics, 2001, n° 66, pp. 1417-1430.
- (2) GARAMBOIS, S., DIETRICH, M., 2002, « Full-waveform numerical simulations of seismo-electromagnetic wave conversions in fluid-saturated stratified porous media», Journal of Geophysical Research, 107, No B7.
- (3) PRIDE, S., GARAMBOIS, S., 2002, « The role of Biot slow waves in electroseismic wave phenomena », Journal of Acoustical Society of America, 111, 697-706.
- (4) GARAMBOIS, S., SENECHAL, P. & H. PERROUD, 2002, « On the use of combined geophysical methods to assess water content and water conductivity of near-surface», Journal of Hydrology, 259, pp 32-48.

- (5) LUTZ, P., GARAMBOIS, S., & PERROUD, H., 2003, Influence of antenna configurations for GPR surveys: information from polarization and amplitude offset measurements, Special Publication of the Geol. Soc. of London, 211, pp 295-308.
- (6) NGUYEN, F., GARAMBOIS, S., JONGMANS, D., PIRARD, E. & M. LOCKE, 2005, Image processing of 2D resistivity data to locate precisely faults, Journal of Applied Geophysics, 57, pp 260-277.
- (7) PRIDE, S. & S. GARAMBOIS, 2005, Electrostatic wave theory of Frenkel and more recent developments, Journal of Engineering Mechanics, pp 898-907.
- (8) MERIC, O., GARAMBOIS S., JONGMANS D., VENGEON J.-M. & J.-L. CHATELAIN, 2005, Application of geophysical methods for the investigation of the large gravitational mass movement of Séchilienne (France), Canadian Geotechnical Journal, 42, pp 1105-1115.
- (9) REY, E., JONGMANS D., GOTTELAND, P. & S. GARAMBOIS, 2006, Characterization of heterogeneous soils using geoelectrical measurements, Journal of Applied Geophysics, 58, pp 188-201.
- (10) JEANNIN, M., GARAMBOIS S., GREGOIRE C. & JONGMANS D., 2006, Multi-configuration GPR measurements for geometrical fracture characterization in limestone cliffs (Alps), Geophysics, 71, pp B85-B92.
- (11) BORDES C., JOUNIAUX, L., DIETRICH, M., POZZI J.-P. & S. GARAMBOIS, 2006, Laboratory measurements of seismo-magnetic conversions in fluid-filled sand, Geophys. Res. Lett., VOL. 33, L01302, doi:10.1029/2005GL024582.
- (12) GUEGUEN, P., CORNOU, C., GARAMBOIS, S. and J. BANTON, 2007, On the limitation of the H/V spectral ratio using seismic noise as an exploration tool: Application to the Grenoble valley (France), a small apex ratio basin, PAGEOPH, 164(1), 115-134..
- (13) MERIC O., GARAMBOIS S., MALET J.-P., CADET H., GUEGUEN P. & D. JONGMANS, 2007, Seismic-noise based methods for soft-rock landslides characterization, Bull. Soc. géol. France, 2007, n 2, pages 137-148.
- (14) JONGMANS D. & S. GARAMBOIS, 2007, Surface geophysical investigation and monitoring of landslides: a review, BSGE, n2, pages 101-112.
- (15) NGUYEN, F., GARAMBOIS S., CHARDON, D., BELLIER O., HERMITTE D. & D. JONGMANS, 2007, Subsurface electrical imaging of anisotropic formations affected by a slow active reverse fault, Provence, France, Near surface Geophysics, 62, pages 338-353.
- (16) DEPARIS J., GARAMBOIS S. & D. HANTZ, 2007, On the potential of Ground Penetrating Radar to help rock fall hazard assessment of a limestone scale, Engineering geology, 94, 89-102.
- (17) BORDES C., JOUNIAUX L., GARAMBOIS S., DIETRICH M., POZZI J.-P. & S. GAFFET, 2008, Evidence of the theoretically predicted seismo-magnetic conversion, Geophysical Journal International, doi: 10.1111/j.1365-246X.2008.03828.x.
- (18) DEPARIS, J. & GARAMBOIS S., 2009, On the use of APVO GPR curves for thin-bed properties estimation : theory and application to fracture characterization, Geophysics, 74, 1, J1-J12.
- (19) HELMSTTETER A. & S. GARAMBOIS, 2010, Seismic activity of Séchilienne rockslide (french Alps) and its correlation with rainfalls, Journal of Geophys. Res., VOL. 115, F03016, doi:10.1029/2009JF001532.
- (20) VINCENT C., GARAMBOIS, S., E. THIBERT, E. LEFÈBVRE, E. LE MEUR AND D. SIX, 2010, Origin of the outburst flood from Tete Rousse glacier in 1892 (Mont-Blanc area, France), Journal of Glaciology, Vol. 56, No. 198, pp. 688-698.
- (21) DEPARIS J. & GARAMBOIS S., 2010, Inversion Methodology of Dispersive Amplitude and Phase versus Offset of GPR Curves (DAPVO) for Thin Beds, Soc. Exp. Geo., Advances in Near-surface Seismology and Ground-penetrating Radar, Edited by Richard D. Miller, John H. Bradford, and Klaus Holliger

- (22) **SENECHAL, P.**, GARAMBOIS S. & BORDES C., 2010, Feasibility of acoustic imaging for in-situ characterization of fresh concrete injected into soil subsurface", Journal of Applied Geophysics, 2, 184–193.
- (23) **TATARD, L.**, GRASSO, J.-R., HELMSTETTER, A., & S. GARAMBOIS, 2010, Characterization and comparison of landslide dynamics in different tectonic and climatic settings, Journal of Geophys. Res., 115, F04040, doi:10.1029/2009JF001624.
- (24) **LEGCHENKO A.**, DESCLOITRES M., VINCENT C., GUYARD H., GARAMBOIS S., CHALIKAKIS K. & M. EZERSKI, 3D Magnetic resonance imaging for Groundwater, 2011, New Journal of Physics, 13, February 2011.
- (25) **DUPUY B.**, de BARROS L., GARAMBOIS S. & J. VIRIEUX, 2011, Wave propagation in heterogeneous porous media formulated in the frequency-space domain, Geophysics, vol. 76, n° 4, N13-N28.
- (26) **LEGCHENKO, A.**, CLEMENT, R., GARAMBOIS, S., MAURY, M., MIC, L.-M., LAURENT, J.-P., DESPLANQUE C. & GUYARD H., 2011, Locating water storage of Luitel lake peat bog using MRS, ERT and GPR, Near Surface Geophysics, 2011, 9, 201-209.
- (27) **GRANDJEAN G.**, GOURRY J.C., SANCHEZ O., BITRI A & S. GARAMBOIS, 2011, Structural study of the Ballandaz landslide (French Alps) using geophysical imagery, Journal of Applied Geophysics, 75, 531-542.
- (28) **BEAUPRETRE S.**, GARAMBOIS S., MANIGHETTI I., J. Malavieille, R. Langridge, G. Sénéchal, M. Chatton, T. Davies, C. Larroque, D. Rousset, N. Cotte, C. Romano, 2012, Finding the buried record of past earthquakes with GPR-based paleoseismology: a case study on the Hope fault, New Zealand, Geophysical Journal international, Vol. 189, issue 1, p. 73-100, doi. 10.1111/j.1365-246X.2012.05366.x .
- (29) **VINCENT C.**, DESCLOITRES M., GARAMBOIS S., LEGCHENKO A., GUYARD H., LEFEBVRE E. & A. GILBERT, 2012, A potential catastrophic subglacial lake outburst flood avoided in the Mont Blanc area, Journal of Glaciology, vol 58 (211), p. 866-878.
- (30) **C. VINCENT, M. DESCLOITRES, S. GARAMBOIS, S. LEGCHENKO, H. GUYARD, E. THIBERT, A. GILBERT, N. KARR et V. TAIRRAZ.** 2012. Intraglacial water reservoir detected from a geophysical survey in 2010 and preventive measures to avoid a disaster. Houille Blanche-Revue Internationale De L Eau (2), 34–41.
- (31) **WARDEN S.**, GARAMBOIS S., SAILHAC P., JOUNIAUX L. & M. BANO, 2012, Curvewavelet-based seismoelectric processing, Geophysical Journal International, Vol 190, issue 3, 1533-1550, DOI: 10.1111/j.1365-246X.2012.05587.x.
- (32) **ASNAASHARI A.**, BROSSIER R., GARAMBOIS S., AUDEBERT F., THORE P. & VIRIEUX J., 2013, Regularized seismic full waveform inversion with prior model information, Geophysics, Vol 78, No 2, R25-R36, DOI: 10.1190/GEO2012-0104.1.
- (33) **WARDEN S.**, GARAMBOIS S., JOUNIAUX L. SAILHAC P., BRITO S. & C. BORDES, Seismoelectric numerical modeling in partially saturated conditions, Geophys. J. Int. Volume: 194 Issue: 3 Pages: 1498-1513 DOI: 10.1093/gji/ggt198.
- (34) **BEAUPRETRE S.**, MANIGHETTI I., GARAMBOIS S., MALAVIELLE J., & S. DOMINGUEZ, 2013, Stratigraphic architecture and fault offsets of alluvial terraces at Te Marua, Wellington fault, New Zealand, revealed by pseudo-3D GPR investigation, Journal of Geophys. Res.- Solid Earth, Volume: 118 Issue: 8 Pages: 4564-4585 DOI: 10.1002/jgrb.50317.
- (35) **LAVOUE F.**, BROSSIER R., METHIVIER L. GARAMBOIS S. & J. VIRIEUX . 2014, 2D Permittivity and conductivity imaging by Full waveform inversion of multi-offset data : a frequency-domain quasi-Newton approach, Geophysical Journal International, Volume: 197 Issue: 1 Pages: 248-268.

- (36) LEGCHENKO A., C. VINCENT, J.M. BALTASSAT, J.F. GIRARD, E. THIBERT, O. GAGLIARDINI, M. DESCLOITRES, A. GILBERT, S. GARAMBOIS, A. CHEVALIER, and H. GUYARD, 2014, Monitoring water accumulation in a glacier using magnetic resonance imaging, *CRYOSPHERE* Volume: 8 Issue: 1 Pages: 155-166.
- (37) CAPPA F., GUGLIELMI Y., VISEUR S. & S. GARAMBOIS, 2014, Deep fluids can facilitate rupture of slow-moving giant landslides as a result of stress transfer and frictional weakening, *Geophysical Research Letters*, Volume: 41 Issue: 1 Pages: 61-66.
- (38) GUEDRON S., TISSERAND D., GARAMBOIS S., SPADINI L., MOLTON F., BOUNVILAYAND B., CHARLET L. and D.POLYA, 2014, Baseline investigation of (methyl)mercury in waters, soils, sediments and key foodstuffs in the Lower Mekong Basin: The rapidly developing city of Vientiane (Lao PDR), *JOURNAL OF GEOCHEMICAL EXPLORATION* Volume: 143 Pages: 96-102.
- (39) LE MEUR E., SACCHETTINI, M., GARAMBOIS, S., BERTHIER, E., DROUET, A. S., DURAND, G., YOUNG, D., GREENBAUM, J. S., 2014, Two independent methods for mapping the grounding line of an outlet glacier: example from the Astrolabe Glacier, Terre Adelie, Antarctica, *The Cryosphere*, 8, 1331–1346, 2014.

IN PRESS

- (40) ASNAASHARI A., BROSSIER R., GARAMBOIS S., AUDEBERT F., THORE P. & VIRIEUX J., 2013, Time-lapse seismic imaging using regularized FWI with prior model: which strategy?, accepted to *Geophysical prospecting*.
- (41) LAVOUE F., R. BROSSIER, L. METIVIER, S. OPERTO, S. GARAMBOIS, J. VIRIEUX, 2013, Frequency-domain modelling and inversion of electromagnetic data for 2D permittivity and conductivity imaging: An application to the Institut 3 Fresnel experimental data, Near Surface geophysics, accepted.