

# Marianne Métois

06/12/1986 - 34 years old - one child

Laboratoire de Géologie de Lyon, La Doua

Bâtiment Géode, office 620

+33 678474153

+33 (0)472445868

✉ marianne.metois@univ-lyon1.fr

URL: <http://perso.univ-lyon1.fr/marianne.metois/>

## Present position

- Position** Associate professor since Septembre the 1st of 2015  
**Employer** UCBL, Observatoire des Sciences de l'Univers, LGLTPE UMR5276  
**PhD** Université Paris-Diderot, Paris 7, 2012

## Professional Experience

- 2015– **Associate Professor**, LGLTPE, Université Claude Bernard Lyon 1, Team "Surface and Lithosphere".
- 2013-2015 **AXA postdoctoral fellow**, Istituto Nazionale di Geofisica e Vulcanologia, INGV, Centro Nazionale Terremoti, Roma, Italy, Assessment of seismic hazard in the Balkans using space-geodesy (GPS), sous la direction de Nicola D'Agostino..
- 2012-2013 **Postdoctoral fellow and teaching assistant**, Tectonics and lithosphere mechanics laboratory, IPG Paris.
- 2009-2012 **PhD**, Laboratoire de géologie, ENS Paris and "Tectonics and lithosphere mechanics lab" from IPGP, PhD supervisors : C.Vigny and A.Socquet. Title : *Coupling along the Chilean subduction zone*.

## Education

- 2008–2009 **Master Degree**, IPGP and Université Paris 7, Earth and Planetary Sciences (STEP), Major in geophysics.
- 2007–2008 **Preparation for the competitive exam to get the High School teacher authorization in Biology and Geology**, Ecole Normale Supérieure de Lyon.
- 2006–2007 **First year of Master**, ENS Lyon, Physics and Chemistry of Earth and Planets - PCTP.
- 2005–2006 **Entered ENS Lyon, a selective university-level school training for research and teaching**, "Junior" year "L3 Sciences de la Terre et des planetes".

## Current research projects

- CNES-TOSCA **ALBA** funded project "Active tectonics and anthropogenic deformation in Albania", PI. Consortium : C.Lasserre, R.Grandin, P.Allemand, F.Jouanne, R.Vassallo, R.Koçi, E.Dushi
- PNTS-INSU **GIPI** funded project "Gps and Insar Probabilistic Inversion of strain rate tensor for seismic hazard assessment", PI. Consortium : C.Pagani, T.Bodin, C.Lasserre
- ANR Involved in the **S5** funded project "Synchronous Slow Slip & Seismic Swarm", lead by J-M.Nocquet (starting in 2020). In charge of task WP2.3 "Elastic interseismic coupling models".
- TELLUS-INSU **TACA** proposed project "Tectonique Active et Cinématique de l'Albanie", PI. Consortium : C.Lasserre, F.Jouanne, R.Vassallo, R.Koçi, E.Dushi

## Awards and outreach

- Dec. 2019 Participation to the podcast for children [OLMA](#) diffused by France Inter
- Nov-Dec. 2015 Communication about the [Dürres](#) and [Le Teil](#) earthquakes in the medias
- since 2015 Member of "Les expertes" data base [Link](#)

- 2010-2015 Collaboration in INSU news writing about large Chilean earthquakes [Link-1](#), [Link-2](#)
- 2013 - AXA postdoctoral fellowship for academic research (2yrs funding)
- **"Le Monde" award** for young scientists in academic research
- Invited scientist in France Inter *La Tête au carré*
- Invited scientist in France Info news bulletin

## Teaching projects and responsibilities

- 2019 Virtual Reality field work for L3 students in Earth Sciences : virtual visit and onsite measurement of the submarine Roseau fault scarp. [Link to video](#)
- 2019-present In charge of the "Investigation du sous-sol" teaching unit (UE, semi-applied L3)
- 2018-present In charge of the "Géosciences 1" teaching unit (UE) for 1st year of License (800 std/yr)
- 2018-2019 Coordinator of the working group on freshen up classes of cartography for L1 students with SIG initiation
- 2015-2020 TGV1-4 "Terrains Géologiques Virtuels" teaching ICAP-UCBL project (PI). Virtual tours for geological initiation on 1st years of License students.[Link](#)

## Supervision

- 2018-2021 C.Pagani **PhD thesis** "Estimation probabiliste du tenseur des taux de déformation (GPS/InSAR)", co-supervisor with T.Bodin
- 04-06 2021 L.Barrois research internship (M1) "investigating near fault geodetic strain localization in southern CA", cosupervised with K.Chanard and C.Lasserre
- 04-06 2021 V.Guiller research internship (M1) "Inversion bayésienne des taux de déformation dans la zone péri-Adriatique", cosupervised with C.Lasserre and T.Bodin
- 01-06 2021 E.Labraña **Master thesis** "Kinematics of the Andean eastern front at different time-scales"
- janv 2021 L. Delette research initiation internship on "Analyse de la séquence sismique de Huasco, Chili (01/09/2020) par GPS statique et haute fréquence"
- janv 2020 M.Grenier research initiation internship on "Estimation de l'aléa sismique en Albanie"
- janv 2020 E.Dumont research initiation internship on "Étude préalable théorique à l'installation d'un réseau GPS transandin à 25°S"
- 01-07 2018 M.Benjelloun **Master thesis** "Déformations du sol induites dans le champ pétrolier de Patos-Marinza (Albanie)", co-supervisor with C.Lasserre and R.Grandin
- janv 2018 C.Gardin research initiation internship on "Étude morphologique de la faille de Karaburun, Albanie"
- janv 2017 E.Saclier research initiation internship on "La séquence sismique d'Italie centrale d'aout 2016 à janvier 2017, vue par GPS"
- janv 2017 L.Collomb research initiation internship on "Détermination du couplage intersismique par GPS du Chili central (Zone de Taltal)"

## Involvement in the scientific community

- Organizer In charge of the student involvement in the 2020-2021 edition of the *"Réunion des Sciences de la Terre"* to be held in Lyon (nov.2021)
- Convener Session ESSI4.2 - *"Virtual reality in earth sciences for research and teaching"* at EGU 2019
- Reviews Regular reviewer for *Geophysical Journal International*, *Tectonophysics*, *Oceanography*, *Earth and Planetary Sciences Letters*, *Geophysical Research Letters*, *Nature Geoscience*
- Member Nominated member of the LGLTPE laboratory board (2016-2020)
- Member Nominated member of the Observatoire des Sciences de l'Univers de Lyon scientific board (2016-2021)
- Scientific animation Introduction to SIG for research (QGIS) for "Surface and Lithosphere" thematic group in LGLTPE (2019)

## Technical Skills

Field-work	Design and installation of continuous and campaign GPS stations, postquake emergency fieldwork
Processing	GPS raw data : GAMIT-GLOBK; GIPSYX; GINS
Modeling	- Elastic modeling of lithosphere deformation - Strain tensor inversion from GPS and seismic data - Viscous modeling of lithosphere deformation (thin sheet formalism)
Computing	AWK, GMT, Fortran, UniX, L <sup>A</sup> T <sub>E</sub> X, Python, Qgis

## Languages

French	native	English	fluent
Spanish	fluent	Italian	fluent
Arabic	basic		

## Publications

Researcher ID **D-7019-2017**

ORCID ID **0000-0002-1489-0513**

### Published papers

- [1] **M.Métois**, J.E.Martelat, J.Billant, M.Andreani, J.Escartin, & F.Leclerc. Deep oceanic submarine fieldwork with undergraduate students, an immersive experience using the Minerve software. *accepted to Solid Earth Discussions*, 1-17, **2021**.
- [2] F.Boudin, P.Bernard, G.Meneses, C.Vigny, M.Olcay, C.Tassara, et al. Slow slip events precursory to the 2014 Iquique Earthquake, revisited with long-base tilt and GPS records. *Geophysical Journal International*, **2021**.
- [3] C.Pagani, T.Bodin, **M.Métois**, C.Lasserre, Transdimensional estimation of surface strain rates from GPS measurements : application to California, *accepted at JGR*, **2021**.
- [4] C.Cornou et al., Rapid response to the  $M_w$  4.9 earthquake of November 11, 2019 in Le Teil, Lower Rhône Valley, France, *Comptes Rendus Geosciences*, **2021**.
- [5] S.Mazzotti, A.Déprez, E.Henrion, C.Masson, F.Masson, J-L.Menut, **M.Métois** et al., Comparative analysis of synthetic GNSS time series - Bias and precision of velocity estimations, *Research report, Resif-Renag*, **2020**.
- [6] **M.Métois**, M.Benjelloun, C.Lasserre, R.Grandin, L.Barrier, E.Dushi, R.Koçi. Subsidence associated with oil extraction seen by Sentinel-1A InSAR images : case of the Patos Marinze oil field, Albania. *Solid Earth*, **2020**
- [7] K.Chanard, **M.Métois**, P.Rebishung, J-P. Avouac. Matters Arising: A warning against over-interpretation of GNSS seasonal signals, *Nature Communication, matter arising*, **2020**
- [8] N.D'Agostino, **M.Métois**, L.Duni, A.Ganas, I.Georgiev, F.Jouanne, N.Kaludjerovic, R.Kandić, R.Koci, N.Kuka. Active crustal deformation and rotations in the southwestern Balkans *accepted to Earth and Planetary Science Letters*, **2020**
- [9] S. Labarre, S. Jacquemoud, C. Ferrari, A. Delorme, A. Derrien, R. Grandin, A. Derrien, R. Grandin, M. Jalludin, F. Lemaître, **M. Métois**, M. Pierrot-Deseilligny, E. Rupnik, B. Tanguy. Retrieving soil surface roughness with the Hapke photometric model: Confrontation with the ground truth. *Remote Sensing of Environment*, **2019**
- [10] E.Klein, **M. Métois**, G.Meneses, C.Vigny, A.Delorme. Bridging the gap between North and Central Chile : insight from new GPS data on coupling complexities and the Andean sliver motion, *Geophysical Journal International*, **2018**
- [11] M. Bai, M-L. Chevalier, J. Pan, A. Replumaz, P-H. Leloup, **M. Métois**, H. Li. South-eastward increase of the Late Quaternary slip-rate of the Xianshuihe fault, eastern Tibet. Geodynamic and seismic hazard implications, *Earth and Planetary Science Letters*, **2018**

- [12] M-L. Chevalier, P-H. Leloup, A. Replumaz, J. Pan, **M. Métois**, H. Li. Temporally constant slip rate along the Ganzi fault, NW Xianshuihe fault system, eastern Tibet. *GSA Bulletin*, **2017**
- [13] L. Bie, I. Ryder, M. Métois. Deep Postseismic Viscoelastic Relaxation Excited By an Intra-Slab Normal Faulting Earthquake in the Chile Subduction Zone, *Tectonophysics*, **2017**
- [14] E. Klein, C. Vigny, L. Fleitout, R. Grandin, R. Jolivet, E. Rivera, & **M. Métois**. A comprehensive analysis of the Illapel 2015 Mw 8.3 Earthquake from GPS and InSAR data, *Earth and Planetary Science Letters*, **2017**
- [15] R. Devoti, N. D'Agostino, E. Serpelloni, G. Pietrantonio, F. Riguzzi, A. Avallone, A. Cavaliere, D. Cheloni, G. Cecere, C. D'Ambrosio, L. Falco, G. Selvaggi, **M. Métois**, A. Esposito, V. Sepe, A. Galvani, M. Anzidei. A Combined Velocity Field of the Mediterranean Region. *Annals of Geophysics*, 60(2), 0215, **2017**
- [16] F. Silverii, N. D'Agostino, **M. Métois**, F. Fiorillo, G. Ventafridda. Transient deformation of karst aquifers due to seasonal and multi-year groundwater variations observed by GPS in Southern Apennines (Italy), *Journal of Geophysical Research*, **2016**
- [17] M.L. Chevalier, P.H. Leloup, A. Replumaz, J. Pan, D. Liu, H. Li, L. Gouret & **M. Métois**. Tectonic-geomorphology of the Litang fault system, SE Tibetan Plateau, and implication for regional seismic hazard, *Tectonophysics*, **2016**
- [18] S. Ruiz, E. Klein, F. del Campo, E. Rivera, P. Poli, **M. Métois**, C. Vigny, J.C. Baez, G. Vargas, F. Leyton, R. Madariaga, L. Fleitout. The seismic sequence of Illapel Mw 8.3 earthquake *Seismological Research Letters*, fev. **2016**
- [19] **M. Métois**, C. Vigny, A. Socquet. Interseismic coupling, megathrust earthquakes and seismic swarms along the Chilean subduction zone (38°-18°S). *Pure and Applied Geophysics*, **2016**
- [20] R. Grandin, E. Klein, **M. Métois**, C. Vigny. 3D displacement field of the 2015 Mw 8.3 Illapel earthquake (Chile) from across- and along-track Sentinel-1 TOPS interferometry *Geophysical Research Letters*, **2016**
- [21] **M. Métois**, N. D'Agostino, A. Avallone, N. Chamot-Rooke, A. Rabaute, L. Duni, N. Kuka, R. Koci, I. Georgiev. Insights on Continental Collisional Processes from GPS Data : Dynamics of the Peri-Adriatic Belts, *Journal of Geophysical Research Solid Earth*, 120, **2015**. Lien vers le pdf: <http://perso.univ-lyon1.fr/marianne.metois/docs/balkans.pdf>
- [22] S. Ruiz, **M. Métois**, A. Fuenzalida, J. Ruiz, F. Leyton, R. Grandin, C. Vigny, R. Madariaga, J. Campos. Intense foreshocks and a slow slip event preceded the 2014 Iquique Mw 8.1 earthquake. *Science*, 345 (6201), 1165-1169, **2014**.
- [23] **M. Métois**, C. Vigny, A. Socquet, A. Delorme, S. Morvan, I. Ortega, M.-C. Valderas-Bermejo. GPS-derived interseismic coupling on the subduction and seismic hazards in the Atacama region, Chile. *Geophysical Journal International*, 196 (2), 644-655, **2014**. Lien vers le pdf: [http://perso.univ-lyon1.fr/marianne.metois/docs/GJI\\_2013.pdf](http://perso.univ-lyon1.fr/marianne.metois/docs/GJI_2013.pdf)
- [24] **M. Métois**, A. Socquet, C. Vigny, D. Carrizo, S. Peyrat, A. Delorme, E. Maureira, M.-C. Valderas- Bermejo and I. Ortega. Revisiting the North Chile seismic; gap segmentation using GPS-derived interseismic coupling. *Geophysical Journal International*, 194 (3), 1283-1294, **2013**. Lien vers le pdf: [http://www.ipgp.fr/~metois/docs/GJI\\_atac\\_2013.pdf](http://www.ipgp.fr/~metois/docs/GJI_atac_2013.pdf)
- [25] **M. Métois**, A. Socquet, and C. Vigny. Interseismic coupling, segmentation and mechanical behavior of the central Chile subduction zone. *Journal of Geophysical Research*, 117, B3, **2012**. Lien vers le pdf: [http://perso.univ-lyon1.fr/marianne.metois/docs/jgr\\_2012\\_paper\\_finalversion.pdf](http://perso.univ-lyon1.fr/marianne.metois/docs/jgr_2012_paper_finalversion.pdf)
- [26] C. Vigny, A. Socquet, J.-C. Ruegg, S. Peyrat, **M. Métois**, R. Madariaga, et al. The 2010 (Mw 8.8) earthquake of central Chile monitored by GPS. *Science*, 332(6026) :1417, **2011**. Lien vers le pdf: <http://www.geologie.ens.fr/~madariag/Papers/Science-2011-Vigny.pdf>

- [27] R. Madariaga, **M. Métois**, C. Vigny, and J. Campos. Central Chile finally breaks. *Science (perspectives)*, 328(5975) :181, **2010**. Lien vers le pdf: [http://www.geologie.ens.fr/~madariag/Papers/Science\\_persp.pdf](http://www.geologie.ens.fr/~madariag/Papers/Science_persp.pdf)
- [28] M. Pérez-Gussinyé, **M. Métois**, M. Fernández, J. Vergés, J. Fullea, and AR Lowry. Effective elastic thickness of Africa and its relationship to other proxies for lithospheric structure and surface tectonics. *Earth and Planetary Science Letters*, 287(1-2) :152-167, **2009**. Lien vers le pdf: [http://134.219.58.4/~perez/Perez\\_Gussinyeetal\\_EPSL\\_2009.pdf](http://134.219.58.4/~perez/Perez_Gussinyeetal_EPSL_2009.pdf)

#### Papers submitted or in preparation

- [1] L.Marconato, P.H.Leloup, C.Lasserre, S.Caritg, R.Jolivet, R.Grandin, O.Cavalié, **M.Métois**, L.Audin, Insights on fault reactivation during the November 11, 2019, Mw4.9 Le Teil earthquake in south-eastern France, from a joint 3D geological model and InSAR time series analysis, *in prep. for GJI*.

#### Book chapters

- [1] **M. Métois**, Anticiper les grands tremblements de terre: comprendre le calme avant la tempête, in *5 jeunes chercheurs d'avenir*, Editions Le Pommier, Belin
- [2] **M. Métois**, Introduction au cycle sismique, *Ouvrage collectif sur le cycle sismique*, ISTE-Wiley, en cours de publication

#### Academic reports

- [1] PhD thesis "Quantification du couplage au long de la subduction Chilienne". Link:<https://hal.archives-ouvertes.fr/tel-01360635>, **2012**
- [2] Master thesis "Determination of the coupling distribution on the Chilean subduction interface using GPS data" under the supervision of C.Vigny and A.Socquet, Laboratoire de Géologie, ENS, Paris, **2009**
- [3] Master internship "Determination of the effective elastic thickness of Africa using spectral methods and satellite derived gravity model." under the supervision of M.Perez-Gussinyé, ISTJA, Barcelona, **2007**
- [4] License internship "Numerical simulation of a silicate sphere falling down in a high-pressure icy mantle : application to Callisto" under the supervision of O.Grasset, Planetology and Geodynamic Laboratory, U.Nantes, **2006**

## Scientific presentations

### Talks

- [1] **M. Métois**, C.Pagani, T.Bodin, C.Lasserre. Bayesian Estimation of Surface Strain Rates from Geodetic Measurements : Application to California, Detect talks series, **2021**. [Link](#)
- [2] **M. Métois**, M.Benjelloun, C.Lasserre, R.Grandin, L.Barrier, E.Dushi, R.Koçi. Subsidence associated with oil extraction, measured from time-series analysis of Sentinel-1 data : case study of the Patos-Marinza oil field, Albania, MDIS conference, **2019**
- [3] **M. Métois**, The rigid Andean sliver hypothesis challenged : impact on interseismic coupling on the Chilean subduction zone, *AGU conference 2017*, New Orleans, USA, **2017**
- [4] **M. Métois**, The calm before the storm : from Interseismic Coupling to Megathrust Earthquakes Scenarios, Case of the Chilean Subduction Zone, *Great Earthquakes workshop*, College de France, Paris, France, **2017**
- [5] **M. Métois**, N. D'Agostino, A. Copley. Dynamics of the Balkans deformation: regional impact of the western hellenic subduction-collision transition. *Wegener conference*, Azores, Portugal, **2016**
- [6] **M. Métois**, A. Socquet, C. Vigny. Interseismic coupling, megathrust earthquakes and seismic swarms along the Chilean subduction zone (30°-18°S), *Wegener conference*, Azores, Portugal, **2016**
- [7] **M. Métois**, N. D'Agostino, A. Avallone, N. Chamot-Rooke, A. Rabaute, L. Duni, N. Kuka, R. Koci, I. Georgiev. Insights on Continental Collisional Processes from GPS Data: Dynamics of the Peri-Adriatic Belts. *EGU conference*, Vienna, Austria, **2015**

- [8] **M. Métois**, N. D'Agostino, A. Avallone, N. Chamot-Rooke, A. Rabaute, L. Duni, N. Kuka, R. Koci, I. Georgiev. Deforming Balkans : Insights on Continental Collisional Processes from GPS Data. *AGU conference, San Francisco, USA, 2014*
- [9] **M. Métois**, N. D'Agostino, A. Avallone, N. Chamot-Rooke, A. Rabaute, L. Duni, N. Kuka, R. Koci, I. Georgiev. New insights on the seismic hazard in the Balkans inferred from GPS. *CBGA conference, Tirana, Albania, 2014*
- [10] **M. Métois**, N. D'Agostino, A. Avallone, N. Chamot-Rooke, A. Rabaute, L. Duni, N. Kuka, R. Koci, I. Georgiev. New insights on the seismic hazard in the Balkans inferred from GPS. *Wegener conference, Leeds, UK, 2014*
- [11] **M. Métois**, C. Vigny and A. Socquet. Are slow-slip events hiding in low-coupled areas of the Chilean subduction zone ? *EGU annual meeting, Vienna, Austria, 2014*
- [12] **M. Métois**, A. Socquet, and C. Vigny. Interseismic coupling, segmentation and mechanical behaviour of the central chile subduction zone. **Solicited talk**, *EGU annual meeting, Vienna, Austria, 2012*
- [13] **M. Métois**, A. Socquet, and C. Vigny. New insights on interseismic coupling along North-Central Chile (32°S-26°S) from GPS measurements, *Congrès des doctorants, IPGP, France, 2012*
- [14] **M. Métois**, A. Socquet, and C. Vigny. Interseismic coupling, segmentation and mechanical behaviour of the central chile subduction zone. *Congrès des doctorants, IPGP, France, 2011*
- [15] **M. Métois**, A. Socquet, and C. Vigny. Variable coupling controls the seismic segmentation and transient creep on the central Chile subduction. *AGU Fall Meeting Conference, 2010*
- [16] **M. Métois**, A. Socquet, and C. Vigny. Upper plate deformation is dominated by varying coupling on the chilean subduction zone. *AGU Chapman conference, Valparaiso-Vina del mar, 2010*
- [17] **M. Métois**, A. Socquet, and C. Vigny. Upper plate deformation is dominated by varying coupling on the chilean subduction. *French-Japanese Workshop on Earthquake Source, 2009*

#### Posters

- [1] **M. Métois**, M. Benjelloun, C. Lasserre, R. Grandin, L. Barrier, E. Dushi, R. Koçi. Subsidence associated with oil extraction seen by Sentinel-1A InSAR images : case of the Patos Marinze oil field, Albania, *AGU conference, San Francisco, 2019*.
- [2] C. Pagani, T. Bodin, **M. Métois**, C. Lasserre, Transdimensional estimation of surface strain rates from GPS measurements : application to California, *AGU conference, San Francisco, 2019*.
- [3] **M. Métois**, M. Benjelloun, C. Lasserre, R. Grandin, F. Jouanne, R. Vassallo, R. Koçi, N. Kuka, E. Dushi. Monitoring the slowly deforming subduction to collision zone in the Balkans, the ALBA project, *Wegener conference, Grenoble, 2018*.
- [4] C. Pagani, T. Bodin, **M. Métois**, C. Lasserre, A probabilistic estimation of surface strain rates from GPS measurements, *Wegener conference, Grenoble, 2018*.
- [5] **M. Métois**, E. Klein, C. Vigny, G. Meneses, A. Delorme. Bridging the gap between North and Central Chile : insights from new GPS data on coupling complexities and the Andean sliver motion, *G2 conference, Nice, 2017*.
- [6] **M. Métois**, E. Klein, C. Vigny, G. Meneses, A. Delorme. Bridging the gap between North and Central Chile : insights from new GPS data on coupling complexities and the Andean sliver motion, *Mdis conference, Clermont-Ferrand, 2017*.
- [7] **M. Métois**, N. D'Agostino, A. Copley. Dynamics of the Balkans deformation : regional impact of the Western Hellenic subduction-collision transition, *EGU, 2016*.
- [8] F. Silverii, N. D'Agostino, **M. Métois**. Postseismic Viscoelastic Relaxation Following the L'Aquila 2009 Earthquake: Implications for Lithospheric Rheology of the Apennines, *AGU, 2014*.

- [9] R. Grandin, S. Ruiz, **M. Métois** et al. The 2014 Pisagua-Iquique (Chile) earthquake sequence : geodetic constraints on space-time slip behaviour of a megathrust segment, *AGU*, **2014**.
- [10] N. D'Agostino, **M. Métois**, A. Avallone and N. Chamot-Rooke. New insights on the seismic hazard in the Balkans inferred from GPS, *EGU Fall meeting*, **2014**. Link: [http://www.ipgp.fr/~metois/docs/poster\\_EGU\\_2014\\_final.pdf](http://www.ipgp.fr/~metois/docs/poster_EGU_2014_final.pdf)
- [11] **M. Métois**, A. Socquet, C. Vigny, D. Carrizo, and S. Peyrat. Revisiting the North Chile seismic gap segmentation using GPS-derived interseismic coupling, *EGU Fall meeting*, **2013**.