Théa Ragon

PH.D. IN GEOPHYSICS
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INVERSE PROBLEMS - SEISMIC SOURCE AND RUPTURE - SEISMIC CYCLE - FAULT SYSTEMS - GEODESY

CURRENT POSITION

Sept. 2019 - present

Post-doctoral Research Associate · **California Institute of Technology, Pasadena, U.S.A.**
Division of Geological and Planetary Sciences Chair's Prize Postdoctoral Fellowship.
Collaborators: Mark Simons, Zachary Ross

RESEARCH EXPERIENCE

March 2016 - May 2019

Research assistant · **Géoazur, Université Côte d'Azur, France**
Experienced in inverse problems, Bayesian (MCMC) inference, modeling of the seismic source.
Towards a more realistic imagery of earthquakes.

- I developped a method to account for uncertainties related to our poor knowledge of the causative fault geometry in earthquakes source inversion, for both Bayesian and optimization procedures.
- I performed a bayesian exploration of co-seismic static slip models for the Mw 6.1 Amatrice, August 2016, Italian earthquake, accounting for uncertainties related to our model of the Earth physics.
- I investigated the early-postseismic processes of the Mw 6.3 2009 l'Aquila earthquake with a joint Bayesian inversion of strictly coseismic and co+post-seismic observations.
- I analyzed the influence of topography on static slip distributions, focusing on the Mw 7.5 2015 Gorkha and Mw 8.1 Maule earthquakes.

2016 (6 months)

Junior Geologist · **Total, Paris, France – New Venture Africa**
Advisors: M. Allain and J.-L. Rubino.
The Turkana depression (EARS, Kenya): Structural and sedimentary characterization.
Preceded by a 1 month field trip. Global interpretation of +50 seismic lines, well logs, gravimetric data and field observations to reconstruct the current architecture and lithology of the Turkana depression. Proposed an updated rift evolution model and discussed rifting styles and processes.

2015 (5 months)

Graduate Student Researcher · **IPGS- DYLBAS, Strasbourg, France**
Advisors: M. Schuster and A. Nutz.
The Ekitale basin and Topernawi Formation (North West Turkana- Kenya rift): a sedimentary record of the earliest phase of rift initiation. Preceded by a 2 weeks field trip. Characterisation of a previously unseen sedimentary basin: sedimentology, structures, basin evolution. I proposed a basin evolution model and discussed the associated riting processes.

2014 (2 months)

Graduate Student Researcher · **UiO- CEED, Oslo, Norway**
Advisor: C. Gaina
Metangula karoo graben: geological overview and magnetic depth determination (Nyassa province, Mozambique). Actualization of structural and geological characteristics of the Metangula basin. Calculation of depth to basement and sediment thickness from magnetic data with various methods.

EDUCATION

March 2016 - May 2019

Géoazur, Université Côte d'Azur, France
Ph.D. in Geophysics. Uncertainties in Earthquake Source Estimates.
Advisors: Anthony Sladen and Bertrand Delouis.

Sept. 2012 - 2015

EOST, Université de Strasbourg, France
Diplôme d'ingénieur in Geophysics, French Grande Ecole diploma, with honours.
M.Sc in geophysics - excellence training program, with honours.

Sept. 2010 - 2012

CPGE Lycée Pierre de Fermat, Toulouse, France
Intensive program in Mathematics and Physics preparing for national competitive examinations to enter French Grandes Ecoles.

PUBLICATIONS

10) **Ragon, T.**, M. Simons, Q. Bletery, O. Cavalié, E. Fielding. **(submitted)** A stochastic view of the 2020 Elazığ M_w6.8 earthquake *Geophysical Research Letters*, . doi:–. –
9) A. Nutz, M. Schuster, D. Barboni, G. Gassier, C. Robin, **T. Ragon**, J.F. Ghienne, J.-L. Rubino. **(in review)** Plio-Quaternary sedimentation in West Turkana (Turkana Depression, Kenya, East African Rift System): paleolake Turkana fluctuations, paleolandscapes and controlling factors *Earth-Science Reviews*, . doi:. –
8) **Ragon, T.**, M. Simons. **(in review)** Accounting for uncertain 3D elastic structure in fault slip estimates *Geophysical Journal International*, . doi:–. –
7) Bletery, Q., O. Cavalié, J.-M. Nocquet, **T. Ragon**. **(2020)** Interseismic coupling along the North and East Anatolian Faults *Geophysical Research Letters*, 47, e2020GL087775. doi:10.1029/2020GL087775. Free access link
6) **Ragon, T.***, L. Langer*, A. Sladen, J. Tromp (* equally contributing authors). **(2020)** Impact of topography on earthquake static slip estimates *Tectonophysics*, . doi:10.1016/j.tecto.2020.228566. Preprint on EarthArxiv
5) **Ragon, T.**, A. Sladen, Q. Bletery, M. Vergnolle, O. Cavalie, A. Avallone, J. Balestra, B. Delouis. **(2019)** Joint inversion of co-seismic and early post-seismic slip to optimize the information content in geodetic data: application to the 2009 Mw6.3 L'Aquila earthquake, Central Italy *JGR Solid Earth*, 124, 10522– 10543. doi:10.1029/2018JB017053. Free access link
4) **Ragon, T. (2019)** Uncertainties in Earthquake Source Estimates *PhD Thesis*, Université Côte d'Azur. doi:-. Free access link
3) **Ragon, T.**, A. Sladen, M. Simons. **(2019)** Accounting for uncertain fault geometry in earthquake source inversions — II: Application to the 2016 Mw6.1 Amatrice earthquake. *Geophysical Journal International*, 218(1),689–707. doi:10.1093/gji/ggz180. Free access link
2) **Ragon, T.**, A. Nutz, M. Schuster, J.F. Ghienne, G. Ruffet, J.-L. Rubino. **(2019)** Evolution of the northern Turkana Depression (East African Rift System, Kenya) during the Cenozoic rifting: new insights from the Ekitale Basin (28-25.5 Ma). *Geological Journal*, 54: 3468– 3488. doi:10.1002/gj.3339. Preprint
1) **Ragon, T.**, A. Sladen, M. Simons. **(2018)** Accounting for uncertain fault geometry in earthquake source inversions — I: theory and simplified application. *Geophysical Journal International*, 214(2), 1174-1190. doi:10.1093/gji/ggy187. Free access link

SCIENTIFIC COMMUNICATIONS

INVITED COMMUNICATIONS AND SEMINARS

2) **2019**, May, **Institut de Physique du Globe (IPGP)**, Paris, France. *Uncertainties in Earthquake Source Estimates.*
1) **2018**, December, **AGU Fall Meeting**, Washington, USA. Ragon, T., A. Sladen, M. Simons. *Accounting for uncertain fault geometry in source inversion problems.*

SELECTED ORAL PRESENTATIONS

Full list available here

6) A. Nutz, **Ragon, T.**, M. Schuster, J.-F. Ghienne, G. Ruffet, J.L. Rubino. Caractérisation d'un micro-bassin « Early syn-rift » dans la Dépression du Turkana (Rift Est-Africain) : implications pour les modèles d'initiation de l'ouverture. 17e Congrès de Sédimentologie Français, Oct 2019, Beauvais, France, **2019**.
5) L. Langer, **T. Ragon**, A. Sladen, J. Tromp. Impact of 3D Green's Functions with Topography on Coseismic Slip Model Inversions. AGU Fall Meeting 2018, Washington, USA, **2018**.
4) **Ragon, T.**, A. Sladen, M. Simons. Accounting for uncertain fault geometry in source inversion problems. 19th General Assembly of Wegener, Grenoble, France, **2018**.
3) **Ragon, T.**, A. Sladen, M. Simons. Accounting for uncertain fault geometry in source inversion problems. PhD students annual conference of the doctoral school of fundamental and applied sciences EDSFA, Nice, France, **2018**.
2) **Ragon, T.**, A. Sladen, M. Simons. Accounting for uncertainties related to the fault geometry in source inversion problems. G2, Nice, Fr, **2017**.
1) **Ragon, T.**, A. Nutz, M. Schuster, J.L. Rubino, M. Bez. The Topernawi Fm (Turkana depression, EARS, Kenya): a recording of early rift opening? Congress of the French Association of Sedimentologists (ASF), Chambéry, Fr, **2015**

SELECTED POSTERS

Full list available here

9) **Ragon, T.**, M. Simons. Accounting for uncertain 3D elastic structure in fault slip estimates. AGU Fall Meeting **2020**.
8) **Ragon, T.**, A. Sladen, M. Vergnolle, Q. Bletery, A. Avallone, O. Cavalié, J. Balestra, B. Delouis. Optimizing the information content available in geodetic data to jointly estimate co-seismic and early afterslip models. AGU Fall Meeting 2019, Washington, USA, **2019**.
7) **Ragon, T.**, A. Sladen, M. Vergnolle, Q. Bletery, A. Avallone, O. Cavalié. Optimizing the information content available in geodetic data to jointly estimate co-seismic and early afterslip models. AGU Fall Meeting 2018, Washington, USA, **2018**.
6) **Ragon, T.**, A. Sladen, M. Simons. Accounting for uncertain fault geometry in source inversion problems. Workshop on Modeling Earthquake Source Processes, Caltech, USA, **2018**.
5) **Ragon, T.**, A. Sladen, M. Simons. Accounting for uncertainties on the fault geometry in source inversion problems. AGU Fall Meeting, New Orleans, USA, **2017**.
4) **Ragon, T.**, A. Sladen, Q. Bletery, M. Simons. Accounting for uncertainty on the fault geometry in source inversion problems. Cargèse School on Earthquakes, Fr, **2017**.
3) **Ragon, T.**, A. Sladen, M. Simons. Influence of Fault Geometry Uncertainties on the Slip Distribution of Continental Earthquakes. CIG Crustal Deformation Modeling Workshop, Golden, USA, **2017**.
2) **Ragon, T.**, A. Sladen, Q. Bletery, M. Simons, F. Magnoni, A. Avallone, O. Cavalié, M. Vergnolle. Influence of epistemic uncertainties on the slip distribution of continental earthquakes: application to the 2009 L'Aquila (Mw6. 3) and 2016 Amatrice (Mw6. 0) earthquakes, central Italy. AGU Fall Meeting, San Francisco, USA, **2016**.
1) **Ragon, T.**, A. Nutz*, M. Schuster, J.F. Ghienne. Very early rift sedimentation in the Turkana depression (EARS, Kenya): example of the Topernawi Formation. AGU Fall Meeting, San Francisco, USA, **2015**.

GRANTS AND FELLOWSHIPS AWARDED

2019 - 2020 Caltech GPS Chair's Prize Postdoctoral Fellowship.
2016 - 2019 French Ministery of Research and Higher Education Fellowship.
2015 Rift Lake Sedimentology RiLakS Total research project — M. Sc. grant.

TEACHING EXPERIENCE

Years 2016-2017 and 2017-2018. Undergraduates

Informatics L1 (21h x2 = 42h). Practical work with Scilab for 1st year bachelor students.
Mathematics L2 (15h x2 = 30h). Algebra seminars or tutorials for 2nd year bachelor students.
Plate Tectonics L2 (15h). Seminars about plate tectonics and geomagnetism for 2nd year students.
Physics of the Earth L2 (9h x2 = 18h). Seminars or tutorials for 2nd year bachelor students.
Field trips for L1, L2 and L3 (21h x2 = 42h). Cartography and geophysics (seismic acquisition, electric acquisition).

ADVISING AND MENTORING

Graduate students

Mathilde Banjan, 2017 (6 months) Master's thesis internship on the impact of seismic rupture characteristics on tsunami-generated ionospheric signature. Advised for 15%, co-advised with L. Rolland and A. Sladen.

Caltech *Women Mentoring Women* program

2019 - 2020 Mentored one second year graduate student and one fifth year graduate student.

MEDIATION AND OUTREACH EXPERIENCE

UCA Complex Days, 2019 Flash talk of 5 minutes and poster. Outreach about uncertainties in earthquake estimates to non-geosciences scientific researchers.
MEDITES program, 2016-2018 Volonteer for ∼40h in three middle schools to explain and play with earthquakes and seismology concepts. Years 2016-2017 and 2017-2018.
3 minutes thesis, National competition, 2017 I gave a talk on *Accounting for what we don't know to model earthquakes, explained with chocolate* at the regional finale of the competition. 2017.

INVITED COMMUNICATIONS

Université Côte d'Azur, Nice, 2018	*Accounting for uncertainties to model earthquakes, explained with chocolate.* Event *Mon TPE en 300s*, Université Côte d'Azur, May 17, 2018.
Observatoire Côte d'Azur, Nice, 2017	*Accounting for uncertainties to model earthquakes, explained with chocolate.* Scientific days of the Observatoire Côte d'Azur, November 9, 2017.

LEADERSHIP EXPERIENCE AND SCIENTIFIC COMMUNITY

Reviewer for scientific journals: *Geophysical Journal International* (GJI), *Geophysical Research Letters* (GRL), *Journal of Geophysical Research* (JGR) Solid Earth, *Remote Sensing*, *Comptes Rendus Geoscience*.

Reviewer for funding agencies: National Fund for Scientific and Technological Development (FONDECYT, Chile).

Judge for the AGU Outstanding Student Paper Award (OSPA), 2019 - 2020.

International conference chair and convener · In charge of seminars

Dec. 2020	Primary convener of the session S016: "Modeling and imaging complex earthquake ruptures ", 2020 AGU Fall meeting.
Dec. 2019	Primary convener of the session S031: "Resolving the complexity of earthquake processes", 2019 AGU Fall meeting.
2016 - 2019	In charge of seminars for the Earthquake team, Géoazur.

Representative in several education and administrative boards

2018 - 2019	Student representative in the administrative board of Observatoire Côte d'Azur.
2017 - 2019	Student representative in the Géoazur laboratory committee.
2013 - 2016	Student representative in the board of Géophyse, EOST former students' association.
2012 - 2014	Student representative in the EOST board of education.
2012 - 2013	Secretary of the EOST (IPG Strasbourg) student association.

Organizer of training cycles

April 2019	"How to write an article in Geosciences" for 1st and 2nd year PhD students, Géoazur.

FIELD EXPERIENCE

2019	Los Angeles area, CA, USA Deployment of seismometers (3-component nodes) for the Northern Los Angeles Basin seismic experiment (1 day).
Jul. 2015 (5 weeks)	West Turkana County, Kenya Continuation of Oct. 2014 work, along with sedimentary facies analysis and interpretation, cartography, sections logging on the Plio-Pleistocene Nachukui Fm.
Oct. 2014 (2 weeks)	Topernawi, West Turkana County, Kenya Study of the Topernawi Miocene unknown sedimentary basin: cartography, sedimentary facies analysis and interpretation, depositional environments, structural mapping, log sections.
2014 (4 + 4days)	Heissenstein and La Soutte, Alsace, France Subsurface geophysics and logging.
2013 - 2014 (1 + 1week)	Swiss Alps, Switzerland and Digne-les-bains, Alpes de Haute Provence, France Foreland basin geology, tectonics, sequence stratigraphy, geomorphology, cartography.