

# Théa Ragon

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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.  
Main collaborators: Mark Simons, Zachary Ross

## RESEARCH EXPERIENCE

March 2016 - Jul 2019 **Research assistant · Géoazur, Université Côte d'Azur, France**  
Uncertainties in earthquake source estimates. I demonstrated how fault geometry, crustal structure and post-seismic deformation included in co-seismic data, affect and bias our slip models. I also proposed methods to mitigate this bias.

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 evolution.

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.

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)

## EDUCATION

March 2016 - May 2019 **Géoazur, Université Côte d'Azur, France**  
Ph.D. in Geophysics. Uncertainties in Earthquake Source Estimates. [Access the PDF here](#)  
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

As of July, 2022:

- 10 peer-reviewed manuscripts, including 7 as first author
- 3 manuscripts in preparation

- 13) **Ragon, T.\***, L. Langer\*, J. Tromp (\* equally contributing authors). **(in prep)** Topography of subduction zones: when to account for it in fault slip estimates? *Earth and Planetary Science Letters*, . doi:-. \_
- 12) **Ragon, T.**, M. Simons. **(in prep)** Subduction zones: can we improve our estimates of near-trench deformation? *Seismica*, . doi:-. \_
- 11) **Ragon, T.**, M. Simons. **(in prep)** A secondary zone of uplift measured after megathrust earthquakes: caused by early downdip afterslip? *Geophysical Research Letters*, . doi:-. \_
- 10) Nutz, A., **T. Ragon**, M. Schuster. **(2021)** Cenozoic tectono-sedimentary evolution of the northern Turkana Depression (East African Rift System) and its significance for continental rifts. *Earth and Planetary Science Letters*, -. doi:10.1016/j.epsl.2021.117285. [PDF](#)

- 9) **Ragon, T.**, M. Simons. (2021) Accounting for uncertain 3D elastic structure in fault slip estimates *Geophysical Journal International*, 224(2), 1404–1421. doi:10.1093/gji/ggaa526. [Free access link](#)
- 8) **Ragon, T.**, M. Simons, Q. Bletery, O. Cavalié, E. Fielding. (2020) A stochastic view of the 2020 Elazığ  $M_w$ 6.8 earthquake (Turkey) *Geophysical Research Letters*, 48. doi:10.1029/2020GL090704. [Free access link](#)
- 7) Nutz, A., M. Schuster, D. Barboni, G. Gassier, C. Robin, **T. Ragon**, J.F. Ghienne, J.-L. Rubino. (2020) Plio-Quaternary sedimentation in West Turkana (Turkana Depression, Kenya, East African Rift System): paleolake Turkana fluctuations, paleolandscapes and controlling factors *Earth-Science Reviews*, . doi:10.1016/j.earscirev.2020.103415. [PDF](#)
- 6) 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. [PDF](#)
- 5) **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](#)
- 4) **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](#)
- 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

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### INVITED SEMINARS & KEYNOTES

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|------|---|
| 2022 | <b>ITES, Strasbourg, France.</b><br>The future of finite-fault modeling: how critical are structural heterogeneities?   |
| 2022 | <b>Keynote, CIG Crustal Deformation Modeling Workshop, Golden, USA.</b><br>The future of finite-fault modeling: how critical are structural heterogeneities?                          |
| 2022 | <b>Keynote, Geoprisms workshop, Deformation at plate boundaries, Hawaii, USA.</b><br>On and off-fault deformation: similar research directions for subduction zones and rift systems? |
| 2022 | <b>Brown bag seminar, Caltech, USA.</b><br>A secondary zone of uplift observed after megathrust earthquakes: caused by rapid down-dip afterslip?                                      |
| 2021 | <b>Isterre, Université de Grenoble, France.</b><br>On-fault deformation estimates: can we mitigate the effect of our approximations ?   |
| 2021 | <b>Laboratoire de Géologie de l'ENS, Paris, France.</b><br>On-fault deformation estimates: can we mitigate the effect of our approximations ?   |
| 2021 | <b>Géoazur, Nice, France.</b><br>How to hamper the effect of Earth's structure approximations on on-fault deformation estimates ?   |
| 2020 | <b>Brown bag seminar, Caltech, USA.</b><br>Accounting for uncertainties in finite-fault slip estimates.   |
| 2019 | <b>Institut de Physique du Globe (IPGP), Paris, France.</b><br>Accounting for uncertainties in finite-fault slip estimates.   |

### SELECTED ORAL PRESENTATIONS

[Full list available here](#)

- 12) A. Nutz, **T. Ragon**, M. Schuster. Histoire tecto-sédimentaire cénozoïque de la Dépression Nord du Turkana et implications pour l'évolution des rifts continentaux, ASF, Brest, France, **2022**.
- 11) J.Jiang, **T. Ragon**, C. Liang, M. Simons. Bayesian inference of megathrust faulting during and after the 2010 Maule earthquake: Quantifying uncertainties and spatiotemporal source processes in 3D structures, SEG-AGU joint workshop on Convergent Margins, **2022**.
- 10) **Ragon, T.**, A. Nutz, M. Schuster. From fault-driven to flexural subsidence: modes of early continental rifting in the northern Turkana Depression (East African Rift, Kenya). *eLightning presentation*, AGU Fall meeting, New Orleans, **2021**.
- 9) E. J. Fielding, C. Liang, M.-H. Huang, Z. Liu, **T. Ragon**, D. Bekaert, M. Simons. Imaging Complex Fault Slip of Large Earthquakes with Sentinel-1 and ALOS-2 SAR analysis and Other Geodetic and Seismic Data. IGARSS Symposium, **2021, invited**.
- 8) Bletery, Q., O. Cavalié, J.-M. Nocquet, **T. Ragon**. Interseismic coupling along the North and East Anatolian Faults. EGU General Assembly, **2020, invited**.

- 7) 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**.
- 6) **Ragon, T.**, A. Sladen, M. Simons. Accounting for uncertain fault geometry in source inversion problems. AGU Fall Meeting, Washington, USA, **2018, invited**.
- 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, 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](#). Since 2019, I submit posters in the sessions I convene at international conferences.

- 11) **Ragon, T.**, M. Simons. The secondary zone of uplift of the 2010 Maule event: unseen afterslip because of neglected 3D elastic crustal structure? SCEC Meeting **2022**.
- 10) **Ragon, T.**, M. Simons. The secondary zone of uplift of the 2010 Maule event: unseen afterslip because of neglected 3D elastic crustal structure? AGU Fall Meeting **2021**.
- 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, FELLOWSHIPS and AWARDS

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|-------------|---|
| 2022        | AGU 2021 Editors' Citation for Excellence in Refereeing - JGR-Solid Earth   |
| 2019 - 2021 | <b>Caltech GPS Chair's Prize Postdoctoral Fellowship.</b>   |
| 2020        | Top most cited GJI Article. Ragon et al. (2018) was among the 14 most cited articles published in Geophysical Journal International in 2020.            |
| 2020        | <b>Academic Excellence Fellowship and Thesis Award - Université Côte d'Azur</b>   |
| 2019        | Top Altmetric GJI Article. Ragon et al. (2018) was the article published in Geophysical Journal International with the highest Altmetric score in 2019. |
| 2016 - 2019 | <b>French Ministry of Research and Higher Education Fellowship.</b>   |
| 2015        | Rift Lake Sedimentology RiLakS Total research project — M. Sc. grant.   |

### TEACHING EXPERIENCE

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**2021. Université Côte d'Azur** · total 10 hours, 20 students.

'Beginning with  $\LaTeX$ ', 'Writing my PhD thesis in  $\LaTeX$ ' and 'Advanced  $\LaTeX$  personalization' for PhD students & postdocs.

**2016-2018. Université Côte d'Azur** · total 142 hours, between 3 and ~50 students.

Teaching assistant for undergraduates

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

## ADVISING AND MENTORING

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### 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.

## LEADERSHIP EXPERIENCE AND SCIENTIFIC COMMUNITY

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**Handling editor** and **co-Chair of the Standards and Copy Editing Team** for **Seismica**, a community-led initiative for a Diamond Open Access journal for seismology and earthquake science.

**Reviewer for scientific journals:** *Earth and Planetary Science Letters* (EPSL), *Scientific Reports*, *Science Advances*, *Earth Science Reviews*, *Bulletin of the Seismological Society of America* (BSSA), *Geophysical Journal International* (GJI), *Geophysical Research Letters* (GRL), *Journal of Geophysical Research* (JGR) Solid Earth, *Tectonics*, *Pure and Applied Geophysics* (PAAG), *Computational Geosciences*, *Remote Sensing*, *Comptes Rendus Geoscience*.

**Reviewer for funding agencies:** National Science Foundation (NSF, USA), National Fund for Scientific and Technological Development (FONDECYT, Chile).

**Judge** for the AGU Outstanding Student Paper Award (OSPA), 2019 - 2021.

### International conference chair and convener · In charge of seminars

Dec. 2022      Co-convener, with Elif Oral, Alice Gabriel and Ahmed Elbanna, of the session S023: "State-of-the-art observations and modeling of earthquake source processes", 2022 AGU Fall meeting.  
 Co-convener, with Zhe Jia, Ryo Okuwaki and Elisa Tinti, of the session S023 : "State-of-the-art observations and modeling of earthquake source processes", 2022 AGU Fall meeting.

Dec. 2021      Co-convener, with Elisa Tinti, Alice Gabriel and Yoshi Kaneko, of the session S023 (5 oral and 3 poster sessions): "State-of-the-art observations and modeling of earthquake source processes", 2021 AGU Fall meeting.

Dec. 2020      Primary convener, with Ryo Okuwaki, Wenyuan Fan and Dara Golberg, of the session S016 (2 oral and 2 poster sessions): "Modeling and imaging complex earthquake ruptures", 2020 AGU Fall meeting.

Dec. 2019      Primary convener, with Ryo Okuwaki, Wenyuan Fan and Valère Lambert, of the session S031 (1 oral and 1 poster sessions): "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.

### Code development

I am involved in the development of several projects, including:

- ALTar**      PI M. Simons, Caltech. Bayesian inversion
- CSI**      PI R. Jolivet, ENS Paris. Finite-fault slip inversion
- Pylith**      v3 in particular, CIG, finite-element code for simulations of crustal deformation

## MEDIATION AND OUTREACH EXPERIENCE

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- 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** Volunteer 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.

## FIELD EXPERIENCE

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- 2019 **Los Angeles area, CA, USA**  
Deployment of seismometers (3-component nodes) for the Northern Los Angeles Basin seismic experiment (2 days).
- 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.