Kristel **Chanard**

Research Scientist · IPGP · Geodesy

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Research Interests

Response of the Earth to climatic forcing, Geodesy, Rheological properties of the Earth and seismology.
Theoretical studies, numerical modelling, field and laboratory observations.

Current Positions

Research Scientist, IPGP, Paris, France *2017 - Present*

Associate Research Scientist, École Normale Supérieure, Paris, France *2020 - Present*

Postdoctoral Research Fellow, University of Lausanne, Switzerland *2016-2017*

Geodesy Field Engineer (Nepal), California Institute of Technology, Pasadena, USA *2009-2010*

Award

European Geosciences Union Geodesy division Outstanding Early Career Award *2022*

Education

Ph.D. in Geophysics, with honors *2011-2015*

École Normale Supérieure, in collaboration with the California Institute of Technology *Paris, France*

Diploma of the École Normale Supérieure *2012*

École Normale Supérieure *Paris, France*

M.S., Geophysics, with honors *2011*

Institut de Physique du Globe de Paris & École Normale Supérieure *Paris, France*

B.S., Physics, with honors *2008*

Université Pierre et Marie Curie & École Normale Supérieure *Paris, France*

Academic Service

International Terrestrial Reference System Combination Centre *2017-Present*

Active staff member

Earth Rotation and Reference Systems Service *2020-Present*

Associate member of the Directing Board

Scientific Committee on Antarctic Research *2022-Present*

France representative of Antarctic Geographic Information

International Association of Geodesy *2020-Present*

- Chair of the Working Group on Geocenter Motion
- Member of the Working Group on Glacial Isostatic Adjustment modelling
- Member of the Working Group on Assessing impacts of loading on Reference Frame realizations

Institut de Physique du Globe de Paris *2020-Present*

Member of the Scientific Council

Conferences and Seminars Convener

- RhEIA: Rheology of Earth's Interior Across scales, Paris 2022
- IGS Workshop Paris 2017
- Unified Analysis Workshop Paris 2017
- Geodesy seminars series (IPGP) 2019-Present
- Science & Politics seminars series (IPGP) 2020-Present
- AGU and EGU sessions 2017-Present

Reviewer for scientific journals *On occasion*

JGR, GRL, Nature Communications, Pageoph, EPSL, JoG, ASR, Nature Geosciences, Science, GJI

Reviewer for scientific proposals *On occasios*

CNES, CNRS

Memberships

- American Geophysical Union 2011-Present
- European Geosciences Union 2011-Present
- International Association of Geodesy 2017-Present

Teaching

- Satellite Geodesy, IPGP 2019-Present
- Geodesy for Geophysical Applications, ENSG 2019-Present
- Geoid and altitude references, ENSG 2019-Present
- Viscoelastic deformation and Rotation of the Earth induced by climatic forcing, IPGP 2018-Present
- Mathematics for Geodesy, ENSG 2018-2020

Field Experience

Geodesy field missions *2017-present*

Installation and maintenance of GNSS networks *IGN, IPGP*

Field engineer in Geodesy *2009-2010*

Maintenance and improvement of the Nepal GNSS network *Caltech, USA*

Invited Seminars

- American Geophysical Union, Geodesy Division Seminar 2021
- Michigan State University, Geosciences Division Seminar 2021
- Lamont-Doherty Earth Observatory, Marine Geology and Geophysics & Seismology Geology and Tectonophysics Seminar Series 2021
- Cambridge University, Bullard Seminar Series 2021
- California Institute of Technology, Geology and Planetary Sciences Division Seminar 2021
- Brown University, Brown DEEPS Colloquium 2020
- SCEC, Scientific Council, *Perspectives on geodetic transient detection* 2020
- SAGE/GAGE Workshop, Plenary Speaker on Earth Rheology and Structure: New Approaches, Applications & Implications for Dynamics 2019
- RESIF, Scientific Council, *Perspectives on environmental geodesy* 2019
- Laboratoire de Géologie de Lyon, Terre, Planètes, Environnement, Division Seminar 2019
- ISTerre, Grenoble, Geodesy Seminar 2015

Proposal Awarded

As lead PI

- CNES-TOSCA: Hydrogeodesy 2022-present
- Programme national de télédétection spatiale (PNTS, INSU): InSAR for Hydrogeodesy 2022-present
- Programme national de télédétection spatiale (PNTS, INSU): Geocenter Motion 2020-present
- CNES-TOSCA: Spatio-temporal variations of the Earth gravity field measured by GRACE/GRACE-Follow On: 2020-present
- FLATSIM: Hydrogeodesy, Ozark, USA 2020-present
- CNES-TOSCA: (Visco-)elastic response of the Earth to surface loading 2015-2019

As co-PI

- NSF-Frontier Research in Earth Sciences, as collaborator 2022-present
  Collaborative Research: Towards a new framework for interpreting mantle deformation: integrating theory, experiments, and observations spanning seismic to convective timescales
- EC2CO: Impact of earthquakes on aquifers in La Martinique 2021-present
- ANR S5: Synchronous Slow Slip & Seismic Swarm 2020-present
- CNES-TOSCA: International Terrestrial Reference Frame Realization 2017-present
- CNES-TOSCA: Separating recent and past ice melting signals in space geodetic observations 2017-present

Advised and co-advised PhD Students

- Laetitia Pantobe (IPGP), Periodic modulation of volcanic seismicity, example of La Soufrière de Guadeloupe 2020-Present
- Martin Colledge (ENS), Periodic modulation of microseismicity, from the laboratory to the natural case 2020-Present
- Louis-Marie Gauer (IPGP), Contribution of space gravity and radar interferometry to ice mass balance 2020-Present
- Ana Sanchez (IPGP), Separating contributions of past and recent ice rereat on the Earth's deformation and gravity field 2017-2022
- Stacy Larochelle (Caltech), Separating and modeling sources of seasonal deformation in GNSS time series 2017-2022
- Paoline Prevost (ENS/Luxembourg University) 2016-2019
  Extracting the spatio-temporal variations in the gravity field recovered from GRACE spatial mission: methods and geophysical applications

Publications

- Larochelle, S., **Chanard, K.**, Fleitout, L., Fortin, J., Gualandi, A., Longuevergne, L., Rebischung, P., Violette, S. and Avouac, J. P., 2021. Understanding the geodetic signature of large aquifer systems: Example of the Ozark Plateaus in Central United States. *Journal of Geophysical Research: Solid Earth*
- Van Camp, M., de Viron, O., Dassargues, A., Delobbe, L., **Chanard, K.**, and Gobron, K., 2022. Extreme hydrometeorological events, a challenge for gravimetric and seismology networks. *Earth's Future*, 10(4), e2022EF002737.
- Adhikari LB., Bollinger L., Vergne J., Lambotte S., **Chanard, K.,** Laporte M., Grace L., Koirala B., Bhattarai M., Bishwokarma TN., Wendling Vazquez N., Girault F. and Perrier F. Orogenic collapse and stress adjustments revealed by an intense seismic swarm following the 2015 Gorkha earthquake in Nepal, *Frontiers in Earth Science, 524.*
- Hetenyi, G., **Chanard, K.**, Baumgardner, L., Herman, F., Metamorphic transformation rate over large spatial and temporal scales constrained by geophysical data and coupled modeling, accepted to *Journal of Metamorphic Geology*
- Pétrélis, F., **Chanard, K.**, Schubnel, A. and Hatano, T., 2021. Earthquake sensitivity to tides and seasons: theoretical studies. Journal of Statistical Mechanics: Theory and Experiment, 2021(2), p.023404.
- Couhert, A., Bizouard, C., Mercier, F., **Chanard, K.**, Greff, M. and Exertier, P., 2020. Self-consistent determination of the Earth's GM, geocenter motion and figure axis orientation. *Journal of Geodesy*, 94(12), pp.1-16
- **Chanard, K.**, Métois, M., Rebischung, P. and Avouac, J.P., 2020. A warning against over-interpretation of seasonal signals measured by the Global Navigation Satellite System. *Nature communications*, 11(1), pp.1-4
- Benoist, C., Collilieux, X., Rebischung, P., Altamimi, Z., Jamet, O., Métivier, L., **Chanard, K.** and Bel, L., 2020. Accounting for spatiotemporal correlations of GNSS coordinate time series to estimate station velocities. *Journal of Geodynamics*, p.101693
- Prevost, P., **Chanard, K.**, Fleitout, L., Calais, E., Walwer, D., van Dam, T. and Ghil, M., 2019. Data-adaptive spatio-temporal filtering of GRACE data. *Geophysical Journal International*, 219(3), pp.2034-2055
- **Chanard, K.**, Nicolas, A., Hatano, T., Petrelis, F., Latour, S., Vinciguerra, S. and Schubnel, A., 2019. Sensitivity of acoustic emission triggering to small pore pressure cycling perturbations during brittle creep. *Geophysical Research Letters*, 46(13), pp.7414-7423
- Altamimi Z., Rebischung P., Collilieux X., Métivier L., **Chanard, K.**, 2019. Review of Reference Frame Representations for a Deformable Earth. *International Association of Geodesy Symposia*. Springer, Berlin, Heidelberg
- Larochelle, S., Gualandi, A., **Chanard, K.**, Avouac, J-P., 2018. Identification and extraction of seasonal geodetic signals due to surface load variations, *Journal of Geophysical Research: Solid Earth*, , 123(12), pp.11-031
- **Chanard, K.**, Fleitout, L., Calais, E., Rebischung, P. and Avouac, J.P., 2018. Toward a global horizontal and vertical elastic load deformation model derived from GRACE and GNSS station position time series. *Journal of Geophysical Research: Solid Earth*, 123(4), pp.3225-3237
- **Chanard, K.**, Fleitout, L., Calais, E., Barbot, S. and Avouac, J.P., 2018. Constraints on transient viscoelastic rheology of the asthenosphere from seasonal deformation. *Geophysical Research Letters*, 45(5), pp.2328-2338
- Craig, T.J., **Chanard, K.** and Calais, E., 2017. Hydrologically-driven crustal stresses and seismicity in the New Madrid Seismic Zone. *Nature communications*, 8(1), pp.1-11
- **Chanard, K.**, J. P. Avouac, G. Ramillien, and J. Genrich, 2014. Modeling deformation induced by seasonal variations of continental water in the Himalaya region: Sensitivity to Earth elastic structure, *J. Geophys. Res. Solid Earth*, 119, 5097–5113, doi:10.1002/2013JB010451
- Ader, T., J. P. Avouac, J. Liu-Zeng, H. Lyon-Caen, L. Bollinger, J. Galetzka, J. Genrich, M. Thomas, **Chanard, K.,** S. N. Sapkota, S. Rajaure, P. Shrestha, L. Ding, and M. Flouzat, 2012. Convergence rate across the Nepal Himalaya and interseismic coupling on the Main Himalayan Thrust: Implications for seismic hazard,*J. Geophys. Res.*, 117, B04403, doi:10.1029/2011JB009071

Outreach Activities

- TV Documentary on Earth's gravity field 2022
- Kristel Chanard:Trekking and tracking mountains. Wheeling, K. (2021), *Eos*, 102
- Press interviews on Earth rotation variations 2021
- Geosciences outreach interventions in primary and middle schools 2016-present
- TV and Radio Interviews following the 2015 Gorkha Earthquake 2015
- Documentary La valse des continents: L'Asie d'aujourd'hui, Arte 2012
- Earthquake awareness in Nepal 2010-2015
- Active member of the Caltech Tectonics Observatory outreach program 2010-2012
- Animation of the India-Asia collision 2010