

Xiaohua (Eric) Xu

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Present Position:

Research Associate - University of Texas at Austin Institute for Geophysics

Education:

Ph.D. 2017 University of California San Diego, Earth Sciences
B.S. 2012 University of Science and Technology of China, Geophysics

Professional Experience:

2021/08-present University of Texas at Austin Institute for Geophysics
- Research Associate
2017/12-2021/07 Scripps Institution of Oceanography
- Postdoctoral Researcher
2012/09-2017/11 Scripps Institution of Oceanography
- Graduate Research Assistant

Research Interest:

Strain/moment accumulation: Use geodetic observations to estimate fault slip rate, strain/moment accumulation rate, and on/off-fault strain partitioning. Understand how these evaluations can be related to seismic hazard.

Earth surface deformation observation and modeling: Investigate large/small scale coseismic/interseismic deformation, and the related fault behaviors. Model surface change due to magma activities, reservoir depletion, ice motion and hydrological activities.

Large InSAR dataset processing: Developer of GMTSAR to improve accuracy and reliability of InSAR data processing. Develop robust algorithms to construct deformation time-series. Recent development can be found <https://github.com/gmtsar/gmtsar>. A product of InSAR time-series along the San Andreas fault system <https://topex.ucsd.edu/gmtsar/insargen/>.

Publications:

Google Scholar: <https://scholar.google.com/citations?user=ME1EfdsAAAAJ&hl=en&oi=ao>

34. Xu, X., Liu, D., Lavier, L., A Geodetic Approach on Constraining Fault Properties, *in prep*
33. Zhai, G., Xu, X., Shirzaei, M., Characterizing Tropospheric Turbulence Phase Delay in SAR Interferometry Using Atmospheric Dynamics-based Spectrum Analysis, *in prep*.

32. Zhai, G., **Xu, X.**, Shirzaei, M., A Seamless Merging Method for Multi-track InSAR Deformation Maps Using Computer Vision, *in prep.*
31. Sun, Y.S., Melgar, D., Angulo, A. R., Ganas, A., Taymaz, T. Crowell, B., **Xu, X.**, Tsironi, V., Karasante, I., Yolsal-Cevikbilen, S., Eken, T., (2022) Source and tsunami characteristics of the 2020 Mw 7.0 Néon Karlovásion (Samos) Earthquake in the Eastern Aegean Sea, *submitted to PAAG.*
30. Yin, H. Z., **Xu, X.**, Haase, J., Douilly, R., Sandwell, D., Lepinay, B. M., (2022) Surface deformation surrounding the 2021 M7.2 Haiti earthquake illuminated by InSAR observations, *in review for BSSA.*
29. Ward, L., Guns, K., Smith-Konter, B., **Xu, X.**, Bock, Y., Sandwell., D. (2022) Vertical Postseismic Deformation of the 2019 Ridgecrest Earthquake Sequence, *Journal of Geophysical Research: Solid Earth*, e2021JB023331.
28. Guns, K., **Xu, X.**, Bock, Y., Sandwell, D.T., (2022) GNSS-corrected InSAR Displacement Time Series Spanning the 2019 Ridgecrest, CA Earthquake. *Geophysical Journal International.*
27. Tong, X., **Xu, X.**, & Chen, S. (2022). Coseismic Slip Model of the 2021 Maduo Earthquake, China from Sentinel-1 InSAR Observation. *Remote Sensing*, 14(3), 436.
26. Wang, W., Shearer, P. M., Vidale, J. E., **Xu, X.**, Trugman, D. T., & Fialko, Y. (2022). Tidal modulation of seismicity at the Coso geothermal field. *Earth and Planetary Science Letters*, 579, 117335.
25. **Xu, X.**, Sandwell, D. T., Klein, E., & Bock, Y. (2021). Integrated Sentinel-1 InSAR and GNSS time-series along the San Andreas fault system. *Journal of Geophysical Research: Solid Earth*, e2021JB022579.
24. Hu, X., Bürgmann, R., **Xu, X.**, Fielding, E., & Liu, Z. (2021) Machine-learning characterization of tectonic, hydrological and anthropogenic sources of active ground deformation in California. *Journal of Geophysical Research: Solid Earth*, e2021JB022373.
23. Golriz, D., Bock, Y., & **Xu, X.** (2021). Defining the Coseismic Phase of the Crustal Deformation Cycle With Seismogeodesy. *Journal of Geophysical Research: Solid Earth*, 126(10), e2021JB022002.
22. Ward, L. A., Smith-Konter, B. R., **Xu, X.**, & Sandwell, D. T. (2021). Seismic Moment Accumulation Response to Lateral Crustal Variations of the San Andreas Fault System. *Journal of Geophysical Research: Solid Earth*, 126(4), e2020JB021208.
21. **Xu, X.**, Sandwell, D. T., Ward, L. A., Milliner, C.W.D., Smith-Konter, B.R., Fang, P., Bock, Y. (2020) Surface deformation associated with fractures near the 2019 Ridgecrest earthquake sequence, *Science*, 370(6516), 605-608.
20. Melgar, D., Ruiz-Angulo, A., Pérez-Campos, X., Crowell, B. W., **Xu, X.**, Cabral-Cano, E., ... & Rodriguez-Abreu, L. (2020). Energetic Rupture and Tsunamigenesis during the 2020 Mw 7.4 La Crucecita, Mexico Earthquake. *Seismological Research Letters*
19. Ponti, D. J., Blair, J. L., Rosa, C. M., Thomas, K., Pickering, A. J., Akciz, S., ... **Xu, X.**, ... & Barth, N. (2020). Documentation of Surface Fault Rupture and Ground-Deformation Features Produced by the 4 and 5 July 2019 M w 6.4 and M w 7.1 Ridgecrest Earthquake Sequence. *Seismological Society of America*, 91(5), 2942-2959.
18. Goldberg, D. E., Melgar, D., Sahakian, V. J., Thomas, A. M., **Xu, X.**, Crowell, B. W., & Geng, J. (2020). Complex rupture of an immature fault zone: A simultaneous kinematic model of the 2019 Ridgecrest, CA earthquakes. *Geophysical Research Letters*, 47(3), e2019GL086382.
17. **Xu, X.**, Sandwell, D. T., & Smith-Konter, B. (2020). Coseismic displacements and surface fractures from Sentinel-1 InSAR: 2019 Ridgecrest earthquakes. *Seismological Research Letters*.

16. Williamson, A., Melgar, D.D., **Xu, X.**, Milliner, C.W.D., (2020) The 2018 Palu Tsunami: Coeval Landslide and Coseismic Sources, *Seismological Research Letters*.
15. Sepúlveda, I., Haase, J. S., Carvajal, M., **Xu, X.**, & Liu, P. L. (2020). Modeling the sources of the 2018 Palu, Indonesia, tsunami using videos from social media. *Journal of Geophysical Research: Solid Earth*, 125(3), e2019JB018675.
14. **Xu, X.**, Sandwell, D.T. (2019). Towards Absolute Phase Recovery with InSAR: Correcting for Earth Tides, Ionosphere, and Phase Unwrapping Ambiguities, *IEEE Transactions on Geoscience and Remote Sensing*.
13. Klein, E., Bock, Y., **Xu, X.**, Sandwell, D.T., Golriz, D., Fang, P., Su, L. (2019). Transient deformation in California from two decades of GPS displacements: Implications for a three-dimensional kinematic reference frame, *Journal of Geophysical Research Solid Earth*.
12. Tymofyeyeva, E., Fialko, Y., Jiang, J., **Xu, X.**, Sandwell, D. T., Bilham, R., Rockwell, T. K., Blanton, C., Burkett, F., Gontz, A., Moafipoor, S. (2019). Slow slip event on the southern San Andreas fault triggered by the 2017 Mw 8.2 Chiapas (Mexico) earthquake, *Journal of Geophysical Research Solid Earth*.
11. **Xu, X.**, Ward, L., Jiang, J., Smith-Konter, B., Tymofyeyeva, E., Lindsey, E. O., ... & Sandwell, D. T. (2018). Surface Creep Rate of the Southern San Andreas Fault Modulated by Stress Perturbations from Nearby Large Events. *Geophysical Research Letters*.
10. Melgar, D., Ruiz-Angulo, A., Garcia, E. S., Manea, M., Manea, V. C., **Xu, X.**, Ramirez-Herrera, T., ... & Ramirez-Guzmán, L. (2018). Deep embrittlement and complete rupture of the lithosphere during the M_w 8.2 Tehuantepec earthquake. *Nature Geoscience*.
9. **Xu, X.** (2017). *Earthquake Cycle Study with Geodetic Tools*. University of California, San Diego.
8. Wang, K., **Xu, X.**, & Fialko, Y. (2017). Improving Burst Alignment in TOPS Interferometry with Bivariate Enhanced Spectral Diversity. *IEEE Geoscience and Remote Sensing Letters*, 14(12), 2423-2427.
7. **Xu, X.**, Sandwell, D. T., & Bassett, D. (2017). A spectral expansion approach for geodetic slip inversion: implications for the downdip rupture limits of oceanic and continental megathrust earthquakes. *Geophysical Journal International*, 212(1), 400-411.
6. Melgar, D., Riquelme, S., **Xu, X.**, Baez, J. C., Geng, J., & Moreno, M. (2017). The first since 1960: A large event in the Valdivia segment of the Chilean Subduction Zone, the 2016 M7. 6 Melinka earthquake. *Earth and Planetary Science Letters*, 474, 68-75.
5. **Xu, X.**, Sandwell, D. T., Tymofyeyeva, E., González-Ortega, A., & Tong, X. (2017). Tectonic and anthropogenic deformation at the Cerro Prieto geothermal step-over revealed by Sentinel-1A InSAR. *IEEE Transactions on Geoscience and Remote Sensing*, 55(9), 5284-5292.
4. Feng, W., Lindsey, E., Barbot, S., Samsonov, S., Dai, K., Li, P., ... & **Xu, X.** (2017). Source characteristics of the 2015 MW 7.8 Gorkha (Nepal) earthquake and its MW 7.2 aftershock from space geodesy. *Tectonophysics*, 712, 747-758.
3. **Xu, X.**, Tong, X., Sandwell, D. T., Milliner, C. W., Dolan, J. F., Hollingsworth, J., ... & Ayoub, F. (2016). Refining the shallow slip deficit. *Geophysical Journal International*, 204(3), 1867-1886.
2. Galetzka, J., Melgar, D., Genrich, J. F., Geng, J., Owen, S., Lindsey, E. O., **Xu, X.**, ... & Upreti, B. N. (2015). Slip pulse and resonance of the Kathmandu basin during the 2015 Gorkha earthquake, Nepal. *Science*, 349(6252), 1091-1095.

1. Lindsey, E. O., Natsuaki, R., **Xu, X.**, Shimada, M., Hashimoto, M., Melgar, D., & Sandwell, D. T. (2015). Line-of-sight displacement from ALOS-2 interferometry: Mw 7.8 Gorkha Earthquake and Mw 7.3 aftershock. *Geophysical Research Letters*, 42(16), 6655-6661.

Talks:

25. AGU Fall Meeting 2022, Chicago or Everywhere on-line, **(Invited)** “Predicting InSAR deformation with GNSS using machine learning”
24. SSA Meeting 2022, Bellevue, “A Geodetic Constraint on Seismic Velocity Changes in Fault Damage Zones”
23. AGU Fall Meeting 2021, New Orleans or Everywhere on-line, “What can we learn from the earthquake induced fractures mapped by InSAR?”
22. Southern California Earthquake Center Annual Meeting 2021, On-line, U.S. **(Invited)** “Mapping faults from space with InSAR: Ridgecrest and beyond”
21. Geodetic Image Data Workshop on Establishing Community Guidelines and Best Practices for Using Remote Sensing Data in Earthquake Mapping Response, 2021, On-line, U.S. **(Invited)** “Fractures from InSAR: Real or Unreal?”
20. University of Texas at Austin, Institute for Geophysics, 2021, Austin, U.S., **(Invited)** “Probing Earth’s Shallow Crust with Space Geodesy”
19. University of Houston, Department of Civil and Environmental Engineering, 2021, Houston, U.S., **(Invited)** “Understanding Earthquake Cycle with Geodetic Tools”
18. AGU Fall Meeting 2020, Everywhere on-line, “Surface fractures nearby the Ridgecrest earthquakes: what can we learn on the regional stress and fault properties?”
17. Nanyang Technological University EOS/Math Seminar 2020, Singapore, **(Invited)** “What can we learn from the surface fractures nearby the Ridgecrest earthquakes?”
16. University of Science and Technology of China Geophysics Seminar 2020, Hefei, China, **(Invited)** “What can we learn from the surface fractures nearby the Ridgecrest earthquakes?”
15. Zhejiang University Earth Department Seminar 2020, Hangzhou, China, **(Invited)** “What can we learn from the surface fractures nearby the Ridgecrest earthquakes?”
14. China Earthquake Network Center Seminar 2020, Beijing, China, **(Invited)** “Imaging surface deformation with InSAR: the Good, the Bad and the Ugly”
13. NASA/JPL North America Surface Displacement Workshop 2020, CA, U.S. **(Invited)** “GNSS integration with InSAR, a product or a service?”
12. AGU Fall Meeting 2019, San Francisco, CA, U.S., “Surface fractures on nearby faults from the Ridgecrest earthquakes revealed by InSAR”.
11. AGU Fall Meeting 2019, San Francisco, CA, U.S., “Line-of-Sight Deformation Time-series along the San Andreas Fault System from Sentinel-1 InSAR and GPS”.
10. NASA Solid Earth Meeting 2019, San Diego, CA, U.S., **(Invited)** “Sentinel-1 SAR/InSAR: radar for the masses”.
9. ALOS2 PI Meeting 2019, Tokyo, Japan, “InSAR deformation time series of the 2018 Kilauea events”.
8. ALOS2 PI Meeting 2019, Tokyo, Japan, “Toward absolute deformation time series with InSAR: the southern section of the San Andreas fault system”.

7. ALOS2 PI Meeting 2018, Tokyo, Japan, “Crustal deformation along the San Andreas fault system”.
6. AGU Fall Meeting 2017, New Orleans, LA, U.S., “Crustal deformation along the San Andreas fault system revealed by GPS and Sentinel-1 InSAR”.
5. AGU Fall Meeting 2016, San Francisco, CA, U.S., “A Spectral Expansion Approach for Geodetic Slip Inversion and Its Application to the 2010 Mw 8.8 Maule Earthquake and 2015 Mw7.8 Gorkha Earthquake”.
4. ALOS2 PI Meeting 2015, Tokyo, Japan, “ScanSAR interferometry along the southern San Andreas fault system”.
3. SSA Meeting 2015, Pasadena, CA, U.S., “Refining the magnitude of shallow slip deficit”.
2. FRINGE Meeting 2015, Frascati, Italy, “Assessment of ScanSAR Interferometry from Sentinel-1 and ALOS-2”.
1. FRINGE Meeting 2015, Frascati, Italy, “Refining the magnitude of shallow slip deficit”.

Reviewer Service:

IEEE Transactions on Geoscience and Remote Sensing, Geophysical Research Letters, Journal of Geophysical Research Solid Earth, Geophysical Journal International, Tectonics, Tectonophysics, Seismological Research Letters, Bulletin of Seismological Society of America, Scientific Reports, Remote Sensing, Sensors, Earth Planet and Space, Earth and Space Science, Frontiers of Earth Science, Advances in Space Research, Pure and Applied Geophysics.

Recognition and Award:

UTIG Outstanding Young Research Award 2021-2022

Seismological Research Letters Top downloaded and cited papers 2020.

Teaching experience:

Instructor at GMTSAR short courses 2015-present: This 2.5-day course covers the theory and application of InSAR processing with GMTSAR. The course materials can be found <https://www.unavco.org/education/professional-development/short-courses/2018/insar-gmtsar/insar-gmtsar.html>. In 2020, our on-line course successfully hosted 150+ participants from around the world. We (David T. Sandwell & Xiaohua Xu) also did a 5-day summer school at University of Chinese Academy of Sciences in summer 2017. I myself held a crash-course on basic InSAR theory with GMTSAR (3-hour) at University of Science and Technology of China in April 2019. I also volunteer lecturing on InSAR techniques on Space Geodesy seminars at Scripps.

Instructor at GMT short course 2019-present: This 2-day course covers the mostly applications of GMT in plotting and displaying geophysical data. With the future release of GMT6, the scripting of GMT will become much easier with modern mode. I was involved in the applications to geodetic data, e.g. plotting GPS and InSAR.

Instructor for Space Geodesy 2019 (SIO 237): This is a seminar class with casual lectures, paper discussions, research projects and field surveys. I organized the syllabus and took the position for lectures of InSAR theory and processing. (<https://topex.ucsd.edu/insar/>)

Guest lecturer for Satellite Remote Sensing 2018-2019: I was invited to give lectures talking about applications of InSAR/GPS and other geodetic measurements on natural hazards and anthropogenic activities at Scripps.

Teaching assistant for Satellite Remote Sensing 2014: This course was co-taught by David T. Sandwell and Hellen A. Fricker at Scripps Institution of Oceanography, UCSD. As a teaching assistant, I was in charge of the laboratory part for students to apply their learned remote sensing knowledge to actual geophysical problems.

Field Experience:

Two GPS field trips to Ridgecrest 2019 (4 days in total)

GPS field trip to Mexicali Mexico 2018 (2 days)

Seagoing cruise across Mendocino Fracture Zone 2017 (8 days)

GPS field trip to North Shore Salton Sea 2017 (2 days)

GPS field trip to Imperial Valley 2016 (2 days)

GPS field trip to Mexicali Mexico 2015 (2 days)

GPS field trip to Mexicali Mexico 2014 (2 days)

GPS field trip to Highway 79 2014 (2 days)

GPS field trip to Laguna Salada Mexico Fall 2012 (2 days)

Current and Prior Support:

Title: Monitoring Earth Surface Deformation with the Next Generation of InSAR Satellites – GMTSAR

Source of Support: NSF-CSSI (Xu - PI) Total: \$386,419

Total Award Period: 06/01/22-05/31/24

Location of Project: UTIG

Person-Months on Project: 3/yr

Title: SCEC-NASA collaborative Proposal: Crustal Deformation Time Series from InSAR and GPS

Source of Support: SCEC – USC Subgrant (Sandwell - PI) Total: \$42,889

Total Award Period: 09/01/22-04/30/23

Location of Project: UTIG

Person-Months on Project: 1/yr

Title: Estimating Seismic Hazard Along the San Andreas Fault System from InSAR and GNSS

Source of Support: NASA ROSES-2018 ESI (Sandwell - PI) Total: \$339,662

Total Award Period: 06/01/19-05/31/22

Location of Project: SIO

Person-Months on Project: 6/yr

Title: Elements: Software – Harnessing the InSAR Data Revolution: GMTSAR

Source of Support: NSF OAC (Sandwell - PI) Total: \$281,747

Total Award Period: 10/01/18-09/30/21

Location of Project: SIO

Person-Months on Project: 9/yr

Title: SCEC-NASA collaborative Proposal: Crustal Deformation Time Series from InSAR and GPS
Source of Support: SCEC – USC Subgrant (Sandwell - PI) Total: \$34,553
Total Award Period: 02/01/20-01/31/21
Location of Project: SIO
Person-Months on Project: 2/yr