Lin Liu   Curriculum Vitae

Earth System Science Programme
Faculty of Science
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Education
Ph.D. in Geophysics, University of Colorado at Boulder, USA	2011
B.Sc. in Geophysics, Wuhan University, China	2005

Research Interests
- Cryosphere
- Remote Sensing
- Solid Earth's Interactions with Cryosphere, Atmosphere, and Ocean
- Geodesy and Geophysics
- Deep Learning Applications in Earth System Science

Professional Experience
The Chinese University of Hong Kong (CUHK)	2020–present
Associate Professor, Earth System Science Programme, Faculty of Science	
Head, Graduate Division of Earth and Atmospheric Sciences	
Research Fellow, Institute of Environment, Energy and Sustainability (since 2014)	
Research Fellow, Institute of Space and Earth Information Science (since 2014)	
Assistant Professor (2014–2019)	
Visiting Scholar, Stanford University	2014–present
George Thompson Postdoctoral Fellow, Stanford University	2011–2013
Research Assistant, University of Colorado	2006–2011

Teaching Experience
Exploring the Earth System (ESSC1000), CUHK	Fall 2016–2020
Solid Earth Dynamics (ESSC2010), CUHK	Spring 2014–2021
Applied Geophysics (ESSC4110 & EASC5110), CUHK	Fall 2017, 2019
Remote Sensing: Principles and Applications (ESSC4540 & EASC5540), CUHK	Fall 2014, 16, 18, 20
Engineering Geology and Applied Geophysics (co-taught with T-f Wong), CUHK	Spring 2016
Research Frontiers in Earth and Atmospheric Sciences (EASC5001/5002), CUHK	2014–2020
Hydrogeology (ESSC3220, co-taught with T-f Wong), CUHK	Fall 2014
Undergraduate Research Mentor, Stanford University	2012–2013
Teaching Assistant, Experimental Physics, University of Colorado	2005–2006
Teaching Assistant, Electricity and Magnetism, University of Colorado	2005–2006

Honors and Awards (since graduate school)
Exemplary Teaching Award, Faculty of Science, CUHK	2016
George Thompson Postdoctoral Fellowship, Stanford University	2011–2013
NASA Earth and Space Science Fellowship	2008–2011
CIRES Graduate Research Assistant Fellowship, University of Colorado	2006–2007

Publications (Annotations: <u>graduate students</u>, postdocs$^\times$, undergraduate*, and visiting students$^\diamond$)

1. Jiang, G., **Liu, L.**, Barbour, A., Yang, H., and Lu, R., Physics-based evaluation of the maximum magnitude of potential earthquakes induced by the Hutubi (China) underground gas storage, *Journal of Geophysical Research: Solid Earth*, in press.

2. Clayton, L. K., Schaefer, K., Battaglia, M. J., Bourgeau-Chavez, L., Chen, J., Chen, R. H., Chen, A., Bakian-Dogaheh, K., Grelik, S., Jafarov, E., **Liu, L.**, Michaelides, R. J., Moghaddam, M., Parsekian, A., Rocha, A. V., Schaefer, S. R., Sullivan, T., Tabatabaeenejad, A., Wang, W., Wilson, C., Zebker, H. A., Zhang, T., and Zhao, Y., Active layer thickness as a function of soil water content, *Environmental Research Letters*, in press.

3. <u>Zhang, J.</u> and **Liu, L.** (2021), Mining noise data for monitoring Arctic permafrost by using GNSS interferometric reflectometry, *Polar Science*, doi:10.1016/j.polar.2021.100649.

4. Zhang, B., Yao, Y., **Liu, L.**, and Yang, Y. (2021), Interannual ice mass variations over the Antarctic ice sheet from 2003 to 2017 were linked to El Niño-Southern Oscillation, *Earth and Planetary Science Letters*, 560, 116796, doi:10.1016/j.epsl.2021.116796.

5. <u>Zhang, E.</u>, **Liu, L.**, Huang, L.$^\times$, and Ng, K. S.* (2021), An automated, generalized, deep-learning-based method for delineating the calving fronts of Greenland glaciers from multi-sensor remote sensing imagery, *Remote Sensing of Environment*, 254, 112265, doi:10.1016/j.rse.2020.112265.

6. Liu, W., Chen, X., Ran, J., **Liu, L.**, Wang, Q., Xin, L., Li, G. (2021), LaeNet: A Novel Lightweight Multitask CNN for Automatically Extracting Lake Area and Shoreline from Remote Sensing Images, *Remote Sensing*, 13, 56, doi:10.3390/rs13010056.

7. <u>Hu, Y.</u>, **Liu, L.**, Wang, X., Zhao, L., Wu, T., Cai, J., Zhu, X. and Hao, J. (2021), Quantification of permafrost creep provides kinematic evidence for classifying a puzzling periglacial landform, *Earth Surface Processes and Landforms*, 46, 465–477, doi:10.1002/esp.5039.

8. Khan, S. A., Bjørk, A.A., Bamber, J.L., Morlighem, M., Bevis, M., Kjær, K.H., Mouginot, J., Løkkegaard, A., Holland, D.M., Aschwanden, A. and Zhang, B., Helm, V., Korsgaard, N., Colgan, W., Larsen, N., **Liu, L.**, Hansen, K., Barletta, V., Dahl-Jensen, T., Søndergaard, A. S., Csatho, B., Sasgen, I., Box, J., and Schenk, T. (2020), Centennial response of Greenland's three largest outlet glaciers, *Nature Communications*, 11, 5718, doi:10.1038/s41467-020-19580-5.

9. Zhang, B., **Liu, L.**, Yao, Y., van Dam, T., and Khan, S. A. (2020), Improving the estimate of the secular variation of Greenland ice mass in the recent decades by incorporating a stochastic process, *Earth and Planetary Science Letters*, 549, 116518, doi:10.1016/j.epsl.2020.116518.

10. <u>Zhang, J.</u>, **Liu, L.**, and Hu, Y. (2020), Global Positioning System interferometric reflectometry (GPS-IR) measurements of ground surface elevation changes in permafrost areas in northern Canada, *The Cryosphere*, 14, 1875–1888, doi:10.5194/tc-14-1875-2020.

11. <u>Huang, L.</u>, Luo, J., Lin, Z., Niu, F., and **Liu, L.** (2020), Using Deep Learning to Map Retrogressive Thaw Slumps in the Beiluhe Region (Tibetan Plateau) from CubeSat Images, *Remote Sensing of Environment*, 237, 111534, doi:10.1016/j.rse.2019.111534.

12. Jiang, G.$^\times$, Qiao, X., Wang, X., Lu, R., **Liu, L.**, Yang, H., Su, Y., Song, L., Wang, B., and Wong, T-f. (2020), GPS observed horizontal ground extension at the Hutubi (China) underground gas storage facility and its application to geomechanical modeling for induced seismicity, *Earth and Planetary Science Letters*, 530, 115943, doi:10.1016/j.epsl.2019.115943.

13. <u>Huang, L.</u>, Baud, P., Cordonnier, B., Renard, F., **Liu, L.**, and Wong, T-f. (2019), Synchrotron X-ray imaging in 4D: Multiscale failure and compaction localization in triaxially compressed porous limestone, *Earth and Planetary Science Letters*, 528, 115831, doi:10.1016/j.epsl.2019.115831.

14. <u>Zhang, E.</u>, **Liu, L.**, and <u>Huang, L.</u> (2019), Automatically delineating the calving front of Jakobshavn Isbræ from multitemporal TerraSAR-X images: a deep learning approach, *The Cryosphere*, 13, 1729–1741, doi:10.5194/tc-2019-14.

15. Zhou, Z.$^\times$, **Liu, L.**, Jiang, L., Feng, W., and Samsonov, S.V. (2019), Using Long-Term SAR Backscatter

Data to Monitor Post-Fire Vegetation Recovery in Tundra Environment, *Remote Sensing*, 11(19), 2230, doi:10.3390/rs11192230.

16. Zhang, B.$^{\times}$, **Liu, L.**, Khan, S.A., van Dam, T., Bjørk, A.A., Peings, Y., Zhang, E., Bevis, M., Yao, Y., and Noël, B. (2019), Geodetic and model data reveal different spatio-temporal patterns of transient mass changes over Greenland from 2007 to 2017, *Earth and Planetary Science Letters*, 515, 154–163, doi:10.1016/j.epsl.2019.03.028.

17. Chen, X., **Liu, L.**, and Bartsch, A. (2019), Detecting soil freeze/thaw onsets in Alaska using SMAP and ASCAT data, *Remote Sensing of Environment*, 220, 59–70, doi:10.1016/j.rse.2018.10.010.

18. Wang, S., Xu, W., Xu, C., Yin, Z., Bürgmann, R., **Liu, L.**, and Jiang, G.$^{\times}$ (2019), Changes in groundwater level possibly encourage shallow earthquakes in central Australia: The 2016 Petermann Ranges earthquake, *Geophysical Research Letters*, 46, 3189–3198, doi:10.1029/2018GL080510.

19. Michaelides, R. J., Schaefer, K., Zebker, H.A., Parsekian, A., **Liu, L.**, Chen, J., Natali, S., Ludwig, S., and Schaefer, S.R. (2019), Inference of the impact of wildfire on permafrost and active layer thickness in a discontinuous permafrost region using the remotely sensed active layer thickness (ReSALT) algorithm, *Environmental Research Letters*, 14(3), 035007, doi:10.1088/1748-9326/aaf932.

20. Huang, L., **Liu, L.**, Zhang, T., and Jiang, L. (2018), Automatic mapping of thermokarst landforms from remote sensing images using deep learning: A case study in the Northeastern Tibetan Plateau, *Remote Sensing*, 10(12), 2067, doi:10.3390/rs10122067.

21. Chen, J., **Liu, L.**, Zhang, T., Cao, B., and Lin, H. (2018), Using Persistent Scatterer Interferometry to map and quantify permafrost thaw subsidence: a case study of Eboling Mountain on the Qinghai-Tibet Plateau, *Journal of Geophysical Research: Earth Surface*, 123, 2663–2676, doi:10.1029/2018JF004618.

22. Chen, J., Günther, F., Grosse, G., **Liu, L.**, and Lin, H. (2018), Sentinel-1 InSAR measurements of elevation changes over Yedoma uplands on Sobo-Sise Island, Lena Delta, *Remote Sensing*, 10(7), 1152, doi:10.3390/rs10071152.

23. Ran, J.$^{\times}$, Vizcaino, M., Ditmar, P., van den Broeke, M. R., Moon, T., Steger, C. R., Enderlin, E. M., Wouters, B., Noël, B., Reijmer, C. H., Klees, R., Zhong, M., **Liu, L.**, and Fettweis, X. (2018) Seasonal mass variations show timing and magnitude of meltwater storage in the Greenland ice sheet, *The Cryosphere*, 12, 2981–2999, doi:10.5194/tc-12-2981-2018.

24. Hu, Y.$^{\diamond}$, **Liu, L.**, Larson, K.M., Schaefer, K.M., Zhang, J., and Yao, Y. (2018), GPS Interferometric Reflectometry reveals cyclic elevation changes in thaw and freezing seasons in a permafrost area (Barrow, Alaska), *Geophysical Research Letters*, 45, 5581–5589, doi:10.1029/2018GL077960.

25. **Liu, L.** and Larson, K.M. (2018), Decadal changes of surface elevation over permafrost area estimated using reflected GPS signals, *The Cryosphere*, 12, 477–489, doi:10.5194/tc-12-477-2018.

26. Zhang, B.$^{\times}$, Zhang, E., **Liu, L.**, Khan, S.A., van Dam, T., Yao, Y., Bevis, M., and Helm, V. (2018), Geodetic measurements reveal short-term changes of glacial mass near Jakobshavn Isbræ (Greenland) from 2007 to 2017, *Earth and Planetary Science Letters*, 503, 216–226, doi:10.1016/j.epsl.2018.09.029.

27. Schuster, P. F., Schaefer, K.M., Aiken, G.R., Antweiler, R.C., Dewild, J.F., Gryziec, J.D., Gusmeroli, A., Hugelius, G., Jafarov, E., Krabbenhoft, D.P., **Liu, L.**, Herman-Mercer, N., Mu, C., Roth, D. A., Schaefer, T., Striegl, R. G., Wickland, K. P., and Zhang, T. (2018), Permafrost stores a globally significant amount of mercury, *Geophysical Research Letters*, 45, 1463–1471, doi:10.1002/2017GL075571.

28. Wu, Z.$^{\diamond}$, Zhao, L., **Liu, L.**, Zhu, R., Gao, Z., Qiao, Y., Tian, L., Zhou, H., and Xie, M. (2018), Surface deformation monitoring in the permafrost regions over Tibetan Plateau using Sentinel-1 data, *Sciences in Cold and Arid Regions*, 10(2), 114–125, doi:10.3724/SP.J.1226.2018.00114.

29. Jafarov E. E., Parsekian, A.D., Schaefer, K., **Liu, L.**, Chen, A.C., Panda, S.K., and Zhang, T. (2018), Estimating active layer thickness and volumetric water content from ground penetrating radar measurements in Barrow, Alaska, *Geoscience Data Journal*, 4, 72–79, doi:10.1002/gdj3.49.

30. Zhang, B.$^{\times}$, **Liu, L.**, Khan, S. A., van Dam, T., Zhang, E., and Yao, Y. (2017), Transient variations in glacial mass near Upernavik Isstrøm (west Greenland) detected by the combined use of GPS and GRACE

data, *Journal of Geophysical Research: Solid Earth*, 122, 10,626–10,642, doi:10.1002/2017JB014529.

31. **Liu, L.**, Khan, S. A., van Dam, T., Ma, J. H. Y., and Bevis, M. (2017), Annual variations in GPS-measured vertical displacements near Upernavik Isstrøm (Greenland) and contributions from surface mass loading, *Journal of Geophysical Research: Solid Earth*, 122, 677–691, doi:10.1002/2016JB013494.

32. Wang, X.◇, **Liu, L.**, Zhao, L., Wu, T., Li, Z., and Liu, G., (2017), Mapping and inventorying active rock glaciers in the northern Tien Shan of China using satellite SAR interferometry, *The Cryosphere*, 11, 997–1014, doi:10.5194/tc-11-997-2017.

33. Iwahana G., Uchida, M., **Liu, L.**, Gong, W., Meyer, F.J., Guritz, R., Yamanokuchi, T., and Hinzman, L., (2016), Field evidence and InSAR detection of thermokarst after a tundra wildfire, using ALOS-PALSAR, *Remote Sensing*, 8(3), 218, doi:10.3390/rs8030218.

34. Chen, A., Parsekian, A.D., Schaefer, K., Jafarov, E., Panda, S., **Liu, L.**, Zhang, T., and Zebker, H. (2016), Ground-penetrating radar-derived measurements of active-layer thickness on the landscape scale with sparse calibration at Toolik and Happy Valley, Alaska, *Geophysics*, 81(2), H1-H11, doi:0.1190/geo2015-0124.1.

35. **Liu, L.**, Schaefer, K.M., Chen, A.C., Gusmeroli, A., Zebker, H.A., and Zhang, T. (2015), Remote sensing measurements of thermokarst subsidence Using InSAR, *Journal of Geophysical Research: Earth Surface*, 120, 1935–1948, doi:10.1002/2015JF003599.

36. Jones, B. M., Grosse, G., Arp, C.D., Miller, E., **Liu, L.**, Hayes, D.J., and Larsen, C.F. (2015), Recent Arctic tundra fire initiates widespread thermokarst development, *Scientific Reports*, 5:15865, doi:10.1038/srep15865.

37. Schaefer, K., **Liu, L.**, Parsekian, A., Jafarov, E., Chen, A., Zhang, T., Gusmeroli, A., Panda, S., Zebker, H.A., and Schaefer, T. (2015), Remotely Sensed Active Layer Thickness (ReSALT) at Barrow, Alaska using Interferometric Synthetic Aperture Radar, *Remote Sensing*, 7, 3735–3759, doi:10.3390/rs70403735.

38. Gusmeroli, A., **Liu, L.**, Schaefer, K., Zhang, T., Schaefer, T., and Grosse, G. (2015), Active layer stratigraphy and organic layer thickness at a thermokarst site in Arctic Alaska identified using Ground Penetrating Radar, *Arctic Antarctic and Alpine Research*, 47(2), 195–202, doi:10.1657/AAAR00C-13-301.

39. **Liu, L.**, Jafarov, E.E., Schaefer, K.M., Jones, B.M., Zebker, H.A., Williams, C.A., Rogan, J., and Zhang, T. (2014), InSAR detects increase in surface subsidence caused by an Arctic tundra fire, *Geophysical Research Letters*, 41, 3906–3913, doi:10.1002/2014GL060533.

40. **Liu, L.**, Schaefer, K., Gusmeroli, A., Grosse, G., Jones, B. M., Zhang, T., Parsekian, A. D., and Zebker, H. A. (2014), Seasonal thaw settlement at drained thermokarst lake basins, Arctic Alaska, *The Cryosphere*, 8, 815–826, doi:10.5194/tc-8-815-2014.

41. Khan, S. A., Kjær, K. H., Bevis, M., Bamber, J. L., Wahr, J., Kjeldsen, K. K., Bjørk, A. A., Korsgaard, N. J., Stearns, L. A., van den Broeke, M. R., **Liu, L.**, Larsen, N. K., and Muresan, I. S. (2014), Sustained mass loss of the Northeast Greenland ice sheet triggered by regional warming, *Nature Climate Change*, 4, 292–299, doi:10.1038/nclimate2161.

42. Mu. C, Zhang, T., Schuster, P.F., Schaefer, K., Wickland, K.P., Repert, D.A., **Liu, L.**, Schaefer, T., and Cheng, G. (2014), Carbon and geochemical properties of cryosols on the North Slope of Alaska, *Cold Regions Science and Technology*, 100, 59–67, doi:10.1016/j.coldregions.2014.01.001.

43. **Liu, L.**, Millar, C.I., Westfall, R.D., and Zebker, H.A. (2013), Surface motion of active rock glaciers in the Sierra Nevada, California, USA: inventory and a case study using InSAR, *The Cryosphere*, 7, 1109–1119, doi:10.5194/tc-7-1109-2013.

44. Parsekian, A., Grosse, G., Walbrecker, J.O., Müller-Petke, M., Keating, K., **Liu, L.**, Jones, B.M., and Knight, R. (2013), Detecting unfrozen sediments below thermokarst lakes with Surface Nuclear Magnetic Resonance, *Geophysical Research Letters*, 40, 1–6, doi:10.1002/grl.50137.

45. Wahr, J., Khan, S.A., van Dam, T., **Liu, L.**, van Angelen, J.H., van den Broeke, M.R., and Meertens, C.M. (2013), The use of GPS horizontals for loading studies, with applications to northern California and southeast Greenland, *Journal of Geophysical Research: Solid Earth*, 118, 1795–1806, doi:10.1002/jgrb.50104.

46. Nielsen, K., Khan, S.A., Spada, G., Wahr, J., Bevis, M., **Liu, L.**, and van Dam, T. (2013), Vertical and horizontal surface displacements near Jakobshavn Isbræ driven by melt-induced and dynamic ice loss, *Journal of Geophysical Research: Solid Earth*, 118, 1837–1844, doi:10.1002/jgrb.50145.

47. **Liu, L.**, Wahr, J., Howat, I., Khan, S.A., Joughin, I., and Furuya, M. (2012), Constraining ice mass loss from Jakobshavn Isbræ (Greenland) using InSAR-measured crustal uplift, *Geophysical Journal International*, 188: 994–1006, doi:10.1111/j.1365-246X.2011.05317.x.

48. **Liu, L.**, Schaefer, K., Zhang, T., and Wahr, J. (2012), Estimating 1992–2000 average active layer thickness on the Alaskan North Slope from remotely sensed surface subsidence, *Journal of Geophysical Research: Earth Surface*, 117, F01005, doi:10.1029/2011JF002041.

49. **Liu, L.**, Zhang, T., and Wahr, J. (2010), InSAR measurements of surface deformation over permafrost on the North Slope of Alaska, *Journal of Geophysical Research: Earth Surface*, 115, F03023.

50. Khan, S. A., **Liu, L.**, Wahr, J., Howat, I., Joughin, I., van Dam, T., and Fleming, K. (2010), GPS measurements of crustal uplift near Jakobshavn Isbræ due to glacial ice mass loss. *Journal of Geophysical Research: Solid Earth*, 115, B09405, doi:10.1029/2010JB007490.

51. Shen W., **Liu, L.**, and Ning, J. (2007), The inner core's super rotation and its influences on the gravity field, *Chinese Journal of Geophysics* (in Chinese), 50(2), 430–436.

Papers Under Review:

52. Xu, X., **Liu, L.**, Schaefer, K., and Michaelides, R., Comparison of surface subsidence measured by airborne and satellite InSAR over permafrost areas near Yellowknife Canada, *Earth and Space Science*, under review.

53. Ran, J., Ditmar, P., **Liu, L.**, Xiao, Y., Klees, R., and Tang, X., Analysis and mitigation of biases in Greenland ice sheet mass balance trend estimates from GRACE mascon products, *Journal of Geophysical Research*, under review.

54. Zhang, J., **Liu, L.**, Su, L., and Che, T., Three-in-one: GPS-IR measurements of ground surface elevation changes, soil moisture, and snow depth at a permafrost site in the northeastern Qinghai-Tibet Plateau, *The Cryosphere Discussions*, https://doi.org/10.5194/tc-2020-236, under review.

55. Wang, X., **Liu, L.**, Hu, Y., Wu, T., Zhao, L., Liu, Q., Zhang, R., Zhang, B., and Liu, G.: Progressive advance and runout hazard assessment of a low-angle valley glacier in East Kunlun Mountains from multi-sensor satellite imagery analysis, *Natural Hazards and Earth System Sciences Discussions*, https://doi.org/10.5194/nhess-2021-57, under review.

Book chapters:

56. **Liu, L.** (2021), A review of Deep Learning for Cryospheric Studies, in *Deep Learning for the Earth Sciences – A Comprehensive Approach to Remote Sensing, Climate Science and Geosciences*, G. Camps-Valls, D. Tuia, X. X. Zhu, and M. Reichstein, Eds., Wiley & Sons

Published Data Products (selected):

57. Zhang, J. and **Liu, L.** (2020), Reflector heights in the Arctic permafrost areas measured by GNSS interferometric reflectometry, Zenodo, https://doi.org/10.5281/zenodo.4319372

58. Schaefer, K., R.J. Michaelides, R.H. Chen, T.D. Sullivan, A.D. Parsekian, Y. Zhao, K. Bakian-Dogaheh, A. Tabatabaeenejad, M. Moghaddam, J. Chen, A.C. Chen, **L. Liu**, and H.A. Zebker (2020), ABoVE: Active Layer Thickness Derived from Airborne L- and P-band SAR, Alaska, 2017. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1796

59. Zhang, J., **Liu, L.**, Y. Hu (2019), Reflector heights measured by GPS-IR at Alert, Resolute Bay, Repulse Bay, Baker Lake, and Iqaluit in northern Canada. PANGAEA, https://doi.org/10.1594/PANGAEA.904347

60. **Liu, L.**, K. M. Larson (2018), Surface elevation changes near Barrow (Alaska) measured using reflected GPS signals. PANGAEA, https://doi.pangaea.de/10.1594/PANGAEA.885935

61. Hu, Y., **Liu, L.**, K. M. Larson (2018), The decadal reflector heights for SG27 in Barrow, Alaska (2007-2016). PANGAEA, https://doi.pangaea.de/10.1594/PANGAEA.884941

62. Schaefer, K., R.J. Michaelides, R.H. Chen, T. Sullivan, A.D. Parsekian, K. Bakian-dogaheh, A. Tabatabaeenejad, M. Moghaddam, J. Chen, A.C. Chen, **Liu, L.** and H.A. Zebker (2019), ABoVE: Active Layer Thickness Derived from Airborne L- and P-band SAR, Alaska, 2017. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1676

63. Zhang, B., **Liu, L.**, S. A. Khan, T. van Dam, E. Zhang, and Y. Yao (2017), GPS and GRACE inferred uplifts and extracted transient and seasonal signals due to glacial mass change near Upernavik Isstrm, PANGAEA, https://doi.org/10.1594/PANGAEA.880159

64. Wang, X., **Liu, L.**, L. Zhao, T. Wu, Z. Li, and G. Liu (2017), An inventory of active rock glaciers in the northern Tien Shan of China compiled using satellite SAR interferometry, PANGAEA, https://doi.pangaea.de/10.1594/PANGAEA.874616

65. Jafarov, E., A. Parsekian, K. Schaefer, **Liu, L.**, A. Chen, S.K. Panda, and T. Zhang (2016), Pre-ABoVE: Active Layer Thickness and Soil Water Content, Barrow, Alaska, 2013. ORNL DAAC, Oak Ridge, Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/1355

66. Chen, A., A. Parsekian, K. Schaefer, E. Jafarov, S.K. Panda, **Liu, L.**, T. Zhang, and H.A. Zebker. 2015. Pre-ABoVE: Ground-penetrating Radar Measurements of ALT on the Alaska North Slope. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/1265

67. **Liu, L.**, K. Schaefer, A. Chen, A. Gusmeroli, E. Jafarov, S. Panda, A. Parsekian, T. Schaefer, H. A. Zebker, T. Zhang. 2015. Pre-ABoVE: Remotely Sensed Active Layer Thickness, Barrow, Alaska, 2006-2011. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/1266

68. **Liu, L.**, K. Schaefer, A. Chen, A. Gusmeroli, E. Jafarov, S. Panda, A. Parsekian, T. Schaefer, H. A. Zebker, T. Zhang. 2015. Pre-ABoVE: Remotely Sensed Active Layer Thickness, Prudhoe Bay, Alaska, 1992-2000. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/1267

Other Publications (non-peer-reviewed):

69. Panda S., K. Schaefer, **Liu, L.**, E. Jafarov, A. Parsekian, A. Chen, Connecting lake area change, ground subsidence and permafrost carbon dynamics in Prudhoe Bay, *Changing Ice: A Newsletter of Cryosphere Research in Alaska*, December 2015.

70. **Liu, L.** (2015) Melting Glaciers in High Asia and their Impacts on Water Sustainability, *CUHK Sustainable Campus*, No 10, October 2015.

71. Contributing author to Bartsch et al. (2014) Requirements for Monitoring of Permafrost in Polar Regions: A community white paper in response to the WMO Polar Space Task Group.

72. **Liu, L.**, C. Millar, R. Westfall, and H. Zebker (2013), Taking a Census of California Rock Glaciers from Space, *Mountain Views*, Volume 7, No 2, November 2013.

73. **Liu, L.** (2011), Studying changes in the cryosphere using radar interferometry: permafrost surface subsidence and glacial unloading deformation, *PhD thesis*, University of Colorado.

74. **Liu, L.**, T. Zhang, K. Schaefer, and J. Wahr, InSAR Observations Revealed Surface Subsidence Over Permafrost in Northern Alaska, *Alaska Satellite Facility News and Notes*, 2011 Spring Volume.

Active Research Projects

1. DeepThaw: Deep-learning-based mapping of thermokarst landforms on the Tibetan Plateau (PI, Hong Kong Research Grants Council (RGC) General Research Fund) 2020–present

2. GNSS-RECIPE: Global Navigation Satellite System Reflectometry Studies of Elevation Changes in Permafrost Areas (PI, HK RGC General Research Fund) 2019–present

3. Kinematics and dynamics of active rock glaciers in western China (PI, HK RGC General Research Fund) 2018–present

Completed Research Projects

1. Earth observation to investigate the characteristics and changes of the cryosphere in High Mountain Asia (Co-I, NRSCC/ESA Dragon 4 Programme) 2016–2020

2. Investigation of characteristics and mechanism of earthquakes associated with the Hutubi gas reservoir (Co-I with T-f Wong as PI, HK RGC NSFC/RGC Joint Research Scheme) 2016–2019

3. Radar remote sensing investigations on thermokarst dynamics on the Qinghai-Tibet Plateau, China (PI, HK RGC General Research Fund) 2016–2019

4. Mass Balance of Greenland Outlet Glaciers: Non-secular Variations From Space Geodetic Measurements (PI, HK RGC Early Career Scheme Grant) 2015–2018

5. The combined use of L- and P-band radar to retrieve active layer thickness over Arctic permafrost (PI, CUHK Direct Grant for Research) 2017–2018

6. Synergistic investigations of surface deformation in permafrost areas using field and remote sensing observations (Co-PI, Hong Kong RGC Germany/Hong Kong Joint Research Scheme) 2016–2017

7. Radar Remote Sensing and Field Investigation of Permafrost Changes in Svalbard (PI, CUHK Direct Grant for Research) 2014–2015

8. Remotely-Sensed Active Layer Thickness (ReSALT) product derived from InSAR data over North American Arctic regions (Co-I, NASA Terrestrial Ecology Program) 2013–2016

9. Collaborative Research: Exploring the Dynamics of the Active Layer and Near-surface Permafrost across the North Slope of Alaska (Co-I, NSF Arctic Natural Science Program) 2012–2015

Research Students Supervised

CUHK Postgraduates
• Joseph H.Y. Ma, *Understanding temporal changes of glacial dynamics with numerical modeling: A case study of Upernavik Isstrøm, Greenland*, MPhil, 2016, PhD at National University of Singapore
• Lingcao Huang, *Mapping non-lake thermokarst landforms on the Tibetan Plateau using remote sensing and deep learning*, PhD, 2019, now postdoc at University of Colorado at Boulder
• Jie Chen, *Studying permafrost and active layer dynamics in Tibet and Arctic by multi-temporal radar interferometry*, PhD, co-supervised with Hui Lin, 2019, now postdoc at CAS
• Enze Zhang, *Investigating front variations of Greenland glaciers using multi-temporal remote sensing images and deep learning*, PhD, 2020
• Xiyu Chen, *Detecting landscape freeze/thaw onsets and states using active and passive microwave remote sensing data*, PhD, 2021
• Yan Hu, PhD, 2021
• Jiahua Zhang, PhD, 2021
• Xingyu (Carol) Xu, PhD, 2019–
• Billy Ho Ming Tsang, MPhil, 2020–
• Zhuoxuan (Summer) Xia, PhD, 2020–

Postdocs: Bo Hu (2015), Zhiwei Zhou (2016–17), Bao Zhang (2017–18), Guoyan Jiang (2016–19, co-supervising with T-f. Wong), Jiangjun Ran (2018), Lingcao Huang (2020)

CUHK undergraduate capstone projects (48 since 2014)

Visting Students: Enze Zhang (USTC, 2015), Weiyu Zheng (USTC, 2016), Xiaowen Wang (SWJTU, 2016-17), Wanwan Shao (Lanzhou U, 2016), Zhenming Wu (CAS, 2017), Jiahui Wang (USTC, 2017), Yongxin Liu (Wuhan U, 2017), Yufeng Hu (Wuhan U, 2017–18), Weifan Zhou (Jilin U, 2018), Linyang Xin (Wuhan U, 2019), Yidan Ding (Jilin U, 2019), Haoran Wang (Jilin U, 2019)

Stanford SURGE: Elena Baluyut (Saint Louis U), Manuel Pichardo (Utah State U), Chris Cumberbatch (Morehouse College)

University, College, and Department Services at CUHK

Chair, Search committee of assistant professor, Earth System Science	2021
Head, Graduate Division of Earth and Atmospheric Sciences	2020–present
Member, Graduate committee, Graduate Division of Earth and Atmospheric Sciences	2014–2019
Department coordinator, Chung Chi College	2015–present
Institutional representative for CUHK, UNAVCO and WInSAR	2015–present
Member, Expert Committee of the Jockey Club Museum of Climate Change	2019–present
Member, Search committee of assistant and associate professors, Earth System Science	2018
Member, Review panel of Master of Science in GeoInformation Science	2017
Member, Search committee of lecturer, Earth System Science	2015
Library committee, Earth System Science	2014

Professional Services

Reviewer for *Journal of Geophysical Research, Geophysical Research Letters, Earth and Planetary Science Letters, Remote Sensing of Environment, The Cryosphere, Geomorphology, ISPRS Journal of Photogrammetry and Remote Sensing, IEEE Transactions on Geoscience and Remote Sensing, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Soil Science Society of America Journal, Earth Surface Processes and Landforms, Pure and Applied Geophysics, Scientific Reports, IPCC's Special Report on Ocean and Cryosphere in a Changing Climate*, US National Science Foundation, Netherlands Space Office, Hong Kong Research Grants Council, etc.

Editor
• Topic Editor, Novel Remote Sensing Technologies and Applications to Map Regional Permafrost Vulnerability, Frontiers in Big Data   2020–21

Team member
• Joint work group 'Geodesy for the Cryosphere: advancing the use of geodetic data in polar climate modelling', IAG Inter-Commission Committee on Geodesy for Climate Research   2020–present
• International Permafrost Association Action Group 'Rock Glacier Inventories and Kinematics'   2018–
• International Permafrost Association Action Group 'Towards a Permafrost Thaw Subsidence Product within the GTN-P database'   2018–2019
• Vulnerability of Permafrost Carbon Research Coordination Network   2012–present

Scientific committee member for international conferences
• 5th International Workshop on Rock Physics   2019
• The 2nd international conference of Digital Belt and Road (DBAR 2017) & The 3rd international conference on remote sensing applications in tropical and subtropical areas (RSATSA 2017)   2017
• The 3rd International Conference on Sensors and Models in Photogrammetry and Remote Sensing   2015
• The 8th World Chinese Geosciences Congress   2015

Session convener and co-chair for international conferences
• Recent Advances in SAR Technology for Earth Observation   AGU Meeting 2016
• Scientific Exploration of the Earth with Multi-modal Remote Sensing: InSAR and the New Sentinel-3 Mission   AGU Meeting 2015
• Advances in InSAR Data Processing for Earth System Applications   AGU Meeting 2014
• Advances in Geophysical Characterization of Permafrost Systems   AGU Meeting 2013

Judge for the Outstanding Student Paper Awards   AGU Fall Meetings 2011–2016, 2019

Member of thesis committee

• Zhouyi Zhao, PhD, CUHK	2021
• Wei Lun Alan LIM, PhD, CUHK (Chair)	2021
• Shihan Sun, PhD, CUHK (Chair)	2020
• LAM Hoi Ki, MPhil, CUHK (Chair)	2020
• WONG Yat Chun, MPhil, CUHK (Chair)	2020
• Xueying Liu, PhD, CUHK (Chair)	2020
• Pengcheng Zhou, PhD, CUHK	2020
• Gaohua Zhu, PhD, CUHK	2020
• Xingfu Li, MPhil, CUHK	2020
• LEE Hing Bun, Martin, MPhil, CUHK	2019
• Ka Ming Fung, PhD, CUHK (Chair)	2019
• Tanghua Li, PhD, University of Hong Kong	2018
• Bing He, MPhil, CUHK	2017
• Xiaowen Wang, PhD, Southwest Jiaotong University	2017
• Keren Dai, PhD, Southwest Jiaotong University	2017

Outreach Activities

Exhibition on permafrost carbon feedbacks, Jockey Club Museum of Climate Change	2017–present
Discussion panelist, public screening of 'Ice and the sky'	2015
Public talk on the Arctic	2014–2017

• Hong Kong Jockey Club Museum of Climate Change
• 13th Lau Oi Wah Memorial Science Lecture Series
• CUHK Knowledge Enrichment Programme for Secondary School Students

Interview with *Hong Kong Economic Journal* on Greenland and cryospheric studies	2020
Interview with *Radio and Television Hong Kong* on global climate change	2014
Interview with *Headline Daily* on Greenland and sea level change	2014

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