

Song Shu

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RESEARCH INTERESTS

- Remote sensing, Satellite radar and laser altimetry, Lidar, hyperspectral image analysis
- Arctic lakes, snow accumulation, lake and river hydrology, water resources
- Cryosphere, global climate change, urbanization

EDUCATION

2013 – 2019	Ph.D. in Department of Geography & GIScience, University of Cincinnati (UC), USA
2010 – 2013	M.S. in Department of Geography, East China Normal University (ECNU), China
2006 – 2010	B. S. in Department of Geography, East China Normal University (ECNU), China

EMPLOYMENT

08/2019 - present	Assistant Professor, Department of Geography and Planning, Appalachian State University
08/2018 – 08/2019	Adjunct Instructor, Department of Geography & GIScience, University of Cincinnati
01/2018 – 05/2018	Adjunct Instructor, Department of History & Geography, Northern Kentucky University
05/2017 – 01/2018	Research Assistant, Department of Geography & GIScience, University of Cincinnati
08/2013 – 05/2016	Teaching Assistant, Department of Geography & GIScience, University of Cincinnati
09/2010 – 06/2013	Teaching Assistant, Department of Geography, East China Normal University

PUBLICATIONS

Peer-reviewed articles

1. Xu, M., Liu, H., Beck, R., Lekki, J., Yang, B., **Shu, S.**, Liu, Y., Benko, T., Anderson, R., Tokars, R., Johansen, R., Emery, E., & Reif, M. (2019). Regionally and Locally Adaptive Models for Retrieving Chlorophyll-a Concentration in Inland Waters From Remotely Sensed Multispectral and Hyperspectral Imagery. *IEEE Transactions on Geoscience and Remote Sensing*, 1-17 (IF: 5.63)
2. Chen, H., Huang, Y., Wang, S., **Shu, S.**, Yu, B., & Wu, J. (2019). Vertical Accuracy Analysis of ASTER GDEM V2 in Byrd Glacier, Antarctica. *Journal of Remote Sensing*. (In Chinese) (IF:1.23) (Accepted, forthcoming).
3. Xu, M., Liu, H., Beck, R., Lekki, J., Yang, B., **Shu, S.**, Kang, E.L., Anderson, R., Johansen, R., Emery, E.,

- Reif, M., & Benko, T. (2019). A spectral space partition guided ensemble method for retrieving chlorophyll-a concentration in inland waters from Sentinel-2A satellite imagery. *Journal of Great Lakes Research*, 45, 454-465 (IF:2.18)
4. **Shu, S.**, Liu, H., Frappart, F., Huang, Y., Wang, S., Hinkel, K.M., Beck, R.A., Yu, B., Jones, B.M., Arp, C.D., Wang, L., & Ye, Z. (2018). Estimation of snow accumulation over frozen Arctic lakes using repeat ICESat laser altimetry observations – A case study in northern Alaska. *Remote Sensing of Environment*, 216, 529-543 (IF: 8.22)
 5. Ye, Z., Liu, H., Chen, Y., **Shu, S.**, Wu, Q., & Wang, S. (2017). Analysis of water level variation of lakes and reservoirs in Xinjiang, China using ICESat laser altimetry data (2003–2009). *PLoS ONE*, 12(9). doi: 10.1371/journal.pone.0183800 (IF: 2.77)
 6. Wang, L., Liu, H., Wang, S., & **Shu, S.** (2015). “Antarctica 2013/2014 Seasonal melt extent and duration [in *.State of the Climate in 2014.*]”. *Bulletin of the American Meteorological Society (BAMS)*, 95(7): S149-S150. (IF: 7.93)
 7. Yu, B., **Shu, S.**, Liu, H., Wu, J., & Chen, Z. (2014). Object-based Spatial Cluster Analysis of Urban Landscape Pattern Using Nighttime Light Satellite Images: A Case Study of China, *International Journal of Geographical Information Science*, 28(11), 2328-2355. (IF: 2.50)
 8. **Shu, S.**, Yu, B., Wu, J., & Liu, H. (2011). “Methods for Deriving Urban Built-up Area Using Night-light Data: Assessment and Application”, *Remote Sensing Technology and Application*. 26(2), 169-176. (CSCD, In Chinese) (IF: 1.19)
 9. Wu, B., Yu, B., Yue, W., **Shu, S.**, Tan, W., Hu, C., Huang, Y., Wu, J., & Liu, H. (2013). “A Voxel-Based Method for Automated Identification and Morphological Parameters Estimation of Individual Street Trees from Mobile Laser Scanning Data”, *Remote Sensing*, 5(2), 584-611. (IF: 4.12)
 10. Hu, Z., Wu, J., Wu, B., **Shu, S.**, & Yu, B. (2012). Simulating and mapping the variations of solar radiation at the Lujiazui region of Shanghai using Airborne LiDAR data. In, *Key Engineering Materials* (pp. 511-516) (IF: 0.39)
 11. Beck, R., Xu, M., Zhan, S., Johansen, R., Liu, H., Tong, S., Yang, B., **Shu, S.**, Wu, Q., Wang, S., Berling, K., Murray, A., Emery, E., Reif, M., Harwood, J., Young, J., Nietch, C., Macke, D., Martin, M., Stillings, G., Stumpf, R., Su, H., Ye, Z., & Huang, Y. (2019). Comparison of satellite reflectance algorithms for estimating turbidity and cyanobacterial concentrations in productive freshwaters using hyperspectral aircraft imagery and dense coincident surface observations. *Journal of Great Lakes Research*, 45, 413-433 (IF:2.18)
 12. Johansen, R., Beck, R., Nowosad, J., Nietch, C., Xu, M., **Shu, S.**, Yang, B., Liu, H., Emery, E., Reif, M., Harwood, J., Young, J., Macke, D., Martin, M., Stillings, G., Stumpf, R., & Su, H. (2018). Evaluating the portability of satellite derived chlorophyll-a algorithms for temperate inland lakes using airborne hyperspectral imagery and dense surface observations. *Harmful Algae*, 76, 35-46 (IF: 5.01)
 13. Beck, R., Xu, M., Zhan, S., Liu, H., Johansen, R.A., Tong, S., Yang, B., **Shu, S.**, Wu, Q., Wang, S., Berling, K., Murray, A., Emery, E., Reif, M., Harwood, J., Young, J., Martin, M., Stillings, G., Stumpf, R., Su, H., Ye, Z., & Huang, Y. (2017). Comparison of satellite reflectance algorithms for estimating phycocyanin values and cyanobacterial total biovolume in a temperate reservoir using coincident hyperspectral aircraft

imagery and dense coincident surface observations. *Remote Sensing*, 9 (IF: 4.12)

14. Beck, R., Zhan, S., Liu, H., Tong, S., Yang, B., Xu, M., Ye, Z., Huang, Y., **Shu, S.**, Wu, Q., Wang, S., Berling, K., Murray, A., Emery, E., Reif, M., Harwood, J., Young, J., Nietch, C., Macke, D., Martin, M., Stillings, G., Stump, R., & Su, H. (2016). Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations. *Remote Sensing of Environment*, 178, 15-30 (IF: 8.22)

Articles in Review

1. **Shu, S.**, Liu, H., Frappart, F., & Kang, E.L. (2019). “Improving Satellite Waveform Altimetry Measurements with a Probabilistic Relaxation Algorithm”, *IEEE Transactions on Geoscience and Remote Sensing* (in review with major revision) (IF: 5.63)
2. **Shu, S.**, Liu, H., & Frappart, F. (2018). “Analysis of Sentinel-3 SAR Altimetry Waveform Retracking Algorithms for Deriving Temporally Consistent Water Levels on Inland Lakes”, *Remote Sensing of Environment* (in review) (IF: 8.22)
3. Wang, S., Liu, H., Jezek, K.C., Yu, B., Wang, L., Huang, Y., **Shu, S.**, Beck, R., & Ward, D. (2018). “Ice-shelf disintegration: instability development revealed by a half-century ice velocity record”, *Nature Climate Change* (in review) (IF: 19.30)
4. Wang, S., Liu, H., **Shu, S.**, & Wu, Q., (2018). “Investigation of the multidecadal changes of the Larsen B outlet glaciers by integrating multi-source satellite and airborne remote sensing data”, *Remote Sensing of Environment* (in review) (IF: 8.22)
5. Yang, B., Liu, H., Kang, E.L., & **Shu, S.** (2018). “Spatio-temporal Cokriging Method for Assimilating and Downscaling Multi-scale Remote Sensing Data”, *IEEE Transactions on Geoscience and Remote Sensing* (in review) (IF: 5.63)

Articles in Preparation

1. **Shu, S.**, Liu, H., & Frappart, F. (2018). “Retrieval of Long-term Water Levels for Seasonally-frozen Lakes using Multi-mission Radar Altimetry Observations”, to be submitted to *Hydrology and Earth System Sciences* (IF: 4.94)
2. Wang, S., **Shu, S.** (Corresponding Author), Liu, H. (2018). “Dynamic Thinning of the Ice Shelves on West Antarctic Peninsula revealed by Sentinel-3 SAR Altimetry”, to be submitted to *Geophysical Research Letter* (4.34)

CONFERENCE PAPERS AND PRESENTATIONS

1. **Shu, S.**, & Liu, H. (2018). “Waveform Analysis of Sentinel-3 SAR Altimetry in the Retrieval of Water Levels over Seasonally-frozen Lakes”, AAG Annual Meeting 2018, New Orleans, Louisiana, USA, April, 2018.
2. **Shu, S.**, Liu, H., & Frappart, F., (2017). “Improving Satellite Waveform Altimetry Measurements with a

- Probabilistic Relaxation Algorithm*”, AAG Annual Meeting, Boston, USA, April, 2017.
3. **Shu, S.** (2017) The Department of Geography Colloquium, “*Estimation of the Arctic Snow Depth using Satellite Laser Altimetry Observations*”, University of Cincinnati, Ohio, USA, February, 2017.
 4. **Shu, S.**, Liu, H., Frappart, F., Kang, L.E., Wang, L., & Hinkel, K.M. (2016). “*Improving ICESat-1 Altimetric Measurements Using Probabilistic Relaxation Algorithm*”, AAG Annual Meeting 2016, San Francisco, California, USA, April, 2016.
 5. **Shu, S.**, Liu, H., Hinkel, K.M., Beck, R.A., Wang, L., Jones, B.M., Ye, Z., & Yu, B. (2015). “*Snow Depth and Lake Elevation Variability of Alaskan Arctic Coastal Plain Derived from ICESat-1 Laser Altimetry*”, AAG Annual Meeting, Chicago, Illinois, USA, April, 2015. (**Winner, first Place**)
 6. **Shu, S.**, Liu, H., Hinkel, K.M., Beck, R.A., & Wang, L. (2014). “*Spatio-temporal Variability of Ice and Snow Surface Elevation in Alaskan Arctic Lakes from ICESat Altimetry Observations, 2003-2009*”, AAG Annual Meeting, Tampa, Florida, USA, April, 2014.
 7. Liu, H., Yang, B., & **Shu, S.** (2013). “*Spatio-temporal analysis of surface temperature and water level variability of thermokarst lakes on the Arctic Coastal Plain of northern Alaska using multiscale satellite thermal images and ICESat laser altimetry*”, AGU Annual Meeting, San Francisco, USA, December, 2013.
 8. **Shu, S.**, Yu, B., Liu, H., & Wu, J., (2012). “*Object-based Spatial Cluster Analysis of Urban Landscape Pattern Using Nighttime Light Satellite Images: A Case Study of China*”, AAG Annual Meeting, New York, USA, February, 2012.

AWARDS AND HONORS

- 04/2018 **The Robert Bruce McNea Award for Outstanding Academic Achievements** in Department of Geography and Geographic Information Science, University of Cincinnati
- 04/2017 **Finalist of Student Paper Competition** in AAG Remote Sensing Specialty Group, “*Improving Satellite Waveform Altimetry Measurements with a Probabilistic Relaxation Algorithm*”, AAG Annual Meeting 2017, Boston, U.S.
- 2016 – 2017 **Graduate School Dean’s Fellowship**, University of Cincinnati
- 04/2015 **First Place Award** in R.S. Tarr Student Illustrated Paper Competition in AAG Cryosphere Specialty Group, “*Snow Depth and Lake Elevation Variability of Alaskan Arctic Coastal Plain Derived from ICESat-1 Laser Altimetry*”, AAG Annual Meeting 2015, Chicago, Illinois, U.S.
- 06/2013 Shanghai Outstanding Graduate Student Award
- 02/2012 **Third Place Award** in AAG GIS Specialty Group, “*Object-based Spatial Cluster Analysis of Urban Landscape Pattern Using Nighttime Light Satellite Images: A Case Study of China*”, AAG Annual Meeting 2012, New York, U.S.
- 2012 Excellent Student Award of East China Normal University

- 2012 “Wisdom” Scholarship for excellent graduate students in East China Normal University
- 2011 Excellent Student Award in Department of Geography, East China Normal University
- 2008 Excellent Student Award of East China Normal University
- 2008 Second-level Outstanding Scholarship of East China Normal University
- 2007 Third-level Outstanding Scholarship of East China Normal University

RESEARCH EXPERIENCE

University of Cincinnati

Advisor: *Prof. Hongxing Liu*

- 05/2017 – 01/2018 **Research Assistant** for the NASA project “*Algorithm development and comparison for deriving water quality parameters for inland lakes and rivers from multispectral and hyperspectral images*”
- 05/2016 – 10/2016
- 04/2017 – 06/2017 **Research Assistant** for the USDA project “*Application of Airborne LiDAR Remote Sensing of Forest Canopy Structure and Fragmentation with Oil/Gas development in the Appalachian Region*”
- 05/2015 – 08/2015 **Research Assistant** for the NSF project “*Toward a Circumarctic Lakes Observation Network (CALON): Multiscale observations of lacustrine systems*”
- 05/2014 – 08/2014

East China Normal University

Advisor: *Prof. Bailang Yu*

- 05/2012 – 06/2013 **Research Assistant** for the project “*Spatio-temporal analysis of urban clusters in the Yangtze River Delta using nighttime light data and object-based method.*”
- 01/2011 – 01/2012 **Research Assistant** for the project “*Geographic Information System of Monitoring and Controlling the Gasoline Evaporation in Typical Cities of China.*”
- 01/2011 – 06/2012 **Research Assistant** for the project “*Identification and morphological parameters estimation of individual street trees from Vehicle-borne Laser Scanning data.*”

TEACHING EXPERIENCE

Appalachian State University

- 08/2019 – 12/2019 **Instructor** for “Environmental Remote Sensing”
- Instructor** for “Introduction to GIS”

Northern Kentucky University

- 01/2018 – 05/2018 **Instructor** for “Introduction to Remote Sensing”

University of Cincinnati

06/2019 – 08/2019	Instructor for online course “Natural Disasters and Hazards”
05/2019 – 06/2019	Instructor for online course “Earth from Space”
08/2018 – 12/2018	Instructor for “Advanced GIS”
06/2018 – 07/2018	Instructor for online course “Natural Hazards and Disasters”
05/2018 – 06/2018	Instructor for online course “Introduction to GIS”
06/2017 – 07/2017	Instructor for online course “Natural Hazards and Disasters”
01/2017 – 05/2017	Teaching Assistant for “Natural Hazards and Disasters”
07/2016 – 08/2016	Instructor for online course “Natural Hazards and Disasters”
01/2016 – 05/2016	Teaching Assistant for “Spatial Statistics II”
08/2015 – 12/2015	Teaching Assistant for “Advanced GIS”
01/2015 – 05/2015	Teaching Assistant for “Spatial Statistics II”
08/2014 – 12/2014	Teaching Assistant for Advanced Environmental Geography
01/2014 – 05/2014	Teaching Assistant for “People and Environment II”
09/2013 – 12/2013	Teaching Assistant for “Computer Cartography”

East China Normal University

09/2011 – 01/2012	Teaching Assistant for “Geographic Information System Development”
02/2011 – 07/2011	Teaching Assistant for “Introduction to GIS”

TECHNICAL SKILLS

Programming skills

- **Proficient in C#, Matlab, VB.NET, C++, R, SAS, ArcObjects, Python, ENVI IDL**

Software skills

- **Skillful in ERSI ArcGIS, ArcGIS server, ENVI, eCognition, SPSS, SAS**