Kel N. Markert

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EDUCATION

PhD: Civil Engineering (hydrology)   Expected Apr. 2024
Department of Civil and Construction Engineering, Brigham Young University Provo, UT, USA

MBA: Technology & Innovation Management   Dec. 2020
College of Business, University of Alabama in Huntsville, Huntsville, AL, USA

M.S: Earth System Science   Dec. 2016
Atmospheric Science Department, University of Alabama in Huntsville, Huntsville, AL, USA
   Thesis: Investigation into the effects of climate variability and land cover change on the
   hydrologic system of the Lower Mekong Basin
   Advisor: Dr. Robert Griffin

B.S. (Cum Laude): Earth System Science   May 2014
Atmospheric Science Department, University of Alabama in Huntsville, Huntsville, AL, USA

PROFESSIONAL EXPERIENCE

Cloud Geographer   Apr. 2022-present
Google, Mountain View, CA, USA
   Work with Public Sector agencies to help them successfully leverage Google's Geospatial services in their
   operations. Help prospective customers and partners to understand the power of Google Earth Engine and
   Google Maps APIs and related offerings. Maintain technical relationships and serve as the customer's
   advocate within Google, file feature requests, and conduct regular best practice reviews.

Research Scientist   Aug. 2017-Apr. 2022
Earth System Science Center, University of Alabama in Huntsville, Huntsville, AL, USA
   Support the NASA-SERVIR program as the Water Thematic Lead and Science-GIT integration Lead.
   Main roles include the science coordination, product development, and technical backstopping for all
   global SERVIR water resource application related activities. Also, help support SERVIR's water-related
   disaster application portfolio. Help define science needs for Geospatial Information Technology (GIT)
   product development and also assist in geospatial product and application development for science needs.

Part-time Lecturer   Jan. 2017-May 2018
Atmospheric Science Department, University of Alabama in Huntsville, Huntsville, AL, USA
   Support the teaching of introductory GIS/remote sensing and Python programming for Earth science
   applications at the Atmospheric Science Department at the University of Alabama in Huntsville.

Research Associate   Apr. 2016-Aug. 2017
Earth System Science Center, University of Alabama in Huntsville, Huntsville, AL, USA

Supported the NASA-SERVIR program as the SERVIR-Mekong Regional Science Associate. Main roles included the science coordination, product development, and technical backstopping for the SERVIR program's Mekong hub. Also, helped support SERVIR's global water and water-related disaster application portfolio and the Geospatial Information Technology (GIT) product development.

Graduate Research Assistant   2014-2016
Atmospheric Science Department, University of Alabama in Huntsville, Huntsville, AL, USA
        Supported the NASA-SERVIR program with the operations of the ISERV sensor.

RESEARCH INTERESTS

- Satellite remote sensing of land surface
- Land surface hydrology

- Disaster applications
- Cloud computing
- Machine learning for Earth science

AWARDS / ACCOMPLISHMENTS

- *SERVIR Excellence Award (2018):* For providing outstanding leadership, bringing the science and geospatial technology efforts together across the entire SERVIR network
- *SERVIR Collaboration Award (2018):* For successfully improving and expanding the Regional Land Cover Monitoring System (RLCMS) throughout the Lower Mekong and Hindu Kush-Himalaya regions, in a way that transforms access and analytical ability for land cover monitoring
- *NASA Agency Group Achievement Award (2018):* For outstanding technical support in disaster monitoring and response for Hurricane Harvey
- *NASA MSFC Science and Technology Office Peer Award (2018):* "Pounding the Pavement", For extreme dedication in providing science and GIT support to the SERVIR network
- *NASA Group Achievement Award (2016):* For outstanding contributions to the disaster response efforts for the 2015 Nepal earthquake through the acquisition, analysis, and distribution of satellite observations
- *UAH Earth System Science Graduate Researcher Award (2015):* Development and implementation of the ISERV Cloud Forecasting System

PUBLICATIONS / REPORTS

Peer-reviewed

Tottrup, C., Druce, D., Meyer, R. P., Christensen, M., Riffler, M., Dulleck, B., ... **Markert, K.** & Paganini, M. (2022). Surface Water Dynamics from Space: A Round Robin Intercomparison of Using Optical and SAR High-Resolution Satellite Observations for Regional Surface Water Detection. Remote Sensing, 14(10), 2410. https://doi.org/10.3390/rs14102410

Mayer, T., Poortinga, A., Bhandari, B., Nicolau, A. P., **Markert, K.**, Thwal, N. S., et al. (2021). Deep learning approach for Sentinel-1 surface water mapping leveraging Google Earth

Engine. ISPRS Open Journal of Photogrammetry and Remote Sensing, 2, 100005. https://doi.org/10.1016/j.ophoto.2021.100005

Poortinga, A., Thwal, N. S., Khanal, N., Mayer, T., Bhandari, B., **Markert, K.**, et al. (2021). Mapping sugarcane in Thailand using transfer learning, a lightweight convolutional neural network, NICFI high resolution satellite imagery and Google Earth Engine. ISPRS Open Journal of Photogrammetry and Remote Sensing, 1, 100003. https://doi.org/10.1016/j.ophoto.2021.100003

Mishra, V., Limaye, A. S., Muench, R. E., Cherrington, E. A., & **Markert, K. N.** (2020). Evaluating the performance of high-resolution satellite imagery in detecting ephemeral water bodies over West Africa. International Journal of Applied Earth Observation and Geoinformation, 93, 102218. https://doi.org/10.1016/j.jag.2020.102218

Miller, S. E., Adams, E. C., **Markert, K. N.**, Ndungu, L., Ellenburg, W. L., Anderson, E. R., ... & Irwin, D. (2020). Assessment of a spatially and temporally consistent MODIS derived NDVI product for application in index-based drought insurance. Remote Sensing, 12(18), 3031. https://doi.org/10.3390/rs12183031

Markert, K. N., Markert, A. M., Mayer, T., Nauman, C., Haag, A., Poortinga, A., ... & Saah, D. (2020). Comparing sentinel-1 surface water mapping algorithms and radiometric terrain correction processing in southeast asia utilizing google earth engine. Remote Sensing, 12(15), 2469. https://doi.org/10.3390/rs12152469

Cherrington, E. A., Griffin, R. E., Anderson, E. R., Sandoval, B. E. H., Flores-Anderson, A. I., Muench, R. E., **Markert K. N.** ... & Irwin, D. E. (2020). Use of public Earth observation data for tracking progress in sustainable management of coastal forest ecosystems in Belize, Central America. Remote Sensing of Environment, 245, 111798. https://doi.org/10.1016/j.rse.2020.111798

Mishra, V., Ellenburg, W. L., **Markert, K. N.**, & Limaye, A. S. (2020). Performance evaluation of soil moisture profile estimation through entropy-based and exponential filter models. Hydrological Sciences Journal, 65(6), 1036-1048. https://doi.org/10.1080/02626667.2020.1730846

Saah, D., Tenneson, K., Poortinga, A., Nguyen, Q., Chishtie, F., San Aung, K., **Markert, K. N.** ... & Ganz, D. (2020). Primitives as building blocks for constructing land cover maps. International Journal of Applied Earth Observation and Geoinformation, 85, 101979. https://doi.org/10.1016/j.jag.2019.101979

Phongsapan, K., Chishtie, F., Poortinga, A., Bhandari, B., Meechaiya, C., Kunlamai, T., ... **Markert K.N.**, … & Towashiraporn, P. (2019). Operational flood risk index mapping for disaster risk reduction using Earth Observations and cloud computing technologies: a case study on Myanmar. Frontiers in Environmental Science, 7, 191. https://doi.org/10.3389/fenvs.2019.00191

Saah, D., Tenneson, K., Matin, M., Uddin, K., Cutter, P., Poortinga, A., …, **Markert K.**, … & Chishtie, F. (2019). Land cover mapping in data scarce environments: challenges and opportunities. Frontiers in Environmental Science, 7, 150. https://doi.org/10.3389/fenvs.2019.00150

Nelson, E. J., Pulla, S. T., Matin, M. A., Shakya, K., Jones, N., Ames, D. P., …, **Markert K. N.**, … & Hales, R. (2019). Enabling stakeholder decision-making with Earth observation and modeling data using Tethys platform. Frontiers in Environmental Science, 7, 148. https://doi.org/10.3389/fenvs.2019.00148

Saah, D., Johnson, G., Ashmall, B., Tondapu G., Tenneson, K., Patterson, M., Poortinga, A., **Markert, K.**, Quyen, N.H., Aung, K.S., Schlichting L., Matin, M., Uddin K., Aryal R.R., Dilger J., Ellenburg W.L., Flores-Anderson, A.I., Wiell, D., Lindquist E., Goldstein, J., Clinton, N. and Chishtie, F. (2019) Collect Earth: An online tool for systematic reference data collection in land cover and use applications, *Environ. Modell. Softw.,* 118, 166-171, https://doi.org/10.1016/j.envsoft.2019.05.004.

Markert, K.N., Pulla, S.T., Lee, H., Markert, A.M., Anderson, E.R., Okeowo, M.A., Limaye, A.S. (2019), AltEx: An open source web application and toolkit for accessing and exploring altimetry datasets. *Environ. Modell. Softw.*, 117, 164-175, https://doi.org/10.1016/j.envsoft.2019.03.021.

Markert, K.N (2019) cartoee: Publication quality maps using Earth Engine. *Journal of Open Source Software*, 4(33), 1207, https://doi.org/10.21105/joss.01207.

Markert, K.N., Schmidt, C.M., Griffin, R.E., Flores, A.I., Poortinga, A., Saah, D.S., Muench, R.E., Clinton, N.E., Chishtie, F., Kityuttachai, K., Someth, P., Anderson, E.R., Aekakkararungroj, A., and Ganz, D.J. (2018), Historical and Operational Monitoring of Suspended Sediment in the Lower Mekong Basin using Landsat and Google Earth Engine Cloud Computing. *Remote Sens.*, 10(6), 909, https://doi.org/10.3390/rs10060909.

Poortinga, A., Clinton, N., Saah, D.; Cutter, P., Chishtie, F., **Markert, K.N.**, Anderson, E.R., Troy, A., Fenn, M.; Tran, L.H., Bean, B., Nguyen, Q., Bhandari, B., Johnson, G., and Towashiraporn, P. (2018), An operational Before-After-Control-Impact (BACI) designed platform for vegetation monitoring at planetary scale, *Remote Sens.,* 10(5), 760*,* https://doi.org/10.3390/rs10050760.

Markert, K.N., Chishtie, F., Anderson, E.R., Saah, D., and Griffin, R.E. (2018), On the merging of optical and SAR satellite imagery for surface water mapping applications. *Results Phys.*, 9, pp.275-277, https://doi.org/10.1016/j.rinp.2018.02.054.

Book Chapters

Markert, K.N., Griffin, R.E., Limaye, A.S. and McNider, R.T. (2018), Spatial Modeling of Land Cover/Land Use Change and Its Effects on Hydrology Within the Lower Mekong Basin. In Vadrevu K.P., Ohara T., and Justice C. (Eds). *Land Atmospheric Research Applications in Asia.* Springer Verlag. (ISBN: 978-3-319-67473-5). pp.667-698, https://doi.org/10.1007/978-3-319-67474-2_29.

Scientific Reports/Proceedings

Bugbee, K., Ramachandran, R., Maskey, M., Barciauskas, A., Kaulfus, A., ... **Markert, K.** & Lynnes, C. (2020, September). Advancing Open Science Through Innovative Data System Solutions: The Joint ESA-NASA Multi-Mission Algorithm and Analysis Platform (MAAP)'s Data Ecosystem. In IGARSS 2020-2020 IEEE international

geoscience and Remote sensing symposium (pp. 3097-3100). IEEE. https://doi.org/10.1109/IGARSS39084.2020.9323731

Markert, K.N., P. Shrestha, Tenzin, B. Tiwari, K. Gaden, N. Dorji, J. Kayitare, M. Muhire, (2014), Using NASA EOS to assess the availability of water supply and/or agriculture in Bhutan and Nepal. Report submitted to NASA DEVLEOP National Program Office, NASA Applied Science Division.

Markert, K.N., A. Weigel, J. Kayitare, T. Reeves, (2013), Using NASA Earth Observations to Model Representative Species Distribution in the Cumberland Plateau to Aide in Conservation Efforts. Report submitted to NASA DEVLEOP National Program Office, NASA Applied Science Division.

Markert, K.N., N. Paudel, P. Narenpitak, S. Sarker, L. Farhana, R. Rimal, (2013), Utilizing NASA Earth Observations and Remote Sensing Techniques to Monitor Possible Threats to Protected Areas for Decision Support in Chittagong Hill Tracts, Bangladesh. Report submitted to NASA DEVLEOP National Program Office, NASA Applied Science Division.

PRESENTATIONS

Invited Presentations

Markert, K.N., Pulla, S.T., Limaye, A., Lee, H., Saah, D., Poortinga, A., Jayasinghe, S., Mithieu, F., Meechaiya, C., Sarr, A., Markert, A. M., Anderson, E.R., Chishtie, F. (2018) Towards democratization of water related data in developing regions using cloud computing and open source geospatial web applications. American Geophysical Union, Washington, D.C., USA

Anderson, E.R., Griffin, R.E., **Markert, K.N.** (2017) Advancing the citizen scientist's contributions to documenting and understanding natural hazards: a proof of concept for linking crowdsourced and remotely sensed data on landslide hazards in El Salvador, American Geophysical Union, New Orleans, LA, USA

Markert, K.N., Searby, N., Irwin, D., Limaye, A., Childs-Gleason, L., Prados, A., Doorn, B. (2017) Monitoring Water Resources from Space –The NASA Water Resources Program, UNESCO Water Security Forum, Paris, France

Markert, K.N., (2016), Remote Sensing of Suspended Sediments. University of Alabama in Huntsville ESS 690 (Hydrology) course, Huntsville, AL, USA

Markert, K.N., (2015), Atmospheric Correction of Remotely Sensed Datasets using Python. University of Alabama in Huntsville ESS 508 (Python for ESS Applications), Huntsville, AL, USA

Markert, K.N., (2015), Geoprocessing using Python. Global Hydrology Resource Center GIS Workshop, Huntsville, AL, USA

Conference Presentations

Markert, A.M., **Markert, K.N.,** Chistie, F., Haag, A., Poortinga, A., Oddo, P., Anderson, E.R., Saah, D. , Bolten, J.(2018) Water we going to do with all these data? Service development using interdisciplinary data for flood applications. American Geophysical Union, Washington, D.C., USA

Markert, K.N., Limaye, A., Rushi, B., Adams, E.C., Anderson, E.R., Ellenburg, W.L., Mithieu, F., Griffin, R.E. (2017) A Multi-Tiered Approach for Building Capacity in Hydrologic Modeling for Water Resource Management in Developing Regions, American, Geophysical Union, New Orleans, LA, USA

Markert, K.N., Ashmall, W., Johnson, G., Saah, D.S., Anderson, E.R., Flores, A.I., Diaz, A.S., Mollicone, D., Griffin, R.E. (2017) GeoDash: Assisting Visual Image Interpretation in Collect Earth Online by Leveraging Big Data on Google Earth Engine, American Geophysical Union, New Orleans, LA, USA

Markert, K.N., Griffin, R.E., Limaye, A., McNider, R.T, Anderson, E.R. (2016) Investigation into the effects of climate variability and land cover change on the hydrologic system of the Lower Mekong Basin, American Geophysical Union, San Francisco, CA, USA

Markert K.N., R. Griffin, (2015), Agent-Based Modeling of Fish Population Dynamics in the Lower Mekong River: Implications of Dams to Fish Habitat Selection, Population Grow Rates, and Reproductive Success of River Carp. Association of American Geographers, Chicago, IL, USA

Markert K.N., N. Paudel, P. Narenpitak, S. Sarker, L. Farhana, R. Rimal, (2014), NASA Earth Observing Application to Monitoring Threats to Protected Areas in Chittagong Hill Tracts, Bangladesh. American Society of Photogrammetry and Remote Sensing, Louisville, KY, USA

Markert, K., N. Paudel, P. Narenpitak, S. Sarker, L. Farhana, R. Rimal, (2013), Utilizing NASA Earth Observations and Remote Sensing Techniques to Monitor Possible Threats to Protected Areas for Decision Support in Chittagong Hill Tracts, Bangladesh. NASA Applied Science Showcase, NASA Headquarters, Washington D.C., USA

CLASSES TAUGHT / TRAININGS

BYU, Civil Engineering 594R – Remote sensing for engineers

UAH, Earth System Science 313 – Geographic Information Systems

UAH, Earth System Science 408/508 – Python for GIS

South-Southeast Asia Research Initiative – Python for Earth System Science (https://github.com/KMarkert/sari-python-training)

NASA Applied Remote Sensing Training - Using the VIC Hydrologic Model with NASA Earth Observations (https://arset.gsfc.nasa.gov/water/webinars/VIC18)

SERVICE

Journal Review
Journal: Remote Sensing of Environment, Publisher: Elsevier; Journal: Remote Sensing, Publisher: MDPI; Journal: Hydrology, Publisher: MDPI; Journal: Journal of Water Resources and Protection, Publisher: SCIRP

DEVELOP program Project Science Advisor   2015-2017
NASA-SERVIR/NASA DEVELOP National Program/MSFC, Huntsville, AL, USA

User Working Group Member   2014-2016
Global Hydrology Resource Center, NASA/MSFC, Huntsville, AL, USA

PROFESSIONAL MEMBERSHIPS

- American Geophysical Union (2016-Present)

SCIENTIFIC SOFTWARE

- Forecasting of Inundation Extents using REOF: https://github.com/servir/fierpy
- Hydrologic Remote Sensing Analysis for Floods:
  https://github.com/servir-mekong/hydra-floods
- cartoee: Publication Quality Maps using Google Earth Engine:
  https://github.com/kmarkert/cartoee