

Konstantinos **Andreadis**

Assistant Professor

+1 413 545 5395 @ kandread@umass.edu

18C Marston Hall, 130 Natural Resources Rd, Amherst, MA 01003, USA

My research has primarily focused on the intersection between applied hydrologic modeling and remote sensing and in-situ observations, data assimilation, as well as the study of large-scale hydrology as it relates to climate change and environmental monitoring.

Education

- 2009 **Ph.D., Civil and Environmental Engineering, University of Washington**, Seattle, WA, USA (A remote sensing data assimilation system for cold land processes hydrologic estimation)
- 2004 **M.S.E., Civil and Environmental Engineering, University of Washington**, Seattle, WA, USA (Assimilating remotely sensed snow observations into a macroscale hydrology model)
- 2002 **Engineering Diploma, Environmental Engineering, Technical University of Crete**, Chania, Greece (Statistical methods and software development for oil spill source identification)

Research and Teaching Experience

- Sep 2018 **Assistant Professor, Civil and Environmental Engineering, University of Massachusetts, Amherst, Amherst, MA**
- Present
 - > Development of algorithms for the SWOT satellite mission.
 - > Scientific machine learning for hydrology.
 - > Deep learning for land cover classification.
 - > Assessment of the value of GNSS-R satellite observations for mapping wetland dynamics.
 - > Impact of urbanization on flood risks globally.
 - > Teaching Probability and Statistics in Civil Engineering.
- Jun 2011 **Research Scientist, Jet Propulsion Laboratory, Pasadena, CA**
- Aug 2018 Led and worked on multiple projects with an overall focus on the merging of observations and water resources models. Mentoring post-doctoral researchers at JPL. Responsible for securing funding (either as a PI or Co-I).
 - > Data assimilation of remotely sensed observations into hydrologic, hydrodynamic and agricultural models
 - > Development of data product algorithms for the SWOT satellite mission
 - > Development of seasonal drought forecasting system in East Africa and Southeast Asia
 - > Streamflow forecasting in support of reservoir operations using airborne snow observations
 - > Impact of deforestation on drought severity
 - > Assessing the role of climate teleconnections in flooding over Australia
 - > Development of a coupled human and natural water resources model
 - > Mentored undergraduate students through the JPL Internship Program
- Sep 2009 **Post-doctoral Researcher, Byrd Polar Research Center, Ohio State University, Columbus, OH**
- Jun 2011 Worked on multiple projects, revolving around the SWOT proposed satellite mission science team, including:
 - > Data assimilation of remotely sensed river measurements over the Ohio River basin
 - > Large-scale hydraulic modeling of the Ohio River basin
 - > Congo River basin hydrological processes from gravimetric remote sensing
- Mar 2011 **Adjunct Professor, Ohio State University, Columbus, OH**
- Jan 2011
 - > Taught the “Water Resources Engineering” undergraduate class (CIVILEN562) at the Department of Civil and Environmental Engineering and Geodetic Science

Aug 2002	Research Assistant, University of Washington, Seattle, WA
Sep 2009	Worked on multiple projects along with the pursuit of the M.S.E. and Ph.D.: <ul style="list-style-type: none"> > MODIS and AMSR-E snow data assimilation > Coupled microwave emission-snow hydrology model development > Surface water swath altimetry virtual mission > JCSDA radiative transfer model inter-comparison > Twentieth century US and global drought > Real-time drought monitoring > Short and long-term hydrologic predictability > Streamflow sensitivity to climatic change over the Colorado River basin
Apr 2007	Guest Lecturer, University of Washington, Seattle, WA
Apr 2009	<ul style="list-style-type: none"> > Taught classes on Remote sensing of snow (CEE599 Snow Hydrology, Prof. Jessica Lundquist), and Applied optimal estimation (CEE599 Hydrologic Data Analysis, Prof. Dennis Lettenmaier)
Sep 2006	Visiting Scientist, NASA Goddard Space Flight Center, Greenbelt, MD
Nov 2006	<ul style="list-style-type: none"> > Examined the sensitivity of passive microwave emission model predictions to snow micro-physical parameters in coupled modeling experiments

Publications

- > **K. Andreadis**, C. Brinkerhoff, C. Gleason, 2020: Constraining the assimilation of SWOT observations with hydraulic geometry relations, *Water Resour. Res.*, doi:10.1029/2019WR026611
- > J. Kravits, J. Kasprzyk, K. Baker, **K. Andreadis**, 2020: Screening Tool for Dam Hazard Potential Classification Using Machine Learning and Multi-Objective Hyperparameter Tuning, *J. Water Resour. Plan. Manag.*, accepted
- > Y. Ishitsuka, C. Gleason, M. Hagemann, E. Beighley, G. Allen, D. Feng, P. Lin, M. Pan, **K. Andreadis**, T. Pavelsky, 2020: Combining big-data remote sensing and global hydrologic modelling improves daily discharge estimates across an entire large watershed, *Water Resour. Res.*, accepted
- > R. Frasson, M. Durand, K. Larnier, C. Gleason, **K. Andreadis**, M. Hagemann, R. Dudley, D. Bjerklie, H. Oubanas, P. Garambois, P. Malaterre, P. Lin, T. Pavelsky, J. Monnier, C. Brinkerhoff, C. David, 2020: Exploring the factors controlling the performance of the Surface Water and Ocean Topography mission discharge algorithms, *Water Resour. Res.*, in review
- > G. Schumann, D. Moller, L. Croneborg-Jones, **K. Andreadis**, 2020: Applications of remote sensing techniques to hydrologic research in Sub-Saharan Africa, with a special focus on the Congo basin. *Congo Basin Hydrology, Climate, and Biogeochemistry: A Foundation for the Future*, AGU Monograph, accepted
- > D. Li, **K. Andreadis**, S. Margulis, D. Lettenmaier, 2020: A data assimilation framework for generating space-time continuous SWOT river discharge data products, *Water Resour. Res.*, doi:10.1029/2019WR026999
- > C. Emery, C. David, **K. Andreadis**, M. Turmon, J. Reager, J. Hobbs, M. Pan, J. Famiglietti, E. Beighley, M. Rodell, 2020: Underlying fundamentals of Kalman filtering of river network modeling, *J. Hydromet.*, doi:10.1175/JHM-D-19-0084.1
- > D. Li, D. Lettenmaier, S. Margulis, **K. Andreadis**, 2019: The value of accurate high-resolution and spatially continuous snow information to streamflow forecasts, *J. Hydromet.*, doi:10.1175/JHM-D-18-0210.1
- > D. Li, D. Lettenmaier, S. Margulis, **K. Andreadis**, 2019: The role of rain-on-snow in flooding over the conterminous United States, *Water Resour. Res.*, doi:10.1029/2019WR024950
- > H. Tran, P. Nguyen, M. Ombadi, K. Hsu, S. Sorooshian, **K. Andreadis**, 2019: Improving hydrologic modeling using cloud-free MODIS flood maps, *J. Hydromet.*, doi:10.1175/JHM-D-19-0021.1
- > D. Stampoulis, J. Reager, C. David, **K. Andreadis**, J. Famiglietti, T. Farr, A. Trangsrud, R. Basillio, P. Lundgren, Z. Liu, 2019: Assimilation of GRACE terrestrial water storage observations to estimate changes in water table depth, *Adv. Water Resour.*, doi:10.1016/j.advwatres.2019.04.004
- > S. Margulis, Y. Fang, D. Li, **K. Andreadis**, 2019: The utility of infrequent snow depth images for deriving continuous space-time estimates of seasonal snow water equivalent, *Geophys. Res. Lett.*, doi:10.1029/2019GL082507
- > G. Schumann, J. Muhlhausen, **K. Andreadis**, 2019: Rapid Mapping of Small-Scale River-Floodplain Environments Using a UAV Structure from Motion Point Cloud, *Remote Sens.*, doi.org/10.3390/rs11080982
- > C. Oaida, J. Reager, **K. Andreadis**, C. David, S. Levoe, T. Painter, K. Bormann, A. Trangsrud, M. Giroto, J. Famiglietti, 2019: A high-resolution data assimilation framework for snow water equivalent estimation across the Western

United States and validation with the Airborne Snow Observatory, *J. Hydrometeorology*, doi:0.1175/JHM-D-18-0009.1

- > **K. Andreadis**, 2018: Data assimilation and river hydrodynamic modeling over large scales. In: Schumann, G., Bates, P., Aronica, G., and Apel, H. (eds). *Global Flood Hazard: applications in modeling, mapping and forecasting*. American Geophysical Union
- > **K. Andreadis**, G. Schumann, D. Stampoulis, P. Bates, G.R. Brakenridge, and A. Kettner, 2017: Can atmospheric re-analysis datasets be used to reproduce flooding over large scales?, *Geophys. Res. Lett.*, doi:10.1002/2017GL075502
- > G. Allen, C. David, **K. Andreadis**, F. Hossain, J. Famiglietti, 2017: Global estimates of river flow wave travel times and implications for low-latency satellite data, *Geophys. Res. Lett.*, doi:10.1029/2018GL077914
- > **K. Andreadis**, N. Das, D. Stampoulis, A. Ines, J. Fisher, S. Granger, J. Kawata, E. Han, and A. Behrangi, 2017: The Regional Hydrologic Extremes Assessment System: A GIS-enabled software framework for hydrologic modeling and data assimilation, *PLoS ONE*, 12(5): e0176506, doi:10.1371/journal.pone.0176506
- > D. Moller, **K. Andreadis**, K. Bormann, S. Hensley, and T. Painter, 2017: Mapping snow depth from Ka-band interferometry: Proof of concept and comparison with scanning lidar retrievals, *IEEE Geosci. Remote Sens. Lett.*, 14, 886-890
- > G. Schumann, D. Stampoulis, A. Smith, C. Sampson, **K. Andreadis**, J. Neal, and P. Bates, 2016: Rethinking flood risk at the global scale, *Geophys. Res. Lett.*, 43, 10.1002/2016GL070260
- > G. Schumann, and **K. Andreadis**, 2016: A method to assess localized impact of better floodplain topography on flood risk prediction, *Adv. Meteorol.*, 2016, 1-8
- > D. Stampoulis, **K. Andreadis**, S. Granger, J. Fisher, F. Turk, A. Behrangi, N. Das, and A. Ines, 2016: Assessing the hydrologic vulnerability and adaptive capacity at regional scales from space, *Remote Sens. Environ.*, 184, 58-72
- > Y. Chao, J. Farrara, G. Schumann, **K. Andreadis**, and D. Moller, 2015: Sea surface salinity variability in response to the Congo River discharge, *Continental Shelf Res.*, 99, 34-45
- > **Andreadis, K.**, and G. Schumann, 2014: Estimating the impact of satellite observations on the predictability of large-scale hydraulic models, *Adv. Water Resour.*, 73, 44-54
- > A. Behrangi, **K. Andreadis**, J. Fisher, F. J. Turk, S. Granger, T. Painter, N. Das, 2014: Satellite-Based Precipitation Estimation and Its Application for Streamflow Prediction over Mountainous Western U.S. Basins, *J. Appl. Meteorol. Climatol.*, 53, 2823-2842
- > Schumann, G., P. Bates, J. Neal, **K. Andreadis**, 2014: Measuring and mapping flood processes. In Paolo Paron, Giuliano Di Baldassarre and J. F. Shroder Jr. (eds). *Hydro-meteorological hazards, risks and disasters*. Elsevier: Hazards and Disasters Series, p. 306, pp. 35-64
- > Fisher, J.B. and **Andreadis, K.**, 2014: Drought - Roles of Precipitation, Evapotranspiration, and Soil Moisture. In: Wang, Y. (Ed) *Encyclopedia of Natural Resources: Air*. Taylor and Francis, New York, pp 1015-1017
- > Schumann, G., Bates, P.D., Neal, J.C. and **Andreadis, K.**, 2014. Measuring and Mapping Flood Processes. *Hydro-Meteorological Hazards, Risks, and Disasters*, p.35
- > Pavelsky, T., M. Durand, **K. Andreadis**, E. Beighley, R. Paiva, G. Allen, and Z. Miller, 2014: Assessing the global impact of SWOT river observations, *J. Hydrology*, 27, 1516-1525
- > Schumann, G., P. Bates, J. Neal, and **K. Andreadis**, 2014: Technology: Fight floods on a global scale, *Nature*, 507(7491), 169-169
- > Durand, M., J. Neal, E. Rodriguez, **K. Andreadis**, L. Smith, and Y. Yoon, 2014: Estimating reach-averaged discharge for the River Severn from measurements of river water surface elevation and slope, *J. Hydrology*, 511, 92-104
- > Schumann, G., **K. Andreadis**, and P. Bates, 2014: Downscaling coarse grid hydrodynamic simulation over large domains, *J. Hydrology*, 508, 289-298
- > Biancamaria, S., **K. Andreadis**, and S. Ricci, 2014: Using images of continental water surface elevations from upcoming satellite mission, *Eos. Trans. AGU*, 95.12, 105-105
- > **Andreadis, K.**, G. Schumann, and T. Pavelsky, 2013: A simple global river width and depth database, *Water Resour. Res.*, 49, 7164-7168
- > Schumann, G., J. Neal, N. Voisin, **K. Andreadis**, F. Pappenberger, K. Phanthuwongpakdee, A. Hall, and P. Bates, 2013: A first large scale hydrodynamic model for flood forecasting in the Lower Zambezi basin, *Water Resour. Res.*, 49, 6248-6257
- > Livneh, B., E. Rosenberg, C. Lin, V. Mishra, **K. Andreadis**, E. Maurer, and D. Lettenmaier, 2013: Long-term hydrologically based dataset of land surface fluxes and states for the conterminous U.S.: Update and extensions, *J. Climate*, doi:10.1175/JCLI-D-12-00508.1
- > Mersel, M.K., L. Smith, **K. Andreadis**, M. Durand, 2013: Estimation of river depth from remotely sensed hydraulic relationships, *Water Resour. Res.*, 49, 3165-3179
- > Yoon, Y., M. Durand, C. Merry, E. Clark, **K. Andreadis**, and D. Alsdorf, 2012: Estimating river bathymetry from data

- assimilation of synthetic SWOT measurements, *J. Hydrology*, 464-465, 363-375
- > **Andreadis, K.**, D. P. Lettenmaier, 2012: Implications of representing snowpack stratigraphy for the assimilation of passive microwave satellite observations, *J. Hydrometeorology*, 13, 1493-1506
 - > Lee, H., R. E. Beighley, D. Alsdorf, H. Jung, C.K. Shum, J. Duan, J. Guo, D. Yamazaki, **K. Andreadis**, 2011: Characterization of terrestrial water dynamics in the Congo Basin using GRACE and satellite radar altimetry, *Remote Sens. Environ.*, 115, 3530-3538
 - > Beighley, R.E, R.L. Ray, Y. He, H. Lee, L. Schaller, M. Durand, **K. Andreadis**, D.E. Alsdorf, C.K. Shum, 2011: Comparing satellite derived precipitation datasets using the Hillslope River Routing (HRR) model in the Congo River Basin, *Hydrol. Process.*, doi:10.1002/hyp.8045
 - > Biancamaria, S., M. Durand, **K. Andreadis**, P.D. Bates, A. Boone, N.M. Mognard, E. Rodriguez, D.E. Alsdorf, D. Lettenmaier, and E. Clark, 2011: Assimilation of virtual wide swath altimetry to improve Arctic river modeling, *Remote Sens. Environ.*, 115, 373-381
 - > Xu, X., D. Liang, **K. Andreadis**, L. Tsang, E. G. Josberger, and D. P. Lettenmaier, 2010: Active remote sensing of snow using NMM3D/DMRT and comparison with CLPX II airborne data, *IEEE J. Sel. Topics Earth Obs. and Remote Sens.*, 3, 689-697
 - > Biancamaria, S., **K. Andreadis**, M. Durand, E. Clark, E. Rodriguez, N. Mognard, D. Alsdorf, D. Lettenmaier, and Y. Oudin, 2010: Preliminary characterization of SWOT hydrology error budget and global capabilities, *IEEE J. Sel. Topics Earth Obs. and Remote Sens.*, 3, 6-19
 - > **Andreadis, K.**, P. Storck, and D. P. Lettenmaier, 2009: Modeling the effects of canopies on snow accumulation and ablation processes, *Water Res. Research*, 45, W05429, doi:10.1029/2008WR007042
 - > Sheffield, J., **K. Andreadis**, E. F. Wood, and D. P. Lettenmaier, 2009: Global and continental drought in the second half of the 20th century: severity-area-duration analysis and temporal variability of large-scale events, *J. Climate*, 22, 1962-1981
 - > Rutter, N., R. Essery, J. Pomeroy, N. Altimir, **K. Andreadis** et al., 2009: Evaluation of forest snow processes models (SnowMIP2), *J. Geophys. Res.*, 114, D06111, doi:10.1029/2008JD011063
 - > Durand, M., **K. Andreadis**, D. Alsdorf, and D. P. Lettenmaier, 2008: Estimation of bathymetric depth and slope from swath altimetry and a hydrodynamic model, *Geophys. Res. Lett.*, 35, L20401, doi:10.1029/2008GL034150
 - > Wójcik, R., **K. Andreadis**, M. Tedesco, E. F. Wood, and D. P. Lettenmaier, 2008: Multi-model estimation of snow microwave emission during CLPX03 using operational parameterization of micro-physical snow characteristics, *J. Hydrometeorology*, 9, doi:10.1175/2008JHM9091
 - > Liang, D., X. Xu, L. Tsang, **K. Andreadis**, and E. G. Josberger, 2008: Modeling Multi-layer Effects in Passive Microwave Remote Sensing of Dry Snow Using Dense Media Radiative Transfer Theory Based on the Quasicrystalline Approximation, *IEEE Trans. Geosci. Remote Sens.*, 46, 3663-3671
 - > **Andreadis, K.**, D. Liang, L. Tsang, D. P. Lettenmaier, and E. G. Josberger, 2008: Characterization of errors in a coupled snow hydrology-microwave emission model, *J. Hydrometeorology*, 9, 149-164
 - > **Andreadis, K.**, E. A. Clark, D. P. Lettenmaier, and D. E. Alsdorf, 2007: Prospects for river discharge and depth estimation through assimilation of swath-altimetry into a raster-based hydrodynamics model, *Geophys. Res. Lett.*, 34, L10403
 - > **Andreadis, K.**, and D.P. Lettenmaier, 2006: Trends in 20th century drought over the continental United States, *Geophys. Res. Lett.*, 33, L10403, doi:10.1029/2006GL025711
 - > **Andreadis, K.**, and D.P. Lettenmaier, 2006: Assimilating Remotely Sensed Snow Observations into a Macroscale Hydrology Model, *Adv. Water Res.*, 29, 872-886
 - > **Andreadis, K.**, E.A. Clark, A.W. Wood, A.F. Hamlet, and D.P. Lettenmaier, 2005: 20th Century Drought in the Conterminous United States, *J. Hydrometeorology*, 6, 985-1001

Grants

- > USGS Northeast Climate Adaptation Science Center (Co-I), 2020-2023: “A Decision Support System for Estimating Changes Due to Climate Change in Extreme Hydrologic Events in the Northeast” (\$229,422)
- > USGS Northeast Climate Adaptation Science Center (Co-I), 2020-2023: “Rethinking lake management for invasive plants under future climate: Sensitivity of lake ecosystems to winter water level drawdowns” (\$400,690)
- > NASA SERVIR (Co-I), 2019-2022: “Enhancement of the RHEAS Capabilities for Monitoring and Forecasting of Seasonal Rice Crop Productivity for the Lower Mekong Basin Countries” (\$686,634)
- > NASA SWOT Science Team (Co-I), 2020-2024: “Development of spatiotemporally continuous runoff using SWOT discharge data products” (\$596,831)
- > NASA High-Mountain Asia Program (Co-I), 2020-2023: “Characterizing future changes in glacier melt, snow melt, and regional runoff to inform adaptation decisions in high mountain dependent economies” (\$1,080,187)

- › NOAA OAR (PI), 2018-2020: “Evaluation and diagnosis of National Water Model simulations over CONUS using a novel snow reanalysis dataset” (\$573,314)
- › NASA Terrestrial Hydrology Program (PI), 2014-2017: “A multi-sensor hydrologic modeling framework to understand the coupled human and natural feedbacks in the Zambezi basin” (\$449,160)
- › NASA SWOT Science Team (PI), 2016-2020: “Developing a global assimilation and modeling framework to produce SWOT data products” (\$651,010)
- › NASA SERVIR (PI), 2016-2019: “Monitoring and Forecasting Drought and Crop Yield for the Lower Mekong Basin” (\$596,630)
- › NASA INCA (Co-I), 2016-2019: “Managing Vegetation Water Stress Under a Changing Climate” (\$812,130)
- › NASA SWOT Science Team (Co-I), 2016-2020: “Integration of SWOT Measurements into global terrestrial hydrologic models” (\$621,230)
- › NASA Advanced Information Systems Technology (Co-I), 2015-2017: “Global Flood Risk From Advanced Modeling and Remote Sensing in Collaboration With Google Earth Engine” (\$700,936)
- › NASA SERVIR (Co-I), 2012-2016: “East Africa Drought and Agricultural Productivity Assessment and Prediction System” (\$985,880)
- › NASA GRACE Science Team (Co-I), 2011-2016: “Enhancement of GRACE Temporal Gravity Field Solutions to Study Terrestrial Water Dynamics in the Congo Basin” (\$663,353)
- › NASA SWOT Science Definition Team (Co-I), 2013-2015: “A hydrologically informed terrestrial water classification algorithm for SWOT” (\$220,017)
- › NASA SWOT Science Definition Team (Co-I), 2013-2015: “Modeling Channel and Floodplain Hydrodynamics in Support of the SWOT Mission” (\$230,269)
- › US Bureau of Reclamation (Co-PI), 2013-2014: “Hydrologic modeling and forecasting in support of the Airborne Snow Observatory” (\$100,946)
- › NASA Terrestrial Hydrology Program (Co-I), 2012-2015: “Evaluating SWOT observations of river discharge and their implications for large-scale hydrologic estimation and prediction” (\$612,149)
- › NASA Physical Oceanography (Co-I), 2011-2013: “Assessing and Retiring Risk in SWOT Discharge Products: Two Methods for Characterizing River Depth” (\$402,951)

Awards

- › NASA Early Career Achievement Medal (2015)
- › NASA Group Achievement Award (2014, 2017)
- › AGU Fall Meeting Outstanding Student Paper Award (2008)
- › Andy Studebaker Fellowship, Center for Water and Watershed Studies, University of Washington (2006)

Professional Activities

- › Editor (2019-present) and Associate Editor (2014-2019), Journal of Hydrometeorology
- › Member of the American Meteorological Society Committee on Hydrology (2017-Present)
- › Reviewer for Water Resources Research, Journal of Hydrometeorology, Journal of Geo-physical Research, Advances in Water Resources, Hydrological Processes, Theoretical Applied Climatology, IEEE Transactions of Geosciences and Remote Sensing, Vadose Zone, Journal of Hydrology, Hydrology and Earth System Sciences
- › Reviewer for proposals submitted to NOAA, NSF, NWS, ANR France, Hong Kong RGC, FNR Luxembourg
- › Organized “Water Cycle Science” workshop (June 2012, Pasadena, CA)
- › Lectured at the NASA Summer School on Satellite Observations and Climate Models (August 2015-2017, Pasadena, CA)
- › Organized training workshops at the Regional Center for Mapping of Resources for Development (March 2015, Nairobi, Kenya) and Asian Disaster Preparedness Center (September 2016, Bangkok, Thailand)

Technical Skills

Programming Languages: C/C++, Python, Fortran, CUDA C, SQL, Scala, Shell, Julia, Javascript
Technical Software: R, Matlab, GRASS GIS, ENVI/IDL, ArcGIS
Publishing: LaTeX, OpenOffice, Microsoft Office
Operating Systems: Linux, Mac OS, Windows

Languages

English ● ● ● ● ●
 Greek ● ● ● ● ●