Konstantinos **Andreadis**

Assistant Professor

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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 – Present

Assistant Professor, Civil and Environmental Engineering, University of Massachusetts, Amherst, Amherst, MA

- 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 – Aug 2018

Research Scientist, Jet Propulsion Laboratory, Pasadena, CA

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 – Jun 2011

Post-doctoral Researcher, Byrd Polar Research Center, Ohio State University, Columbus, OH

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 – Jan 2011

Adjunct Professor, Ohio State University, Columbus, OH

- Taught the “Water Resources Engineering” undergraduate class (CIVILEN562) at the Department of Civil and Environmental Engineering and Geodetic Science

Aug 2002 – Sep 2009 | **Research Assistant, University of Washington, Seattle, WA**

Worked on multiple projects along with the pursuit of the M.S.E. and Ph.D.:

- 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 – Apr 2009 | **Guest Lecturer, University of Washington, Seattle, WA**

- 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 – Nov 2006 | **Visiting Scientist, NASA Goddard Space Flight Center, Greenbelt, MD**

- Examined the sensitivity of passive microwave emission model predictions to snow microphysical 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.*, in review
- 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.*, in review
- 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, in review
- 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. Girotto, 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 reanalysis 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 Rriver 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 ●●●●●