



Alexandra Konings

Associate Professor of Earth System Science and Senior Fellow at the Woods Institute for the Environment

 Curriculum Vitae available Online

Bio

BIO

Alexandra Konings leads the Remote Sensing Ecohydrology group, which studies interactions between the global carbon and water cycles. That is, her research studies how changes in hydrological conditions change ecosystems, and how this in turn feeds back to weather and climate. These interactions include studies of transpiration and root water uptake, photosynthesis, mortality, and fire processes, among others. To address these topics, the groups primarily uses the tools of model development and remote sensing (satellite) data, especially microwave remote sensing data of vegetation water content. Alex believes that a deep understanding of remote sensing techniques and how they can be used to create environmental datasets enables new opportunities for scientific insight and vice versa.

ACADEMIC APPOINTMENTS

- Associate Professor, Earth System Science
- Senior Fellow, Stanford Woods Institute for the Environment

ADMINISTRATIVE APPOINTMENTS

- Faculty Affiliate, Stanford Woods Institute for the Environment, (2016- present)
- Assistant Professor, Stanford Department of Earth System Science, (2016- present)
- Visiting Postdoc, NASA Jet Propulsion Laboratory, (2016-2016)
- Visiting Postdoc, Columbia University, (2015-2016)
- NASA Earth and Space Science Fellow, Massachusetts Institute of Technology, (2012-2015)
- NSF Graduate Research Fellow, Massachusetts Institute of Technology, (2011-2011)
- NSF Graduate Research Fellow, Duke University, (2009-2011)

HONORS AND AWARDS

- Global Environmental Change Early Career Award, AGU (2021)
- Editor's Citation for Excellence in Refereeing (Geophysical Research Letters), AGU (2020)
- CAREER, NSF (2020-2025)
- New (Early Career) Investigator Award, NASA (2018-2021)
- Group Achievement Award: AirMOSS Implementation Team, NASA (2016)
- Best Doctoral Thesis Award, MIT Department of Civil and Environmental Engineering (2015-2016)
- Earth and Space Science Fellowship, NASA (2012-2015)
- Graduate Research Fellowship, National Science Foundation (2009-2012)
- James B. Duke Fellowship, Duke University (2009-2011)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Jasper Ridge Biological Preserve Faculty Advisory Committee (2017 - present)
- Member, AGU Hydrology Technical Committee on Remote Sensing (2016 - present)
- Member, IEEE Geoscience and Remote Sensing Society (2010 - present)
- Member, American Geophysical Union (2008 - present)

PROFESSIONAL EDUCATION

- Ph.D., Massachusetts Institute of Technology , Hydrology (2015)
- M.S., Duke University , Environmental Science (2011)
- S.B., Massachusetts Institute of Technology , Environmental Engineering Science (2009)

LINKS

- Remote Sensing Ecohydrology Group: <http://earth.stanford.edu/koningslab>

Teaching

COURSES

2023-24

- Biosphere-Atmosphere Interactions: EARTHSYS 123A, EARTHSYS 223, ESS 123, ESS 223 (Win)
- Remote Sensing of Hydrology: CEE 260D, ESS 224 (Win)

2022-23

- Biosphere-Atmosphere Interactions: EARTHSYS 123A, EARTHSYS 223, ESS 123, ESS 223 (Win)
- Remote Sensing of Hydrology: CEE 260D, ESS 224 (Spr)
- Topics in Earth System Science: ESS 301 (Aut, Win, Spr)

2021-22

- Citizenship in the 21st Century: COLLEGE 102 (Win)
- Remote Sensing of Hydrology: CEE 260D, ESS 224 (Spr)

2020-21

- Biosphere-Atmosphere Interactions: EARTHSYS 123A, EARTHSYS 223, ESS 123, ESS 223 (Win)
- Remote Sensing of Hydrology: CEE 260D, ESS 224 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Elizabeth Wig

Postdoctoral Faculty Sponsor

Marvin Browne, Dapeng Feng

Doctoral (Program)

Natan Holtzman, Erica McCormick, Trent Robinett, Matthew Worden

Publications

PUBLICATIONS

- **Achieving Breakthroughs in Global Hydrologic Science by Unlocking the Power of Multisensor, Multidisciplinary Earth Observations** *AGU ADVANCES*
Durand, M., Barros, A., Dozier, J., Adler, R., Cooley, S., Entekhabi, D., Forman, B. A., Konings, A. G., Kustas, W. P., Lundquist, J. D., Pavelsky, T. M., Rodell, M., Steele-Dunne, et al
2021; 2 (4)
- **Interannual Variations of Vegetation Optical Depth are Due to Both Water Stress and Biomass Changes** *GEOPHYSICAL RESEARCH LETTERS*
Konings, A. G., Holtzman, N. M., Rao, K., Xu, L., Saatchi, S. S.
2021; 48 (16)
- **Extreme wet events as important as extreme dry events in controlling spatial patterns of vegetation greenness anomalies** *ENVIRONMENTAL RESEARCH LETTERS*
Famiglietti, C. A., Michalak, A. M., Konings, A. G.
2021; 16 (7)
- **Global Coordination in Plant Physiological and Rooting Strategies in Response to Water Stress** *GLOBAL BIOGEOCHEMICAL CYCLES*
Liu, Y., Konings, A. G., Kennedy, D., Gentine, P.
2021; 35 (7)
- **Global ecosystem-scale plant hydraulic traits retrieved using model-data fusion** *HYDROLOGY AND EARTH SYSTEM SCIENCES*
Liu, Y., Holtzman, N. M., Konings, A. G.
2021; 25 (5): 2399-2417
- **Optimal model complexity for terrestrial carbon cycle prediction** *BIOGEOSCIENCES*
Famiglietti, C. A., Smallman, T., Levine, P. A., Flack-Prain, S., Quetin, G. R., Meyer, V., Parazoo, N. C., Stettz, S. G., Yang, Y., Bonal, D., Bloom, A., Williams, M., Konings, et al
2021; 18 (8): 2727-2754
- **Satellite Observations of the Tropical Terrestrial Carbon Balance and Interactions With the Water Cycle During the 21st Century** *REVIEWS OF GEOPHYSICS*
Worden, J., Saatchi, S., Keller, M., Bloom, A., Liu, J., Parazoo, N., Fisher, J. B., Bowman, K., Reager, J. T., Fahy, K., Schimel, D., Fu, R., Worden, et al
2021; 59 (1)
- **Patterns of plant rehydration and growth following pulses of soil moisture availability** *BIOGEOSCIENCES*
Feldman, A. F., Gianotti, D., Konings, A. G., Gentine, P., Entekhabi, D.
2021; 18 (3): 831-847
- **Empirical estimates of regional carbon budgets imply reduced global soil heterotrophic respiration** *NATIONAL SCIENCE REVIEW*
Ciais, P., Yao, Y., Gasser, T., Baccini, A., Wang, Y., Lauerwald, R., Peng, S., Bastos, A., Li, W., Raymond, P. A., Canadell, J. G., Peters, G. P., Andres, et al
2021; 8 (2)
- **L-band vegetation optical depth as an indicator of plant water potential in a temperate deciduous forest stand** *BIOGEOSCIENCES*
Holtzman, N. M., Anderegg, L. L., Kraatz, S., Mavrovic, A., Sonnentag, O., Pappas, C., Cosh, M. H., Langlois, A., Lakhankar, T., Tesser, D., Steiner, N., Colliander, A., Roy, et al
2021; 18 (2): 739-753
- **Global-scale assessment and inter-comparison of recently developed/reprocessed microwave satellite vegetation optical depth products** *REMOTE SENSING OF ENVIRONMENT*
Li, X., Wigneron, J., Frappart, F., Fan, L., Ciais, P., Fensholt, R., Entekhabi, D., Brandt, M., Konings, A. G., Liu, X., Wang, M., Al-Yaari, A., Moisy, et al
2021; 253
- **Leaf surface water, not plant water stress, drives diurnal variation in tropical forest canopy water content.** *The New phytologist*
Xu, X. n., Konings, A. G., Longo, M. n., Feldman, A. n., Xu, L. n., Saatchi, S. n., Wu, D. n., Wu, J. n., Moorcroft, P. n.
2021
- **Lagged effects regulate the inter-annual variability of the tropical carbon balance** *BIOGEOSCIENCES*

- Bloom, A., Bowman, K. W., Liu, J., Konings, A. G., Worden, J. R., Parazoo, N. C., Meyer, V., Reager, J. T., Worden, H. M., Jiang, Z., Quetin, G. R., Smallman, T., Exbrayat, et al
2020; 17 (24): 6393–6422
- **Interannual variability of ecosystem iso/anisohydry is regulated by environmental dryness.** *The New phytologist*
Wu, G., Guan, K., Li, Y., Novick, K. A., Feng, X., McDowell, N. G., Konings, A. G., Thompson, S. E., Kimball, J. S., De Kauwe, M. G., Ainsworth, E. A., Jiang, C.
2020
 - **SMAP Detects Soil Moisture Under Temperate Forest Canopies** *GEOPHYSICAL RESEARCH LETTERS*
Colliander, A., Cosh, M. H., Kelly, V. R., Kraatz, S., Bourgeau-Chavez, L., Siqueira, P., Roy, A., Konings, A. G., Holtzman, N., Misra, S., Entekhabi, D., O'Neill, P., Yueh, et al
2020; 47 (19)
 - **Divergent forest sensitivity to repeated extreme droughts** *NATURE CLIMATE CHANGE*
Anderegg, W. L., Trugman, A. T., Badgley, G., Konings, A. G., Shaw, J.
2020
 - **Data-driven estimates of evapotranspiration and its controls in the Congo Basin** *HYDROLOGY AND EARTH SYSTEM SCIENCES*
Burnett, M. W., Quetin, G. R., Konings, A. G.
2020; 24 (8): 4189–4211
 - **SAR-enhanced mapping of live fuel moisture content** *REMOTE SENSING OF ENVIRONMENT*
Rao, K., Williams, A., Flefil, J., Konings, A. G.
2020; 245
 - **Plant hydraulics accentuates the effect of atmospheric moisture stress on transpiration** *NATURE CLIMATE CHANGE*
Liu, Y., Kumar, M., Katul, G. G., Feng, X., Konings, A. G.
2020
 - **Carbon Flux Variability from a Relatively Simple Ecosystem Model with Assimilated Data is Consistent with Terrestrial Biosphere Model Estimates** *Journal of Advances in Modeling Earth Systems*
Quetin, G. R., Bloom, A. A., Bowman, K. W., Konings, A. G.
2020; 12: e2019MS001889
 - **SMAP VALIDATION EXPERIMENT 2019-2021 (SMAPVEX19-21): DETECTION OF SOIL MOISTURE UNDER FOREST CANOPY**
Colliander, A., Cosh, M. H., Misra, S., Bourgeau-Chavez, L., Kelly, V., Siqueira, P., Roy, A., Lakhankar, T., Kraatz, S., Konings, A. G., Holtzman, N., Kurum, M., Entekhabi, et al
IEEE.2020: 3338-3340
 - **Validation practices for satellite soil moisture retrievals: What are (the) errors?** *Remote Sensing of Environment*
Gruber, A., De Lannoy, G., Albergel, C., Al-Yaari, A., Brocca, L., Calvet, J., Colliander, A., Cosh, M., Crow, W., Dorigo, W., Draper, C., Hirshi, M., Kerr, et al
2020; 224: 111806
 - **Satellite-based vegetation optical depth as an indicator of drought-driven tree mortality** *REMOTE SENSING OF ENVIRONMENT*
Rao, K., Anderegg, W. L., Sala, A., Martinez-Vilalta, J., Konings, A. G.
2019; 227: 125–36
 - **Global satellite-driven estimates of heterotrophic respiration** *BIOGEOSCIENCES*
Konings, A. G., Bloom, A., Liu, J., Parazoo, N. C., Schimel, D. S., Bowman, K. W.
2019; 16 (11): 2269–84
 - **Macro to Micro: Microwave Remote Sensing of Plant Water Content for Physiology and Ecology.** *The New phytologist*
Konings, A. G., Rao, K., Steele-Dunne, S. C.
2019
 - **Physics-Based Modeling of Active and Passive Microwave Covariations Over Vegetated Surfaces** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Jagdhuber, T., Konings, A. G., McColl, K. A., Alemohammad, S., Das, N., Montzka, C., Link, M., Akbar, R., Entekhabi, D.
2019; 57 (2): 788–802

- **Satellite soil moisture observations predict burned area in Southeast Asian peatlands** *ENVIRONMENTAL RESEARCH LETTERS*
Dadap, N. C., Cobb, A. R., Hoyt, A. M., Harvey, C. F., Konings, A. G.
2019; 14
- **Simultaneous retrieval of global-scale vegetation optical depth, surface roughness, and soil moisture using X-band AMSR-E observations** *Remote Sensing of Environment*
Karthikeyan, L., Pan, M., Konings, A. G., Piles, M., Fernandez-Moran, R., Kumar, D. N., Wood, E. F.
2019; 234: 111473
- **Macro to micro: microwave remote sensing of plant water content for physiology and ecology** *NEW PHYTOLOGIST*
Konings, A. G., Rao, K., Steele-Dunne, S. C.
2019; 223: 1166-1172
- **Beyond soil water potential: An expanded view on isohyricity including land-atmosphere interactions and phenology** *PLANT, CELL, AND ENVIRONMENT*
Novick, K. A., Konings, A. G., Gentine, P.
2019; 42: 1802-1815
- **Moisture pulse-reserve in the soil-plant continuum observed across biomes** *NATURE PLANTS*
Feldman, A. F., Gianotti, D., Konings, A. G., McColl, K. A., Akbar, R., Salvucci, G. D., Entekhabi, D.
2018; 4 (12): 1026-33
- **Global-scale assessment and combination of SMAP with ASCAT (active) and AMSR2 (passive) soil moisture products** *REMOTE SENSING OF ENVIRONMENT*
Kim, H., Parinussa, R., Konings, A. G., Wagner, W., Cosh, M. H., Lakshmi, V., Zohaib, M.
2018; 204: 260-275
- **Hydraulic diversity of forests regulates ecosystem resilience during drought** *NATURE*
Anderegg, W. R., Konings, A. G., Trugman, A. T., Yu, K., Bowling, D. R., Gabbitas, R., Karp, D. S., Pacala, S., Sperry, J. S., Sulman, B. N., Zenes, N.
2018; 561: 538-541
- **Tall Amazonian forests are less sensitive to precipitation variability** *NATURE GEOSCIENCE*
Giardina, F., Konings, A. G., Kennedy, D., Alemohammad, S., Oliviera, R. S., Uriarte, M., Gentine, P.
2018: 405-409
- **L-band vegetation optical depth seasonal metrics for crop yield assessment** *REMOTE SENSING OF ENVIRONMENT*
Chapparro, D., Piles, M., Vall-Ilossera, M., Camps, A., Konings, A. G., Entekhabi, D.
2018
- **Characterization of vegetation and soil scattering mechanisms across different biomes using P-band SAR polarimetry** *REMOTE SENSING OF ENVIRONMENT*
Alemohammad, S., Konings, A. G., Jagdhuber, T., Moghaddam, M., Entekhabi, D.
2018: 107-117
- **Active microwave observations of diurnal and seasonal variations of canopy water content across the humid African tropical forests** *GEOPHYSICAL RESEARCH LETTERS*
Konings, A. G., Yu, Y., Xu, L., Yang, Y., Schimel, D., Saatchi, S.
2017; 44: 2290-2299
- **Water, Energy, and Carbon with Artificial Neural Networks (WECANN): a statistically based estimate of global surface turbulent fluxes and gross primary productivity using solar-induced fluorescence** *BIOGEOSCIENCES*
Alemohammad, S., Fang, B., Konings, A. G., Aires, F., Green, J. K., Kolassa, J., Miralles, D., Prigent, C., Gentine, P.
2017; 14: 4101-4124
- **Relationship between vegetation microwave optical depth and cross-polarized backscatter from multi-year Aquarius observations.** *IEEE JOURNAL OF SELECTED TOPICS IN EARTH OBSERVATIONS AND REMOTE SENSING*
Rotzer, K., Montzka, C., Entekhabi, D., Konings, A. G., McColl, K. A., Piles, M., Vereecken, H.
2017
- **Estimating global ecosystem iso/anisohydry using active and passive microwave satellite data** *JOURNAL OF GEOPHYSICAL RESEARCH - BIOGEOSCIENCES*

- Li, Y., Guan, K., Gentine, P., Konings, A. G., Meinzer, F. C., Kimball, J. S., Xu, X., Anderegg, W. R., McDowell, N. G., Martinez-Vilalta, J., Long, D. G., Good, S. P.
2017; 122
- **Interacting effects of leaf water potential and biomass on vegetation optical depth** *JOURNAL OF GEOPHYSICAL RESEARCH - BIOGEOSCIENCES*
Momen, M., Wood, J. D., Novick, K. A., Pangle, R., Pockman, W. T., McDowell, N. G., Konings, A. G.
2017; 122
 - **Regionally strong feedbacks between the atmosphere and terrestrial biosphere** *NATURE GEOSCIENCE*
Green, J., Konings, A. G., Alemohammad, S., Berry, J., Entekhabi, D., Kolassa, J., Lee, J., Gentine, P.
2017; 10: 410–414
 - **L-band vegetation optical depth and scattering albedo estimation from SMAP** *REMOTE SENSING OF ENVIRONMENT*
Konings, A. G., Piles, M., Das, N., Entekhabi, D.
2017; 198: 460-470
 - **The global distribution and dynamics of surface soil moisture** *NATURE GEOSCIENCE*
McColl, K. A., Alemohammad, S., Akbar, R., Konings, A., Yueh, S., Entekhabi, D.
2017; 10: 100-104
 - **Global variations in ecosystem scale isohyricity** *GLOBAL CHANGE BIOLOGY*
Konings, A. G., Gentine, P.
2017; 23 (2): 891-905
 - **Sensitivity of grassland productivity to aridity controlled by stomatal and xylem regulation** *NATURE GEOSCIENCE*
Konings, A. G., Williams, A., Gentine, P.
2017; 10: 284-288
 - **Triple collocation for binary and categorical variables: Application to validating landscape freeze/thaw retrievals** *REMOTE SENSING OF ENVIRONMENT*
McColl, K. A., Roy, A., Derksen, C., Konings, A. G., Alemohammed, S. H., Entekhabi, D.
2016; 176: 31-42
 - **Vegetation optical depth and scattering albedo retrieval using time series of dual-polarized L-band radiometer observations** *REMOTE SENSING OF ENVIRONMENT*
Konings, A. G., Piles, M., Roetzer, K., McColl, K. A., Chan, S. K., Entekhabi, D.
2016; 172: 178-189
 - **L-Band Radar Soil Moisture Retrieval Without Ancillary Information** *IEEE JOURNAL OF SELECTED TOPICS IN APPLIED EARTH OBSERVATIONS AND REMOTE SENSING*
Bruscantini, C. A., Konings, A. G., Narvekar, P. S., McColl, K. A., Entekhabi, D., Grings, F. M., Karszenbaum, H.
2015; 8 (12): 5526-5540
 - **How Many Parameters Can Be Maximally Estimated From a Set of Measurements?** *IEEE GEOSCIENCE AND REMOTE SENSING LETTERS*
Konings, A. G., McColl, K. A., Piles, M., Entekhabi, D.
2015; 12 (5): 1081-1085
 - **Characterization of precipitation product errors across the United States using multiplicative triple collocation** *HYDROLOGY AND EARTH SYSTEM SCIENCES*
Alemohammad, S. H., McColl, K. A., Konings, A. G., Entekhabi, D., Stoffelen, A.
2015; 19 (8): 3489-3503
 - **The Effect of Variable Soil Moisture Profiles on P-Band Backscatter** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Konings, A. G., Entekhabi, D., Moghaddam, M., Saatchi, S. S.
2014; 52 (10): 6315-6325
 - **Extended triple collocation: Estimating errors and correlation coefficients with respect to an unknown target** *GEOPHYSICAL RESEARCH LETTERS*
McColl, K. A., Vogelzang, J., Konings, A. G., Entekhabi, D., Piles, M., Stoffelen, A.
2014; 41 (17): 6229-6236
 - **Thermodynamics of an idealized hydrologic cycle** *WATER RESOURCES RESEARCH*
Konings, A. G., Feng, X., Molini, A., Manzoni, S., Vico, G., Porporato, A.

2012; 48

- **A phenomenological model for the flow resistance over submerged vegetation** *WATER RESOURCES RESEARCH*
Konings, A. G., Katul, G. G., Thompson, S. E.
2012; 48
- **Mean Velocity Profile in a Sheared and Thermally Stratified Atmospheric Boundary Layer** *PHYSICAL REVIEW LETTERS*
Katul, G. G., Konings, A. G., Porporato, A.
2011; 107 (26)
- **Drought sensitivity of patterned vegetation determined by rainfall-land surface feedbacks** *JOURNAL OF GEOPHYSICAL RESEARCH-BIOGEOSCIENCES*
Konings, A. G., Dekker, S. C., Rietkerk, M., Katul, G. G.
2011; 116
- **Unsteady overland flow on flat surfaces induced by spatial permeability contrasts** *ADVANCES IN WATER RESOURCES*
Thompson, S., Katul, G., Konings, A., Ridolfi, L.
2011; 34 (8): 1049-1058
- **Comparative hydrology across AmeriFlux sites: The variable roles of climate, vegetation, and groundwater** *WATER RESOURCES RESEARCH*
Thompson, S. E., Harman, C. J., Konings, A. G., Sivapalan, M., Neal, A., Troch, P. A.
2011; 47
- **Effect of Radiative Transfer Uncertainty on L-Band Radiometric Soil Moisture Retrieval** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Konings, A. G., Entekhabi, D., Chan, S. K., Njoku, E. G.
2011; 49 (7): 2686-2698
- **The rainfall-no rainfall transition in a coupled land-convective atmosphere system** *GEOPHYSICAL RESEARCH LETTERS*
Konings, A. G., Katul, G. G., Porporato, A.
2010; 37
- **Conditioning Stochastic Rainfall Replicates on Remote Sensing Data** *IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING*
Wojcik, R., McLaughlin, D., Konings, A. G., Entekhabi, D.
2009; 47 (8): 2436-2449