Curriculum Vitae

CHRISTOPHER MICHAEL USHER NEALE

Director of Research
Daugherty Water for Food Global Institute, University of Nebraska, Lincoln

Professor, Department of Biological Systems Engineering
Professor, School of Natural Resources
University of Nebraska – Lincoln

(435) 770-0297 (Cell), (402) 472-5359(office), cneale@nebraska.edu

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EDUCATION:

Civil Engineering Degree, Escola de Engenharia Mauá
São Caetano do Sul, São Paulo, Brazil
Graduation: January 1980

Master of Science in Agricultural Engineering
Colorado State University, Fort Collins, Colorado
Graduation: May 1983

Doctor of Philosophy in Agricultural Engineering
Colorado State University, Fort Collins, Colorado
Graduation: May 1987

HONORARY AND PROFESSIONAL SOCIETIES:

Sigma Xi, Gamma Sigma Delta, Alpha Epsilon

American Society of Agricultural and Biological Engineers – ASABE
American Society of Civil Engineers - ASCE
American Geophysical Union - AGU
American Society for Photogrammetry & Remote Sensing – ASPRS
Society of Photo-Optical Instrumentation Engineers - SPIE
International Association of Hydrological Sciences - IAHS

PROFESSIONAL REGISTRATION: Civil Engineer, SP, Brazil, CREA# 193933

AREAS OF RESEARCH and TECHNICAL SPECIALIZATION:

- Irrigation water management and water demands estimates.
- Irrigation and Drainage Engineering
- Energy Balance and Evapotranspiration measurements with lysimeters, Bowen ratio, eddy covariance and scintillometer systems.
- GIS applications in irrigation engineering, including development of irrigation water user cadaster maps and databases.

- Remote sensing of energy balance components and Evapotranspiration.
- Development of crop coefficients including remote sensing approaches.
- Applied Remote Sensing from satellite and airborne systems in the visible, near infrared, thermal infrared and microwave portions of the electromagnetic spectrum.
- The use of airborne multispectral imagery for monitoring and mapping river corridors, riparian vegetation, wetlands, and irrigated agriculture.
- High resolution remote sensing with UAV systems
- Precision agriculture and crop yield estimation using satellite and UAV remote sensing and GPS equipment.
- Remote sensing of crop water productivity

LANGUAGES: Fluent in English, Portuguese, and Spanish. Conversational French.

EMPLOYMENT HISTORY AND EXPERIENCE:

Daugherty Water for Food Institute, University of Nebraska, Lincoln,NE
Director of Research (January 2014 to Present)
Department of Biological Systems Engineering, University of Nebraska, Lincoln, Professor

- Directing research activities for DWFI, supporting faculty fellows of the Institute, representing DWFI at conferences, giving invited presentations, developing proposals with faculty and partner teams, coordinating research for the Water Resources Program of Excellence, supporting DWFI cluster hire faculty, engaging international partners in Brazil, Sri Lanka, Chile, Kazakhstan, India, Dominican Republic, Costa Rica and other countries to develop future research activities. Develop International research and technical transfer projects. Forming technical teams for submitting proposals for further funding. Supporting visiting scholars from different countries. Manage the DWFI student support program.
- Founding Partner and executive committee member of the Irrigation Innovation Consortium, funded by the Foundation for Food and Agricultural Research (FFAR)
- Principal Investigator presently for research projects totaling over $4.0 million dollars.

Utah State University, Department of Civil and Environmental Engineering – Irrigation Engineering Division
Logan, UT 84322-4110 (December 2009 to 2013)
Professor
Recent Research Activities:

- Energy balance studies and airborne thermal infrared monitoring of hydrothermal features in Yellowstone National Park.
- Airborne multispectral and Lidar mapping of the Escalante River Canyon and Canyon de Chelly, Dinosaur National Monument for the National Park Service, Mojave River, CA for the US Bureau of Reclamation & other projects

- Remote sensing of evapotranspiration and estimation of riparian vegetation water use in the Lower Colorado River System
- Development of guidelines and specifications for the estimation of crop water use with remote sensing - USGS

Utah State University, Department of Biological and Irrigation Engineering
Logan, UT 84322-4105 (September 1988 to December 2009)
Assistant Professor, Associate Professor, Professor

Selected Research Activities:
- Director and PI for a large, irrigated area and infrastructure mapping project in the Dominican Republic ($7.9 million dollars) for USU. The client INDRHI is the federal water resources agency of the Dominican Government. Funded by the Inter-American Development Bank
- Ongoing research in the areas of applied remote sensing to resource mapping, hydrology and precision irrigated agriculture using satellite imagery and airborne multispectral digital imagery from the USU airborne multispectral system.
- Developed the USU airborne multispectral digital remote sensing system that flies on a Cessna TU206 aircraft dedicated to remote sensing. Director of the Remote Sensing Services Laboratory (1993-2013)
- Use of airborne and satellite multispectral imagery for mapping riparian corridors, wetland areas, rangeland, forested and agricultural areas.
- Use of remote sensing and GIS for irrigation command area mapping and modeling of irrigation water demand.
- Development of hydrologic parameter retrieval algorithms for the Special Sensor Microwave/Imager, a U.S. Navy instruments onboard a DMSP satellite. Member of the calibration/validation team for the original SSM/I
- Modeling of energy balance fluxes in complex terrain in semi-arid watersheds, irrigated agriculture, riparian ecosystems as well as desert ecosystems in the Great Basin using remotely sensed inputs from airborne and satellite platforms.

Teaching:
- Graduate and senior level course in Irrigation Water Management and Irrigation Hydrology.
- Graduate and senior level course in Operation and Maintenance of Irrigation and Drainage Systems
- Developed a course on Remote Sensing of Land Surfaces that covers applications in agriculture and hydrology.
- GIS for Water Resources course, Fall 2007.
- Several short-course teaching assignments for the International Irrigation Center, including on-farm water management, pumps, irrigation scheduling, surface irrigation, computer applications in irrigated agriculture and remote sensing applied to irrigated agriculture.

Texas A&M University, Department of Agricultural Engineering
College Station, TX. (January 1987 to August 1988)
Research Agricultural Engineer

- Calibration and validation of algorithms for the retrieval of surface soil moisture, surface temperature and other parameters from microwave brightness temperatures obtained from a satellite. Experience included the day-to-day management of the project, mentoring of graduate students, development of specialized software to support project goals (expert systems, database control), and data analysis.
- Assistance in the development of a mobile evapotranspiration laboratory, with state-of-the-art Bowen ratio equipment.

Western Agri-Management Company
Fort Collins, Colorado (January 1985 to December 1986)
Civil and Agricultural Engineer

- Participated in the preparation of a feasibility study for the development of a vegetable farm (melons, cantaloupes) and packing plant in the Dominican Republic.
- Responsible for a feasibility study on the production of roses and ornamental plants in Costa Rica for the US market.

United States Department of Agriculture-ARS
Kimberly, Idaho (May to October 1984)

- Responsible for data collection and evaluation of automated surface irrigation systems (cablegation) in the Grand valley of Colorado. The experience included the installation of automated orifice plates and flumes, use of data loggers, irrigation system operation, system evaluation data gathering and analysis.

THEMAG Engenharia Ltda
Sao Paulo, SP, Brazil (1978 to 1980)
Student trainee progressing to Junior Civil Engineer

- Responsible for the translation of technical documents, curriculums, etc., to be used in proposal preparation.
- Participated in the preparation of a proposal for consulting services concerning the Upper Mazaruni hydroelectric power plant and aluminum smelter in Guyana.

INTERNATIONAL EXPERIENCE:

International Projects:

2014-Present: Several international partnerships and projects in different countries.
Middle East North Africa Region: Estimating daily evapotranspiration using the ALEXI model with VIIRS satellite input, for drought monitoring and water balance studies.
India: Development of a drought composite index for 2 States in India, using Geospatial technologies for monitoring large irrigation systems, developing irrigation schedules using in-field sensors.
Brazil: (1) Testing and verifying the ALEXI/VIIRS daily evapotranspiration product in several ecosystems and agricultural areas in Brazil, using eddy covariance flux towers; (2) Studies towards the sustainable development of the Urucuia aquifer, western state of Bahia, Brazil
(3) Studies towards the sustainable development of irrigation on existing agricultural lands in the state of Mato Grosso, Brazil
Kazakhstan: Evaluation of the Turkestan Canal System in southern Kazakhstan, including field visit, examination of hydraulic structures, identification of maintenance issues, analysis of irrigated area and preliminary water resources analysis, report preparation and submittal to Minister of Ecology, Geology and Natural Resources. Signing of MOU with Ministry.

2010 – 2011 Mozambique: Directed the USU effort towards pursuing a joint project with the Gorongosa Restoration Project in the area of sustainable agriculture and forestry within the buffer zone of the Gorongosa National Park in Mozambique. Conducted a survey of small landholders on Mount Gorongosa through a sub-contract with the Pedagogic University of Beira to determine agricultural practices and social customs that lead to the present slash and burn activities. The results of this effort provided preliminary data for a comprehensive future proposal to the NSF Bread program and other funding agencies.

1999 to 2004 Dominican Republic: PI and Director of a large mapping project in the Dominican Republic: "Estudios Basicos para el Manejo de los Sistemas de Riego". Total project cost: $7.9 million dollars. The client was the Instituto Nacional de Recursos Hidraulicos (INDRHI), the National water resources agency of the Dominican Republic (DR) Government. The project was funded with a loan from the Inter-American Development Bank (IADB) after USU's proposal won the International Tender and successfully negotiated the contract.
Project consisted of four studies:
(1) Color Aerial photography of the entire country at 1:20000 scale. Production of orthophotos and other mapping products for 4400 Km2 of irrigated agriculture using the aerial photography and derived orthophotoquads.
(2) Production of irrigated property boundary (cadastre) maps from digital orthophotos in a GIS environment.
(3) Development of a hydro-climatological database and an interface for visualizing the data

(4) Monitoring salinity and drainage problems using airborne multispectral digital imaging.

Experience included:

- proposal writing, coordination, and preparation,
- contract negotiation with INDRHI, sub-contract negotiations with local Dominican partners "Ingenieria Agrofuturo", sub-contract negotiation with RLDA Surveying and Mapping, TOBIN International, GeoAir SA and other subcontractors,
- establishment of local office headquarters for USU,
- selection and hiring of personnel (28 people in the DR, 15 at USU),
- establishment of field methodology, training of field personnel,
- establishment and supervision of all technical aspects of the project
- establishment of a state-of-the-art Geomatics Laboratory at INDHRI and training of their personnel,
- project management
- writing of progress and final reports in Spanish, continuous contacts with client supervision.

International Consulting:

Inter-American Development Bank (IADB) (2002) Dominican Republic: Prepared the Scope of Work and Terms of Reference for an international tender. The project would consist of mapping 15000 Km2 of non-irrigated agriculture and the preparation of rural property cadastre maps in the Dominican Republic.

Secretaria de Recursos Hídricos – MMA, Brasilia, Brazil (**1997-1998)**. A one-year (1/2 time), in-house consulting assignment at the Brazilian National Water Resources Agency in the areas of Remote Sensing and Geographical Information Systems, Irrigation Water Management and Water Resources in general. This activity was funded by the World Bank, through IICA (Inter-American Institute for Cooperation on Agriculture).

CODEVASF (Compania de Desenvolvimento do Vale do Sao Francisco) – Brasilia, DF, Brazil (1997-1998): A one-year (1/2 time), in-house consulting assignment at the Remote Sensing and GIS Laboratory of CODEVASF, the San Francisco valley development agency. Conducted training in ERDAS Imagine software and analysis procedures and techniques, developed projects using airborne videography equipment, participated in several on-going and new projects. Preparation of proposals to obtain funds for future lab activities. This activity was funded by the World Bank through IICA.

Golder Associates, Canada (1995 -1996) Brazil and Argentina: Mapped vegetation along the Paraguai-Parana waterway (3400 Km) in Brazil, Paraguay and Argentina using TM and MSS Landsat Imagery and airborne multispectral imaging as a ground truthing tool. This activity also involved field work in Argentina along the Parana River and in the Pantanal wetlands of Brazil.

U.S. Bureau of Reclamation (1992-1993) Egypt: Mapped the canal and drain layout of an irrigation system in the Nile Delta, using a combination of satellite imagery, GIS and GPS. Trained Ministry engineers in the use of GPS and GIS software.

EMBRAPA (Empresa Brasileira de Pesquisa Agropecuaria) Brazil:

1. **1988:** One-month consulting assignment in Brazil, to advise EMBRAPA, the Brazilian Agricultural Research Agency, on future Irrigation Engineering Research needs in the country.
2. **1994:** One-week consulting assignment with EMBRAPA to participate in an evaluation panel of one of their major irrigation and drainage research centers (CNPAI).

US Bureau of Reclamation at CODEVASF, **Brasilia, Brazil, June 1990:**
Training of CODEVASF personnel on the theory and use of portable radiometers for ground truthing of satellite imagery. Conducted a ground truthing experiment of a SPOT satellite image along with Bureau and CODEVASF personnel as part of the training.

Western Agri-Management Company, Fort Collins, CO, (1985 - 1986):

- Participated in the preparation of a feasibility study for the development of an irrigated vegetable farm (melons, cantaloupes) and packing plant in the **Dominican Republic** targeting the US winter market. The experience included meeting and gathering data and technical information with the Dominican Federal Agencies, identification of suitable land sites for the project, negotiating with landowners, over the course of several trips to the country.
- Responsible for a feasibility study on the production of roses and ornamental tropical plants in **Costa Rica** for the US market. The experience included several trips to the country for data collection and site inspection, identification of potential partners, negotiations with the partners, technical analysis and design, financial analysis, procurement of financing and preparation of loan applications to OPIC.

SERVICE:

ASABE:
Present Member of the NRES-03/2 US TAG ISO TC 23/SC 18: US Technical Advisory Group for ISO TC 23/18. This committee develops the position of the United States on international standardization activities for ISO TC23/SC 18, Irrigation and Drainage Equipment and Systems. (2018 to Present).
Present Member NRES-244 Irrigation Management committee, the NRES-24 Irrigation Group and MS-60 Unmanned Aerial Systems.
Past Member of the Irrigation Management Committee (~1988-1989)
Past Member of the NRES-03/2 Irrigation and drainage equipment and systems

ASCE: Secretary, Vice-Chair, Chair, Past chair of the Planning and Management of Irrigation and Drainage Committee. (~1989-1992)
Vice-Chair of the Special Committee for Remote Sensing. This committee wrote a series of papers on the state-of-the-art of Remote Sensing Applications in I & D. (~1991-1992)
Member of the publications committee, Journal of Irrigation and Drainage, ASCE. Reviewed technical papers, help set policy and select award papers. (~1991-1994)
Co-Chair along with Dr. Rick Allen of the ASCE Park City Irrigation and Drainage Conference held in July 1993. (1992-1993)

IAHS: Presently Past-President of the International Commission on Remote Sensing (ICRS) – IAHS, President from July 2014 to July 2017. Vice-president and President-elect of ICRS, July 2008 to July 2014.
Chair of the Remote Sensing and Hydrology 2010 Symposium in Jackson Hole, Wy, September 28 – 30, 2010.
Co-Convener of the IAHS Symposium on Remote Sensing for Environmental Monitoring and Change Detection, Peruggia, Italy, July 2007

SPIE: Symposium Chair for the SPIE Remote Sensing Europe 2018 and 2019, co-chair for 2016-2017. Conference Chair and Proceedings Editor for the Remote Sensing for Agriculture, Ecosystems, and Hydrology Conference: Florence, Italy, September 2007; Cardiff, Wales, September 2008; Berlin, Germany, September 2009, Toulouse, France, 2010; Prague Check Republic, 2011; Edinburgh, Scotland 2012; Dresden Germany 2013; Amsterdam, Netherlands 2014; Toulouse, France 2015; Edinburgh, Scotland 2016; Warsaw, Poland 2017; Berlin, Germany 2018; Strasbourg, France 2019; Edinburgh, Scotland 2020 (Digital Forum); Madrid, Spain 2021 (Digital Forum); Berlin, Germany 2022; Amsterdam, Netherlands 2023.

ASPRS: Member of the Board of Directors of the Heartland Region: 2015-2018
Conference organizer and editor of the proceedings for the 14th Biennial Workshop on Color Photography, Videography and Airborne Imaging for Resource Assessment in 1993 and the 19th Biennial Workshop in 2003 for the American Society for Photogrammetry and Remote Sensing (ASPRS)

NASA: Chair of the NASA Pathfinder Committee, tasked with producing a complete, quality controlled SSM/I dataset to be used by the research community, and to give recommendations for parameter retrieval algorithms and include the parameters in the dataset. Member of the Technical Review Committee for the Center for Hydrology, Soil Climatology, and Remote Sensing sponsored by NASA and Alabama A&M University. Organized and hosted the NASA WetNet Annual Meeting, September 1993 at the Eccles Conference Center at Utah State University

USBR: 2004 Member of the steering committee representing a US Western University to analyze the scope of work of the Alliance of Universities of Ohio on a remote sensing of ET for irrigation project.

AWARDS AND HONORS

- 2022 ASCE Royce J. Tipton Award for "significant contributions on the use of remote sensing for estimating evapotranspiration of agricultural crops, irrigation water management and hydrology, and the education of irrigation engineers."
- 2012 ESRI Award for Best Scientific Paper in Geographic Information Systems, American Society for Photogrammetry and Remote Sensing
- Certificate of Appreciation for Meritorious Service. American Society for Photogrammetry and Remote Sensing. April 1994
- USU College of Engineering, Research Excellence Award, 1994.

INVITATIONS TO MAKE PRESENTATIONS AT SCIENTIFIC/TECHNICAL MEETINGS – SELECTED SUBSET:

Irrigation New Zealand, 2016 Conference, Oamaru, NZ, April 5-7, 2016. Keynote address: "Our Future – What Will Irrigation Look Like In 2050"

World Water Forum – Korea April 13-17, 2015. Participated on two panels: Making Every Drop Count: Best Available Technology in Irrigated Agriculture with presentation "Making Every Drop Count: Integrating Geospatial Technology" and "Irrigation and Food Production in North America: Droughts and Policy Impacts" for the Americas Regional Process

International Workshop on Evapotranspiration Mapping for Water Security, World Bank, Washington DC, September 15-17, 2015. Invited Presentation: "Airborne Mapping of Evapotranspiration: Role of Piloted Systems in the Future"

University of Sao Paulo, "Estimativa da Evapotranpiracao com Sensoriamento Remoto em Differentes Escalas" (Estimating Evapotranspiration with Remote Sensing at Different Scales). I WORK CTI Workshop de Ciencia e Tecnologia em Irrigacao, ESALQ -USP, Piracicbaba, SP Brazil.

Federal University of Ceara and the INOVAGRI (Innovation and Research Institute for the Irrigated Agriculture) to be one of the main speakers at the III WINOTEC – International Workshop on Technological Innovation in Irrigation. "State of the Art of Remote Sensing Applied to the Cadastre of Irrigation Water Users in a GIS Environment". The event was held in Fortaleza, capital of the State of Ceará, Brazil, from June 8 to 11, 2010. Similar invitation to be a main speaker at the I Winotec in Sobral, Ceara, 2007

Neale, C.M.U. and M. J. McFarland. An overview of soil moisture monitoring using passive microwave. Workshop on soil moisture. National Hydrology Research Institute, Saskatoon, Canada. March 9-11, 1992. (Invited paper)

REFEREED JOURNAL PUBLICATIONS:

Qiao Hu, Ligang Zhang, Jeff Drahota, Wayne Woldt, Dana Varner, Andy Bishop, Ted LaGrange, **Christopher MU Neale**, Zhenghong Tang. 2024. Combining Multi-View UAV Photogrammetry, Thermal Imaging, and Computer Vision Can Derive Cost-Effective Ecological Indicators for Habitat Assessment. Remote Sensing, Volume 16, Issue 6, Pages 1081.

Xin-Zhong Liang, Drew Gower, Jennifer A. Kennedy, Melissa Kenney, Michael C. Maddox, Michael Gerst, Guillermo Balboa, Talon Becker, Ximing Cai, Roger Elmore, Wei Gao, Yufeng He, Kang Liang, Shane Lotton, Leena Malayil, Megan L. Matthews, Alison M. Meadow, **Christopher M. U. Neale**, Greg Newman, Amy Rebecca Sapkota, Sanghoon Shin, Jonathan Straube, Chao Sun, You Wu, Yun Yang, and Xuesong Zhang. 2024. DAWN: Dashboard for Agricultural Water Use and Nutrient Management—A Predictive Decision Support System to Improve Crop Production in

a Changing Climate. Bulletin of the American Meteorological Society. Pages E432 - 441 https://doi.org/10.1175/BAMS-D-22-0221.1

Singh, Pragya Vinay Kumar Sehgal, Rajkumar Dhakar, **Christopher M. U. Neale**, Ivo Zution Goncalves, Alka Rani, Prakash Kumar Jha, Deb Kumar Das, Joydeep Mukherjee, Manoj Khanna and Swatantra Kumar Dubey. 2024. Estimation of ET and Crop Water Productivity in a Semi-Arid Region Using a Large Aperture Scintillometer and Remote Sensing-Based SETMI Model. Water 2024, 16(3), 422; https://doi.org/10.3390/w16030422

Richa Pandey, Ravinder Kaur, Ivo Zution Goncalves, **Christopher Neale**, Manoj Khanna
Man Singh, Vinay Kumar Sehgal, Arjamadutta Sarangi, Manjaiah Kanchikeri Math. 2024.
Single vs dual source surface energy balance model based actual evapotranspiration estimation. Environment Conservation Journal, 25(1), 84–95. https://doi.org/10.36953/ECJ.27532611

Ivo Z Gonçalves, **Christopher MU Neale**, Andy Suyker, Fábio R Marin. 2023. Evapotranspiration adjustment for irrigated maize–soybean rotation systems in Nebraska, USA. International Journal of Biometeorology, Volume 67, pages 1869–1879

Fatemeh Rezaie, Mahdi Panahi, Sayed M Bateni, Saro Lee, Changhyun Jun, Clay Trauernicht, **Christopher MU Neale.** 2023. Development of novel optimized deep learning algorithms for wildfire modeling: A case study of Maui, Hawai'i. Engineering Applications of Artificial Intelligence. Volume 125, October 2023, 106699. https://doi.org/10.1016/j.engappai.2023.106699

Trang Thi Kieu Tran, Sayed M Bateni, Fatemeh Rezaie, Mahdi Panahi, Changhyun Jun, Clay Trauernicht, **Christopher MU Neale**. 2023. Enhancing predictive ability of optimized group method of data handling (GMDH) method for wildfire susceptibility mapping. Agricultural and Forest Meteorology Volume 339, Pages 109587. https://doi.org/10.1016/j.agrformet.2023.109587

Bhatti, Sandeep, Derek M Heeren, Susan A O'Shaughnessy, **Christopher MU Neale**, Jacob LaRue, Steve Melvin, Eric Wilkening, Geng Bai. 2023. Toward automated irrigation management with integrated crop water stress index and spatial soil water balance. Precision Agriculture, 24 (6), 2223-2247https://doi.org/10.1007/s11119-023-10038-4

Ferreira, Thomás R, Mitchell S Maguire, Bernardo B da Silva, **Christopher M U Neale**, Edivaldo AO Serrão, Jéssica D Ferreira, Magna SB de Moura, Carlos AC dos Santos, Madson T Silva, Lineu N Rodrigues, Herica FS Carvalho. 2023. Assessment of water demands for irrigation using energy balance and satellite data fusion models in cloud computing: A study in the Brazilian semiarid region. Agricultural Water Management, Volume 281, Pages 108260

Ivo Zution Gonçalves, Anderson Ruhoff, Leonardo Laipelt, RC Bispo, Fernando Braz Tangerino Hernandez, **Christopher Michael Usher Neale**, Antônio Heriberto de Castro Teixeira, Fábio Ricardo Marin. 2022. Remote sensing-based evapotranspiration modeling using geeSEBAL for sugarcane irrigation management in Brazil. Agricultural Water Management, Volume 274, Pages 107965.

Paryani, Sina; Mojgan Bordbar, Changhyun Jun, Mahdi Panahi, Sayed M. Bateni, **Christopher M. U. Neale**, Hamidreza Moeini & Saro Lee. 2022. Hybrid-based approaches for the flood susceptibility prediction of Kermanshah province, Iran. Natural Hazards. https://doi.org/10.1007/s11069-022-05701-4

Vosoughifar, Hamidreza, Helaleh Khoshkam, Sayed M. Bateni, Changhyun Jun, Tongren Xu, Shahab S. Band, **Christopher M.U. Neale**. 2022. Estimation of daily reference evapotranspiration from limited climatic variables in coastal regions. Hydrological Sciences Journal. https://doi.org/10.1080/02626667.2022.2142473

Rezaie, Fatemeh, Mahdi Panahi, Sayed M Bateni, Changhyun Jun, **Christopher M U Neale**, Saro Lee. 2022. Novel hybrid models by coupling support vector regression (SVR) with meta-heuristic algorithms (WOA and GWO) for flood susceptibility mapping. *Nat Hazards* **114**, 1247–1283 (2022). https://doi.org/10.1007/s11069-022-05424-6

Bhatti, Sandeep, Derek M. Heeren, Steven R. Evett, Susan A. O'Shaughnessy, Daran R. Rudnick, Trenton E. Franz, Yufeng Ge, **Christopher M U. Neale**. 2022. Crop response to thermal stress without yield loss in irrigated maize and soybean in Nebraska. Agricultural Water Management, Vol. 274, Pages 107946. https://doi.org/10.1016/j.agwat.2022.107946

Maguire, Mitchell S., **Christopher M. U. Neale**, Wayne E. Woldt, Derek M. Heeren. 2022. Managing spatial irrigation using remote-sensing-based evapotranspiration and soil water adaptive control model. Agricultural Water Management, Vol. 272, Pages 107838 https://doi.org/10.1016/j.agwat.2022.107838

Santos, Robson Argolo, Everardo Chartuni Mantovani, Elpidio Inacio Fernandes-Filho, Roberto Filgueiras, Rodrigo Dal Sasso Lourenco, Vinicius Bof Bufon, **Christopher M. U. Neale**. 2022. Modeling Actual Evapotranspiration with MSI-Sentinel Images and Machine Learning Algorithms. Atmosphere, Vol 13, Issue 9, Page 1518 https://doi.org/10.3390/atmos13091518

Lopes, Tárcio R, Jéssica G Nascimento, Adriano B Pacheco, Sergio N Duarte, **Christopher MU Neale**, Marcos Vinicius Folegatti. 2022. Estimation of sediment production and soil loss in a water supply basin for the metropolitan region of São Paulo-Brazil. Journal of South American Earth Sciences, Volume 118, Pages 103929 https://doi.org/10.1016/j.jsames.2022.103929

Bispo, R.C., F.B.T. Hernandez, I.Z. Goncalves, **C.M.U. Neale**, A.H.C. Teixeira. 2022. Remote Sensing based Evapotranspiration Modeling for Sugarcane in Brazil Using a Hybrid Approach. Agricultural Water Management, Vol 271, https://doi.org/10.1016/j.agwat.2022.107763

Becker, Sophia M, Trenton E Franz, Olufemi Abimbola, Dean D Steele, J Paulo Flores, Xinhua Jia, Thomas F Scherer, Daran R Rudnick, **Christopher MU Neale.** 2022. Feasibility assessment on use of proximal geophysical sensors to support precision management. Vadose Zone Journal. Pages e20228. https://doi.org/10.1002/vzj2.20228

Kayser, RH, A Ruhoff, L Laipelt, E de Mello Kich, DR Roberti, Vanessa de Arruda Souza, Gisele Cristina Dotto Rubert, Walter Collischonn, **Christopher Michael Usher Neale.** 2022. Assessing geeSEBAL automated calibration and meteorological reanalysis uncertainties to estimate evapotranspiration in subtropical humid climates. Agricultural and Forest Meteorology, Volume 314, Pages 108775

Singh, Jasreman, Yufeng Ge, Derek M Heeren, Elizabeth Walter-Shea, **Christopher MU Neale**, Suat Irmak, Mitchell S Maguire. 2022. Unmanned Aerial System-Based Data Ferrying over a Sensor Node Station Network in Maize. Sensors, Vol 22, Issue 5, pp 1863.

Bhatti, Sandeep, Derek M Heeren, Susan A O'Shaughnessy, Steven R Evett, Mitchell S Maguire, Suresh P Kashyap, **Christopher MU Neale**. 2022. Applied Engineering in Agriculture, (doi: 10.13031/aea.14945)

Santos, CAC, **Neale, CMU**, Mekonnen, MM, Goncalves, IZ, Oliveira, G, Ruiz-Alvarez, O, Safa, B, Rowe, CM. 2022. Trends of extreme air temperature and precipitation and their impact on corn and soybean yields in Nebraska, USA. Theoretical And Applied Climatology. DOI10.1007/s00704-021-03903-7

Opstal, Jonna v., **C. M. U. Neale**, L. E. Hipps. 2022. Evaluating the adaptability of an irrigation district to seasonal water availability using a decade of remotely sensed evapotranspiration estimates. Agricultural Water Management 261, 107383

Hu, Q, Woldt, W, **Neale, C**, Zhou, YZ, Drahota, J,Varner, D, Bishop, A LaGrange, T, Zhang, LG, Tang, ZH. 2021. Utilizing unsupervised learning, multi-view imaging, and CNN-based attention facilitates cost-effective wetland mapping. Remote Sensing of Environment. Volume267, Article Number112757. DOI10.1016/j.rse.2021.112757, Dec 15 2021

Eger, Glauco ZS, Gerson C Silva Junior, Eduardo AG Marques, Bernardo RC Leão, Diana GTB da Rocha, Troy E Gilmore, Luís GH do Amaral, Juremá AO Silva, **Christopher Neale.** 2021. Recharge assessment in the context of expanding agricultural activity: Urucuia Aquifer System, western State of Bahia, Brazil. Journal of South American Earth Sciences, Paper 103601

Neale, CMU, Gonzalez-Dugo, MP; Serrano-Perez, A; Campos, I; Mateos, L. 2021. Cotton canopy reflectance under variable solar zenith angles: Implications of use in evapotranspiration models. HYDROLOGICAL PROCESSES, Volume: 35 Issue: 6, Article Number: e14162, DOI: 10.1002/hyp.14162. Published: JUN 2021

Shrestha, Nawaraj, Aaron R Mittelstet, Troy E Gilmore, Vitaly Zlotnik, **Christopher M Neale.** 2021. Effects of drought on groundwater-fed lake areas in the Nebraska

Sand Hills. Journal of Hydrology: Regional Studies
Volume 36, Article 100877 https://doi.org/10.1016/j.ejrh.2021.100877

Singh, Jasreman, Yufeng Ge, Derek M Heeren, Elizabeth Walter-Shea, **Christopher MU Neale**, Suat Irmak, Wayne E Woldt, Geng Bai, Sandeep Bhatti, Mitchell S Maguire. 2021. Inter-relationships between water depletion and temperature differential in row crop canopies in a sub-humid climate. Agricultural Water Management, Volume 256, Article 107061
https://doi.org/10.1016/j.agwat.2021.107061

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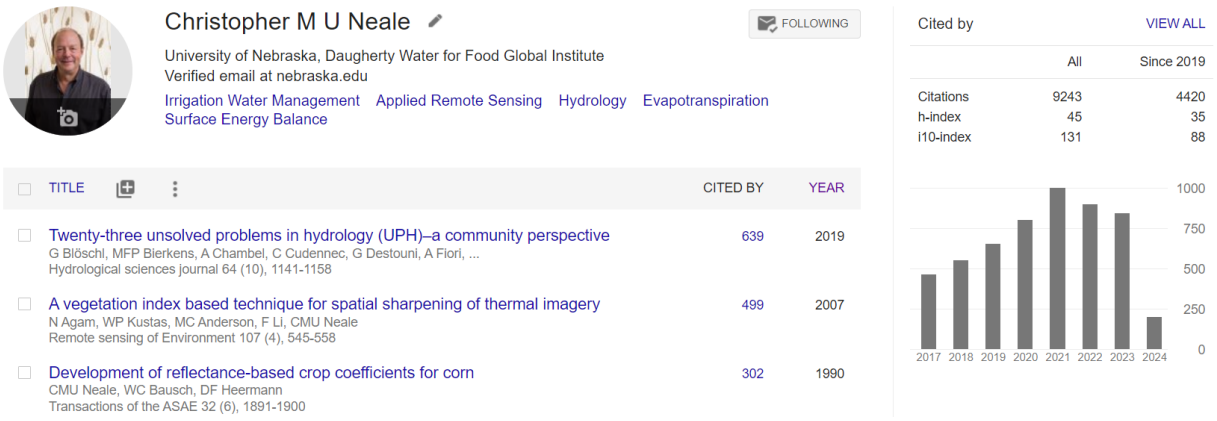

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