

CHRISTOPHER MICHAEL USHER NEALE

Director of Research, Daugherty Water for Food Institute
Professor, Department Biological Systems Engineering
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EDUCATION:

Civil Engineering Degree, Escola de Engenharia Mauá
São Caetano do Sul, São Paulo, Brazil

Master of Science in Agricultural Engineering
Colorado State University, Fort Collins, Colorado

Doctor of Philosophy in Agricultural Engineering
Colorado State University, Fort Collins, Colorado

AREAS OF RESEARCH and TECHNICAL SPECIALIZATION:

- 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, natural resources, irrigated agriculture.
- GIS applications in engineering, including development of irrigation water user cadastre maps and database for water user organizations.
- Irrigation water management and water demands estimates.
- Irrigation and Drainage Engineering
- Evapotranspiration measurements with lysimeters, Bowen ratio, eddy covariance and scintillometer systems.
- Remote sensing of energy balance components and Evapotranspiration.
- Development of crop coefficients including remote sensing approaches.
- Precision agriculture and crop yield estimation using remote sensing and GPS equipment.

LANGUAGES: Fluent in English, Portuguese and Spanish, good French language skills

RECENT EMPLOYMENT HISTORY AND EXPERIENCE:

- **University of Nebraska, Robert B. Daugherty Water for Food Institute** Lincoln, NE – Director of Research (Oct. 1, 2013 to Present)
- **Utah State University, Department of Civil and Environmental Engineering – Irrigation Engineering Division**
Logan, UT (December 2009 to December 2013) Professor
- **Utah State University, Department of Biological and Irrigation Engineering** Logan, UT (September 1988 to December 2009)
Assistant Professor, Associate Professor, Professor

SELECTED INTERNATIONAL EXPERIENCE:

2009-2012: Mozambique: Feasibility Studies towards a Sustainable Agricultural System in the buffer zone of the Gorongosa National Park in cooperation with the Gorongosa Restoration Project and local government and educational entities.

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.

1992-1993: Egypt Mapped the canal and drain layout of a irrigation system in the Nile Delta, using a combination of satellite imagery, GIS and GPS.

Inter-American Development Bank (IADB) (2002): Prepared the Scope of Work and Terms of Reference for an international tender in the Dominican Republic.

Secretaria de Recursos Hídricos – MMA, Brasilia, Brazil. (1997-1998). A one-year, 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.

CODEVASF (Compania de Desenvolvimento do Vale do Sao Francisco) – Brasilia, DF, Brazil. (1997-1998): A one-year, assignment at the Remote Sensing and GIS Laboratory of CODEVASF, the San Francisco valley development agency.

Golder Associates, Canada (1995 -1996): Mapped vegetation along the Paraguai-Parana waterway (3400 Km) in Brazil, Paraguay and Argentina using TM and MSS Landsat Imagery and airborne multispectral imaging.

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.

SELECTED SERVICE:

IAHS: Presently President of the International Commission on Remote Sensing (ICRS) – IAHS, July 2014 to July 2017.

SPIE: Conference Chair for the SPIE Remote Sensing Europe – 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.

ASPRS: 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)

ASCE: Secretary, Vice-Chairman, Chairman and Past-chairman of the Planning and Management of Irrigation and Drainage Committee. (~1989-1992)

Vice-chairman of the Special Committee for Remote Sensing.

Member of the publications committee for the Journal of Irrigation and Drainage (~1991-1994)

ASABE: Member of the Irrigation Management Committee (~1988-1989)

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. (~1993)

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.

REFEREED JOURNAL PUBLICATIONS (59+)

Cheryl Jaworowski, Henry Heasler, **Christopher Neale**, Sivarajan Saravanan Ashish Masih. 2013. Temporal and Seasonal Variations of the Hot Spring Basin Hydrothermal System, Yellowstone National Park, USA. *Remote Sens.* 2013, 5, 6587-6610; doi:10.3390/rs5126587

Paul, G., Gowda, P. H., Prasad, P. V. Vara, Howell, T. A., Staggenborg, S. A., **Neale, C. M. U.** (2013). Lysimetric evaluation of SEBAL using high resolution airborne imagery from BEAREX08. *ADVANCES IN WATER RESOURCES*, 59, 157-168.

Zaccaria, D., Lamaddalena, N., **Neale, C. M. U.**, Merkle, G. P., Palmisano, N., Passarella, G. (2013). Simulation of peak-demand hydrographs in pressurized irrigation delivery systems using a deterministic–stochastic combined model. Part I: model development. *Irrigation Science*, 31(3), 209-224.

Zaccaria, D., Lamaddalena, N., **Neale, C. M. U.**, Merkle, G. P. (2013). Simulation of peak-demand hydrographs in pressurized irrigation delivery systems using a deterministic–stochastic combined model. Part II: model applications. *Irrigation Science*, 31(3), 192-208.

Alfieri, J. G., W. P. Kustas, J. H. Prueger, L. E. Hipps, S. R. Evett, J. B. Basara, **C. M.U. Neale**, A.N. French, P. Colaizzi, N. Agam, M. H. Cosh, J. L. Chavez, T. A. Howell. 2012. On the discrepancy between eddy covariance and lysimetry-based surface flux measurements under strongly advective conditions, *Advances in Water Resources*, Volume 50, December 2012, Pages 62-78, ISSN 0309-1708, 10.1016/j.advwatres.2012.07.008.

Prueger, J.H., J.G. Alfieri, L.E. Hipps, W.P. Kustas, J.L. Chavez, S.R. Evett, M.C. Anderson, A.N. French, **C.M.U. Neale**, L.G. McKee, J.L. Hatfield, T.A. Howell, N. Agam. 2012. Patch scale turbulence over dryland and irrigated surfaces in a semi-arid landscape under advective conditions during BEAREX08, *Advances in Water Resources*, Volume 50, December 2012, Pages 106-119, ISSN 0309-1708, 10.1016/j.advwatres.2012.07.014.

Kustas, W. P., J. G. Alfieri, M. C. Anderson, P. D. Colaizzi, J. H. Prueger, S. R. Evett, **C. M.U. Neale**, A. N. French, L. E. Hipps, J. L. Chávez, K. S. Copeland, T. A. Howell. 2012. Evaluating the two-source energy balance model using local thermal and surface flux observations in a strongly advective irrigated agricultural area, *Advances in Water Resources*, Volume 50, December 2012, Pages 120-133, ISSN 0309-1708, 10.1016/j.advwatres.2012.07.005.

Neale, C. M.U., H. M.E. Geli, W. P. Kustas, J. G. Alfieri, P. H. Gowda, S. R. Evett, J.H. Prueger, L. E. Hipps, W. P. Dulaney, J. L. Chávez, A. N. French, T. A. Howell. 2012. Soil water content estimation using a remote sensing based hybrid evapotranspiration modeling approach. *Advances in Water Resources*, Volume 50, December 2012, Pages 152-161, ISSN 0309-1708, 10.1016/j.advwatres.2012.10.008.

Bingham, QG; Neilson, BT; **Neale, CMU**; Cardenas, MB. 2012. Application of high-resolution, remotely sensed data for transient storage modeling parameter

estimation. *Water Resources Research*, Volume: 48 Article Number: W08520
DOI: 10.1029/2011WR011594 Published: AUG 25 2012

Geli, Hatim M. E.; **Neale, Christopher M. U.**; Watts, Doyle; Osterberg, J; De Bruin, HAR; Kohsiek, W; Pack, RT; Hipps, LE. 2012. Scintillometer-Based Estimates of Sensible Heat Flux Using Lidar-Derived Surface Roughness. *Journal of Hydrometeorology*, Volume: 13 Issue: 4 Pages: 1317-1331 DOI: 10.1175/JHM-D-11-085.1 Published: AUG 2012

Terletzky, Pat; Ramsey, R. Douglas; **Neale, Christopher M. U.** 2012. Spectral Characteristics of Domestic and Wild Mammals. *GIScience and Remote Sensing*, Volume: 49 Issue: 4 Pages: 597-608 DOI: 10.2747/1548-1603.49.4.597
Published: JUL-AUG 2012

Chavez, J. L.; Gowda, P. H.; Howell, T. A.; Garcia, L. A.; Copeland, K. S.; **Neale, C. M. U.** 2012. ET Mapping with High-Resolution Airborne Remote Sensing Data in an Advective Semiarid Environment. *Journal of Irrigation and Drainage Engineering-ASCE*, Volume: 138 Issue: 5 Pages: 416-423 DOI: 10.1061/(ASCE)IR.1943-4774.0000417 Published: MAY 2012

Zaman, B.; McKee, M.; **Neale, C. M. U.** 2012. Fusion of remotely sensed data for soil moisture estimation using relevance vector and support vector machines. *INTERNATIONAL JOURNAL OF REMOTE SENSING*, Volume: 33 Issue: 20 Pages: 6516-6552 DOI: 10.1080/01431161.2012.690540 Published: 2012

Edward P. Glenn, **Christopher M. U. Neale**, Doug J. Hunsaker and Pamela L. Nagler. 2011. Vegetation index-based crop coefficients to estimate evapotranspiration by remote sensing in agricultural and natural ecosystems. *Hydrological Processes*, Volume 25, Issue 26, Pages 4050-4062.

Saleh Taghvaeian and **Christopher M. U. Neale**. 2011. Water balance of irrigated areas: a remote sensing approach. *Hydrological Processes*, Volume 25, Issue 26, Pages 4132-4141

Farag, F. A.; **C. M. U. Neale**; R. K. Kjelgren; J. Endter-Wada. 2011. Quantifying Urban Landscape Water Conservation Potential Using High Resolution Remote Sensing and GIS Photogrammetric Engineering and Remote Sensing 77 11 1113-1122

Santos, C.A.C., **C. M. U. Neale**, T. V. R. Rao and B. B. da Silva. 2011. Trends in indices for extremes in daily temperature and precipitation over Utah, USA. *International Journal of Climatology*, 31 12 1813-1822

Lecina, S. **C.M.U. Neale**, G.P. Merkley, C.A.C. Santos. 2011. Irrigation evaluation based on performance analysis and water accounting at the Bear River Irrigation Project (U.S.A.). *Agricultural Water Management*, 98:1349-1363

Cardenas B.; **C. M. U. Neale**; C. Jaworowski; H. Heasler. 2011. High-resolution mapping of river-hydrothermal water mixing: Yellowstone National Park. *International Journal of Remote Sensing* 32 10 2765-2777.

Campos I; **C. M. U. Neale**; A. Calera; C. Balbontin; J. G. Piqueras. 2010. Assessing satellite-based basal crop coefficients for irrigated grapes (*Vitis vinifera* L) *Agricultural Water Management* 98 1 45-54

Zaccaria, D., Ines Oueslati, **C. M. U. Neale**, N.Lamaddalena, Michele Vurro Luis S. Pereira. 2010. Flexible delivery schedules to improve farm irrigation and reduce pressure on groundwater: a case study in southern Italy. *Irrigation Science*, Volume 28, Issue 3 (2010), Page 257 - 270

Sridhar, BBM; RK Vincent, RK.; WB Clapham, SI Sritharan, J Osterberg, **CMU Neale**, DR Watts. 2010. Mapping saltcedar (*Tamarix ramosissima*) and other riparian and agricultural vegetation in the Lower Colorado River region using multi-spectral Landsat TM imagery. *Geocarto International*. Volume: 25, Issue: 8, Pages: 649-662 DOI: 10.1080/10106049.2010.521857

Gonzalez-Dugo, MP., **C. M. U. Neale**, L Mateos, WP Kustas, JH Prueger, MC Anderson and F. Li. 2009. A comparison of operational remote sensing-based models for estimating crop evapotranspiration. *Agricultural and Forest Meteorology*, 149 (2009) pp1843-1853

Chavez, J. L., P. H. Gowda, T. A. Howell, **C. M. U. Neale** and K.S. Kopeland. 2009. Estimating Hourly Crop ET Using a Two-Source Energy Balance Model and Multispectral Airborne Imagery. *Irrigation Science*, Vol. 28, No. 1, pp: 79-91.

Costa dos Santos, Carlos Antonio, B. B.Silva, T. V. R. Rao and **Christopher M. U. Neale**. 2009. Energy balance measurements over a banana orchard in the Semiarid region in the Northeast of Brazil. *Pesq. agropec. bras.*, Brasília, v.44, n.11, p.1365-1373, nov. 2009

Chavez, JL; **CMU Neale**, J. H. Prueger, W. P. Kustas. 2008. Daily evapotranspiration estimates from extrapolating instantaneous airborne remote sensing ET values. *Irrigation Science*, Volume: 27 Issue: 1 Pages: 67-81

Akashah O.Z., **Neale, C. M. U.**, Jayanthi, H. 2008. Detailed mapping of riparian vegetation in the middle Rio Grande River using high resolution multi-spectral airborne remote sensing. *Journal of Arid Environments*, Volume: 72, Issue: 9, Pages: 1734-1744

Endter-Wada J., Kurtzman J., Keenan S.P., Kjelgren R.K., **Neale C.M.U.** 2008. Situational waste in landscape watering: Residential and business water use in an urban Utah community. *Journal of the American Water Resources Association*, Volume: 44, Issue: 4, Pages: 902-920

Konrad, C. P., Black, R. W., Voss, F., **Neale, C. M. U.** 2008. Integrating remotely acquired and field data to assess effects of setback levees on riparian and aquatic habitats in glacial-melt water rivers. *River Research and Applications*. Volume: 24, Issue: 4, Pages: 355-372

Agam N, Kustas W.P., Anderson M.C., Li F.Q., **Neale C.M.U.** 2007. A vegetation index based technique for spatial sharpening of thermal imagery. *Remote Sensing Of Environment* 107 (4): 545-558

Jayanthi H., **Neale C.M.U.**, Wright J.L. 2007. Development and validation of canopy reflectance-based crop coefficient for potato. *Agricultural Water Management* 88 (1-3): 235-246

Cooper, D. I., Eichinger, W. E., Archuleta, J., Hipps, L., **Neale, C. M. U.**, Prueger, J. H. 2007. An advanced method for deriving latent energy flux from a scanning Raman lidar. *Agronomy Journal* 99 (1): 272-284

Payero, J. O., **C. M. U. Neale**, J. L. Wright. 2006. Effect of stability correction on remote sensing estimates of near-noon sensible heat flux of alfalfa and tall fescue grass. *International Journal of Remote Sensing*, Vol 27, No. 2, pp 307-328.

Payero, J. O., **C. M. U. Neale**, J. L. Wright. 2006. Near-noon albedo values of alfalfa and tall fescue grass derived from multispectral data. *International Journal of Remote Sensing*. Vol 27, No. 3, pp 569 - 586

Eichinger W.E., D. I. Cooper, L. E. Hipps, W. P. Kustas, **C. M. U. Neale**, J.H. Prueger. 2006. Spatial and temporal variation in evapotranspiration using Raman lidar. *Advances In Water Resources* 29 (2): 369-381

Neale, C.M.U., H. Jayanthi, J.L. Wright. 2005. Irrigation water management using high resolution airborne remote sensing. *Journal of Irrigation and Drainage Systems*, Volume 19, Numbers 3-4, Pages: 321 - 336

Li, Fuqin, William P.Kustas, John H. Prueger, **C. M. U. Neale**, Thomas J. Jackson. 2005. Utility of Remote Sensing Based Two-Source Energy Balance Model Under Low and High Vegetation Cover Conditions. *Journal of Hydrometeorology*, Vol. 6, No. 6, pages 878-891

Chávez, J. L., **C. M. U. Neale**, L. E. Hipps, J. H. Prueger, and W. P. Kustas. 2005. Comparing aircraft-based remotely sensed energy balance fluxes with eddy covariance tower data using heat flux source area functions. *Journal of Hydrometeorology*, Vol. 6, No. 6, pages 923–940.

Prueger, J. H., J. L. Hatfield, W. P. Kustas, L. E. Hipps, J. I. MacPherson, **C. M. U. Neale**, W. E. Eichinger, D. I. Cooper, and T. B. Parkin. 2005. Tower and Aircraft Eddy Covariance Measurements of Water Vapor, Energy, and Carbon Dioxide Fluxes during SMACEX *Journal of Hydrometeorology*, Vol. 6, No. 6, pages 954–960

Payero, J.O, **C.M.U. Neale**, and J.L. Wright. 2005. Estimating soil heat flux for alfalfa and clipped tall fescue grass. *Applied Engineering in Agriculture*, 21(3): 401-409.

Payero, J.O., **C.M.U. Neale**, and J.L. Wright. 2005. Non-water-stressed baselines for calculating crop water stress index (CWSI) for alfalfa and tall fescue grass. *Transactions of the ASAE*, 48(2): 653-661.

Anderson, M.C., **C.M.U. Neale**, F. Li, J.M. Norman, W.P. Kustas, H. Jayanthi, and J. Chavez. 2004. Up scaling ground observations of vegetation water content, canopy height, and leaf area index during SMEX02 using aircraft and Landsat imagery. *Remote Sensing of Environment*, 92 447-464.

Payero, J.O., **C. M. U. Neale** and J.L. Wright. 2004. Comparison of eleven vegetation indices for estimating plant height of alfalfa and grass. *ASAE Applied Engineering in Agriculture*. Vol 20(3): 385-393.

Payero, J.O., **C.M.U.Neale**, J.L. Wright, R.G. Allen. 2003. Guidelines for Validating Bowen Ratio Data. *Transactions of the ASAE*, Vol 46 (4) 1:10

Cooper, D.I., W.E. Eichinger, J. Archuleta, L. Hipps, J. Kao, M. Y. Leclerc, **C. M. Neale**, and J. Prueger. 2003. Spatial source-area analysis of three-dimensional moisture fields from lidar, eddy covariance, and a footprint model. *Agric. and Forest Meteorol.* Vol. 114: Issue 3-4, Pages 213–234.

Artan, G. A., **C. M. U. Neale** and D. G. Tarboton. 2000. Characteristic Length Scale of Input Data to Distributed Models: Implications for Modelling Grid Size. *Journal of Hydrology*, vol 227, Issue 1-4, pp. 128-139.

Hawkins, C. P., K. L. Bartz and **C. M. U. Neale**. 1997. Vulnerability of Riparian Vegetation to Catastrophic Flooding: Implications for Riparian Restoration. *Restoration Ecology*, Vol. 5, No. 48, pp. 75-84.

O’Niell, M. P., J.C. Schmidt, J. P. Dobrowolski, C.P. Hawkins and **C.M. U. Neale**. 1997. Identifying Sites for Riparian Restoration: Application of a model to the Upper Arkansas River Basin. *Restoration Ecology*, Vol5, No. 48, pp 85-102.

Neale, C. M. U. 1997. Classification and Mapping of Riparian Systems Using Airborne Multispectral Videography. *Restoration Ecology*, Vol. 5, No. 48, pp.103-112

Sun, C., **C. M. U. Neale**, J. J. McDonnell, H. D. Cheng. 1997. Monitoring land-surface snow conditions from SSM/I data using an artificial neural network classifier. *IEEE Transactions On Geoscience And Remote Sensing* 35 (4): 801-809 JUL 1997

M. S. Moran, A. Vidal, D. Troufleau, J. Qi, T. R. Clarke, P. J. Pinter, T. A. Mitchell, Y. Inoue, **C. M. U. Neale**. 1997. Combining multifrequency microwave and optical data for crop management. *Remote Sensing of Environment* 61 (1): 96-109

Sun, C., **C. M. U. Neale** and J.J. McDonnell. 1996. Snow Wetness Estimates of Vegetated Terrain from Satellite Passive Microwave Data. *Hydrological Processes*, Vol 10 (12), 1619-1628

Neale, C.M.U. and B.G. Crowther. 1994. An airborne multispectral video/radiometer remote sensing system: development and calibration. *Remote Sensing of Environment*, Volume: 49 Issue: 3 Pages: 187-194.

Neale C. M. U., M.J. McFarland and K. Chang. Land Surface Type Classification using microwave brightness temperatures from the Special Sensor Microwave/Imager. *IEEE Transactions on Geoscience and Remote Sensing*, Vol 28, No. 5, September

1990, pp 829-838.

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Bausch W. C. and **C.M.U. Neale**. 1989. Spectral inputs improve corn crop coefficients and irrigation scheduling. Transactions of the ASAE, Vol. 32(6):1901-1908

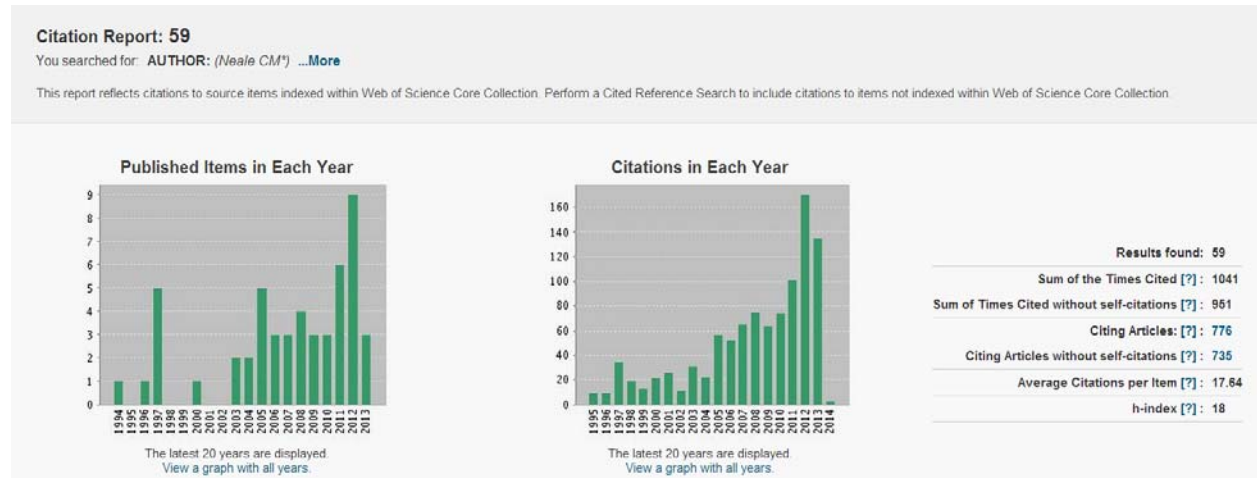
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From ISI Web of Science:



OTHER SIGNIFICANT PUBLICATIONS

- Seven Proceedings Edited
- Six Peer Reviewed Symposium Papers
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