

Kelly Robert Thorp, Ph.D., P.E.

Curriculum Vitae

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*“Agriculture is our wisest pursuit, because it will in the end
contribute most to real wealth, good morals, and
happiness.” ~Thomas Jefferson*

Education

- 5/2006 **Ph.D., Agricultural Engineering**, Iowa State University (ISU), Ames, IA.
 - Dissertation: Integration of Remote Sensing and Crop Growth Modeling for Nitrogen Management Decision Support in Corn
 - Advisors: Dr. William D. Batchelor and Dr. Brian L. Steward
 - Minor in Statistics
- 12/2002 **M.S., Agricultural Engineering**, University of Illinois at Urbana-Champaign (UIUC).
 - Thesis: Variable-rate Applications of Herbicide Using Weed Maps Generated from Remote Sensing Imagery
 - Advisor: Dr. Lei Tian
- 5/2000 **B.S., Agricultural Engineering**, University of Illinois at Urbana-Champaign (UIUC).
- 5/1998 **A.S., Engineering Science**, Parkland College, Champaign, IL.

Professional Experience

- 2019–present **Research Agricultural Engineer (GS-15)**, United States Department of Agriculture (USDA), Agricultural Research Service (ARS), U. S. Arid-Land Agricultural Research Center (ALARC), Maricopa, AZ.
- 2010–present **Adjunct Professor**, Biosystems Engineering, University of Arizona, Tucson, AZ.
 - 2014–2019 **Research Agricultural Engineer (GS-14)**, USDA-ARS-ALARC, Maricopa, AZ.
 - 2010–2014 **Research Agricultural Engineer (GS-13)**, USDA-ARS-ALARC, Maricopa, AZ.
 - 2007–2010 **Research Agricultural Engineer (GS-12)**, USDA-ARS-ALARC, Maricopa, AZ.
 - 2006–2007 **Postdoctoral Research Associate (GS-11)**, USDA-ARS, National Soil Tilth Laboratory (NSTL), now the National Laboratory for Agriculture and the Environment (NLAE), Ames, IA.
- 2003–2006 **Graduate Research Assistant**, Agricultural & Biosystems Engineering, ISU, Ames, IA.
- 2000–2003 **Graduate Research Assistant**, Agricultural Engineering, UIUC, Urbana, IL.
- 1999–2001 **Research Intern**, Institute for Technology Development (Spectral Visions), Urbana, IL.

Professional Affiliations

- 1998–present American Society of Agricultural and Biological Engineers (ASABE), formerly the American Society of Agricultural Engineers (ASAE)

- 1999–present Alpha Epsilon Agricultural Engineering Honor Society
- 2000–present The Order of the Engineer
- 2006–present American Society of Agronomy (ASA)
- 2006–present Soil Science Society of America (SSSA)
- 2006–present Crop Science Society of America (CSSA)
- 2014–present International Environmental Modelling and Software Society (iEMSs)

———— Honors and Awards

- 11/2019 L. R. Ahuja Ag Systems Modeling Award, Soil Science Society of America.
- 7/2018 ASABE Superior Paper Award: Thorp, K. R., Hunsaker, D. J., Bronson, K. F., Andrade-Sanchez, P., Barnes, E. M., 2017. Cotton irrigation scheduling using a crop growth model and FAO-56 methods: Field and simulations studies. *Transactions of the ASABE* 60(6), 2023–2039.
- 6/2018 ASCE-EWRI Superior Paper Award: Bautista, E., Warrick, A. W., Schlegel, J. L., Thorp, K. R., Hunsaker, D. J., 2016. Approximate furrow infiltration model for time-variable ponding depth. *Journal of Irrigation and Drainage Engineering* 142 (11).
- 7/2017 Outstanding Associate Editor, ASABE Natural Resources and Environmental Systems (NRES) Community
- 7/2017 Outstanding Manuscript Reviewer, ASABE NRES Community
- 2/2017 Outstanding Manuscript Reviewer for Crop Science journal
- 7/2015 ASABE Superior Paper Award: Thorp, K. R., Barnes, E. M., Hunsaker, D. J., Kimball, B. A., White, J. W., Nazareth, V. J., Hoogenboom, G., 2014. Evaluation of CSM-CROPGRO-Cotton for simulating effects of management and climate change on cotton growth and evapotranspiration in an arid environment. *Transactions of the ASABE* 57(6), 1627–1642.
- 6/2009 Outstanding Manuscript Reviewer, ASABE Information and Electronic Technologies (IET) Division.
- 4/2006 Graduate Student of the Year, ASABE Mid-Central Section.
- 7/2005 ASAE IET Select Paper Award: Thorp, K. R., Batchelor, W. D., Paz, J. O., 2005. A cross validation approach to evaluate CERES-Maize simulations of corn yield spatial variability. ASAE Paper No. 05-3002. ASAE, St. Joseph, MI.

———— Licensure and Certifications

- 2018–present FAA Remote Pilot Certification for Small Unmanned Aircraft Systems
- 2011–present Registered Professional Engineer, State of Arizona (#52156)
- 2000–2011 Professional Engineer Intern, State of Illinois (#061-029370)

———— Research Interests

I. Information Technology for Agricultural Systems

- Airborne and Satellite Remote Sensing ○ Machine Vision and Proximal Sensing
- Geographic Information Systems ○ Decision Support Systems

II. Soil and Water Engineering for Agricultural Systems

- Hydrologic and Water Quality Modeling ○ ET Measurement and Modeling

- Drainage and Irrigation of Crop Lands
- Watershed Hydrology

III. Agronomic, Soil, and Crop Science

- Irrigation and Fertilizer Management
- Agroecosystem Modeling
- Precision Agriculture
- High-Throughput Plant Phenomics

Research Contributions and Impact

Dr. Thorp develops remote sensing, computer simulation models, and geospatial technologies for improving water, nutrient, and pesticide management in cropping systems and for enhancing plant breeding and genetics research. He has published 92 articles in refereed journals, and he is the lead author on 29 of these. Six additional manuscripts are currently in review. Two recent lead author papers were selected for ASABE Superior Paper Awards in 2015 and 2018. Dr. Thorp has contributed 51 non-refereed papers and has given 60 oral presentations and 6 posters. His nationwide and international recognition is evidenced by 28 invitations to present research at regional, national, international, and on-line venues. Dr. Thorp has served in leadership positions on four technical committees of the American Society of Agricultural and Biological Engineers (ASABE) and was elected to serve on the Nominating Committee. He was previously recognized as an Outstanding Manuscript Reviewer for Crop Science and Transactions of the ASABE journals and as an Outstanding Associate Editor for the ASABE NRES Community. He was also recently awarded the L. R. Ahuja Ag Systems Modeling Award by the Soil Science Society of America. He has served as principle investigator or co-investigator on 20 extramural research grants totaling \$2,507,336 (\$335,854 to Dr. Thorp).

Refereed Publications

Asterisk (*) indicates graduate students and post-docs advised by Dr. Thorp.

- [1] Bronson, K. F., Conley, M. M., French, A. N., Hunsaker, D. J., **Thorp, K. R.**, Barnes, E. M., 2020. Which active optical sensor vegetation index is best for nitrogen status assessment in irrigated cotton? *Agronomy Journal* xx (x), xx–xx. Accepted 1/1/2020. doi:10.1002/agj2.20120
- [2] De la Cruz Jiménez*, J., Leiva, L., Cardoso, J. A., French, A. N., **Thorp, K. R.**, 2020. Proximal sensing of *Urochloa* grasses increases selection accuracy. *Crop & Pasture Science* 71 (4), 401–409. doi:10.1071/CP19324
- [3] DeJonge, K. C., **Thorp, K. R.**, Marek, G. W., 2020. The apples and oranges of reference and potential evapotranspiration: Implications for agroecosystem models. *Agricultural & Environmental Letters* 5, e20011. doi:10.1002/ael2.20011
- [4] Huang*, J., Ridoutt, B. G., Sun, Z., Lan, K., **Thorp, K. R.**, Wang, X., Yin, X., Huang, J., Chen, F., Scherer, L., 2020. Balancing food production within the planetary water boundary. *Journal of Cleaner Production* 253, 119900. doi:10.1016/j.jclepro.2019.119900
- [5] **Thorp, K. R.**, Thompson, A. L., Bronson, K. F., 2020. Irrigation rate and timing effects on Arizona cotton yield, water productivity, and fiber quality. *Agricultural Water Management* 234, 106146. doi:10.1016/j.agwat.2020.106146
- [6] Ale, S., Omani, N., Himanshu, S. K., Bordovsky, J. P., **Thorp, K. R.**, Barnes, E. M., 2020. Determining optimum irrigation termination periods for cotton production in the Texas High Plains. *Transactions of the ASABE* 63 (1), 105–115. doi:10.13031/trans.13483

- [7] Chen, X., **Thorp, K. R.**, Van Oel, P. R., Xu, Z., Zhou, B., Li, Y., 2020. Environmental impact assessment of water-saving irrigation systems across 60 irrigation construction projects in northern China. *Journal of Cleaner Production* 245, 118883. doi:10.1016/j.jclepro.2019.118883
- [8] **Thorp, K. R.**, 2020. Long-term simulations of site-specific irrigation management for Arizona cotton production. *Irrigation Science* 38 (1), 49–64. doi:10.1007/s00271-019-00650-6
- [9] Luo*, Z., **Thorp, K. R.**, Abdel-Haleem, H., 2019. A high-throughput quantification of resin and rubber contents in *Parthenium argentatum* using near-infrared (NIR) spectroscopy. *Plant Methods* 15, 154. doi:10.1186/s13007-019-0544-3
- [10] Bronson, K. F., Hunsaker, D. J., Meisinger, J. J., Rockholt, S. M., **Thorp, K. R.**, Conley, M. M., Williams, C. F., Norton, E. R., Barnes, E. M., 2019. Improving nitrogen fertilizer use efficiency in subsurface drip-irrigated cotton in the Desert Southwest. *Soil Science Society of America Journal* 83 (6), 1712–1721. doi:10.2136/sssaj2019.07.0210
- [11] Joshi*, V. R., **Thorp, K. R.**, Coulter, J. A., Johnson, G. A., Porter, P. M., Strock, J. S., Garcia y Garcia, A., 2019. Improving site-specific maize yield estimation by integrating satellite multispectral data into a crop model. *Agronomy* 9, 719. doi:10.3390/agronomy9110719
- [12] Huang*, J., Ridoutt, B. G., **Thorp, K. R.**, Wang, X., Lan, K., Liao, J., Tao, X., Wu, C., Huang, J., Chen, F., Scherer, L., 2019. Water-scarcity footprints and water productivities indicate unsustainable wheat production in China. *Agricultural Water Management* 224, 105744. doi:10.1016/j.agwat.2019.105744
- [13] Zerihun, D., Sanchez, C. A., **Thorp, K. R.**, Hagler, M. J., 2019. Hydraulics of linear-move sprinkler irrigation systems, III: Model evaluation. *Irrigation & Drainage Systems Engineering* 8 (2), 237.
- [14] Bronson, K. F., Hunsaker, D. J., **Thorp, K. R.**, 2019. Nitrogen fertilizer and irrigation effects on seed yield and oil in camelina. *Agronomy Journal* 111 (4), 1712–1719. doi:10.2134/agronj2018.10.0644
- [15] Huang*, J., Scherer, L., Lan, K., Chen, F., **Thorp, K. R.**, 2019. Advancing the application of a model-independent open-source geospatial tool for large spatiotemporal simulations. *Environmental Modelling & Software* 119, 374–378. doi:10.1016/j.envsoft.2019.07.003
- [16] **Thorp, K. R.**, Marek, G. W., DeJonge, K. C., Evett, S. R., Lascano, R. J., 2019. Novel methodology to evaluate and compare evapotranspiration algorithms in an agroecosystem model. *Environmental Modelling & Software* 119, 214–227. doi:10.1016/j.envsoft.2019.06.007
- [17] Chen, X., **Thorp, K. R.**, Ouyang, Z., Hou, Y., Zhou, B., Li, Y., 2019. Energy consumption due to groundwater pumping for irrigation in the North China Plain. *Science of the Total Environment* 669, 1033–1042. doi:10.1016/j.scitotenv.2019.03.179
- [18] Kimball, B. A., Boote, K. J., Hatfield, J. L., Ahuja, L. R., Stockle, C., Archontoulis, S., Baron, C., Basso, B., Bertuzzi, P., Constantin, J., Deryng, D., Dumont, B., Durand, J., Ewert, F., Gaiser, T., Gayler, S., Hoffmann, M. P., Jiang, Q., Kim, S., Lizaso, J., Moulin, S., Nendel, C., Parker, P., Palosuo, T., Priesack, E., Qi, Z., Srivastava, A., Stella, T., Tao, F., **Thorp, K. R.**, Timlin, D., Twine, T. E., Webber, H., Willaume, M., Williams, K., 2019. Simulation of maize evapotranspiration: An intercomparison among 29 maize models. *Agricultural and Forest Meteorology* 271, 264–284. doi:10.1016/j.agrformet.2019.02.037

- [19] Thompson, A. L., **Thorp, K. R.**, Conley, M. M., El-Shikha, D., French, A. N., Andrade-Sanchez, P., Pauli, D., 2019. Comparing nadir and multi-angle view sensor technologies for measuring in-field plant height of upland cotton. *Remote Sensing* 11, 700. doi:10.3390/rs11060700
- [20] Kothari*, K., Ale, S., Bordovsky, J. P., **Thorp, K. R.**, Porter, D. O., Munster, C. L., 2019. Simulation of efficient irrigation management strategies for grain sorghum production over different climate variability classes. *Agricultural Systems* 170, 49–62. doi:10.1016/j.agsy.2018.12.011
- [21] Bronson, K. F., Hunsaker, D. J., Williams, C. F., **Thorp, K. R.**, Rockholt, S. M., Del Grosso, S. J., Venterea, R. T., Barnes, E. M., 2018. Erratum: Nitrogen management affects nitrous oxide emissions under varying cotton irrigation systems in the Desert Southwest, USA (*Journal of Environmental Quality* 47:(1), 70–78. doi:10.2134/jeq2017.10.0389). *Journal of Environmental Quality* 47 (6), 1572–1572. doi:10.2134/jeq2017.10.0389er
- [22] **Thorp, K. R.**, Thompson, A. L., Harders, S. J., French, A. N., Ward, R. W., 2018. High-throughput phenotyping of crop water use efficiency via multispectral drone imagery and a daily soil water balance model. *Remote Sensing* 10, 1682. doi:10.3390/rs10111682
- [23] Shamshiri, R. R., Jones, J. W., **Thorp, K. R.**, Ahmad, D., Man, H. C., Taheri, S., 2018. Review of optimum temperature, humidity, and vapour pressure deficit for microclimate evaluation and control in greenhouse cultivation of tomato: a review. *International Agrophysics* 32 (2), 287–302. doi:10.1515/intag-2017-0005
- [24] Lamsal*, A., Welch, S. M., White, J. W., **Thorp, K. R.**, Bello, N., 2018. Estimating parametric phenotypes that determine anthesis date in *Zea mays*: Challenges in combining ecophysiological models with genetics. *PLOS ONE* 13 (4), e0195841. doi:10.1371/journal.pone.0195841
- [25] Thompson, A. L., **Thorp, K. R.**, Conley, M. M., Andrade-Sanchez, P., Heun, J. T., Dyer, J. M., White, J. W., 2018. Deploying a proximal sensing cart to identify drought-adaptive traits in upland cotton for high-throughput phenotyping. *Frontiers in Plant Science* 9, 507. doi:10.3389/fpls.2018.00507
- [26] Bronson, K. F., Hunsaker, D. J., Williams, C. F., **Thorp, K. R.**, Rockholt, S. M., Del Grosso, S. J., Venterea, R. T., Barnes, E. M., 2018. Nitrogen management affects nitrous oxide emissions under varying cotton irrigation systems in the Desert Southwest, USA. *Journal of Environmental Quality* 47 (1), 70–78. doi:10.2134/jeq2017.10.0389
- [27] Shamshiri, R. R., Kalantari, F., Ting, K. C., **Thorp, K. R.**, Hameed, I. A., Weltzien, C., Ahmad, D., Shad, Z. M., 2018. Advances in greenhouse automation and controlled environment agriculture: A transition to plant factories and urban farming. *International Journal of Agricultural and Biological Engineering* 11 (1), 1–22. doi:10.25165/j.ijabe.20181101.3210
- [28] Youssef, M. A., Abdelbaki, A. M., Negm, L. M., Skaggs, R. W., **Thorp, K. R.**, Jaynes, D. B., 2018. DRAINMOD-simulated performance of controlled drainage across the U.S. Midwest. *Agricultural Water Management* 197, 54–66. doi:10.1016/j.agwat.2017.11.012
- [29] Adhikari*, P., Ale, S., DeLaune, P. B., **Thorp, K. R.**, Barnes, E. M., 2017. Simulated effects of winter wheat cover crop on the cotton production systems of the Texas Rolling Plains. *Transactions of the ASABE* 60 (6), 2083–2096. doi:10.13031/trans.12272

- [30] Bronson, K. F., Hunsaker, D. J., Mon, J., Andrade-Sanchez, P., White, J. W., Conley, M. M., **Thorp, K. R.**, Bautista, E., Barnes, E. M., 2017. Improving nitrogen fertilizer use efficiency in surface- and overhead sprinkler-irrigated cotton in the Desert Southwest. *Soil Science Society of America Journal* 81 (6), 1401–1412. doi:10.2136/sssaj2017.07.0225
- [31] DeJonge, K. C., **Thorp, K. R.**, 2017. Implementing standardized reference evapotranspiration and dual crop coefficient approach in the DSSAT Cropping System Model. *Transactions of the ASABE* 60 (6), 1965–1981. doi:10.13031/trans.12321
- [32] **Thorp, K. R.**, Hunsaker, D. J., Bronson, K. F., Andrade-Sanchez, P., Barnes, E. M., 2017. Cotton irrigation scheduling using a crop growth model and FAO-56 methods: Field and simulation studies. *Transactions of the ASABE* 60 (6), 2023–2039. doi:10.13031/trans.12323
- [33] Mauget, S. A., Adhikari, P., Leiker, G., Baumhardt, R. L., **Thorp, K. R.**, Ale, S., 2017. Modeling the effects of management and elevation on West Texas dryland cotton production. *Agricultural and Forest Meteorology* 247, 385–398. doi:10.1016/j.agrformet.2017.07.009
- [34] Pauli, D., White, J. W., Andrade-Sanchez, P., Conley, M. M., Heun, J., **Thorp, K. R.**, French, A. N., Hunsaker, D. J., Carmo-Silva, A. E., Wang, G., Gore, M. A., 2017. Investigation of the influence of leaf thickness on canopy reflectance and physiological traits in upland and Pima cotton populations. *Frontiers in Plant Science* 8, 1405. doi:10.3389/fpls.2017.01405
- [35] Bronson, K. F., White, J. W., Conley, M. M., Hunsaker, D. J., **Thorp, K. R.**, French, A. N., Mackey, B. E., Holland, K. H., 2017. Active optical sensors in irrigated durum wheat: Nitrogen and water effects. *Agronomy Journal* 109 (3), 1060–1071. doi:10.2134/agronj2016.07.0390
- [36] **Thorp, K. R.**, Wang, G., Bronson, K. F., Badaruddin, M., Mon, J., 2017. Hyperspectral data mining to identify relevant canopy spectral features for estimating durum wheat growth, nitrogen status, and grain yield. *Computers and Electronics in Agriculture* 136, 1–12. doi:10.1016/j.compag.2017.02.024
- [37] Bautista, E., Schlegel, J., **Thorp, K. R.**, Hunsaker, D. J., 2016. Approximate furrow infiltration model for time-variable ponding depth. *Journal of Irrigation and Drainage Engineering* 142 (11). doi:10.1061/(ASCE)IR.1943-4774.0001057
- [38] Wang*, X., **Thorp, K. R.**, White, J. W., French, A. N., Poland, J. A., 2016. Approaches for geospatial processing of field-based high-throughput plant phenomics data from ground vehicle platforms. *Transactions of the ASABE* 59 (5), 1053–1067. doi:10.13031/trans.59.11502
- [39] Mon, J., Bronson, K. F., Hunsaker, D. J., **Thorp, K. R.**, White, J. W., French, A. N., Conley, M. M., 2016. Interactive effect of nitrogen fertilization and irrigation on grain yield, canopy temperature, and nitrogen use efficiency in overhead sprinkler-irrigated durum wheat. *Field Crops Research* 191, 54–65. doi:10.1016/j.fcr.2016.02.011
- [40] Pauli, D., Andrade-Sanchez, P., Carmo-Silva, A. E., Gazave, E., French, A. N., Heun, J., Hunsaker, D. J., Lipka, A. E., Setter, T. L., Strand, R. J., **Thorp, K. R.**, Wang, S., White, J. W., Gore, M. A., 2016. Field-based, high-throughput plant phenotyping reveals the temporal patterns of quantitative trait loci associated with stress-responsive traits in cotton. *G3: Genes, Genomes, Genetics* 6 (4), 865–879. doi: 10.1534/g3.115.023515
- [41] **Thorp, K. R.**, Wang, G., Badaruddin, M., Bronson, K. F., 2016. Lesquerella seed yield estimation using color image segmentation to track flowering dynamics in response to variable water and nitrogen management. *Industrial Crops and Products* 86, 186–195. doi:10.1016/j.indcrop.2016.03.035

- [42] Chu, Q., Liu, J., Bali, K., **Thorp, K. R.**, Smith, R., Wang, G., 2016. Automated thinning increases uniformity of in-row spacing and plant size in romaine lettuce. *HortTechnology* 26 (1), 12–19.
- [43] Adhikari*, P., Ale, S., Bordovsky, J. P., **Thorp, K. R.**, Modala, N. R., Rajan, N., Barnes, E. M., 2016. Simulating future climate change impacts on seed cotton yield in the Texas High Plains using the CSM-CROPGRO-Cotton model. *Agricultural Water Management* 164, 317–330. doi:10.1016/j.agwat.2015.10.011
- [44] Cendrero-Mateo*, M. P., Moran, M. S., Papuga, S. A., **Thorp, K. R.**, Alonso, L., Moreno, J., Ponce-Campos, G., Rascher, U., Wang, G., 2016. Plant chlorophyll fluorescence: active and passive measurements at canopy and leaf scales with different nitrogen treatments. *Journal of Experimental Botany* 67 (1), 275–286. doi:10.1093/jxb/erv456
- [45] **Thorp, K. R.**, Gore, M. A., Andrade-Sanchez, P., Carmo-Silva, A. E., Welch, S. M., White, J. W., French, A. N., 2015. Proximal hyperspectral sensing and data analysis approaches for field-based plant phenomics. *Computers and Electronics in Agriculture* 118, 225–236. doi:10.1016/j.compag.2015.09.005
- [46] Liu, J., Wang, G., **Thorp, K. R.**, Zhang, Y., Yang, M., Chu, Q., 2015. Effect of nitrogen and water deficit type on the yield gap between the potential and attainable wheat yield. *Chilean Journal of Agricultural Research* 75 (4), 457–464. doi:10.4067/S0718-58392015000500011
- [47] **Thorp, K. R.**, Hunsaker, D. J., French, A. N., Bautista, E., Bronson, K. F., 2015. Integrating geospatial data and cropping system simulation within a geographic information system to analyze spatial seed cotton yield, water use, and irrigation requirements. *Precision Agriculture* 16 (5), 532–557. doi:10.1007/s11119-015-9393-x
- [48] Groenendyk*, D. G., Ferré, T. P. A., **Thorp, K. R.**, Rice, A. K., 2015. Hydrologic-process-based soil texture classification for improved visualization of landscape function. *PLOS ONE* 10 (6), e0131299. doi:10.1371/journal.pone.0131299
- [49] Hunsaker, D. J., French, A. N., Waller, P. M., Bautista, E., **Thorp, K. R.**, Bronson, K. F., Andrade-Sanchez, P., 2015. Comparison of traditional and ET-based irrigation scheduling of surface-irrigated cotton in the arid southwestern USA. *Agricultural Water Management* 159, 209–224. doi:10.1016/j.agwat.2015.06.016
- [50] Modala, N. R., Ale, S., Rajan, N., Munster, C. L., DeLaune, P. B., **Thorp, K. R.**, Nair, S. S., Barnes, E. M., 2015. Evaluation of the CSM-CROPGRO-Cotton model for the Texas Rolling Plains region and simulation of deficit irrigation strategies for increasing water use efficiency. *Transactions of the ASABE* 58 (3), 685–696. doi:10.13031/trans.58.10833
- [51] French, A. N., Hunsaker, D. J., **Thorp, K. R.**, 2015. Remote sensing of evapotranspiration over cotton using the TSEB and METRIC energy balance models. *Remote Sensing of Environment* 158, 281–294. doi:10.1016/j.rse.2014.11.003
- [52] **Thorp, K. R.**, Barnes, E. M., Hunsaker, D. J., Kimball, B. A., White, J. W., Nazareth, V. J., Hoogenboom, G., 2014. Evaluation of CSM-CROPGRO-Cotton for simulating effects of management and climate change on cotton growth and evapotranspiration in an arid environment. *Transactions of the ASABE* 57 (6), 1627–1642. doi:10.13031/trans.57.10612
- [53] Malone, R. W., Jaynes, D. B., Kaspar, T. C., **Thorp, K. R.**, Kladviko, E., Ma, L., James, D. E., Singer, J., Morin, X. K., Searchinger, T., 2014. Cover crops in the upper midwestern

- United States: Simulated effect on nitrate leaching with artificial drainage. *Journal of Soil and Water Conservation* 69 (4), 292–305. doi:10.2489/jswc.69.4.292
- [54] Liu, J., Bronson, K. F., **Thorp, K. R.**, Mon, J., Badaruddin, M., McCloskey, W. B., Ray, D. T., Chu, Q., Wang, G., 2014. Lesquerella seed and oil yield response to split-applied fertilizer. *Industrial Crops and Products* 60, 273–279. 10.1016/j.indcrop.2014.06.024
- [55] Liang, Z., Bronson, K. F., **Thorp, K. R.**, Mon, J., Badaruddin, M., Wang, G., 2014. Cultivar and N fertilizer rate affect yield and N use efficiency in irrigated durum wheat. *Crop Science* 54 (3), 1175–1183. doi:10.2135/cropsci2013.03.0159
- [56] **Thorp, K. R.**, Ale, S., Bange, M. P., Barnes, E. M., Hoogenboom, G., Lascano, R. J., McCarthy, A. C., Nair, S., Paz, J. O., Rajan, N., Reddy, K. R., Wall, G. W., White, J. W., 2014. Development and application of process-based simulation models for cotton production: A review of past, present, and future directions. *Journal of Cotton Science* 18 (1), 1–38.
- [57] Wang, G., Bronson, K. F., **Thorp, K. R.**, Mon, J., Badaruddin, M., 2014. Multiple leaf measurements improve effectiveness of chlorophyll meter for durum wheat nitrogen management. *Crop Science* 54 (2), 817–826. doi:10.2135/cropsci2013.03.0160
- [58] Andrade-Sanchez, P., Gore, M. A., Heun, J. T., **Thorp, K. R.**, Carmo-Silva, A. E., French, A. N., Salvucci, M. E., White, J. W., 2014. Development and evaluation of a field-based, high-throughput phenotyping platform. *Functional Plant Biology* 41 (1), 68–79. doi:10.1071/FP13126
- [59] **Thorp, K. R.**, Bronson, K. F., 2013. A model-independent open-source geospatial tool for managing point-based environmental model simulations at multiple spatial locations. *Environmental Modelling & Software* 50, 25–36. doi:10.1016/j.envsoft.2013.09.002
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Software

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Grants

Project Description	Total Funds	Funds to Thorp
Thorp, K. R. Evaluation and improvement of crop simulation models to meet the data needs of modern cotton production systems (renewed). Cotton, Inc. 1/1/2020–12/31/2020.	\$25,000	\$25,000
Thorp, K. R. Evaluation and improvement of crop simulation models to meet the data needs of modern cotton production systems (renewed). Cotton, Inc. 1/1/2019–12/31/2019.	\$19,000	\$19,000
Thorp, K. R. , French, A. N., Bronson, K. F., Pauli, W. D. Remote sensing for estimation of harvested area and productivity of rice, maize, and soybean in Indonesia. USDA, Foreign Agriculture Service, Borlaug Fellowship Program. 10/1/2018–9/30/2020.	\$29,418	\$29,418
Thorp, K. R. , Marek, G. W. Evaluation and improvement of crop simulation models to meet the data needs of modern cotton production systems (renewed). Cotton, Inc. 1/1/2018–12/31/2018.	\$23,000	\$23,000
Thorp, K. R. , Marek, G. W. Evaluation and improvement of crop simulation models to meet the data needs of modern cotton production systems. Cotton, Inc. 1/1/2017–12/31/2017.	\$19,000	\$19,000
Ale, S., Bordovsky, J., Thorp, K. R. Determining ideal irrigation termination dates for cotton production in the Texas High Plains using the DSSAT Cropping System Model. Cotton, Inc. 1/1/2017–12/31/2017.	\$14,000	
Poland, J., Price, K., Gore, M., French, A., Thorp, K. R. , White, J., Andrade-Sanchez, P., Fritz, A., Price, R., Schapaugh, W., Welch, S., Zhang, N. A field-based high-throughput phenotyping platform for plant genetics. National Science Foundation (NSF) Plant Genome Research Project. 2/1/2016–1/31/2018.	\$871,561	

Project Description	Total Funds	Funds to Thorp
Thorp, K. R. Evaluation of the Cotton2K model for Arizona cotton production. Cotton, Inc. 1/1/2016–12/31/2016.	\$19,000	\$19,000
Ale, S., DeLaune, P., Thorp, K. R. Evaluating the feasibility of cover crops in the Texas Rolling Plains cotton production systems using the DSSAT Cropping System Model. Cotton, Inc. 1/1/2016–12/31/2016.	\$14,000	
Thorp, K. R. Comparison of cotton simulation models for Arizona cotton production systems. Cotton, Inc. 1/1/2015–12/31/2015.	\$19,000	\$19,000
Ale, S., DeLaune, P., Thorp, K. R. Evaluating the feasibility of cover crops in the Texas Rolling Plains cotton production systems using the DSSAT Cropping System Model. Cotton, Inc. 1/1/2015–12/31/2015.	\$14,000	
Thorp, K. R. Geospatial analysis of precision cotton irrigation management strategies by combining sensor data with a cotton simulation model. Cotton, Inc. 1/1/2014–12/31/2014.	\$19,000	\$19,000
Ale, S., Rajan, N., Bordovsky, J., Thorp, K. R. Assessing the climate change impacts on cotton production in the Texas High Plains using the DSSAT CROPGRO-Cotton model. Cotton, Inc. 1/1/2014–12/31/2014.	\$14,000	
Poland, J., Price, K., Gore, M., French, A., Thorp, K. R. , White, J., Andrade-Sanchez, P., Fritz, A., Price, R., Schapaugh, W., Welch, S., Zhang, N. A field-based high-throughput phenotyping platform for plant genetics. National Science Foundation (NSF) Plant Genome Research Project. 2/1/2013–1/31/2016.	\$768,054	
Thorp, K. R. , White, J. W, Bronson, K. F., Hunsaker, D. J., Kimball, B. A., Wang, G. Evaluation of the CROPGRO-Cotton model for Arizona cotton production systems. Cotton, Inc. 1/1/2013–12/31/2013.	\$19,000	\$19,000
Ale, S., Rajan, N., Thorp, K. R. Assessment of water requirements and development of irrigation management plans for cotton production in the Texas High Plains using the DSSAT CROPGRO-Cotton model. Cotton, Inc. 1/1/2013–12/31/2013.	\$17,000	
French, A. N., Schmugge, T., Thorp, K. R. , Sanchez, J. M., Coll, C., Valor, E., Hunsaker, D. Monitoring arid land cover change with simulated HypsIRI data. NASA Headquarters, Science Mission Directorate, Research Opportunities in Space and Earth Sciences (ROSES), HypsIRI Preparatory Activities Using Existing Imagery. 1/1/2011–12/31/2011.	\$101,216	
Crow, W. T., Moran, M. S., Nearing, G., Reichle, R., Thorp, K. R. Ecological and agricultural productivity forecasting using root-zone soil moisture products derived from the NASA SMAP mission. NASA Headquarters, Science Mission Directorate, Research Opportunities in Space and Earth Sciences (ROSES), Terrestrial Ecology. 10/1/2010–9/30/2014.	\$430,914	\$144,436

Project Description	Total Funds	Funds to Thorp
Wang, G., Gutierrez, M., Ottman, M. J., Thorp, K. R. Managing N application for desirable grain protein content in durum wheat using image processing and canopy reflectance. Arizona Grain Research and Promotion Council. 10/1/2010–9/30/2012.	\$7,964	
Wang, G., Nolte, K., Thorp, K. R. Improve management efficiency using crop models. Arizona Department of Agriculture, Arizona Specialty Crop Block Grant. 9/1/2010–8/31/2012.	\$63,209	
Total	\$2,507,336	\$335,854

Invited Presentations

- 11/10/2019 Invited presentation entitled “Comparison of evapotranspiration methods in the DSSAT Cropping System Model” at an ASA Climatology and Modeling Symposium entitled “Progress of Evapotranspiration Simulations in Agricultural System Models,” ASA-SSSA-CSSA Annual Meeting, San Antonio, TX.
- 9/9/2019 Invited plenary address entitled “UAS technologies for HTP and irrigation management” for an annual meeting of the Association for the Advancement of Industrial Crops, Tucson, AZ
- 3/8/2019 Invited keynote address entitled “Remote sensing and crop modeling technologies for precision crop management” for the Production Agriculture Symposium at the University of Minnesota, Minneapolis, MN.
- 11/6/2018 Invited presentation entitled “Simulating spatially variable irrigation recommendations for precision irrigation management” at an ASA Climatology & Modeling Symposium entitled “How Suitable are Models to Reflect Spatially Variable Field Conditions,” ASA-SSSA-CSSA Annual Meeting, Baltimore, MD
- 2/28/2018 Invited presentation entitled “Engineering technologies for improved irrigation management in central Arizona” at the Arizona State University, School of Sustainable Engineering and the Built Environment, Tempe, AZ.
- 6/20/2017 Invited keynote address entitled “Field-based plant phenotyping devices: Data collection and management strategies” at a symposium hosted by the Plant Phenotyping and Imaging Research Centre and the Global Institute for Food Security, University of Saskatchewan, Saskatoon, Canada
- 11/8/2016 Invited presentation entitled “A ‘Big Data’ workflow for field-based plant phenomics from ground vehicles” at an ASA Biometry and Statistical Computing Symposium entitled “Processing High-Throughput Data for Statistical Analysis,” ASA-SSSA-CSSA Annual Meeting, Phoenix, AZ.
- 11/7/2016 Invited presentation entitled “Identifying important canopy hyperspectral reflectance features for estimating crop biophysical traits” at an ASA Climatology & Modeling Symposium entitled “Evolution of Biophysical Measurements: Legacy of the US Water Conservation Lab and Advances in Rapid Phenotyping,” ASA-SSSA-CSSA Annual Meeting, Phoenix, AZ.
- 11/--/2016 Invited to present at an SSSA Soil Physics and Hydrology Division Symposium entitled “Remote Sensing of Land Surface and Vadose Zone Hydrologic Processes,” ASA-SSSA-CSSA Annual Meeting, Phoenix, AZ. Declined.
- 8/3/2016 Invited presentation entitled “Crop simulation models and big data” at a meeting of the Cotton Incorporated Board of Directors, Scottsdale, AZ.

- 7/19/2016 Invited presentation entitled “Comparison of the FAO-56 water balance model and the DSSAT Cropping System Model for cotton irrigation scheduling in Arizona” at an ASABE invited session entitled “Crop Modeling and Decision Support for Optimizing Use of Limited Water,” ASABE Annual International Meeting, Orlando, FL.
- 2/2/2016 Invited presentation entitled “Workflows for field-based plant phenomics data: Geoprocessing, modeling, storage, and enhancement” at a meeting of the National Corn Growers Association, University of Arizona, Maricopa Agricultural Center, Maricopa, AZ.
- 8/31/2015 Invited presentation entitled “Workflows for field-based plant phenomics data: Geoprocessing, modeling, storage, and enhancement” at the University of Arizona, Agricultural and Biosystems Engineering Department, Tucson, AZ.
- 8/17/2015 Invited presentation entitled “Workflows for field-based plant phenomics data: Geoprocessing, modeling, storage, and enhancement” at the High Throughput Plant Phenotyping and Unmanned Aerial Vehicles in Agriculture Workshop, Texas A&M University, College Station, TX.
- 11/4/2014 Invited presentation entitled “Evaluation of CSM-CROPGRO-Cotton for simulating cotton growth and evapotranspiration in an arid environment” at an ASA Climatology & Modeling Symposium entitled “Evapotranspiration in Crop and Hydrologic Models: Testing, Refinements and Cross-Comparisons,” ASA-SSSA-CSSA Annual Meeting, Long Beach, CA.
- 11/3/2014 Invited presentation entitled “Experiences in high performance computing used to characterize maize phenology” at an ASA Climatology & Modeling Symposium entitled “Field Phenomics: Integrating Simulation Modeling and Proximal Sensing for Crop Research,” ASA-SSSA-CSSA Annual Meeting, Long Beach, CA.
- 10/31/2013 Invited presentation entitled “Field Phenomics: Data Analysis” as an eXtension webinar. Available online at www.extension.org/pages/68270
- 2/6/2013 Invited presentation entitled “Application of the DSSAT-CSM for precision crop management” at the Agricultural Model Intercomparison and Improvement Project (AgMIP) Development Sprint, Texas Advanced Computing Center, University of Texas, Austin, TX.
- 1/28/2013 Invited presentation entitled “Enhancing water conservation and crop productivity in irrigated agriculture” at the ASABE Agricultural Equipment Technology Conference, Kansas City, MO.
- 10/22/2012 Invited presentation entitled “Merging GIS, remote sensing, and simulation modeling for analyzing irrigation water management alternatives” at an ASA Climatology & Modeling Symposium entitled “Sensor-based Water Management: Sensors and Algorithms,” ASA-SSSA-CSSA Annual Meeting, Cincinnati, OH.
- 10/22/2012 Invited presentation entitled “Estimating crop physiological traits from remote sensing data using inverse modeling” at a CSSA-C2 Symposium entitled “Modeling of Physiological Traits for Crop Improvement,” ASA-SSSA-CSSA Annual Meeting, Cincinnati, OH.
- 6/14/2012 Invited presentation entitled “Estimating crop biophysical properties from remote sensing data by inverting linked radiative transfer and ecophysiological models” at the Joint Climate Change Agriculture and Food Security (CCAFFS) and Joint Research Centre (JRC) Crop Yield Estimation Workshop, Ispra, Italy. Declined due to USDA foreign travel restrictions.
- 3/29/2012 Invited presentation entitled “GeoSim: An open-source tool for incorporating geospatial data into 1-D simulation models” at the NCERA-180 Precision Agriculture Meeting, University of Arizona, Maricopa Agricultural Center, Maricopa, AZ.

- 10/31/2011 Invited presentation entitled “Techniques for merging remote sensing observations into the simulations of cropping systems models” at the University of Arizona, Agricultural and Biosystems Engineering Department, Tucson, AZ.
- 5/11/2010 Invited presentation entitled “Combining remote sensing and crop systems modeling to develop decision tools for crop water management” at a French-American symposium on Developing Partnerships for Sustainable Water Management and Agriculture in the Context of Climate and Global Change, Purdue University, West Lafayette, IN. Invited by the French Consulate in Chicago (Office for Science and Technology of the French Embassy) and the Purdue University Global Engineering Program.
- 3/11/2008 Invited presentation entitled “Managing agricultural systems using remote sensing and simulation modeling” at the USDA-ARS, Southwest Watershed Research Center, Tucson, AZ.
- 3/10/2008 Invited presentation entitled “Managing agricultural systems using remote sensing and simulation modeling” at the University of Arizona, Agricultural and Biosystems Engineering Department, Tucson, AZ.
- 1/14/2003 Invited presentation entitled “Remote sensing for weed detection and variable-rate herbicide applications” at the Gibson City Lions Club Meeting, Gibson City, IL.

Teaching Experience

- 2007–present Program of Study committee member and research advisor for graduate students.
 - Advised Sara Harders, M.S., Biosystems Engineering, University of Arizona, Tucson, AZ, 2016–2019.
 - Advised Abhishes Lamsal, Ph.D., Department of Agronomy, Kansas State University, Manhattan, KS, 2014–2017.
 - Advised Maria Pilar Cendrero Mateo, Ph.D., Soil, Water, and Environmental Science, University of Arizona, Tucson, AZ, 2010–2013.
 - Advised Grey Nearing, M.S., Agricultural Engineering, University of Arizona, Tucson, AZ, 2007–2009.
- 2019–2020 Advised Brenda Villa, Arizona State University, undergraduate Honor’s thesis on modeling cotton production for future climate conditions.
- 11/27/2018 Guest lecturer on “Data Analytics and Precision Agriculture” for seniors in Biosystems Engineering at University of Arizona.
- 2014–2018 Instructor for 6 four-day workshops to educate graduate students, industry professionals, and government officials on high-throughput field-based plant phenomics.
 - Workshop funding provided through National Science Foundation grants.
 - Provided classroom lectures on several subjects, including passive spectral reflectance sensors, field layout planning, georeferencing sensor data, and model inversion.
 - Led hands-on exercises on development of plot boundary maps and sensor data geoprocessing within a geographic information system.
- 2013–2018 Research mentor collaborating to provide 240 hours of scientific research experience to undergraduate students through courses at Central Arizona Community College (CACCC) and South Mountain Community College (SMCC)
 - Mentored Shreya Varra on the use of high-performance computers to conduct simulations with an agroecosystem model, Summer 2017.
 - Mentored Dylan Polo on field calibration of neutron moisture meters, Summer 2016.

- Mentored Lawrence Hu on analysis of digital images for cotton canopy cover estimates, Summer 2015.
 - Mentored Kendall Stratton on Python programming for analysis of hyperspectral remote sensing data, Summer 2013.
- 2005–2006 Student, Preparing Future Faculty Program, Iowa State University, Ames, IA.
- Participated in weekly discussions on course preparation, pedagogical strategies, classroom management, and other faculty life issues.
 - Achieved the level of “Associate” in the program.
- Summer 2004 Teaching Assistant, Agricultural Engineering 203: Computer Applications and Systems Modeling with Study Abroad Component in Germany, ISU, Ames, IA.
- Co-led 16 undergraduate students on a 3-week study abroad trip to Germany.
 - Supervised lab sessions on programming numerical methods in Visual Basic.
 - Toured various agricultural industries and research farms in southern Germany.
- Fall 2002 Teaching Assistant, Agricultural Engineering 236: Machine Characteristics and Mechanisms, UIUC, Urbana, IL.
- Supervised lab sessions on design characteristics of agricultural machines.
 - Graded homework, lab reports, and exams.
 - Taught three stand-alone lectures.

Professional Service

I. American Society of Agricultural and Biological Engineers

- 2010–present Associate Editor, Transactions of the ASABE and Applied Engineering in Agriculture, Natural Resources and Environmental Systems (NRES) Community. Handled 47 manuscripts.
- 2008–present Organizer of 27 technical sessions for ASABE Annual Meetings.
- 2005–present Moderator of 11 technical sessions at ASABE Annual Meetings.
- 2016–present Member, Cotton Engineering (MS-23/7/3).
- 2010–present Member, Publications Review (NRES-05).
- 2009–present Member, Irrigation Group (NRES-24).
- 2007–present Member, Computational Methods, Simulations, and Applications Committee (ITSC-217), Past-Chair (2016–2017), Chair (2014–2015), Vice-Chair (2012–2013), Secretary (2010–2011).
- 2007–present Member, Precision Agriculture Committee (MS-54), Past-Chair (2015–2016), Chair (2013–2014), Vice-Chair (2011–2012).
- 2007–present Member, Hydrology Group (NRES-21).
- 2016–2018 Member, Nominating Committee (elected by vote of society membership).
- 2011–2016 Member, Executive and Steering Committees for the ASABE Information Technology, Sensors, and Controls Community (ITSC-01/02), P-511 Representative (2014–2016), Past-Chair (2014), Chair (2013), Vice-Chair (2012), Secretary (2011).
- 2006–2011 Member, Drainage Group (NRES-23).
- 2005–2011 Member, Young Professionals Community (YPC), Publications Council Rep (2010–2011).
- 2003–2010 Member, Modeling Biological Processes Committee (BE-26), Past-Chair (2008), Chair (2007), Vice-Chair (2006), Secretary (2005), Interim Secretary (2004).
- 2009 Judge, G. B. Gunlogson Student Environmental Design Competition.

- 2004, 2012–14 Reviewer, IET Select Meeting Paper Award.
- 1998–2000 Member, Student Chapter of the ASAE at the UIUC, President (2000)

II. American Society of Agronomy

- 2011–present Member, Evapotranspiration Measurement and Modeling Community, Vice-Chair (2020)
- 2011–present Member, Model Applications in Field Research Community

III. Biological Systems Simulation Group

- 2010 Co-organizer of the 40th Biological Systems Simulation Group Conference, Maricopa, AZ, 13–15 April.

IV. Technical Reviewer for Scientific Journals

- 2008–present Agricultural & Forest Meteorology (7 reviews)
- 2018–present Agricultural Systems (3 reviews)
- 2006–present Agricultural Water Management (22 reviews)
- 2011–present Agronomy Journal (14 reviews)
 - 2018 Agrosystems, Geosciences & Environment (1 review)
- 2003–present Applied Engineering in Agriculture (11 reviews)
 - 2008 Biosystems Engineering (1 review)
 - 2016 Climate Research (2 reviews)
 - 2014 Climatic Change (2 reviews)
- 2005–present Computers and Electronics in Agriculture (11 reviews)
 - 2017 Computers in Industry (2 reviews)
- 2013–present Crop Science (7 reviews)
- 2013–present Environmental Modelling & Software (5 reviews)
 - 2015 European Journal of Agronomy (1 review)
- 2008–present Field Crops Research (6 reviews)
- 2009–present IEEE Transactions on Geoscience and Remote Sensing (8 reviews)
 - 2011 Industrial Crops and Products (1 review)
 - 2015 Irrigation and Drainage (1 review)
 - 2018 Irrigation Science (3 review)
 - 2013 Journal of Agricultural Science (1 review)
- 2010–2015 Journal of Applied Remote Sensing (2 reviews)
 - 2012 Journal of Arid Environments (1 review)
 - 2017 Journal of Contemporary Water Research and Education (1 review)
- 2008–2009 Journal of Environmental Management (2 reviews)
 - 2013 Journal of Environmental Quality (3 reviews)
 - 2014 Journal of Hydrology (1 review)
 - 2015 Journal of the Science of Food and Agriculture (1 review)
 - 2011 Journal of Soil and Water Conservation (1 review)
 - 2007 Photogrammetric Engineering and Remote Sensing (1 review)

- 2017 The Plant Phenome Journal (1 review)
- 2015 Precision Agriculture (1 review)
- 2012–present Remote Sensing of Environment (4 reviews)
- 2003–present Transactions of the ASABE (43 reviews)

V. Other Technical Reviewing Assignments

- 2005–present USDA-ARS Peer Manuscripts and Project Plans (17 reviews)
- 2019 Guest associate editor for a special collection entitled “High-throughput field phenotyping to boost precision agriculture and speed up plant breeding,” published in *Frontiers in Plant Science*.
- 2008, 2012 United States - Israel Binational Agricultural Research and Development Fund (BARD) proposals (2 reviews)
- 2011 University of Arizona Extension Publications (1 review)
- 2012 Book Chapters (3 reviews)

VII. University Committees

- 2011–present Member, Industrial Advisory Council, Agricultural and Biosystems Engineering, University of Arizona, Tucson, AZ.
- 2003–2006 Senator, Graduate and Professional Student Senate (GPSS), Iowa State University, Ames, IA.
- 2003–2006 Member, Agricultural Engineering Graduate Organization (AEGO), Department of Agricultural and Biosystems Engineering, Iowa State University, Ames, IA.

International Experience

- 2019 Hosted Dena Drajat, an economist and statistician with Badan Pusat Statistik (Statistics Indonesia) in Indonesia, to collaborate on satellite remote sensing methods for mapping extent of rice production in Indonesia, 14 April – 7 July.
- 2018 Hosted Juan de la Cruz Jimenez, plant scientist from the International Center for Tropical Agriculture (CIAT) in Columbia and provided consultation on hyperspectral data analysis for high-throughput phenotyping of brachiaria grass, 6–8 August.
- 2017 Presented a keynote address at a symposium by the Plant Phenotyping and Imaging Research Centre, University of Saskatchewan, Saskatoon, Canada, 19–22 June.
- 2014 Hosted Valentina Zanella, graduate student from the University of Padova in Italy and provided consultation on use of the Geospatial Simulation software for precision nitrogen fertilization assessments, 21–24 September.
- 2014 Attended the 2014 ASABE Annual International Meeting, Montréal, Canada, 13–16 July.
- 2013 Presented research at the 2013 Australian Cotton Research Conference and met with scientists at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) facilities in Narrabri, NSW, Australia, 5–13 September. Travel sponsored by Cotton, Inc.
- 2011 Hosted Holger Lilienthal from the Julius Kühn-Institut (JKI) in Germany and discussed potential research collaborations, 12–16 December.
- 2011 Hosted Alison McCarthy, irrigation and mechatronics engineer from the University of Southern Queensland in Australia, for a two-day tour of USDA-ARS-ALARC, 17–18 March.

- 2005 Took a cross-country bus tour on precision agriculture in Sweden and presented a poster at the 5th European Conference on Precision Agriculture, Uppsala, Sweden, 4–13 June.
- 2004 Co-led a group of 16 ISU undergraduate students during a 3-week study abroad course in southern Germany and Switzerland, 1–19 August.
- 1999 Attended the 1999 American Society of Agricultural Engineers Annual International Meeting, Toronto, Canada, 18–22 July.
- 1995 Participated in a student exchange program called the German-American Partnership Program (GAPP), Stuttgart, Germany, 10 July – 10 August.

Press Releases

- 1/7/2020 Article entitled “Pinal farmers benefiting from eye in sky” by Miles Wilson and Dylan McKim in the Maricopa Monitor.
- 1/2–3/2020 Article entitled “Drone on the range: Farmers take to the skies to save water and money” by Miles Wilson and Dylan McKim in the Casa Grande Dispatch.
- 10/29/2019 Newscast entitled “Farmers’ eyes in the skies” by Dylan McKim on Cronkite News, Arizona PBS.
- 10/16/2018 Article entitled “More crops with less water: USDA researchers in Maricopa developing new tech” by Bethany Blundell in the Maricopa Monitor.
- 6/14/2016 Radio interview and article entitled “Arizona’s Ak-Chin Indian Community leads way in efficient, water-saving farm tech” by Casey Kuhn on National Public Radio (95.1 KJZZ Phoenix).
- 6/4/2016 Article entitled “Arizona trials target next generation of cotton irrigation” by Cary Blake in Western Farm Press.
- 10/8/2011 Article entitled “As water use pressures increase, remote sensing offers solutions” by Cary Blake in Western Farm Press.
- 10/14/2009 Article entitled “High-tech research in Maricopa could aid irrigation scheduling” in the Casa Grande Dispatch.

Professional Development Courses

- 2014 Crucial Conversations: Tools for Talking when Stakes are High, USDA-ARS-ALARC, Maricopa, AZ, 22–24 April.
- 2011 USDA-ARS Object Modeling System (OMS) training, Fort Collins, CO, 24–25 October.
- 2008 Training Program on DSSAT 4.5, Assessing Crop Production, Nutrient Management, Climatic Risk, and Environmental Sustainability with Simulation Models, Griffin, GA, 12–21 May.
- 2008 Introduction to Supervision, USDA Graduate School, Tucson, AZ, 21–25 January.
- 2006 Agronomy for Engineers, Continuing Professional Development (CPD) Course, ASABE Annual Meeting, Portland, OR, 11 July.
- 2006 DRAINMOD-NII Training, North Carolina State University, Raleigh, NC, 24–28 April.

Computer Programming Languages

- Python Use regularly for routine data processing and analysis and for development of custom object-oriented software applications, notably the Geospatial Simulation plug-in for QGIS.

Fortran	Use regularly to modify and improve algorithms in the DSSAT Cropping System Model.
L ^A T _E X	Use regularly for manuscript preparation.
R	Use regularly for statistical analysis of data.
Visual Basic	Use occasionally for development of Microsoft Excel macros.
C/C++	Use occasionally for developing software applications, particularly for hardware control.
IDL	Use occasionally for digital image processing with the Environment for Visualizing Images (ENVI) remote sensing software package.
MATLAB	Basic knowledge.
Java	Basic knowledge.

References

- Current Supervisor **Dr. Kevin F. Bronson**, Research Soil Scientist & Research Leader, USDA-ARS-ALARC, 21881 N. Cardon Ln., Maricopa, AZ, 85138, (520)-316-6380, kevin.bronson@usda.gov
- Project Manager **Dr. Edward M. Barnes**, Director of Environmental and Agricultural Research, Cotton, Inc., 6399 Weston Pkwy, Cary, NC, 27513, (919)-678-2368, ebarnes@cottoninc.com
- Former Supervisor **Dr. Robert W. Malone**, Research Agricultural Engineer, USDA-ARS-NLAE, 1015 N. University Blvd., Ames, IA, 50011, (515)-294-8327, rob.malone@usda.gov
- Major Professor **Dr. Brian L. Steward**, Professor, Agricultural and Biosystems Engineering, Iowa State University, 2325 Elings, 605 Bissell Rd., Ames, IA, 50011, (515)-294-1452, bsteward@iastate.edu
- Major Professor **Dr. William D. Batchelor**, Professor, Biosystems Engineering, Auburn University, 208 Corley Building, Auburn, AL, 36849, (334)-844-3533, wdb0007@auburn.edu
- Major Professor **Dr. Lei F. Tian**, Associate Professor, Agricultural & Biological Engineering, 360L AESB, 1304 W.Pennsylvania Ave., Urbana, IL, 61801, (217)-333-7534, lei-tian@illinois.edu