

ALLAN A. ANDALES

Professor and Extension Specialist in Irrigation and Water Science
Department of Soil and Crop Sciences
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EDUCATION

1998 Ph.D. Agricultural Engineering and Water Resources, Iowa State University.
1995 M.S. Agricultural Engineering, Iowa State University.
1990 B.S. Agricultural Engineering, University of the Philippines at Los Baños.

ACADEMIC POSITIONS

(2019-present) Professor/Extension Specialist, Irrigation/Water Science, Colorado State University
(2013-2019) Associate Professor/Extension Specialist, Irrigation/Water Science, Colorado State University
(2007-2013) Assistant Professor/Extension Specialist, Irrigation/Water Science, Colorado State University
(1999-2001) Assistant Professor, Agricultural Engineering, University of the Philippines at Los Baños
(1990-1993) Instructor, General Physics; Agricultural Engineering, University of the Philippines at Los Baños

OTHER POSITIONS

(2004-2007) Soil Scientist, US Department of Agriculture-Agricultural Research Service, Fort Collins, CO
(2003) Postdoctoral Fellow, Department of Agronomy and Horticulture, New Mexico State University
(2002-2003) Research Associate, Department of Rangeland Ecosystems Science, Colorado State University
(2001-2002) Visiting Scientist (Soil Scientist), US Department of Agriculture-Agricultural Research Service, Fort Collins, CO
(1999) Postdoctoral Fellow, Agricultural and Biosystems Engineering Department, Iowa State University

RESEARCH INTERESTS

Irrigation water management; irrigation scheduling; crop consumptive water use (evapotranspiration); precision irrigation; water resources; computerized decision support systems (crop and rangeland-livestock systems)

HONORS AND AWARDS

2018, Educational Aids Blue Ribbon Award (Water Irrigation Scheduler for Efficient Application), American Society of Agricultural and Biological Engineers
2016, Educational Materials Award for Digital Decision Aids (Water Irrigation Scheduler for Efficient Application), American Society of Agronomy, Extension Education Community
2014, "Balik-Scientist" (Returning Scientist) Award (11 Nov. – 11 Dec. 2014), travel and subsistence funding from Philippine Department of Science and Technology
2012, CSU College of Agricultural Sciences Team Research Award (as a member of the Water Team)
2006, USDA Certificate of Merit (outstanding performance) and Quality Step Increase, USDA-ARS-Northern Plains Area
2005, USDA Certificate of Merit (superior performance) USDA-ARS-Northern Plains Area
2004, On the Spot Award (Outstanding work in evaluating and improving the Forage and Livestock Model), USDA-ARS-Northern Plains Area
2002, USDA Certificate of Merit (outstanding performance) and Quality Step Increase, USDA-ARS-Northern Plains

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Area

- 1999, The Reverend P. T. Taiganides Award (Outstanding Ph.D. Graduate Student in Agricultural Engineering), Iowa State University
- 1995, Honor Society of Phi Kappa Phi, Iowa State University
- 1995, Alpha Epsilon (Honor Society of Agricultural Engineering), Iowa State University
- 1991, Seventh Place, National Agricultural Engineering Board Exam, Philippines
- 1990, Gamma Sigma Delta Honor Society of Agriculture, University of the Philippines

PUBLISHED WORKS ([Google Scholar Profile](#))

Refereed Publications:

(* indicates Andales was a major advisor or co-advisor; ^ indicates Andales was a committee member for the student; +Visiting scholar or Postdoc)

1. Jones, A.S., Andales, A.A., Chávez, J.L., McGovern, C.L.*, Smith, G.E.B.*, David, O., Fletcher, S.J. 2019. Use of Predictive Weather Uncertainties in an Irrigation Scheduling Tool - Part I: A Review of Metrics and Adjoint Methods. *Journal of the American Water Resources Association* (In Press).
2. Jones, A.S., Andales, A.A., Chávez, J.L., McGovern, C.L.*, Smith, G.E.B.*, David, O., Fletcher, S.J. 2019. Use of Predictive Weather Uncertainties in an Irrigation Scheduling Tool - Part II: An Application of Metrics and Adjoints. *Journal of the American Water Resources Association* (In Press).
3. Subedi, A. *, Chávez, J.L., and Andales, A.A. 2019. Hourly alfalfa evapotranspiration estimation using variable bulk surface resistance. *Journal of Irrigation and Drainage Engineering* 145(10):04019023. DOI: 10.1061/(ASCE)IR.1943-4774.0001413
4. Elsayed, M.L.M.+ , Saseendran, S.A., Ahuja, L.R., Ma, L., Trout, T.J., and Andales, A.A. 2019. Modeling Current and Future Climate Effects on Winter Wheat Production in Colorado, USA. *Advances in Agricultural Systems Modeling* 8:171-199. doi:10.2134/advagricsystem8.2017.0015
5. Sadhukhan, D.+ , Qi, Z., Zhang, T.Q., Tan, C.S., Ma, L., and Andales, A.A. 2019. Development and evaluation of a phosphorus (P) module in RZWQM2 for phosphorus management in agricultural fields. *Environmental Modelling & Software* 113:48-58. <https://doi.org/10.1016/j.envsoft.2018.12.007>
6. Sima, N. Q.*, A. A. Andales, R. D. Harmel, L. Ma, and T. J. Trout. 2019. Evaluating RZWQM2-CERES-Maize and water production functions for predicting irrigated maize yield and biomass in eastern Colorado. *Transactions of the ASABE* 62(1):213-223. <https://doi.org/10.13031/trans.13045>
7. Andales, A.A., Straw, D., Simmons, L.H., Marek, T.H., Bartolo, M.E., and Ley, T.W. 2018. Design and Construction of a Precision Weighing Lysimeter in Southeast Colorado. *Transactions of the ASABE* 61(2):509-521. DOI:10.13031/trans.12282
8. Sima, N.Q.+ , Harmel, R.D., Fang, Q.X., Ma, L., and Andales, A.A. 2018. A Modified F-test for Evaluating Model Performance by Including both Experimental and Simulation Uncertainties. *Environmental Modelling & Software* 104:236-248. DOI:10.1016/j.envsoft.2018.03.011
9. Nguyen, D.C.H., Ascough II, J.C., Maier, H.R., Dandy, G.C. and Andales, A. A. 2017. Optimization of Irrigation Scheduling Using Ant Colony Algorithms and an Advanced Cropping System Model. *Environmental Modelling & Software* 97:32-45. DOI:10.1016/j.envsoft.2017.07.002
10. Araya, A., Kisekka, I., Lin, X., Prasad, P.V.V., Gowda, P., Rice, C., Andales, A.A. 2017. Evaluating the Impact of Future Climate Change on Irrigated Corn Production in Kansas. *Climate Risk Management* 17:139-154.

11. Subedi, A. *, Chávez, J.L., Andales, A.A. 2016. ASCE-EWRI Standardized Penman-Monteith Evapotranspiration (ET) Equation Performance in Southeastern Colorado. *Agricultural Water Management* 179:74-80. DOI:10.1016/j.agwat.2016.07.002
12. Zhou, S., Hu, X.+, Wang, W., Andales, A.A., Zhang, Y. 2016. Optimization of irrigation schedule based on RZWQM model for spring wheat in Shiyang River Basin. *Transactions of the Chinese Society of Agricultural Engineering* 32(6):121-129. doi : 10.11975/j.issn.1002-6819.2016.06.017
http://www.tcsae.org/nygcxben/ch/reader/view_abstract.aspx?file_no=20160617&flag=1
13. Mkhwanazi, M. ^, Chávez, J.L., Andales, A.A. 2015. SEBAL-A: A remote sensing ET algorithm that accounts for advection with limited data. Part I: Development and validation. *Remote Sensing* 7:15046-15067. DOI:10.3390/rs71115046
14. Mkhwanazi, M. ^, Chávez, J.L., Andales, A.A., DeJonge, K.C. 2015. SEBAL-A: A remote sensing ET algorithm that accounts for advection with limited data. Part II: Test for Transferability. *Remote Sensing* 7:15068-15081. DOI:10.3390/RS71115068
15. Bartlett, A.C. *, Andales A.A., Arabi, M., Bauder, T.A. 2015. A Smartphone App to Extend Use of a Cloud-based Irrigation Scheduling Tool. *Computers and Electronics in Agriculture* 111:127-130.
16. Saseendran, S.A. *, Trout, T.J., Ahuja, L.R., Ma, L., McMaster, G.S., Nielsen, D.C., Andales, A.A., Chávez, J.L., and Ham, J.M. 2015. Quantifying crop water stress factors from soil water measurements in a limited irrigation experiment. *Agricultural Systems* 137:191-205. doi:10.1016/j.agsy.2014.11.005
17. Saseendran, S.A. *, Ahuja, L.R., Ma, L., Trout, T.J., McMaster, G.S., Nielsen, D.C., Ham, J.M., Andales, A.A., Halvorson, A.D., Chávez, J.L., and Fang, Q.X. 2015. Developing and normalizing average corn crop water production functions across years and locations using a system model. *Agricultural Water Management* 157:65-77. DOI: 10.1016/j.agwat.2014.09.002
18. Fang, Q.X.+, Andales, A.A., Derner, J.D., Ahuja, L.R., Ma, L., Bartling, P.N.S., Reeves, J.L., and Qi, Z. 2014. Modeling weather and stocking rate effects on forage and steer production in northern mixed-grass prairie. *Agricultural Systems* 129:103-114. DOI:10.1016/j.agsy.2014.05.011
19. Reyes-Fox, M. *, Steltzer, H., Trlica, M.J., McMaster, G.S., Andales, A.A., LeCain, D.R. and Morgan, J.A. 2014. Elevated CO₂ further lengthens growing season under warming conditions. *Nature* 510:259-262. doi:10.1038/nature13207
20. Saseendran, S.A. *, Ahuja, L.R., Ma, L., Nielsen, D.C., Trout, T.J., Andales, A.A., Chávez, J.L., and Ham, J.M. 2014. Enhancing the water stress factors for simulation of corn in RZWQM2. *Agronomy Journal* 106(1):81-94.
21. Andales, A.A., Bauder, T.A., and Arabi, M. 2014. A Mobile Irrigation Water Management System Using a Collaborative GIS and Weather Station Networks. *Advances in Agricultural Systems Modeling* 5: 53-84. doi:10.2134/advagriscystmodel5.c3
22. Fang, Q.X.+, Ahuja, L.R., Andales, A.A., and Derner, J.D. 2014. Using a Model and Forecasted Weather to Predict Forage and Livestock Production for Making Stocking Decisions in the Coming Growing Season. *Advances in Agricultural Systems Modeling* 5:161-182.
23. Gleason, D.J. *, Andales, A.A., Bauder, T., Chávez, J.L. 2013. Performance of atmometers in estimating reference evapotranspiration in a semi-arid environment. *Agricultural Water Management* 130(2013):27-35.

24. Alhassan, M.[^], Loomis, J., Frasier, M., Davies, S., Andales, A. 2013. Estimating farmers' willingness to pay for improved irrigation: An economic study of the Bontanga irrigation scheme in northern Ghana. *Journal of Agricultural Science* 5(4):31-42.
25. DeJonge, K.C.* , Ascough, J.C.II, Andales, A.A., Hansen, N.C., Garcia, L.A. and Arabi, M. 2012. Improving evapotranspiration simulations in the CERES-Maize model under limited irrigation. *Agricultural Water Management* 115(2012):92-103.
26. DeJonge, K.C.* , Ascough, J.C.II, Ahmadi, M., Andales, A.A., and Arabi, M. 2012. Global sensitivity and uncertainty analysis of a dynamic agroecosystem model under different irrigation treatments. *Ecological Modelling* 231(2012):113-125. DOI:10.1016/j.ecolmodel.2012.01.024
27. DeJonge, K.C.* , Andales, A.A., Ascough, J.C.II, and Hansen, N.C. 2011. Modeling of full and limited irrigation scenarios for corn in a semiarid environment. *Transactions of the ASABE* 54(2):481-492. DOI: 10.13031/2013.36451
28. Adiku, S.G.K., Ahuja, L.R., Dunn, G.H., Derner, J.D., Andales, A.A., Garcia, L., Bartling, P.N.S. 2011. Parameterization of the GPFARM-Range model for simulating rangeland productivity. *Advances in Agricultural Systems Modeling* 2:209-228.
29. Adiku, S. G. K., Dunn, G. H., Ahuja, L. R., Gunter, S., Bradford, J., Garcia, L., and Andales, A. A. 2010. Simulation of Sandsage-Bluestem Forage Growth under Varying Stocking Rates. *Rangeland Ecology & Management* 63:546-552.
30. Ascough, J.C. II, Andales, A.A., Sherrod, L.A., McMaster, G.S., Hansen, N.C., DeJonge, K.C.* , Fathelrahman, E.M., Ahuja, L.R., Peterson, G.A., Hoag, D.L. 2010. Simulating landscape catena effects in no-till dryland agroecosystems using GPFARM. *Agricultural Systems* 103:569-584.
31. Ascough, J.C. II, Ahuja, L.R., McMaster, G.S., Ma, L., and Andales, A.A. 2008. Agriculture Models. In: *Encyclopedia of Ecology* (Jorgensen, S.E. and Fath, B.D.), Vol. 1, 5 vols., Oxford: Elsevier, pp 85-95.
32. Ahuja, L.R., Andales, A.A., Ma, L., and Saseendran, S.A. 2007. Whole system integration and modeling essential to agricultural science and technology for the twenty-first century. *Journal of Crop Improvement* 19(1/2):73-103.
33. Ahuja, L.R., Kozak, J.A., Andales, A.A. and Ma, L. 2007. Scaling Parameters of the Lewis-Kostiakov Water Infiltration Equation across Soil Textural Classes and Extension to Rain Infiltration. *Transactions of the ASABE* 50(5):1525-1541.
34. Andales, A. A., Green, T. R., Ahuja, L. R., Erskine, R. H. and Peterson, G. A. 2007. Temporally stable patterns in grain yield and soil water on a dryland catena. *Agricultural Systems* 94(2):119-127.
35. Ascough, J.C. II, McMaster, G.S., Andales, A.A., Hansen, N.C., Sherrod, L.A. 2007. Evaluating GPFARM Crop Growth, Soil Water, and Soil Nitrogen Components for Colorado Dryland Locations. *Transactions of the ASABE* 50(5):1565-1578.
36. Wang, J.⁺, Miller, D.R., Sammis, T.W., Gutschick, V.P., Simmons, L.J. and Andales, A.A. 2007. Energy balance measurements and a simple model for estimating pecan water use efficiency. *Agricultural Water Management* 91:92-101.
37. Wang, J.⁺, Sammis, T.W., Andales, A.A., Simmons, L.J., Gutschick, V.P. and Miller, D.R. 2007. Crop coefficients of open-canopy pecan orchards. *Agricultural Water Management* 88:253-262.

38. Andales, A.A., Derner, J.D., Ahuja, L.R. and Hart, R.H. 2006. Strategic and tactical prediction of forage production in northern mixed-grass prairie. *Rangeland Ecology & Management* 59(6):576-584. DOI:10.2111/06-001R1.1
39. Andales, A.A., Wang, J.[†], Sammis, T.W., Mexal, J.G., Simmons, L.J., Miller, D.R. and Gutschick, V. P. 2006. A model of pecan tree growth for the management of pruning and irrigation. *Agricultural Water Management* 84:77-88. DOI:10.1016/j.agwat.2006.02.012
40. Andales, A.A., Derner, J.D., Bartling, P.N.S., Ahuja, L.R., Dunn, G.H., Hart, R.H. and Hanson, J.D. 2005. Evaluation of GPFARM for simulation of forage production and cow-calf weights. *Rangeland Ecology & Management* 58(3):247-255.
41. Ascough II, J.C., Dunn, G.H., McMaster, G.S., Ahuja, L.R. and Andales, A.A. 2005. Producers, Decision Support Systems and GPFARM: Lessons Learned From a Decade of Development. In: MODSIM 2005 International Congress on Modelling and Simulation (Zerger, A. and Argent, R.M.). Modelling and Simulation Society of Australia and New Zealand, December 2005, pp. 170-176. ISBN: 0-9758400-2-9. http://www.mssanz.org.au/modsim05/papers/ascough_1.pdf
42. McMaster, G.S., Ascough, J.C. II, Edmunds, D.A., Andales, A.A., Wagner, L. and Fox, F. 2005. Multi-Crop Plant Growth Modeling for Agricultural Models and Decision Support Systems. In: MODSIM 2005 International Congress on Modelling and Simulation (Zerger, A. and Argent, R.M.). Modelling and Simulation Society of Australia and New Zealand, December 2005, pp. 2138-2144. ISBN: 0-9758400-2-9. <http://www.mssanz.org.au/modsim05/papers/mcmaster.pdf>
43. Andales, A.A., Ahuja, L.R. and Peterson, G.A. 2003. Evaluation of GPFARM for dryland cropping systems in Eastern Colorado. *Agronomy Journal* 95(6):1510-1524.
44. McMaster, G. S., Ascough, J.C. II, Shaffer, M. J., Deer-Ascough, L.A., Byrne, P.F., Nielsen, D.C., Haley, S.D., Andales, A.A. and Dunn, G.H. 2003. GPFARM plant model parameters: Complications of varieties and the Genotype x Environment interaction in wheat. *Transactions of the ASAE* 46(5):1337-1346.
45. Ahuja, L.R., Ma, L., Andales, A.A., and Saseendran, S.A. 2002. Agricultural system models in field research and technology transfer. In: Proceedings of Second International Agronomy Congress on Balancing Food and Environmental Security – A Continuing Challenge (Singh, P., Ahlawat, I.P.S. and Gautam, R.C.). Indian Society of Agronomy, I.A.R.I., New Delhi-110 012, India. pp. 226-233.
46. McMaster, G. S., Ascough, J.C. II, Shaffer, M.J., Byrne, P.F., Haley, S.D., Nielsen, D.C., Andales, A.A., Dunn, G.H., Weltz, M.A. and Ahuja, L.R. 2002. Parameterizing GPFARM: An Agricultural Decision Support System for Integrating Science, Economics, Resource Use, and Environmental Impacts. In: Integrated Assessment and Decision Support, Proceedings of the First Biennial Meeting of the International Environmental Modeling and Software Society (Rizzoli, A.E. and Jakeman, A.J.). iEMSS, June 2002. Vol. 1, pp. 72-77. http://former.iemss.org/sites/iemss2002/proceedings/pdf/volume%20uno/293_mcmaster.pdf
47. Andales, A.A., Batchelor, W.D. and Anderson, C.E. 2000. Modification of a soybean model to improve soil temperature and emergence date prediction. *Transactions of the ASAE* 43(1):121-129.
48. Andales, A.A., Batchelor, W.D., Anderson, C.E., Farnham, D.E. and Whigham, D.K. 2000. Incorporating tillage effects into a soybean model. *Agricultural Systems* 66(2000):69-98.

In Review/Preparation:

1. Bailey, R., Gowda, P., Nozari, S., Kisekka, I., Ray, C., Uddameri, V., Lin, X., Andales, A., Prasad, V., Schipanski, M., Waskom, R. An Integrated Modeling Framework for Investigating Water Management Practices in the Ogallala Aquifer Region. (in preparation for resubmission).

Non-Refereed Journal Articles/Chapters/Proceedings/Transactions:

(* indicates Andales was a major advisor; ^ indicates Andales was a committee member)

Phillippi, E.^, Khosla, R., Andales, A., Longchamps, L. 2019. Precision nitrogen and water management for maize production in the western great plains of the US. In: Precision agriculture '19 (Stafford, J.V.) – Proceedings of the the 12th European Conference on Precision Agriculture, Montpellier, France, 8-11 July 2019, Wageningen Academic Publishers, The Netherlands. https://doi.org/10.3920/978-90-8686-888-9_69

Mkhwanazi, M.M.^, Chávez, J.L., Andales, A.A. 2013. Evaluating the performance of SEBAL ET algorithm under advective conditions. U.S. Committee on Irrigation and Drainage (USCID) Conference. April, 2013, Phoenix, AZ.

Subedi, A.* , Chávez, J.L., Andales, A.A. 2013. Preliminary Performance Evaluation of the Penman-Monteith Evapotranspiration Equation in Southeastern Colorado. 33rd American Geophysical Union Hydrology Days. 25-27 March 2013, Colorado State University, Fort Collins, CO.

Varble, J.L.^, Chávez, J.L., Andales, A.A., Butters, G.L., and Trout, T.J. 2011. Performance evaluation of TDT soil water content and Watermark soil water potential sensors. In: Proceedings of USCID Conference: Emerging Challenges and Opportunities for Irrigation Managers. Albuquerque, New Mexico, 26-29 April 2011.

Andales, A.A., Simmons, L.H., Bartolo, M.E., Straw, D., Chávez, J.L., Ley, T.W., AlWahaibi, H.S. 2010. Alfalfa ET from a weighing lysimeter in the Arkansas Valley of Colorado. In: Proceedings of the 5th National Decennial Irrigation Conference (Dukes, M.). Phoenix, AZ. 5-8 December 2010. American Society of Agricultural and Biological Engineers, St. Joseph, MI.

Chávez, J.L., Straw, D., Garcia, L.A., Ley, T.W., Andales, A.A., Simmons, L.H., Bartolo, M.E., Neale, C.M.U. 2010. Remote Sensing ET of Alfalfa using a Surface Aerodynamic Temperature Model. In: Proceedings of the 5th National Decennial Irrigation Conference (Dukes, M.). Phoenix, AZ. 5-8 December 2010. American Society of Agricultural and Biological Engineers, St. Joseph, MI.

AlWahaibi, H.* , Andales, A., Straw, D., Simmons, L., Bartolo, M., Ley, T., Trout, T., Chávez, J., and Hansen, N. 2010. Alfalfa crop coefficients developed using a weighing lysimeter in Southeast Colorado. In: Proceedings of the 2010 US Committee on Irrigation and Drainage Conference. Fort Collins, CO. 28-30 September 2010. USCID, Denver, CO.

Chávez, J.L., Straw, D., Garcia, L.A., Ley, T.W., Andales, A.A., Simmons, L.H., Bartolo, M.E. 2010. Mapping ET in Southeastern Colorado using a surface aerodynamic temperature model. In: Proceedings of the 2010 US Committee on Irrigation and Drainage Conference. Fort Collins, CO. 28-30 September 2010. USCID, Denver, CO.

Chávez, J.L., T.A. Howell, D. Straw, P.H. Gowda, L.A. Garcia, S.R. Evett, T.W. Ley, L. Simmons, M. Bartolo, P. Colaizzi, and A.A. Andales. 2010. Surface Aerodynamic Temperature Derived from Wind/Temperature Profile Measurements over Cotton and Alfalfa in a Semi-Arid Environment. In: Proceeding of the World Environmental and Water Resources Congress 2010, May 16-20, 2010, Providence, Rhode Island.

Andales, A.A., Straw, D., Ley, T., Berrada, A. 2009. Alfalfa reference ET from a weighing lysimeter and estimates from the ASCE Standardized Reference ET Equation in the Arkansas Valley of Colorado. In Proceedings of the World Environmental and Water Resources Congress 2009: Great Rivers (Starrett, S.). Kansas City, Missouri. May 17–21,

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2009. American Society of Civil Engineers, Reston, VA, pp. 4093-4101.

Andales, A.A. and L.R. Ahuja. 2006. Using a range-livestock model to estimate maximum cow-calf stocking rates on a mixed-grass prairie. Paper No. 0067041, 2006 American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, Oregon Convention Center, Portland, OR, 9-12 July 2006.

Andales, A. A., O. David, and L. R. Ahuja. 2005. Development of a forage growth component in the Object Modeling System. Paper No. 053011, 2005 ASAE Annual International Meeting, Tampa Convention Center, Tampa, FL, 17-20 July 2005.

Sammis, T. W., Andales, A. A., Simmons L. 2004. Adjustment of closed canopy crop coefficients of pecans for open canopy orchards. In: Thirty-eighth Western Pecan Conference Proceedings, 7-9 March 2004, Las Cruces Hilton, Las Cruces, New Mexico, pp. 28-32.

Andales, A. A. 2003. Applied crop growth modeling. In: New frontiers in research for sustainable development: Proceedings of a Lecture Series in Honor of UPLB Chancellor Ruben L. Villareal (Rola, A.C. and Foronda, C.A.). 25-28 October 1999, University of the Philippines at Los Baños, College, Laguna. pp. 73-96. ISBN: 971-547-184-6. 318 p.

Andales, A. A. and C. E. Anderson. 1996. Modeling subsurface drainage and preferential flow. In: Proceedings of the 1996 Mid-Central Meeting of the American Society of Agricultural Engineers, ASAE Paper No. MC96-125. ASAE, St. Joseph, Missouri.

Andales, A. A. and C. E. Anderson. 1995. Calibration and validation of FMBWQ for an agricultural field. In: Proceedings of the 1995 Mid-Central Meeting of the American Society of Agricultural Engineers, ASAE Paper No. MC95-118. ASAE, St. Joseph, Missouri.

Extension Fact Sheets/Products

(Note: All products are available on the Internet. Online fact sheets that were authored and published through CSU Extension have received a total of more than 19,000 hits or views (2009 – 2011), based on CSU Extension web statistics on individual fact sheets. The most popular fact sheet has been “Irrigation Scheduling: The Water Balance Approach”, which was viewed 11,323 times in 2011 alone.)

Andales, A.A. 2019. Irrigation scheduling using a water balance model and soil moisture sensors. In: Proceedings of the 31st Annual Central Plains Irrigation Conference, Kearney, NE, February 26-27, 2019, pp 11-16. (Invited; 40 producers, crop advisors, and researchers attended across 2 sessions)
(<https://www.ksre.k-state.edu/irrigate/oow/p19/Andales19.pdf>)

Andales, A.A., Gates, T.K., Chávez, J.L., Brown, A.J., and Craig, B.D. 2019. Estimating Impacts of Salinity on Irrigated Crop Production using Electrical Conductivity Surveys and Multi-level Remote Sensing. In: Colorado Water (Boehmer, C. ed.), vol. 36(2): 2-5, Colorado Water Center, Colorado State University, Fort Collins, CO.
(http://www.cwi.colostate.edu/Media/img/newsletters/2019/CW_36_2.pdf)

Andales, A.A. and Ham, J. 2018. Subsurface Wireless Networks for Soil Moisture Sensing and Irrigation Water Management. In: Colorado Water (Mokry, M. ed.), vol. 35(6): 40, Colorado Water Center, Colorado State University, Fort Collins, CO. (http://www.cwi.colostate.edu/Media/img/newsletters/2018/CW_35_6.pdf)

Cabot, P.E., Schneekloth, J.P., Osborn, B.J., Waskom, R.M., and Andales, A.A. Water Allocations, Contracts, and Shares on Colorado Land. Colorado State University Extension, Fort Collins, Colorado, 5 pp. (in review)

Jones, A.S., Andales A.A., Chávez, J.L., McGovern, C., Smith, G.E.B. 2017. Weather data integration into irrigation scheduling tools. In: Colorado Water (Mokry, M. ed.), vol. 34(6) (November/December 2017): 24-28, Colorado Water Institute, Colorado State University, Fort Collins, CO.

(http://www.cwi.colostate.edu/media/img/newsletters/2017/CW_34_6.pdf)

Andales, A.A. 2017. Tactical irrigation management using the WISE online tool. In: Proceedings of the 29th Annual Central Plains Irrigation Conference, Burlington, CO., February 21-22, 2017, pp 95-99. (24 producers, crop advisors, and researchers attended across 3 sessions)

(http://www.k-state.edu/irrigate/oow/p17/Andales_17.pdf)

Schneekloth, J. and Andales, A.A. 2017. Seasonal Water Needs and Opportunities for Limited Irrigation for Colorado Crops. Revised Fact Sheet no. 4.718 (updated crop evapotranspiration tables), Colorado State University Extension, Fort Collins, Colorado. <http://extension.colostate.edu/docs/pubs/crops/04718.pdf>

Andales, A.A. and Chávez, J.L. 2015. Adapting Irrigated Cropping Systems to Drought. In: Colorado Water (Middleton, L.A.), vol. 32(4) (November/December 2015): 14-16, Colorado Water Institute, Colorado State University, Fort Collins, CO.

(http://www.cwi.colostate.edu/media/img/newsletters/2015/CW_32_4.pdf)

Andales, A.A., Arabi, M., Bauder, T. 2015. Water Irrigation Scheduler for Efficient Application (WISE), Irrigation scheduling tool on the cloud and smartphones; <http://wise.colostate.edu/>

Andales, A.A. 2015. Irrigation Management. In: Dry Bean Pest Management & Production, 3rd Edition (H.F. Schwartz and M.A. Brick, Eds.). Colorado State University, Fort Collins, CO, pp. 35-42.

(<http://csuextstore.com/dry-bean-production-pest-management>)

Andales, A.A., Chávez, J.L., and Bauder, T.A. 2015. Irrigation Scheduling: The Water Balance Approach. Fact Sheet no. 4.707, Colorado State University Extension, Fort Collins, CO, 6 p.

(<https://extension.colostate.edu/topic-areas/agriculture/irrigation-scheduling-the-water-balance-approach-4-707/>)

Al-Kaisi, M.M., Broner, I., Andales, A.A. 2014. Crop Water Use and Growth Stages. Fact Sheet no. 4.715, Colorado State University Extension, Fort Collins, CO, 3 pp. (<http://extension.colostate.edu/docs/pubs/crops/04715.pdf>)

Bauder, T.A., Waskom, R.M. and Andales, A.A. 2014. Nitrogen and Irrigation Management. Fact Sheet no. 0.514, Colorado State University Extension, Fort Collins, CO, 2 p.

(<https://extension.colostate.edu/topic-areas/agriculture/nitrogen-and-irrigation-management-0-514/>)

Andales, A.A. 2014. Colorado Irrigation Scheduler. In: Proceedings of the 26th Annual Central Plains Irrigation Conference, Burlington, CO., February 25-26, 2014, pp 26-33. (~20 producers and crop advisors attended)

(http://www.ksre.ksu.edu/pr_irrigate/OOW/P14/Andales2014.pdf)

Andales, A.A., Arabi, M., Bauder, T.A. 2013. A Mobile Irrigation Scheduling Tool for Colorado. In: Colorado Water (Middleton, L.A.), vol. 30(4) (July/August 2013):10-13, Colorado Water Institute, Colorado State University, Fort Collins, CO. (http://www.cwi.colostate.edu/media/img/newsletters/2013/CW_30_4.pdf)

Andales, A.A. 2013. The CSU Lysimeter Project: Measuring Crop Water Use to Comply with the Arkansas River Compact. Colorado Agricultural Experiment Station, Fort Collins, CO, 2 p.

Waskom, R.M., Bauder, T.A., Davis, J.G., and Andales, A.A. 2012. Diagnosing saline and sodic soil problems. Fact

Sheet no. 0.521, Colorado State University Extension, Fort Collins, CO, 2 p.

<https://extension.colostate.edu/topic-areas/agriculture/diagnosing-saline-and-sodic-soil-problems-0-521/>

Andales, A.A. and Chávez, J.L. 2011. ET-based irrigation scheduling. In: Proceedings of the 23rd Annual Central Plains Irrigation Conference, Burlington, CO., February 22-23, 2011. Central Plains Irrigation Association. pp.39-46. (<http://www.k-state.edu/irrigate/oow/p11/Andales11.pdf>)

Chávez, J.L., Varble, J.L., and Andales, A.A. 2011. Performance evaluation of selected soil moisture sensors. In: Proceedings of the 23rd Annual Central Plains Irrigation Conference, Burlington, CO., February 22-23, 2011. Central Plains Irrigation Association. pp.29-38. (<http://www.k-state.edu/irrigate/oow/p11/Chavez11.pdf>)

Andales, A.A. 2009. Progress on the Lysimeter Project at Rocky Ford. In: Colorado Water (Schmidt, L.), vol. 26(3) (May/June 2009):10-13, Colorado Water Institute, Colorado State University, Fort Collins, CO. (http://www.cwi.colostate.edu/media/img/newsletters/2009/CW_26_3.pdf)

Andales, A.A., Bauder, T.A. and Doesken, N.J. 2009. The Colorado Agricultural Meteorological Network (CoAgMet) and Crop ET Reports. Fact Sheet no. 4.723, Colorado State University Extension, Fort Collins, Colorado, 5 pp. (<https://extension.colostate.edu/topic-areas/agriculture/the-colorado-agricultural-meteorological-network-coagmet-and-crop-et-reports-4-723/>)

Andales, A.A. 2009. Effects of Weather on Irrigation Requirements. Fact Sheet no. 4.721, Colorado State University Extension, Fort Collins, Colorado, 6 pp. (<https://extension.colostate.edu/topic-areas/agriculture/effects-of-weather-on-irrigation-requirements-4-721/>)

Technical reports and outreach newsletters

Andales, A.A., Simmons, L.H., Bartolo, M.E. 2019. Determination of consumptive water use of grass hay in the Arkansas Valley of Colorado (2018). Completion report to the Colorado Water Conservation Board and Colorado Water Institute. 13 pp.

Hoskins, A. 2018. 21st Century Irrigation – Researchers develop irrigation scheduling tools to help producers manage water (*featured A. Andales and WISE*). tx|H₂O vol. 13(1):6-8; Texas Water Resources Research Institute, Texas A&M, College Station, TX.

Andales, A.A., Simmons, L.H., Bartolo, M.E. 2018. Determination of consumptive water use of grain sorghum in the Arkansas Valley of Colorado (2017 Season). Completion report to the Colorado Water Conservation Board and Colorado Water Institute. 14 pp.

Andales, A.A., Simmons, L.H., Bartolo, M.E. 2017. Determination of consumptive water use of winter wheat in the Arkansas Valley of Colorado (Year 2: 2016-2017). Completion report to the Colorado Water Conservation Board and Colorado Water Institute. 15 pp.

Andales, A.A., Simmons, L.H., Bartolo, M.E. 2016. Determination of consumptive water use of winter wheat in the Arkansas Valley of Colorado (2015-2016). Completion report to the Colorado Water Conservation Board and Colorado Water Institute. 12 pp.

Andales, A.A. 2016. Water Irrigation Scheduler for Efficient Application (WISE App). Agriculture and Farming Newsletter. Vol. 1 (1):6-7. Logan and Morgan Counties CSU Extension, Fort Morgan, CO.

Berrada, A., Sommers, L.E., Johnson, F.P., Andales, A.A., Bartolo, M.E., Ley, T.W., Straw, D., Schafer, B., Simmons, L.H., Waskom, R.M. 2011. Direct Determination of Crop Evapotranspiration in the Arkansas Valley with a Weighing

Lysimeter. Completion Report No. 220. Colorado Water Institute, Fort Collins, Colorado. 32 p.

<http://www.cwi.colostate.edu/media/publications/cr/220.pdf>

Andales, A.A. 2010. Effects of Weather on Dry Bean Irrigation Requirements. In: Colorado Bean News (Schwartz, H.F.), vol. 22(2):4-6, Colorado Bean Network, Fort Collins, CO.

(<http://www.csuag.com/cbn/CBN2202WEB.pdf>)

Andales, A.A. 2009. Effects of Weather on Dry Bean Irrigation Requirements. In: TR09-06: Making Better Decisions 2009 Dry Bean Variety Performance Trials (Johnson, J.), Colorado Agricultural Experiment Station, Fort Collins, Colorado. pp. 14-19.

<https://webdoc.agsci.colostate.edu/aes/AES/pubs/pdf/tr09-6.pdf>

Andales, AA. 2008. Evapotranspiration and Irrigation Requirements of Dry Beans. In: Technical Report TR08-12: Making Better Decisions 2008 Dry Bean Variety Performance Trials (Johnson, J.). CSU Agricultural Experiment Station (AES), Fort Collins, Colorado, pp. 17-22.

<https://webdoc.agsci.colostate.edu/aes/AES/pubs/pdf/tr08-12.pdf>

Andales, AA and Berrada, A. 2008. The Lysimeter Project at Rocky Ford. In: From the Ground Up: Agronomy News, vol. 27(2) (July 2008), CSU Department of Soil and Crop Sciences, Fort Collins, Colorado.

CONTRACTS & GRANTS

Externally-Funded Projects as Principal Investigator (PI)

2017-2020 Understanding water use and plant responses of crops due to deficit irrigation. USDA-ARS.

2017-2022 Lysimeter Operations for Development of Colorado Crop Coefficients. Colorado Division of Water Resources.

2016-2017 Determination of Consumptive Water Use of Wheat in the Arkansas Valley. Colorado Water Conservation Board.

2015-2016 Africa, Climate Change and Food Security (Borlaug Fellowship Program for 2 fellows). Co-PI's Saseendran Anapalli and Lajpat R. Ahuja, USDA-Foreign Agricultural Service.

2015-2016 Water Irrigation Scheduler for Efficient Application (WISE) online tool promotion and improvement in Colorado. Coca-Cola Company.

2014-2015 Determination of Consumptive Water Use of Corn in the Arkansas Valley – Year 2. Colorado Water Institute. (Measurement of corn evapotranspiration from a precision weighing lysimeter at the CSU Arkansas Valley Research Center)

2013-2014 Enhanced system models, management and cultivar adaptations to limited water and climate change, and tools for precision management (Amendment). USDA-Agricultural Research Service. (Interdisciplinary research project; collaboration with USDA-ARS Plant and Soil Scientists in the application and improvement of computer simulation models of agricultural systems)

2013-2014 Determination of Consumptive Water Use of Corn in the Arkansas Valley. Colorado Water Conservation Board. (Measurement of corn evapotranspiration from a precision weighing lysimeter at the CSU Arkansas Valley Research Center)

- 2012-2017 Enhanced system models, management and cultivar adaptations to limited water and climate change, and tools for precision management. USDA-Agricultural Research Service. (Interdisciplinary research project; collaboration with USDA-ARS Plant and Soil Scientists in the application and improvement of computer simulation models of agricultural systems)
- 2011-2015 Mobile Irrigation Water Management System Using eRAMS Cloud Computing Infrastructure; co-PI Dr. Mazdak Arabi; USDA-National Institute of Food and Agriculture. (Interdisciplinary research and engagement project; Project director coordinating web-based and mobile app irrigation management software development and extension activities for irrigating producers)
- 2011-2012 Lysimeter operations in Arkansas River Valley; Dr. Frank Johnson co-PI; Colorado Water Conservation Board. (Research project; Providing scientific guidance in the operation of two precision weighing lysimeters)
- 2009-2012 Using the ASCE Standardized Reference Evapotranspiration Equation and Appropriate Crop Coefficients for Irrigation Management in Colorado; co-PIs Dr. José L. Chávez and Troy Bauder; USDA-NRCS Conservation Innovation Grant. (Interdisciplinary engagement/demonstration project; Project director supervising field and lab activities to estimate crop ET and irrigation requirements)
- 2009-2014 Determining the consumptive water use of crops in Colorado for efficient irrigation; co-PIs Dr. José L. Chávez and Troy Bauder; Colorado Agricultural Experiment Station (Hatch Project). (Interdisciplinary research project)
- 2007-2012 Application of System Models to Evaluate and Extend Cropping Systems Studies at Different Great Plains/Northwest Locations; Dr. Gary Peterson (co-PI); USDA-Agricultural Research Service. (Interdisciplinary research project; Lead scientific investigator for CSU; collaboration with USDA-ARS Plant and Soil Scientists in the application and improvement of computer simulation models of agricultural systems)

Externally-Funded Projects as CoPI

- 2018-2023 Irrigation Innovation Consortium. Foundation for Food and Agricultural Research (FFAR).
- 2018-2019 Next Generation Soil Moisture Measurement Technology for Research, Water Management, and Environmental Monitoring. PI Jay Ham; co-PI's Capurro, Schumacher, Goble, and Sale. CSU Water Center.
- 2018-2019 Semi-arid climate water management strategies. Platte River Water Development Authority. Co-PI with Dr. Daniel Mooney (Equally-shared responsibility for project).
- 2015-2019 US-Pakistan Center for Advanced Studies on Water (USPCAS-W): A partnership with Mehran University of Engineering and Technology to achieve water sustainability in Pakistan. Sub-contract from University of Utah/USAID; CSU PI Dr. Timothy Gates.
- 2015 Update of consumptive use tables for crops. PI Joel Schneekloth; USDA-Risk Management Agency.
- 2013 Demonstration and Validation of an Online Irrigation Scheduling Tool for use in Sugarbeet Production in Northern Colorado. PI Erik Wardle; co-PI's Troy Bauder and Joel Schneekloth; Western Sugar Cooperative. (Field validation of an online irrigation scheduler on 4 sugar beet fields in north east Colorado)

- 2013-2016 Decision Support Tools, Drought Tolerance, and Innovative Soil and Water Management Strategies to Adapt Semi-arid Irrigated Cropping Systems to Drought; PI Dr. Neil Hansen and 6 other co-PIs; USDA-NRCS Conservation Innovation Grant. (Interdisciplinary engagement/demonstration project; Monitoring the field water balance under different irrigation strategies, demonstrating irrigation scheduling techniques and precision irrigation)
- 2012-2015 Reference evapotranspiration (ET) determination using the recursive method and surface aerodynamic temperature; co-PI with Dr. José Chávez; Agricultural Experiment Station. (Research project; Adapting the recursive method of calculating canopy surface temperature in the calculation of ET and evaluating the method using lysimeter and eddy covariance measurements of ET)
- 2011-2012 Crop consumptive use in the full service area of the Dolores Project; co-PIs Dr. Abdel Berrada and Dr. Luis Garcia; Dolores Water Conservancy District, CO. (Service project; Co-supervised a student hourly worker to estimate seasonal crop evapotranspiration (consumptive water use) for 28,566 irrigated acres of the Dolores Project)
- 2008-2013 Determination of consumptive water use by alfalfa in the Arkansas Valley; co-PIs Dr. Reagan Waskom and Dr. Lee Sommers; Colorado Water Conservation Board and Colorado Division of Water Resources (CDWR). (Interdisciplinary research project; Lead scientific investigator for CSU supervising processing and interpretation of lysimeter data; collaboration with Colorado Agricultural Experiment Station agronomist and CDWR engineers)
- 2004-2006 Development of a Pecan Model for Irrigation, Nitrogen, and Pruning Management; co-investigator with Dr. Theodore Sammis and Dr. John Mexal (New Mexico State Univ.); Rio Grande Basin Initiative. (Interdisciplinary research project; Developed the pecan spreadsheet model and provided guidance to a Postdoctoral fellow to complete the model and validate it using data collected from pecan orchards.)

Externally-Funded Projects as Investigator or role other than PI or CoPI

- 2016-2020 Sustaining Agriculture through Adaptive Management Resilient to a Declining Ogallala Aquifer and Changing Climate; PI Meagan E. Schipanski; USDA-National Institute of Food and Agriculture. (Coordinated Agricultural Project with 7 other institutions; Leading sub-objective on developing user-friendly irrigation scheduling tools and contributing to sub-objective on quantifying climate change scenario impacts on crop, soil, and water management.)
- 2013-2015 Implementation of Deficit Irrigation Regimes: Demonstration and Outreach; PI Dr. José L. Chávez; Colorado Water Conservation Board, Alternative Agricultural Water Transfer Methods Competitive Grant Program. (Collaborated in demonstrating the crop coefficient approach of estimating crop consumptive water use and the use of WISE in deficit irrigation scheduling.)
- 2012-2014 Agricultural weather data delivery improvements to Uncompahgre Valley irrigators; PI Denis A. Reich; co-PIs Troy A. Bauder and Nolan J. Doesken; Colorado Water Conservation Board. (Interdisciplinary engagement project; Serving as investigator providing irrigation scheduling and water balance algorithms for an online irrigation scheduling tool.)
- 2008-2009 Developing Economically Sustainable Cropping Strategies for Small and Medium Sized Farms in an Increasingly Scarce Water Environment; PI's Pritchett, J., Hansen, N.C.; USDA-National Research Initiative. (Interdisciplinary research and engagement project; Conducted computer simulation modeling of corn growth and yield under limited irrigation)

2006-2008 Forage growth prediction tools for livestock production during drought using historical and simulated databases; co-PIs Dr. Gale Dunn and Dr. Laj Ahuja (USDA-ARS); USDA-Risk Management Agency. (Interdisciplinary research and engagement project; Made improvements to the USDA-ARS GPFARM-Range model and applied the model for strategic and tactical prediction of forage availability; visited rangeland research stations in the US Great Plains to collate existing rangeland forage production data)

Internally-Funded Awards

- 2012 Variable Rate Irrigation (center pivot) system for CSU ARDEC field 3100; PI Dr. Raj Khosla and co-PI Dr. José L. Chávez; funding from Colorado AES, CSU Departments of Soil and Crop Sciences, Civil and Environmental Engineering, Bioagricultural Sciences and Pest Management; external contributions from Colorado Corn Growers Association and 21st Century Water Technologies. (Facility improvement project; Provided estimates of irrigation requirements for designing the center pivot and sizing of irrigation pump and water storage pond)
- 2010 Sustaining Irrigated Agriculture in Water-limited Environments; travel to Northwest Agriculture & Forestry University, Yangling; Shiyanghe Experiment Station, Wuwei; and China Agricultural University, Beijing, China; CSU Faculty research travel grant.

PAPERS PRESENTED/SYMPOSIA/INVITED LECTURES/PROFESSIONAL MEETINGS/WORKSHOPS

As Presenter:

Andales, A.A. and Gates, T.K. Guidelines, Tips, and Protocol for Effective Field Investigations of Water Systems. U.S.-Pakistan Center for Advanced Studies in Water (USPCAS-W), Mehran University of Engineering and Technology, December 19, 2018, Jamshoro, Pakistan (Invited).

Andales, A.A. Update on Arkansas Valley lysimeter operations. Colorado Water Institute Advisory Board Meeting, November 16, 2018, Denver, Colorado (Invited).

Gates, T.K. and Andales, A.A. Making sense of research results: Some ways to address variability and uncertainty. In *Taking the Next Step (Training Mission)*, U.S.-Pakistan Center for Advanced Studies in Water (USPCAS-W), Mehran University of Engineering and Technology, December 14, 2017, Jamshoro, Pakistan (Invited).

Andales, A.A. The basics of graduate student mentoring. In *Taking the Next Step (Training Mission)*, U.S.-Pakistan Center for Advanced Studies in Water (USPCAS-W), Mehran University of Engineering and Technology, December 12, 2017, Jamshoro, Pakistan (Invited).

Andales, A.A. Precision irrigation. (1.3 hours). SOCR 377 Geographic Information Systems in Agriculture, October 3, 2017, CSU (Invited lecture).

Andales, A.A. and Chávez, J.L. Quantifying Crop Water Requirements using the Water Irrigation Scheduler for Efficient Application (WISE App) in northeast Colorado. 2017 American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, July 16-19, 2017, Spokane, WA.

Andales, A.A., Chávez, J.L., Hansen, N.C. Management strategies for adapting semi-arid corn production to limited irrigation conditions. 2017 Universities Council on Water Resources (UCOWR)/ National Institutes for Water Resources (NIWR) Annual Conference, June 13, 2017, Fort Collins, CO.

Andales, A.A., Capurro, M.C., Smith, G.E.B., Gowda, P.H., Kisekka, I. Calibration of CERES-Maize against precision

weighing lysimeter data under semi-arid conditions of eastern Colorado. 2017 Universities Council on Water Resources (UCOWR)/ National Institutes for Water Resources (NIWR) Annual Conference, June 13, 2017, Fort Collins, CO.

Andales, A.A. Building a Collaborative Water Centers Network, U.S.-Pakistan Center for Advanced Studies in Water (USPCAS-W), Mehran University of Engineering and Technology, December 11-17, 2016, Jamshoro, Pakistan (Gave 4 research presentations and 1 teaching presentation to USPCAS-W faculty and graduate students).

Andales, A.A., Chávez, J.L., Hansen, N.C. Irrigation scheduling strategies for limited irrigation conditions. American Society of Agronomy 2016 Annual Meeting, 8 November 2016, Phoenix, AZ (poster).

Andales, A.A., Qi, Z. Synthesizing rangeland processes for decision-making using the GPFARM-Range model. American Society of Agronomy 2016 Annual Meeting, 9 November 2016, Phoenix, AZ (poster).

Andales, A.A. Update on Arkansas Valley Lysimeter Operations. Evapotranspiration Workshop, 9th International Conference on Irrigation and Drainage, U.S. Committee on Irrigation and Drainage, 13 October 2016, Fort Collins, CO (Invited).

Andales, A.A. The Water Irrigation Scheduler for Efficient Application (WISE). Evapotranspiration Workshop, 9th International Conference on Irrigation and Drainage, U.S. Committee on Irrigation and Drainage, 13 October 2016, Fort Collins, CO (Invited).

Andales, A.A., Elhaddad, A., Bartlett, A.C., Yao, M. Comparison of daily evapotranspiration estimates for sprinkler-irrigated sugar beets from a cloud-based irrigation scheduling tool and remote sensing. 9th International Conference on Irrigation and Drainage, U.S. Committee on Irrigation and Drainage, 12 October 2016, Fort Collins, CO.

Andales, A.A. Irrigation Management (1 lecture hour). AGRI 510 Sustainable Agriculture, 5 October 2016, CSU (Invited lecture).

Andales, A.A. The Water Irrigation Scheduler for Efficient Application Online Tool for Colorado (1 lecture hour). SOCR 492 Senior Seminar, 29 September 2016, CSU (Invited lecture).

Andales, A.A. Irrigation Management Tools (1 lecture hour). SOCR 100 General Crops, 19 September 2016, CSU (Invited lecture)

Andales, A.A. Improving Agricultural Water Management in the Arkansas Valley Using Lysimetric Studies. Colorado Agricultural Experiment Station (CAES) Research Center Conference. 6 January 2016, Fort Collins, CO. (Invited)

2015 September 28 and 30; Irrigation Management (2 lecture hours). AGRI 510 Sustainable Agriculture, CSU (Invited lectures)

2015 September 3, Web and mobile apps for ET-based Irrigation Scheduling in Colorado. WERA-1022 Annual Meeting (Meteorological and Climate Data to Support ET-Based Irrigation Scheduling, Water Conservation, and Water Resources Management), Fort Collins, CO. (Invited)

2015 July 28, Mobile Irrigation Water Management System using eRAMS Cloud Computing Infrastructure. USDA-NIFA NIWQP and AFRI Annual Project Directors' Meeting, Greensboro, North Carolina.

Andales, A.A. 2015. The Water Irrigation Scheduler for Efficiency (WISE) online tool for Colorado. International Workshop on High-efficient Water Use in Agriculture (111 Project). 1-7 June 2015, Center for Agricultural Water

Research in China, China Agricultural University, Beijing, China. (Invited)

2015 April 30, Improving Irrigation Application Efficiency: Examples from China and the Philippines. Department of Soil and Crop Sciences, Colorado State University, Fort Collins, CO. (Invited)

Andales, A.A. 2014. Evapotranspiration-based approaches for estimating irrigation water requirements. College of Engineering and Agro-industrial Technology, University of the Philippines, 24 November 2014, Los Baños, Laguna, Philippines. (Invited)

Andales, A.A. 2014. Agricultural Water Management in Colorado: Challenges and Opportunities. Tianjin Agricultural University, 7 November 2014, Tianjin, China. (Invited)

Andales, A.A. 2014. Agricultural Water Management in Colorado: Challenges and Opportunities. China Agricultural University, 3 November 2014, Beijing, China. (Invited)

Andales, A.A. 2014. Lecture Series (7 lectures) on Agricultural Water Management and Systems Computer Modeling. 4 September – 31 October 2014, Institute for Water Saving Agriculture, Northwest Agriculture & Forestry University, Yangling, Shaanxi, China. (Invited)

Andales, A.A. 2014. The Colorado Irrigation Scheduler. Workshop on Water Management and Agriculture Development. 21 April 2014, National Agricultural Research Center, Islamabad, Pakistan. (Invited)

Andales, A.A., Chávez, J.L., Simmons, L.H., Bartolo, M.E. 2013. Evapotranspiration Measurements Using Weighing Lysimeters: The Rocky Ford Experience. ASA, CSSA, and SSSA International Annual Meetings. 3-6 November 2013, Tampa, FL.

Andales, A. and Arabi, M. 2013. Prototype Mobile Irrigation Water Management System on eRAMS/CSIP. Soil and Water Conservation Society 68th International Annual Conference. 21-24 July 2013, Reno, NV. (Poster for USDA-NIFA projects session)

2012, Alfalfa ET and crop coefficients from a weighing lysimeter in the Arkansas Valley of Colorado. ASA, CSSA, and SSSA International Annual Meetings. 21-24 October 2012, Cincinnati, OH.

2012, Addressing Water Scarcity through Limited Irrigation Cropping: Field Experiments and Modeling. Interdisciplinary Water Resources Seminar (GRAD 592), CSU. 15 October 2012, Fort Collins, CO. (Invited)

2012, Irrigation management tools. Department of Soil and Crop Sciences Seminar, CSU. 4 October 2012, Fort Collins, CO. (Invited)

2012, Estimating crop consumptive water use in the Lower Arkansas Valley. Department of Civil and Environmental Engineering Seminar, Colorado School of Mines. 13 September 2012, Golden, CO. (Invited; ~25 students/faculty attended)

2012, Mobile irrigation water management system using eRAMS/CSIP, USDA-NIFA National Water Conference, 20-24 May 2012, Portland, Oregon. (Poster)

2010, Making every drop count: Irrigation management in China. International Colloquium on China. 8-10 September 2010. CSU, Fort Collins, CO. (Invited)

2010, Determination of Crop Consumptive Water Use in Eastern Colorado. Invited presentations to Agricultural Soil and Water Engineering faculty and students at Northwest Agriculture and Forestry University, Yangling,

Shaanxi Province (25 May 2010), Shiyanghe Experiment Station, Gansu Province (31 May 2010), and China Agriculture University, Beijing (4 June 2010), P.R.China. (Invited)

2010, The Arkansas Valley Research Center Lysimeter Project. 2010 Colorado Agricultural Experiment Station (CAES) Research Center Conference, January 5-7, 2010, Fort Collins, CO.

2008, Performance of the ASCE Standardized Reference ET Equation in the Arkansas Valley of Colorado. Joint meeting of GSA, ASA-CSSA-SSSA, and GCAGS. 5-9 October 2008, Houston, TX.

2006, Applications of a Forage Production Model in Semi-Arid Northern Mixed-Grass Prairie. 36th Biological Systems Simulation Group Conference, 11-13 April 2006; Fort Collins, CO.

2004, Plant stress response in GPFARM. International Workshop on Applications and Development of ARS RZWQM and GPFARM models, Fort Collins, Colorado, 20-22 April 2004.

2003, Spatial and temporal correlations among dryland grain yield and soil water content in a sloping field. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America Annual Meetings, 2-6 Nov. 2003, Denver, CO.

2002, A modeling approach to the evaluation of alternative cropping systems. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America Annual Meetings, 10-14 Nov. 2002, Indianapolis, IN.

2002, Evaluation of the GPFARM decision support system for dryland cropping systems in Eastern Colorado. Joint conference of the Biological Systems Simulation Group and Remote Sensing Technologies Center, 10-13 March 2002, Mississippi State University, MS.

2000, Water Management of Upland Crops. International Training Course on Integrated Crop Management in Farming Systems, Farming Systems and Soil Resources Institute (FSSRI), UPLB, College, Laguna, 15 February 2000.

Presented by Co-authors (Collaborator or Graduate Student) or as Participant:

Jones, A. S., A. Andales, A. Burzynski, J. L. Chavez, O. David, S. J. Fletcher, J. M. Forsythe, M. Goodliff, P. Grazaitis, S. Q. Kidder, A. Kliewer, C. McGovern, J. D. Niemann, M. Pauly, J. Scalia, and G. E. B. Smith, 2020: Integrative hydrometeorological applications with precipitation, soil moisture, and water vapor using phone apps, GIS, and data assimilation, *AMS Annual Meeting, 34th Conference on Hydrology*, 12-16 January, Boston, MA.

Brown, A.J., Andales, A.A., and Gates, T.K. 2019. Predicting Crop Yield Losses Due to Soil-Water Salinity: Comparison of Traditional and Alternative Approaches. *Water for Food Global Conference 2019*, April 29-30, University of Nebraska, Lincoln, NE. (awarded 2nd Place in On-site student poster competition)

Brown, A.J., Andales, A.A., and Gates, T.K. 2019. Predicting Crop Yield Losses Due to Soil-Water Salinity: Comparison of Traditional and Alternative Approaches. *Hydrology Days*, March 27-29, Fort Collins, CO. (awarded 2nd Place in student oral presentations)

Jones, A. S., A. A. Andales, J. L. Chávez, C. McGovern, G. E. B. Smith, J. P. Deshon, J. D. Niemann, S. J. Fletcher, J. M. Forsythe, M. Goodliff, and A. Kliewer, 2019: Tools for use of predictive rainfall within irrigation decision-aids, downscaling of soil moisture, and non-Gaussian data assimilation for agricultural/military applications and analysis of atmospheric river events, *AMS Annual Meeting, 33rd Hydrology Conference*, 6-10 January, Phoenix, AZ.

Jones, A. S., S. J. Fletcher, J. M. Forsythe, M. Goodliff, A. Kliewer, A. Andales, J. L. Chavez, C. McGovern, and G. E.

B. Smith, 2018: An overview of the CIRA Data Assimilation Testbed (CDAT) educational website for applications with atmospheric rivers and predictive irrigation tools, *AGU Fall Meeting*, 10-14 December, Washington, DC.

McGovern, C. and Andales, A.A. Improvements to the WISE Irrigation Scheduler Supporting Precision Agriculture. *Ogallala Water Coordinated Agricultural Project Annual Meeting*, November 29, 2018, Santa Fe, New Mexico. (poster)

Smith, G.E.B., Andales, A.A., and Kisekka, I. Estimating corn yields for different irrigation strategies in the Arikaree River Basin in Colorado amidst declining ground water levels. *Ogallala Water Coordinated Agricultural Project Annual Meeting*, November 29, 2018, Santa Fe, New Mexico. (poster)

Irrigation Innovation Consortium (IIC). Research Steering Committee Meeting. Center for Irrigation Technology, California State University – Fresno, September 6, 2018, Fresno, California.

Brown, A.J., Andales, A.A., Gates, T.K., and Chávez, J.L. 2018. Soil salinity measurement and effects on corn in southeast Colorado. *Great Plains Soil Fertility Conference*, March 6, 2018, Denver, CO. (poster)

Jones, A.S., Andales, A.A., McGovern, C., Smith, G.E.B., David, O., and Fletcher, S.J. 2017. Integrated Decision Tools for Sustainable Watershed/Ground Water and Crop Health using Predictive Weather, Remote Sensing, and Irrigation Decision Tools. *American Geophysical Union Fall Meeting*, December 13, 2017, New Orleans, LA. (poster)

Brown, A.J., Andales A.A., Gates, T.K., Chávez, J.L. 2017. Soil salinity measurement and effects on corn in southeast Colorado. (Honorable Mention, Great Minds in Research, \$100 cash award) *Graduate Student Showcase*, Nov 9, 2017, Colorado State University, Fort Collins, CO. (poster)

Jones, A.S., Andales, A.A., Niemann, J.D., Cammarere, M., Fletcher, S.J., Corbett, J. 2016. Methods linking predictive weather and fine-scale soil moisture to crop and irrigation decision tools. *American Geophysical Union Fall Meeting*, 12-16 December 2016, San Francisco, CA. (poster)

Subedi, A., Chávez, J.L., Andales A.A. 2016. Alfalfa evapotranspiration estimation: One step model. 9th *International Conference on Irrigation and Drainage*, U.S. Committee on Irrigation and Drainage, 12 October 2016, Fort Collins, CO.

Essah, S.Y., Andales, A.A., Bauder, T.A. 2016. Deficit irrigation in early and medium to late maturity potato cultivars. *Annual meeting of Potato Association of America*, July 2016, Grand Rapids, MI.

Green, T.R., Saseendran, S.A., Erskine, R.H., Andales, A.A., Bausch, W.C., DeJonge, K.C., Ahuja, L.R. 2014. Theory and Application of a Residual Energy Balance Method to Estimate Evapotranspiration of Irrigated Corn (Maize). *ASA, CSSA, and SSSA International Annual Meetings*. 2-5 November 2014, Long Beach, CA.

Green, T.R., Saseendran, S.A., Erskine, R.H., Bausch, W.C., Ahuja, L.R., Ma, L., Andales, A.A. 2012. Measurements and Analyses of Surface Energy Balance in Maize under Limited- and Full-Irrigation. *ASA, CSSA, and SSSA International Annual Meetings*. 21-24 October 2012, Cincinnati, OH.

2012, Atmometer use in evapotranspiration based irrigation scheduling. *ASA, CSSA, and SSSA International Annual Meetings*. 21-24 October 2012, Cincinnati, OH.

2012, Comparison of Reference Evapotranspiration from the American Society of Civil Engineers (ASCE) Standardized Penman Monteith and Kimberly-Penman Equations in Northeast Colorado. *ASA, CSSA, and SSSA International Annual Meetings*. 21-24 October 2012, Cincinnati, OH. (Poster)

2010, Modeling and Evaluation of Maize under Full and Limited Irrigation. ASA-CSSA-SSSA 2010 International Annual Meetings, 31 Oct. – 3 Nov., 2010. Long Beach, CA.

2010, Comparison of Neutron Moisture Meter and Watermark Sensor Readings in a Field Experiment of Full and Limited Irrigation of Corn. US Committee on Irrigation and Drainage Conference. Fort Collins, CO. 28-30 September 2010.

2010, Modeling of Full and Limited Irrigation of Corn in a Semiarid Environment. 2010 ASABE Annual International Meeting. June 20-23, 2010. Pittsburgh, PA.

2009, Calibration and Evaluation of CERES-Maize in Full and Limited Irrigation Scenarios for Corn in a Semiarid Environment. International Annual Meetings of ASA-CSSA-SSSA. 1-5 November 2009, Pittsburgh, PA.

2009, Plot-Scale Modeling of Full and Limited Irrigation of Corn in Northern Colorado. Joint meeting of the Western Society of Crop Science and the Western Society of Soil Science. 22-24 June 2009, Fort Collins, CO.

2009, Simulation of Drought and Grazing Effects on Forage Growth in the Northern Mixed Grass Zone of the USA Using the GPFarm-Range Model. Society for Range Management 62nd Annual Meeting. 8-12 February 2009, Albuquerque, NM.

2008, Interactive effects of elevated CO₂, warming, and water additions on the timing and rate of plant development in a mixed-grass prairie ecosystem. 93rd Ecological Society of America Annual Meeting. 3-8 August 2008, Milwaukee, WI.

2008, Use of a Cropping System Model for Soil-Specific Optimization of Limited Water. 9th International Conference on Precision Agriculture. 20-23 July 2008, Denver, CO.

2007, Evaluating EPIC-based Harvest Index Approach for Yield Prediction and Response to Soil Water. ASA-CSSA-SSSA Annual Meeting. 4-8 Nov. 2007, New Orleans, LA.

2007, Simulated Corn Yield Responses to Limited-Water Irrigation Under Varying Soil and Climate Conditions. ASA-CSSA-SSSA Annual Meeting Abstracts. 4-8 Nov. 2007, New Orleans, LA.

2006, Gpfarm evaluation across a no-till dryland agroecosystem landscape catena. ASA-CSSA-SSSA Annual Meeting Abstracts. Indianapolis, IN. 11/15/2006.

2006, Scaling parameters of the Lewis-Kostiakov water infiltration equation across soil textural classes. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America International Annual Meetings, 12-16 Nov. 2006, Indianapolis, IN.

2006, Tactical and strategic difficulties in managing water-limited rangelands of the Western Great Plains. Soil and Water Conservation Society 2006 International Conference, Keystone Resort, Keystone, CO, 22-26 July 2006.

2006, Water Relations and Management of Semi-Arid Grasslands: Current Status, Further Critical Research, and the Useful Role of Models. 36th Biological Systems Simulation Conference. 11-13 April 2006, Ft. Collins, CO.

2005, Whole System Integration and Modeling Essential to Agricultural Science and Technology for the 21st Century. American Society of Agronomy, Crop Science Society of America, Soil Science Society of America International Annual Meetings, 6-10 Nov. 2005, Salt Lake City, UT. (Symposium paper)

2004, Application of GPFARM to simulate forage production and cow-calf weights. 57th annual international

meeting of the Society for Range Management, Salt Lake City, Utah, 25-30 January 2004. (Poster)

2002, Agricultural system models in field research and technology transfer. Second International Agronomy Congress on Balancing Food and Environmental Security – A Continuing Challenge, Indian Society of Agronomy, I.A.R.I., 26-30 Nov. 2002, New Delhi-110 012, India.

TEACHING

<u>Year</u>	<u>Semester</u>	<u>Course No./Title</u>	<u>Cr. Hrs.</u>	<u>Enrollment</u>	
2019	Fall	SOCR492 – Seminar	1	26	*
2019	Fall	SOCR371 – Irrigation of Field Crops	1	3	*
2019	Spring	SOCR370 – Irrigation Principles	2	41	*
2018	Fall	SOCR371 – Irrigation of Field Crops	1	7	(4.67)
2018	Spring	SOCR370 – Irrigation Principles	2	41	(4.55)
2017	Fall	SOCR371 – Irrigation of Field Crops	1	14	(4.64)
2017	Spring	SOCR370 – Irrigation Principles	2	61	(4.52)
2016	Fall	SOCR371 – Irrigation of Field Crops	1	9	(4.78)
2016	Spring	SOCR370 – Irrigation Principles	2	35	(4.46)
2016	Spring	SOCR792 – Seminar	1	6	
2015	Fall	SOCR371 – Irrigation of Field Crops	1	16	(4.50)
2015	Fall	SOCR384 – Supervised College Teaching	1	1	
2015	Fall	SOCR792 – Seminar	1	4	
2015	Spring	SOCR370 – Irrigation Principles	2	56	(4.42)
2014	Fall	SOCR371 – Irrigation of Field Crops	1	18	
2014	Spring	SOCR370 – Irrigation Principles	2	70	(4.89)
2013	Fall	SOCR371 – Irrigation of Field Crops	1	18	(5.00)
2013	Spring	SOCR370 – Irrigation Principles	2	70	(4.28)
2012	Fall	SOCR371 – Irrigation of Field Crops	1	11	(4.33)
2012	Spring	SOCR370 – Irrigation Principles	2	63	(4.28)
2011	Fall	SOCR371 – Irrigation of Field Crops	1	5	(4.20)
2011	Spring	SOCR370 – Irrigation Principles	2	64	(4.34)
2011	Spring	SOCR784 – Supervised College Teaching	1	1	
2010	Fall	SOCR371 – Irrigation of Field Crops	1	11	
2010	Spring	SOCR370 – Irrigation Principles	2	65	
2009	Fall	SOCR371 – Irrigation of Field Crops	1	9	
2009	Spring	SOCR380A1 – Irrigation Principles	2	45	
2008	Fall	SOCR381A1 – Irrigation of Field Crops	1	6	
2008	Spring	SOCR380A1 – Irrigation Principles	2	58	

Note: Values in parentheses are instructor ratings by students out of a maximum score of 5. *Course surveys were changed to non-numeric format.

Participation in Professional Development Activities Related to Teaching

2015 October 20, Open Educational Resources, CSU Library; learned about open access textbooks and other resources and methods to adopt them in courses.

2012, Master Teacher Workshop: The New RamCT Blackboard, 20 April 2012, CSU College of Agricultural Sciences; learned about the features of the new online teaching system adopted by CSU beginning Summer, 2012.

2011, Academic Integrity: The CSU Honor Pledge, 15 December 2011, CSU The Institute for Learning and Teaching (TILT); learned about how to encourage academic integrity among students through the use of an honor pledge that students (voluntarily) sign for selected class assignments and tests; also became aware of the University process for addressing disciplinary cases involving academic integrity/cheating.

2008, Workshop on CSU RamCT; learned how to develop and organize online class materials/resources on the CSU course technology system.

ADVISING

Student advising/graduate supervision

Undergraduate students:

Current Undergraduate Advisees: 1 Honors program

Previous Undergraduate Advisees: 9 (Graduated 2008-2014)

Graduate students:

Current Graduate Advisees:

Maria Cristina Capurro (PhD Soil and Crop Sciences)

Ansley J. Brown (PhD Soil and Crop Sciences)

Garvey E.B. Smith (PhD Soil and Crop Sciences)

Cullen L. McGovern (MS Soil and Crop Sciences)

Huma Tariq (PhD Soil and Crop Sciences)

Current Graduate Committee Memberships (excluding those chaired):

_____ # Plan C

_____ # Plan B

3 # MS/MA

2 # PhD

Graduate Committee Memberships (for past 5 years, not including those above)

_____ # Plan C

_____ # Plan B

5 # MS/MA

1 # PhD

Graduate Degrees Completed Under My Supervision:

Abhinaya Subedi, 2016 (PhD Civil Engineering) – Co-advised with Dr. José Chávez

Andrew C. Bartlett, 2014 (MS Soil and Crop Sciences)

Abdulkariem Aljrbi, 2015 (PhD Soil and Crop Sciences)

Saseendran Anapalli, 2013 (PhD Soil and Crop Sciences)

David J. Gleason, 2013 (MS Soil and Crop Sciences)

Kendall C. DeJonge, 2011 (PhD Civil Engineering)

Hamdan AlWahaibi, 2011 (PhD Soil and Crop Sciences)

Melissa A. Reyes-Fox, 2008 (MS Ecology) – Co-advised with Dr. Milton J. Trlica (Dept. Forest and Rangeland Stewardship)

OTHER ACTIVITIES/ACCOMPLISHMENTS – TEACHING/ADVISING

Visiting scholars sponsored/hosted

Sarwan Ahmed Nahiyoon, MS Student, US-Pakistan Center for Advanced Studies in Water, Mehran University of Engineering and Technology, Jamshoro, Pakistan (January 17, 2019 – May, 2019); training in soil salinity surveys and mentoring in research methods and scientific writing.

Di Wu, PhD Student, China Agricultural University, Beijing, China (September 24, 2018 – December, 2019);

advising in crop and irrigation water management modeling using DSSAT.

Kainat Kalhoro, MS Student, US-Pakistan Center for Advanced Studies in Water, Mehran University of Engineering and Technology, Jamshoro, Pakistan (August , 2018 – December 14, 2018); training in soil salinity surveys and mentoring in research methods and scientific writing.

Muneer Ahmed Memon, Soil Scientist, US-Pakistan Center for Advanced Studies in Water, Mehran University of Engineering and Technology, Jamshoro, Pakistan (4 June – 10 August 2018); training in soil and water measurement and management techniques (laboratory and field).

Uroosa Memon, MS Student, US-Pakistan Center for Advanced Studies in Water, Mehran University of Engineering and Technology, Jamshoro, Pakistan (10 January – May 2018); mentoring in research methods and scientific writing for irrigation water management.

Nageena Makhdoom, MS Student, US-Pakistan Center for Advanced Studies in Water, Mehran University of Engineering and Technology, Jamshoro, Pakistan (10 January – May 2018); mentoring in research methods and scientific writing for irrigation water management.

Wali Muhammad Daudpota, Assistant Professor, US-Pakistan Center for Advanced Studies in Water, Mehran University of Engineering and Technology, Jamshoro, Pakistan (15 January – 6 May 2016); mentoring in teaching and research methods for irrigation water management.

Mingze Yao, Ph.D. candidate, Shenyang Agricultural University, Liaoning, China (September, 2015 – August, 2016); training on computer modeling of soil water and solute movement

Dr. Roger A. Luyun Jr., Associate Professor, University of the Philippines at Los Baños (June 15 – July 17, 2015), Training on soil and water management strategies for adapting cropping systems to changing climate.

Dr. Ronaldo B. Saludes, Assistant Professor, University of the Philippines at Los Baños (June 15 – July 17, 2015), Training on soil and water management strategies for adapting cropping systems to changing climate.

Dr. Maha El Sayed, Research Scientist, Central Laboratory for Agricultural Climate, Cairo, Egypt (May - July, 2015), Borlaug Fellowship Program; Training on field experimental and computer modeling techniques in the area of climate change impacts on crop production.

Dr. Quanxiao Fang, Associate Professor, Agronomy College, Qingdao Agricultural University, China (June, 2013 – November, 2014); Collaborated on rangeland-livestock modeling and crop modeling.

Xuetao Gan, Lecturer, College of Water Resources and Architectural Engineering, Northwest Agriculture and Forestry University, Yangling, China (February, 2013 – February, 2014)

Kamran Buksh Soomro, Senior Engineer, Pakistan Agricultural Research Council, Karachi, PK (24 June – 19 August 2013); Hosted Mr. Soomro as a Borlaug Fellow and provided training in soil moisture and evapotranspiration sensing, and irrigation field studies.

Dr. Dongwei Gui, Research Scientist, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, Urumqi, China (May, 2012 – May, 2013); Hosted Dr. Gui in the Department of Soil and Crop Sciences and collaborated in agricultural systems modeling, hydrologic modeling, and precision irrigation.

Zain Khawaja, Near East & South Asia Undergraduate Exchange Program Fellow, Civil Engineering major from Pakistan (February, 2012 – May, 2012); hosted Mr. Khawaja as an intern training in irrigation hydrology and hydraulics.

Dr. Qinqian Meng, Associate Professor, Northwest Agriculture and Forestry University, Yangling, China (August, 2011 – August, 2012); Hosted Dr. Meng in the Department of Soil and Crop Sciences and collaborated in irrigation research.

Dr. Xiaotao Hu, Associate Professor, Northwest Agriculture and Forestry University, Yangling, China (February, 2008 – February, 2009); Hosted in the Department of Soil and Crop Sciences in collaboration with Dr. Neil Hansen; provided advise and lab/equipment access in conducting limited irrigation field studies and data processing; allowed Dr. Hu to attend my irrigation classes and field trips; mentored Dr. Hu in computer simulation modeling of agricultural systems.

OUTREACH/SERVICE

Committees

Search committee for Postdoctoral Fellow in Precision Agriculture, Department of Soil and Crop Sciences, August – September, 2019

Search committee for Research Scientist/Agricultural Systems Modeler, USDA-Agricultural Research Service-Water Management and Systems Research Unit, January - February 2019

Executive Committee, [CSU Water Center](#), August, 2015 – present

Search committee for Head, Department of Soil and Crop Sciences, May, 2017 – December, 2017

Gardner Faculty Award, Search Chair, Department of Soil and Crop Sciences, Jan – Apr, 2017

Search committee for Agricultural Experiment Station Deputy Director, CSU; February – May, 2016

Faculty Council, Representative for Soil and Crop Sciences Department; January, 2015 – May, 2015

Search committee for Assistant/Associate Professor in Agricultural Systems Science, Department of Soil and Crop Sciences, CSU, 2014

Search committee for Remote Sensing Scientist, USDA Agricultural Research Service, Feb-Mar, 2014

Member, Department of Soil and Crop Sciences Graduate Panel, CSU, 2013 – present

Principal User/Coordinator, Radiation Safety, Department of Soil and Crop Sciences, 2013 – present

Co-leader of interdisciplinary CSU Extension Water Resources Team (members from Colorado Water Institute, Civil and Environmental Engineering, Agricultural and Resource Economics, Horticulture, and Soil and Crop Sciences), coordinated planning and reporting of Water Team extension activities, 2009-2011

CSU Irrigation and Drainage Engineering program (joint appointment in Civil and Environmental Engineering), 2008-present

Search committee for Soil and Crop Sciences Head, 2010-2011

Department Curriculum Task Forces (Contaminant Fate & Transport; Applied Information Technology), 2010-2011

College of Agricultural Sciences search committee for Honor Faculty Award, 2009

Search committee for Water Quality Research Associate II position in Department of Soil and Crop Sciences

Faculty Council Committee on Libraries, 2009

Professional affiliations and activities

Organizer, Exploring research and graduate program collaborations in the area of Water Resources, China Agricultural University Delegation Visit and Mini-workshop with CSU and USDA-Agricultural Research Service, July 1 – 3, 2019, Fort Collins, CO.

Guest Editor, [Irrigation Science](#) special issue: “Improving irrigation management across the Ogallala Aquifer, USA”, January, 2019 – present.

[Irrigation Innovation Consortium](#), Research Steering Committee, 2018 – present

Session Organizer. How technology can contribute significantly to improving agricultural water management. International Colloquium on Global Food Security & Sustainability, 29 November 2016, CSU International Programs, Fort Collins, CO.

WERA-1022 (Meteorological and Climate Data to Support ET-Based Irrigation Scheduling, Water Conservation, and Water Resources Management), 2016-present

Co-organizer, International Workshop on “Water and Food Security under Changing Environments”, June 1 – 7, 2015, China Agricultural University, Beijing.

Session Chair, Advances in Agricultural Water Management. June 2, 2015, International Workshop on “Water and Food Security under Changing Environments”, China Agricultural University, Beijing.

Leader, Evapotranspiration Measurement and Modeling community, Climatology and Modeling Section, American Society of Agronomy, 2013

Vice leader, Remote Sensing of Evapotranspiration community, Climatology and Modeling Section, American Society of Agronomy, 2012

Memberships in professional societies

American Society of Agricultural and Biological Engineers

Soil Science Society of America
American Society of Agronomy
Registered Professional Agricultural Engineer, Professional Regulation Commission, Philippines (1993;
License No. 0003543-96)

Grant Refereeing

California Dept. of Food & Ag, Fertilizer Research & Education Program, 2019
US-Israel Binational Agricultural Research and Development (BARD) Fund (panelist), 2017-2018
National Science Foundation-BREAD (1 proposal reviewed), 2012
National Institutes for Water Resources (1 proposal reviewed), 2011
Oklahoma Water Resources Research Institute (2 proposals reviewed), 2010-2011
CSU Extension - Innovation Award Proposal, 2007

Manuscript Refereeing

Agricultural Systems (1)
Agricultural Water Management (3)
Agronomy Journal (4)
Applied Engineering in Agriculture (2)
Colorado Agricultural Experiment Station Technical Bulletins (2)
Computers and Electronics in Agriculture (1)
Environmental Modelling & Software (1)
Hydrology and Earth System Sciences (1)
Irrigation and Drainage (2)
Irrigation Science (2)
Journal of the American Water Resources Association (1)
Journal of Contemporary Water Research (1)
Journal of Irrigation and Drainage Engineering (1)
Journal of Soil and Water Conservation (2)
Philippine Journal for Agricultural and Biosystems Engineering (1)
The Philippine Agricultural Scientist (1)
Soil Science Society of America Journal (1)
Transactions of the American Society of Agricultural and Biological Engineers (ASABE) (10)
USDA-Agricultural Research Service in-house manuscript peer review (10)
USDA-Natural Resources Conservation Service National Engineering Handbook (Colorado Supplement)
Water (1)

Outreach Workshops, Trainings, Presentations

2019 August 28, Measurements of dry bean evapotranspiration in the Arkansas Basin using a precision weighing lysimeter, Dry bean Field Day, Lucerne, CO. (13 attendees – bean processors, farmers, Extension agents)

2019 February 7, Variable Rate Irrigation and its Feasibility in the San Luis Valley (Modeling approach using the [Water Irrigation Scheduler for Efficient Application](#)), Southern Rocky Mountain Ag Conference, Monte Vista, CO. (Invited; rated 4.53 out of 5.0 by audience; ~ 75 attendees – farmers, crop consultants, agricultural scientists)

2019 January 31, Irrigation Timing (ET and Water Balance Modeling Approach), MillerCoors, Golden, CO. (Invited; 8 barley agronomists from Western U.S. and 3 managers)

2018 August 7, Northern Front Range Water Tour (Extension Water Resources Team); Visits and discussions with urban water managers (7 direct contacts) in Gilcrest and Greeley (Water Department and Luprino Cheese Plant), CO.

2018 June 25, Irrigation Scheduling, Irrigation Association Faculty Academy, CSU Agricultural Research,

Development, and Education Center (ARDEC), Fort Collins, CO. (Invited; 17 participants – Junior College and University faculty from around the U.S.)

2018 May 10, Irrigation Scheduling Tools for Improved Water Management & Water Use Efficiency. USDA Climate Learning Network Webinar (Invited). <http://www.conservationswebinars.net/webinars/irrigation-scheduling-tools-for-improved-water-management-water-use-efficiency>

2018 Jan 11, Irrigation Timing, (1 continuing education credit), Rocky Mountain Agribusiness Association, 66th Annual Convention & Trade Show, Crowne Plaza Hotel DIA, Denver, CO. (63 participants; producers, crop consultants, conservationists) (Invited)

2017 Aug 2-4, Upper Arkansas River Basin Water Tour (Extension Water Resources Team); Field visits and discussions about water with resource managers and local producers (7 direct contacts) in Leadville, Buena Vista, Salida, and Cañon City, CO.

2017 March 30, Tactical irrigation scheduling using the WISE online tool, Drybean Growers and Jack's Bean Co, Holyoke, CO. (Invited; ~50 participants)

2017 March 23, Calibration of Soil Moisture Sensors and Using the WISE Irrigation Scheduler, Educational Soil Moisture Sensor Workshop, West Greeley Conservation District, Island Grove Park, Greeley, CO. (Invited; 14 participants)

2016 August 23, Getting WISE: New irrigation scheduling app from CSU (Webinar), Colorado Fruit and Vegetable Growers Association. (13 participants) <https://youtu.be/cuGKQPEY-CU>

2016 August 11, The WISE Irrigation Scheduling Tool, Irrigation Water Management Training, CSU and USDA, NRCS, CoBank Center for Agricultural Education, Fort Collins, CO. (30 participants)

2016 August 10, Methods to estimate/measure soil moisture, Irrigation Water Management Training, CSU and USDA, NRCS, CoBank Center for Agricultural Education, Fort Collins, CO. (30 participants)

2016 July 26-28, Extension Water Resources Team Summer Tour; Field visits and discussions about water with local producers and water managers in the Yampa River Basin. (one-to-one interactions with ~10 producers or water managers)

2016 July 5, Overview of Colorado's Water Resources and the WISE irrigation scheduling tool, Nuffield Fellows Program, CSU and ARDEC, Fort Collins, CO (10 participants from Australia, England, Ireland, New Zealand). (Invited)

2016 April 21, The Water Irrigation Scheduler for Efficient Application (WISE) online tool for Colorado. Alternative Agricultural Water Transfer Methods: Deficit irrigation monitoring, CSU Extension, Fort Morgan, CO (41 participants)

2016 January 14, Estimating irrigation water requirements (1 continuing education credit), Rocky Mountain Agribusiness Association, 64th Annual Convention & Trade Show, Crowne Plaza Hotel DIA, Denver, CO (74 participants; producers, crop consultants, conservationists) (Invited)

2015 December 2, Soil moisture monitoring: sensor- and water balance-based approaches (1 continuing education credit), CSU Extension Crop Clinic, Fort Morgan, CO (45 participants; crop consultants and producers)

2015 August 21, Monitoring & Management of Limited Irrigation Water - Field Day (Presentation on Irrigation

Scheduling), Greeley, CO (42 participants including farmers, conservationists, researchers, and consultants)

2015 August 16-18, Summer Tour: Extension Water Resources Team; Field visits and discussions about water with local producers and water managers in Gunnison, Montrose, Olathe, Delta, Orchard Mesa, Grand Valley, and Glenwood Springs, CO. (one-to-one interactions with ~12 producers or water managers)

2015 July 30, San Luis Valley Field Day (Presentation on Irrigation Scheduling), Center, CO (33 participants including farmers, conservationists, and crop consultants)

2014, Colorado Irrigation Scheduler. Water Management and Agriculture Development Workshop, Borlaug Fellowship Program, USDA-Foreign Agriculture Service. 21-24 April 2014, Islamabad, Pakistan. (Invited)

2014, CoAgMet and Irrigation Scheduling Workshop (Demo of the Online Irrigation Scheduler). Upper Arkansas Water Conservancy District. 3 April 2014, Salida, CO. (Invited; 14 attendees)

2014, Mobile Irrigation Scheduler Stakeholder Workshop, 28 January 2014, Fort Collins, CO. (14 attendees)

2013, Alfalfa and corn ET and crop coefficients from weighing lysimeters in the Arkansas Valley of Colorado. Colorado Water Institute Advisory Board Meeting, 15 November 2013, Denver, CO. (Invited; 12 attendees)

2013, Mobile Irrigation Scheduler. Colorado Chapter of Soil and Water Conservation Society Annual Technical Conference, 12 November 2013, Colorado Springs, CO. (Invited; 15 attendees)

2013, Computerized irrigation scheduling apps. Limited Irrigation and Crop Field Day, 5 September 2013, Iliff, CO. (14 non-CSU attendees + 6 CSU Extension specialists/agents)

2013, Progress on the Mobile Irrigation Scheduler and Variable Rate Irrigation research. Dry Bean Field Day, 20 August 2013, Lucerne, CO. (12 attendees)

2013, Evapotranspiration studies in the Arkansas Valley of Colorado. Borlaug Fellowship Program. 9 August 2013, Colorado State University. (Invited; 6 Borlaug Fellows from Pakistan attended)

2013, Tour of CSU and USDA-ARS agricultural water research projects in Colorado. Chinese delegation (3 scientists from China Agricultural University, Beijing; 2 scientists from Northwest Agriculture & Forestry University, Yangling, P.R. China). 28 July – 2 August 2013.

2013, CoAgMet and Irrigation Scheduling Workshop (Demo of the Online Irrigation Scheduler on eRAMS). Upper Arkansas Water Conservancy District. 26 April 2013, Salida, CO. (Invited; 10 attendees – 3 farmers, 1 NRCS technician, 1 newspaper reporter, 2 Conservancy District staff, 3 board members)

2013, Irrigation Scheduler on eRAMS (Stakeholders Workshop). 8 April 2013, Clark Building, Colorado State University, Fort Collins, CO. (11 stakeholders attended)

2013, Advanced Irrigation Scheduling (Online Irrigation Scheduler demo). Rocky Mountain Agribusiness Association (RMAA) Annual Convention and Trade Show. 16 January 2013, Crown Plaza Hotel – DIA, Denver, CO. (Invited; ~50 attendees)

2012, Evapotranspiration: Monitoring, Modeling, and Mapping at Point, Field, and Regional Scales. Symposium co-organized as Vice Leader of the Remote Sensing of Evapotranspiration Community; ASA, CSSA, and SSSA International Annual Meetings. 23 October 2012, Cincinnati, OH.

2012, Measurement of crop evapotranspiration using precision weighing lysimeters. Colorado Bar Association – Continuing Legal Education class. 12 October 2012, Denver, CO. (Invited; 25 on-site and 35 on-line attendees)

2012, Irrigation scheduling. Arkansas Valley Research Center Field Day. 6 September 2012, Rocky Ford, CO.

2012, Irrigation best management practices. Dry Bean Field Days, 22,24 August 2012, Yuma and Lucerne, CO.

2012, Lysimeter studies in the Arkansas River Valley. Arkansas Basin Roundtable, 11 January 2012, Pueblo, CO. (Invited; 35 attendees)

2011, Irrigation Water Management (IWM) Fundamentals. CSU and USDA-NRCS IWM Workshop, 29-30 September 2011, Delta, CO. (Invited; 19 NRCS personnel participated)

2011, ET-based irrigation scheduling. Trilateral (Afghanistan, Pakistan, U.S.) study tour. 21 September 2011, Fort Collins, CO. (Invited; ~ 8 Afghanistan/Pakistan visitors attended)

2011, Requirements for ET Research in the Arkansas River Valley. Lower Arkansas Valley Water Conservancy District Board Meeting, 20 April 2011, Rocky Ford, CO. (Invited; 34 people attended)

2011, Requirements for ET Research in the Arkansas River Valley. Radio Interview (McGee, P.), KBLJ 1400 AM (Approximately 22,000 potential listeners), La Junta, CO.

2010, Where did all the water go?: Tracking water in Agriculture. CSU Information Science and Technology High School Day. 24 September 2010, Fort Collins, CO. (3 technology demonstration sessions; 23 high school students/teachers attended) (Invited)

2010, Crop coefficients for Colorado: the Rocky Ford Lysimeter. Evapotranspiration workshop jointly sponsored by USDA-ARS, CSU Extension, and Colorado Division of Water Resources. 12 March 2010, Fort Collins, CO; 185 professionals involved in water management attended. (Invited)

2010, Evaluating crop coefficients using massive weighing lysimeters. 52nd Annual Convention of the Colorado Water Congress, 29 January 2010, Hyatt Regency Denver Tech Center, Denver, CO; approximately 25 water professionals attended. (Invited)

2009, Effects of Weather on Dry Bean Irrigation Requirements. Bean Field Days, 25 August 2009, Yuma and Holyoke, CO; 16 industry personnel and producers attended.

2009, Irrigation methods. USDA-Foreign Ag. Service Cochran Fellows, 14 August 2009, Fort Collins, CO; 7 visitors from Pakistan attended. (Invited)

2009, The lysimeter project. Lysimeter project open house, 3 April 2009, Rocky Ford, CO; 17 producers/water managers attended.

2008, Evapotranspiration (ET) and Irrigation Requirements of Dry Beans. Bean Field Day, August 21, 2008, Yuma, CO; 17 attendees representing industry and producers participated.

2008, Evapotranspiration Concepts and Water Requirements. CSU/USDA-NRCS joint Irrigation Water Management Training, July 15-17, 2008. CSU-ARDEC; 28 USDA-NRCS and 3 CSU Extension personnel participated.

2008, Growing Crops with Less Water: Field Studies in the South Platte. The High Plains No-Till Conference. 5-6 February 2008, Greeley, CO.