

CURRICULUM VITAE

Employment History/Awards

NAME: José L. Chávez (José Luis Chávez Egüez)

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WORK ADDRESS 1372 Campus Delivery, Fort Collins, CO 80523

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EDUCATION

2005 Ph.D. in Agricultural and Biological Engineering, Utah State University
1999 M.Sc. in Irrigation Engineering, Utah State University
1992 B.Sc. in Agricultural Engineering, Paraíba Federal University

ACADEMIC POSITIONS

(2022-present) Professor, Civil and Environmental Engineering Department, Colorado State University
(2015-2022) Associate Professor, Civil and Environmental Engineering Department, Colorado State University
(2009-2015) Assistant Professor, Civil and Environmental Engineering Department, Colorado State University
(2005-2006) Postdoctoral Research Associate, Washington State University

OTHER POSITIONS

(2006-2008) Research Agricultural Engineer, United States Department of Agriculture (USDA), Bushland, TX
(2000-2005) Research Assistant, Remote Sensing Services Laboratory, Utah State University, Logan, UT

CURRENT JOB DESCRIPTION

35 % Teaching 40 % Research/Creative Activity 25 % Service/Outreach

HONORS AND AWARDS

2020 Irrigation Association 2020 E3 program winner
2019 USCID Merriam Improved Irrigation Award, United States Commission on Irrigation and Drainage
2019 Certificate in Recognition of Ten Years of Service, Col. State Univ. Extension, Nov. 11, Fort Collins, CO
2014 Certificate in Recognition of Five Years of Service, Col. State Univ. Extension, Nov. 11, Fort Collins, CO
2014 Prof. Dr. Iqar Ahmad Khan (Vice-Chancellor) Award, Univ. of Agriculture Faisalabad, Pakistan
2013 Borland Chair of Hydrology award (2013-2016), Civil and Environmental Engineering Department, Colorado State University, Fort Collins, CO
2012 College of Agriculture Sciences Research Award, Colorado State University, Fort Collins, CO
2010 Faculty Award for Excellence in Service/Outreach, Civil and Environmental Engineering Department, Colorado State University, Fort Collins, CO
2009 Certificate of Merit Award for exemplary performance during the rating period January 1, 2008 through November 30, 2008. United States Department of Agriculture (USDA), ARS, CPRL, Bushland, TX
2008 Certificate of Merit Award for exemplary performance during the rating period January 1, 2007 through December 31, 2007. USDA, ARS, CPRL, Bushland, TX
2007 Spot Award for first regional ET mapping of the Texas Panhandle, USDA, ARS, CPRL, Bushland, TX
2006 Certificate of Appreciation, USDA, ARS, Vegetable and Forage Crop Research, Prosser, WA
2002 Graduate Research Scholarship, Organization of American States, Washington, D.C.
1999 Graduate Scholarship, Biological and Irrigation Engineering Department, Utah State University, Logan, UT

Publications/Scholarly Record

PUBLISHED WORKS

Refereed Journal Articles:

Note: Authors underlined are students advised by **Dr. Chávez** as major advisor/professor. Students with an asterisk (*) are students advised by **Dr. Chávez** as part of their Thesis/Dissertation research committee or serving as a research associate or postdoctoral fellow's supervisor (†).

1. **Chávez, J.L.**, H. Zhang, A.J. Brown, A.A. Andales, and E. Costa-Filho*. **2024** “Maize evapotranspiration estimates using Planet Dove mini-satellites and field-level infrared thermometers.” (ASABE) Submitted to *Applied Engineering in Agriculture*. Submitted on 6 June 2023. Approved on 23 October 2023. Published on Feb. 2024. *Applied Engineering in Agriculture*, 40(1): 69-78 (doi: 10.13031/aea.15703). 2024 American Society of Agricultural and Biological Engineers. [Link](#)
2. Costa-Filho*, E., Chavez, J.L., and H. Zhang. **2024**. “Assessing Multi-Sensor Hourly Maize Evapotranspiration Estimation Using a One-Source Surface Energy Balance Approach.” Submitted to (Wiley) *Irrigation and Drainage* on 18 September 2023. Accepted on 19 December 2023. Published online (OA) on 01 January 2024. *Irrigation and Drainage*, 1–22. Available at <http://doi.org/10.1002/ird.2923>
3. Morales-Salinas, L., S. Ortega-Farias, C. Riveros-Burgos, **J.L. Chávez**, S. Wang, F. Tian, M. Carrasco-Benavides, J. Neira-Román, R. López-Olivari, G. Fuentes-Jaque. **2023**. “Assessment of atmospheric emissivity models for clear-sky conditions with reanalysis data,” submitted to *Scientific Reports* on 21 November 2022. Accepted on 10 August 2023. Published on 2 September 2023. *Sci Rep* 13, 14465 (2023). <https://doi.org/10.1038/s41598-023-40499-6>
4. **Chávez, J.L.** **2023**. “Remote Sensing and Aerodynamic Temperature-Based Energy Balance Models to Estimate Crop Evapotranspiration Rates,” submitted on January 22, 2023. Accepted: February 19, 2023. Online Published: March 15, 2023. *Journal of Agricultural Science*; Vol. 15, No. 4; 2023. doi:10.5539/jas.v15n4p15 URL: <https://doi.org/10.5539/jas.v15n4p15>
5. Costa-Filho*, E., **J.L. Chávez**, and H. Zhang. **2023**. “A Multi-sensor Analysis of Selected Reflectance-Based Crop Coefficient Models for Daily Maize Evapotranspiration Estimation.” *Journal of Agricultural Science*, Vol. 15, No. 12; 2023, submitted on August 23, 2023. Accepted: September 24, 2023. Online Published: November 15, 2023. doi:10.5539/jas.v15n12p1 URL: <https://doi.org/10.5539/jas.v15n12p1>
6. Zhang, L., H. Zhang, W. Han, Y. Niu, **J.L. Chávez**, and W. Ma. **2022**. “MGDEXG-A new crop water stress indicator part II: Effects of image spatial resolution and statistical scale on its water stress estimation performance,” submitted to *Agricultural Water Management* on 20 June 21, 2021. Accepted on 22 January 2022. Available online 28 January 2022. Volume 264, 30 April 2022, 107506. <https://doi.org/10.1016/j.agwat.2022.107506>
7. Costa-Filho*, E., **J.L. Chávez**, H. Zhang, and A. Andales. **2021**. “An Optimized Surface Aerodynamic Temperature Approach to Estimate Maize Sensible Heat Flux and Evapotranspiration,” Submitted to *Agricultural and Forest Meteorology* on 5 May 5, 2021. Accepted on 12 October 2021. Published online on 6 November 2021. Volume 311, 15 December 2021, 108683. ISSN 0168-1923, <https://doi.org/10.1016/j.agrformet.2021.108683>
8. Zhang†, L., W. Han, Y. Niu, **J.L. Chavez**, G. Shao, and H. Zhang. **2021**. “Evaluating the Sensitivity of Water Stressed Maize Chlorophyll and Structure based on UAV derived Vegetation Indices,” Submitted to *Computers and Electronics in Agriculture*, on 9 July 2020. Accepted and published online on 14 April 2021. Volume 185, June 2021, 106174. <https://doi.org/10.1016/j.compag.2021.106174>

9. Zhang[†], L., H. Zhang, W. Han, Yaxiao Ni, **J.L. Chávez**, W. Ma. **2021**. “The Mean Value of Gaussian Distribution of Excess Green Index: A New Crop Water Stress Indicator,” Submitted to *Agricultural Water Management* on 24 July 2020, accepted on 5 March 2021, Available online 25 March 2021. *Agricultural Water Management*, Volume 251, 31 May 2021, 106866. <https://doi.org/10.1016/j.agwat.2021.106866>
10. Joy*, S., and **J.L. Chávez**. **2021**. “Correction of Eddy Covariance based Crop ET Considering Heat Flux Source Area,” Submitted to *Atmosphere (Journal)*, Special Issue “Agricultural Microclimate and Irrigation Water Management,” on 21 December 2020. Accepted on 16 February 2021. Published on 21 February 22, 2021. *Atmosphere* **2021**, 12(2), 281. <https://doi.org/10.3390/atmos12020281>
11. Andales, A., D. Rudnick, and J.L. Chávez, **2020**. “Special Issue: Improving irrigation management across the Ogallala aquifer, USA,” Submitted to *Irrig. Sci.* on Oct. 11, 2020. Published online on 22 Oct. 2020. 38:481–483. <https://doi.org/10.1007/s00271-020-00704-0>
12. Chávez, J.L., Torres-Rua, A., Woldt, W., Zhang, H., Robertson, C., Marek, G., Wang, D., Heeren, D., Taghvaeian, S., and Neale, C.M.U. **2020**. “A Decade of Unmanned Aerial Systems in Irrigated Agriculture in the Western U.S.” *ASABE Applied Engineering in Agriculture*, 36(4): 423-436. (doi: 10.13031/aea.13941). Submitted on January 28th, 2020. Accepted on May 8th, 2020. Published on August 13, 2020. <https://elibrary.asabe.org/abstract.asp?aid=51246>
13. Ramón López-Urrea, Juan Manuel Sanchez, Fernando de la Cruz, Jose González-Piqueras, **José L. Chávez**. **2020**. “Evapotranspiration and crop coefficients from lysimeter measurements for sprinkler-irrigated canola.” Submitted to *Agricultural Water Management*, special issue “Updating FAO56 METHODS”, on January 29, 2020. Accepted on May 7th, 2020. Available online on May 25th, 2020. Published in Volume 239, 1 September 2020, 106260. <https://doi.org/10.1016/j.agwat.2020.106260>
14. Edson Costa Filho*, José L. **Chávez**, and Louise Comas. **2020** “Determining Maize Water Stress through an Air Temperature-based Sensible Heat Flux Model.” *Irrigation Science Journal*. Submitted on 15 Sept. 2019, Accepted on 19 February 2020. Published on line on 06 March 2020. 38:501–518. <https://doi.org/10.1007/s00271-020-00668-1>
15. Jones, A.S., A.A. Andales, J.L. **Chávez**, C. McGovern, G.E.B. Smith, O. David, and S.J. Fletcher. **2020**. “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*, 56(2): 187–200. First published online: 13 November 2019. <https://doi.org/10.1111/1752-1688.12810>.
16. Jones, A.S., A.A. Andales, J.L. **Chávez**, C. McGovern, G.E.B. Smith, O. David, and S.J. Fletcher. **2020**. “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*, 56(2): 201–211. First published online: 13 November 2019. <https://doi.org/10.1111/1752-1688.12806>.
17. Camilo Riveros-Burgos, Samuel Ortega-Farias, Rafael López-Olivari, **José Luis Chávez**. **2019**. “Parameterization of a clumped model to directly simulate actual evapotranspiration over a super intensive drip-irrigated olive orchard.” Submitted to *Journal of Hydrometeorology*, Vol. 20, issue 5, 935–946. May 23th, 2018. Accepted on 17 March 2019. Published on-line 15 May 2019. <https://doi.org/10.1175/JHM-D-18-0135.1>
18. Subedi* A., **J.L. Chávez**, and A. Andales. **2019**. “Hourly Alfalfa Evapotranspiration Estimation using Variable Bulk Surface Resistance.” *ASCE Irrigation and Drainage Engineering J.*, Submitted on Aug 2, 2018. Accepted on 19 April 2019. Published on line Aug. 8, 2019. *J. Irrig. Drain Eng.*, 2019, 145(10): 04019023
19. Rudnick, D.R., S. Irmak, C. West, **J.L. Chavez**, I. Kisekka, T.H. Marek, J.P. Schneekloth, D. Mitchell McCallister, V. Sharma, K. Djaman, J. Aguilar, M.E. Schipanski, D.H. Rogers, and A. Schlegel. **2019**. “Deficit Irrigation Management of Maize in the High Plains Aquifer Region: A Review.” *Journal of the American Water Resources Association*, 55(1): 38-55. <https://doi.org/10.1111/1752-1688.12723>. Submitted on Feb. 24, 2018. Accepted on 12 Oct. 2018. Published on line 10 January 2019. Published in issue on Feb. 2019.
20. **Chávez J.L.**, and López-Urrea, R. **2019**. “Modeling r_s to estimate corn water use using the P-M one step Method: Part I Model Development.” Submitted to *Irrigation Science* on 23 Aug 2018. Accepted on 26 Oct 2018. On-line 01 Nov 2018. Published 27 March 2019, *Irrigation Science*, 37(2), 123-137. <https://doi.org/10.1007/s00271-018-0111-1>

21. López-Urrea, R., and **J.L. Chávez**. 2019a. “Modeling rs to estimate corn water use using the P-M one step Method: Part II Model Evaluation of variable surface resistance models.” Submitted to *Irrigation Science on 23 Aug 2018*. Accepted on 26 Oct 2018. On-line 01 Nov 2018. Published 27 March 2019. *Irrigation Science*, 37(2), 139-150. <https://doi.org/10.1007/s00271-018-0607-7>
22. López-Urrea, R., and **J.L. Chávez**. 2019b. “Correction to: One-step approach for estimating maize actual water use: Part II. Lysimeter evaluation of variable surface resistance models.” Published online: 27 November 2018. *Irrigation Science* (2019) 37:219–220. <https://doi.org/10.1007/s00271-018-0615-7>
23. Ming Han, Huihui Zhang, **José L. Chávez**, Liwang Ma, Thomas Trout, K. DeJong. 2018. ‘Improvement estimation of soil water deficit through the integration of canopy temperature measurements into a soil water balance model.’ Submitted to *Irrigation Science* on 23 January 2017. Resubmitted in Dec. 2017. Accepted on 23 March 2018. May 2018, Volume 36, Issue 3, pp 187–201.
24. Huihui Zhang, Ming Han, **José L. Chávez**, Yubin Lan. 2017. “Improvement in estimation of soil water deficit by integrating airborne imagery data into a soil water balance model.” *Int’l Journal of Agricultural and Biological Engineering*. Submitted on Jan 14, 2017. Accepted on 02 May 2017. *Int J Agric & Biol Eng*, 2017; 10(3): 37–46.
25. Subedi* A., J.L. Chávez, and A. Andales. 2017. “ASCE-EWRI Standardized Penman-Monteith Evapotranspiration (ET) Equation Performance in Southeastern Colorado.” Submitted on 10 Feb 2016. Accepted on June 30, 2016. Available on-line 24 Aug 2016. *Agricultural Water Management*, 179, 74-80.
26. Marcos Carrasco-Benavides, Samuel Ortega-Farías, Luis Morales-Salinas, Carlos Poblete-Echeverría and **José L. Chávez**. 2017. "Calibration and validation of an aerodynamic method to estimate the spatial variability of sensible and latent heat fluxes over a drip-irrigated Merlot vineyard," *Int'l Journal of Remote Sensing*. Submitted on July 18th, 2016. Accepted on 1 April 2017. Published on-line 15 May 2017. Vol. 38, 2017 – Issue 24, pg 7473-7496.
27. Hongbo Su, Yongmin Yang, Lina Xu, **José L. Chávez**, Steven R. Evett, Terry A. Howell, Jing Tian, Shaohui Chen, Jinyan Zhan. 2016. A method to correct eddy covariance flux underestimates under an advective environment for arid or semi-arid regions. *Physics and Chemistry of the Earth, Parts A/B/C*, Volume 96, Pages 2-15 (December 2016). [Submitted 17 January 2016, Revised 12 July 2016, Accepted 26 August 2016, Available online 31 August 2016]
28. Kullberg*, E.G., DeJonge, K.C., and **J.L. Chávez**. 2016. “Evaluation of thermal remote sensing indices to estimate crop evapotranspiration coefficients.” Submitted on 15 Feb 2016. Accepted on July 3, 2016. *Agricultural Water Management*, 179, 64-73.
29. DeJonge K., Mefford*, B.S., and **J.L. Chávez**. 2016. “Assessing corn water stress using spectral reflectance,” *International Journal of Remote Sensing*. Submitted on 02 Feb 2015, re-submitted on 03 Feb 2015, re-submitted on 11 Feb 2016. Accepted on 15 March 2016. Volume 37, Issue 10, 2016, pages 2294-2312. DOI:10.1080/01431161.2016.1171929.
30. Mcebisi Mkhwanazi*, **José L. Chávez**, and Allan A. Andales, 2015, SEBAL-A: A remote sensing ET algorithm that accounts for advection with limited data. Part I: Development and validation, *Remote Sensing*, Submitted 17 May 2015, Revised 1 Oct., Accepted on 3 Nov. Published 10 Nov. 2015. *Remote Sens.* 2015, 7(11), 15046-15067; doi:10.3390/rs71115046.
31. Mcebisi Mkhwanazi*, **José L. Chávez**, Allan A. Andales and Kendall DeJonge, 2015, SEBAL-A: A remote sensing ET algorithm that accounts for advection with limited data. Part II: Test for transferability, *Remote Sensing*, Submitted 17 May 2015, Revised 16 Sept, accepted on 18 Sept 2015. Published 10 Nov. 2015. *Remote Sens.* 2015, 7(11), 15068-15081; doi:10.3390/rs71115068.
32. Abhinaya Subedi*, and **José L. Chávez**, 2015, “Crop evapotranspiration (ET) estimation models: A review and discussion of the applicability and limitations of ET methods, *Journal of Agricultural Science*, V7, No 6, 2015, Submitted on 23 Feb 2015, Accepted 10 Apr 2015, On-line publication 15 May 2015.
33. Saseendran Anapalli*, Ph. D; Thomas J Trout, Ph. D; Lajpat R Ahuja, Ph. D. ; Liwang Ma, Ph. D; Gregory S McMaster, Ph. D.; David C Nielsen, Ph. D; Allan A Andales, Ph. D.; **José L Chávez**, Ph. D; Jay Ham, Ph. D. (2015). Quantifying crop water stress factors from soil water measurements in a limited irrigation experiment,

34. Saseendran*, S. A., L.R. Ahuja, L. Ma, T.J. Trout, G.S. McMaster, D. C. Nielsen, A.A. Andales, and A. D. Halvorson, **José L. Chávez**, J. Ham, and Q.X. Fang, 2015, "Developing and generalizing average corn crop water production functions across years and locations using a system model." *Agricultural Water Management*, Volume 157, 31 July 2015, Pages 65--77, *doi:10.1016/j.agwat.2014.09.002*, Submitted on 08 Jan 2014. Approved 04 Sept 2014.
35. **Rambikur***, E., and **J.L. Chávez**, 2014, "Assessing Inter-Sensor Variability and Sensible Heat Flux Derivation Accuracy for a Large Aperture Scintillometer," *Sensors*, 14(2), 2150-2170.
36. **Taghvaeian†**, S., **J.L. Chávez**, W.C. Bausch, K.C. DeJonge, and T.J. Trout, 2014, "Minimizing instrumentation requirement for estimating crop water stress index and transpiration of maize," *Irrigation Science*, 32, 53-65.
37. Saseendran*, S.A., L.R. Ahuja, L. Ma, D.C. Nielsen, T.J. Trout, A.A. Andales, **J.L. Chávez**, and J. Ham, 2014, "Enhancing the water stress factors for simulation of corn (*Zea mays* L.) in RZWQM2," *Agronomy Journal*, 106 (1), 81-94.
38. Gleason*, D.J., A.A. Andales, T.A. Bauder, and **J.L. Chávez**, 2013, "Performance of atmometers in estimating reference evapotranspiration in a semi-arid environment," *Agricultural Water Management*, 130, 27-35.
39. Formetta, G., R. Rigon, **J.L. Chávez**, and O. David, 2013, "Modeling shortwave solar radiation using the JGrass-NewAge System," *Geoscientific Model Development*, 6, 915-928.
40. **Taghvaeian†**, S., **José Chávez**, Mary Hattendorf, Mark Crookston, 2013, "Optical and Thermal Remote Sensing of Turfgrass Quality, Water Stress, and Water Use under Different Soil and Irrigation Treatments," *Remote Sensing*, 5, 2327-2347.
41. Agam, N., S.R. Evett, J.A. Tolk, W.P. Kustas, P.D. Colaizzi, J.G. Alfieri, L.G. McKee, K.S. Copeland, T.A. Howell, and **J.L. Chávez**, 2012, "Evaporative loss from irrigated interrows in a highly advective semi-arid agricultural area," *Advances in Water Resources*, 50, 20-30.
42. **Chávez, J.L.**, Gowda, P.H., Howell, T.A., Garcia, L.A., Copeland, K.S., and Neale, C.M.U., 2012, "ET mapping with high resolution airborne remote sensing data in an advective semi-arid environment," *Journal of Irrigation and Drainage Engineering*, 138(5), 416-423.
43. Vicente-Guillén J., Ayuga-Telléz E., Otero D., **Chávez J.L.**, Ayuga F., and García A.I., 2012, "Performance of a monthly streamflow prediction model for ungauged watershed in Spain," *Water Resources Management*, 26(13), 3767-3784.
44. Anderson, M.C., Kustas, W.P., Alfieri, J., Gao, F., Hain, C., Prueger, J.H., Evett, S., Colaizzi, P., Copeland, K., Howell, T., and **Chávez, J.L.**, 2012, "Mapping Daily Evapotranspiration at Landsat Spatial Scales During the BEAREX'08 Field Campaign," *Advances in Water Resources*, 50, 162-177.
45. French, A.N., J.G. Alfieri, W.P. Kustas, J.H. Prueger, L.E. Hips, **J.L. Chávez**, S.R. Evett, T.A. Howell, P. Gowda, D. Hunsaker, and K. Thorp, 2012, "Estimation of surface energy fluxes using surface renewal and flux variance techniques over an advective irrigated agricultural site." *Advances in Water Resources*, 50, 91-105.
46. Kustas, W.P., J.G. Alfieri, M.C. Anderson, P.D. Colaizzi, J.H. Prueger, S.R. Evett, C.M.U. Neale, A.N. French, L.E. Hips, **J.L. Chávez**, K.S. Copeland, and T.A. Howell, 2012, "Evaluating the two-source energy balance model using local thermal and surface flux observations in a strongly advective irrigated agricultural area" *Advances in Water Resources*, 50, 120-133.
47. Prueger, J.H., J.G. Alfieri, L.E. Hips, W.P. Kustas, **J.L. Chávez**, S.R. Evett, M.C. Anderson, A.N. French, C.M.U. Neale, L.G. McKee, J.L. Hatfield, T.A. Howell, and Nurit Agam, 2012, "Patch scale turbulence over dryland and irrigated surfaces in a semi-arid landscape during BEAREX08," *Advances in Water Resources*, 50, 106-119.
48. Neale, C.M.U., H. Geli, W.P. Kustas, J. Alfieri, P.H. Gowda, S.R. Evett, J.H. Prueger, L.E. Hips, W.P. Dulaney, **J.L. Chávez**, A.N. French, and T.A. Howell, 2012, "Soil water content estimation using a remote sensing based hybrid evapotranspiration modeling approach," *Advances in Water Resources*, 50, 152-161.
49. **Mkhwanazi**, M., **Chávez, J.L.**, and **Rambikur**, E.H., 2012, "Comparison of Large Aperture Scintillometer and

Satellite-based Energy Balance Models in Sensible Heat Flux and Crop Evapotranspiration Determination,” *International Journal of Remote Sensing Applications (IJRSA)*, 2(1), 19-25.

50. Alfieri, J.G., W.P. Kustas, J.H. Prueger, L.E. Hipps, S.R. Evett, J.B. Basara, C.M.U. Neale, A.N. French, P. Colaizzi, N. Agam, M.H. Cosh, **J.L. Chávez**, and T.A. Howell, 2012, “On the discrepancy between eddy covariance and lysimeter-based surface flux measurements under strongly advective conditions,” *Advances in Water Resources*, 50, 62-78.
51. Taghvaeian[†], S., **J.L. Chávez**, and N.C. Hansen, 2012, “Infrared Thermometry to Estimate Crop Water Use and Stress Index of Irrigated Maize in Northeastern Colorado,” Special issue: Advances in Remote Sensing of Crop Water Use Estimation, *Remote Sensing*, 4(11), 3619-3637.
52. Canelón D. and **Chávez J.L.**, 2011, “Soil heat flux modeling using artificial neural networks and multispectral airborne remote sensing imagery,” *Remote Sensing*, 3(8), 1627-1643.
53. Varble, J.L., and **J.L. Chávez**, 2011, “Performance evaluation and calibration of soil water content and potential sensors for agricultural soils in eastern Colorado,” *Agricultural Water Management*, 101, 93-106.
54. Elhaddad, A., L.A. Garcia, and **J.L. Chávez**, 2011, Using a Surface Energy Balance Model to Calculate Spatially Distributed Actual ET, *Irrigation and Drainage Engineering*, 137(1), 17-26.
55. Alfieri, J.G., Kustas, W.P., Prueger, J.H., Hipps, L.E., **Chávez, J.L.**, French, A.N., and Evett, S.R., 2011, “Intercomparison of nine micrometeorological stations during the BEAREX08 field campaign,” *Journal of Atmospheric and Oceanic Technology (JTECHA)*, 28(11), 1390-1406.
56. **Chávez J.L.**, T.A. Howell, P.H. Gowda, K.S. Copeland, and J.H. Prueger, 2010, “Surface aerodynamic temperature modeling over rainfed cotton,” *Transactions of ASABE*, 53(3), 759-767.
57. **Chávez J.L.**, F.J. Pierce, T.V. Elliot, R.G. Evans, Y. Kim, and W.M. Iversen, 2010, “A remote irrigation monitoring and control system (RIMCS) for continuous move systems. Part B: Field testing and results,” *Precision Agriculture*, 11(1), 11-26.
58. **Chávez J.L.**, F.J. Pierce, and R.G. Evans, 2010, “Compensating inherent Linear Move water application errors using a variable rate irrigation system,” *Irrigation Science*, 28, 203-210.
59. **Chávez J.L.**, F.J. Pierce, T.V. Elliot, and R.G. Evans, 2010, “A remote irrigation monitoring and control system (RIMCS) for continuous move systems. Part A: Description and Development,” *Precision Agriculture*, 11, 1-10.
60. **Chávez J.L.**, P.H. Gowda, T.A. Howell, C.M.U. Neale, and K.S. Copeland, 2009, “Estimating hourly crop ET using a two source energy balance model and multispectral airborne imagery,” *Irrigation Science*, 38, 79-91.
61. **Chávez J.L.**, T.A. Howell, and K.S. Copeland, 2009, “Evaluating eddy covariance cotton ET measurements in an advective environment with weighing lysimeters,” *Irrigation Science*, 28, 35-50.
62. **Chávez J.L.**, P.H. Gowda, T.A. Howell, and K.S. Copeland., 2009, “Radiometric Surface Temperature Calibration Effects on Satellite based Evapotranspiration Estimation,” *International Journal of Remote Sensing*, 30(9), 2337-2354.
63. **Chávez, J.L.**, C.M.U. Neale, J.H. Prueger and W.P. Kustas, 2008, “Daily Evapotranspiration estimates from extrapolating instantaneous airborne remote sensing ET values,” *Irrigation Science*, 27, 67-81.
64. Gowda, P.H., **J.L. Chávez**, P.D. Colaizzi, S.R. Evett, T.A. Howell, and J.A. Tolk, 2008, “ET mapping for agricultural water management: present status and challenges,” *Irrigation Science*, 26(3), 223-237.
65. Gowda P.H., **J.L. Chavez**, T.A. Howell, T.H. Marek, and L.L. New, 2008, “Surface Energy Balance Based Evapotranspiration Mapping in the Texas High Plains,” *Sensors*, 8, 5186-5201.
66. Gowda P.H., T.A. Howell, P. D. Colaizzi, S.R. Evett, **J.L. Chavez**, and L. New, 2008, “Remote Sensing of Contrasting Tillage practices in the Texas Panhandle,” *International Journal of Remote Sensing*, 29(12), 3477-3487.
67. Gowda, P.H., **J.L. Chávez**, P.D. Colaizzi, S.R. Evett, T.A. Howell, and J.A. Tolk, 2007, “Remote Sensing based Energy Balance Algorithms for Mapping ET: Current Status and Future Challenges,” *Transactions of the ASABE*, 50(5), 1639-1644.

68. **Chávez J.L.**, C.M.U. Neale, L.E. Hipps, J.H. Prueger, and W.P. Kustas, 2005, “Comparing aircraft-based remotely sensed energy balance fluxes with eddy covariance tower data using heat flux source area functions,” *Journal of Hydrometeorology*, 6(6), 923-940.
69. Anderson, M.C., C.M.U. Neale, F. Li, J.M. Norman, W.P. Kustas, H. Jayanthi, **J. Chavez**, 2004, “Upscaling ground observations of vegetation water content, canopy height, and leaf area index during SMEX02 using aircraft and Landsat imagery,” *Remote Sensing of Environment*, 92, 447-464.

Journal Articles Submitted

Costa-Filho, Edson, Chavez, J.L., Andales, A., Brown, A.J. “*Improving WISE Crop Evapotranspiration Estimates using Crop Coefficients Derived from Remote Sensing Algorithms*,” submitted to ASCE J. of Irrigation and Drainage Engineering, 13 December 2022. Under Review. Minor revision.

Costa-Filho, E., Chavez, J.L., Zhang, H. “Mapping Maize Evapotranspiration with Two-Source Land Surface Energy Balance Approaches and Multiscale Remote Sensing Imagery Pixel Sizes: Accuracy determination towards a Sustainable Irrigated Agriculture,” submitted to Sustainability, 8 January 2024, Under Review.

Costa-Filho, E., Chavez, J.L., Zhang, H. “A Novel Remote Sensing-based Modeling Approach for Maize Light Extinction Coefficient Determination,” submitted to Remote Sensing, special issue “Vegetation Structure Monitoring with Multi-Source Remote Sensing Data,” on 26 January 2024. Under Review.

Refereed Chapters in Books:

Prueger J., J. Alfieri, W. Kustas, L. Hipps, C. Neale, S. Evett, J. Hatfield, L. McKee, and J.L. **Chávez**, 2012, Thermal radiation and energy closure assessment in evapotranspiration estimation for remote sensing validation, In: Multi-Scale Hydrology Remote Sensing: Prospects and Applications, (Eds. Yang Chang and Ni-Bin Hong), CRC Press 2012, Taylor & Francis Group, pp. 87-110.

Refereed Proceedings/Transactions:

1. Costa-Filho, E., J.L. Chávez, H. Zhang, A.A. Andales, and AJ Brown. 2023. “Evaluating Reflectance-based Maize Evapotranspiration estimation under different Irrigation Systems.” In Proceedings of the USCID United States Committee on Irrigation & Drainage 2023 Conference, October 17-20, 2023, Hilton Fort Collins, Fort Collins, Colorado. [Link](#)
2. Sanchez, J.M., J.L. Chávez, E. Costa-Filho, J. Gonzalez-Piqueras, F. Montoya, and R. Lopez-Urrea. 2023. Monitoring the Water Status of Almond Orchards in a Water-scarce area in southeast Spain. In Proceedings of the USCID United States Committee on Irrigation & Drainage 2023 Conference, October 17-20, 2023, Hilton Fort Collins, Fort Collins, Colorado. [Link](#)
3. **Chávez, J.L.**, Torres-Rua, A., Woldt, W., Zhang, H., Robertson, C., Marek, G., Wang, D., Heeren, D., Taghvaeian, S., and Neale, C.M.U. **2021**. “A DECADE OF UNMANNED AERIAL SYSTEMS IN IRRIGATED AGRICULTURE IN THE WESTERN U.S.” In proceedings of the 6th Decennial National Irrigation Symposium, organized by the Irrigation Association and the American Society of Agricultural and Biological Engineers. <https://www.asabe.org/sc20NIS>
4. **Chávez, J.L.**, Zhang, H., Capurro, M.C., Masih, A., Altenhofen, J. 2018. “Evaluation of multispectral unmanned aerial systems for irrigation management,” In Proceedings of the 2018 SPIE Conference Volume 10664: Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping III, 106640Q (15 May 2018); doi: 10.1117/12.2305076; <https://doi.org/10.1117/12.2305076>, Orlando, FL, 17 April, 2018.
5. Mkhwanazi, M.M., **J.L. Chávez**, and A.A. Andales, 2013, “Evaluating the performance of SEBAL ET algorithm under advective conditions,” In Proceedings of the Seventh International Conference on Irrigation and Drainage, USCID. Phoenix, AZ, April 16-19, 2013, pp. 119-128.

6. Taghvaeian[†] S., **Chávez J.L.**, and Hansen N., 2012, "Evaluating Crop Water Stress under Limited Irrigation Practices," In Proceedings of the 2012 ASCE EWRI World Congress, May 21-24, Albuquerque, NM, pp. 2149-2159.
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8. 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," USCID Water Management Conference, Albuquerque, NM, April 26-29, pp. 351.
9. **Chávez, J.L.**, Straw D., Garcia L.A., Ley T.W., Andales, A.A., Simmons L., Bartolo M.E., and Neale C.M.U., 2010, "Remote sensing ET of alfalfa using a surface aerodynamic temperature model." In Proceeding of the 5th National Decennial Irrigation Conference, ASABE and Irrigation Association, Paper No. IRR10-8513, St. Joseph, Mich: ASABE.
10. **Chávez, J.L.**, T.A. Howell, D. Straw, P.H. Gowda, L.A. Garcia, S. Evett, T. Ley, L. Simmons, M. Bartolo, P. Colaizzi, and A. Andales, 2010, "Surface Aerodynamic Temperature Derived from Wind/Temperature Profile Measurements over Cotton and Alfalfa in a Semi-Arid Environment," In Proceedings of the 2010 World & Water Congress, EWRI-ASCE, Reston, VA, pp. 2090-2101.
11. **Chávez, J.L.**, D. Straw, L. A. Garcia, T. W. Ley, A. A. Andales, L. H. Simmons, and M. E. Bartolo, 2010, "Mapping ET in Southeastern Colorado Using a Surface Aerodynamic Temperature Model," In Proceedings of the U.S. Commission on Irrigation and Drainage (USCID), Meeting Irrigation Demands in a Water-Challenged Environment, CD-ROM, pp. 297-308.
12. 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.
13. AlWahaibi*, H., A. Andales, D. Straw, L. Simmons, M. Bartolo, T. Ley, T. Trout, **J. Chávez**, and N. Hansen, 2010, "Alfalfa Crop Coefficients Developed Using a Weighing Lysimeter in Southeast Colorado," In Proceedings of the 2010 U.S. Committee on Irrigation and Drainage (USCID), Meeting Irrigation Demands in a Water-Challenged Environment, CD-ROM, pp. 309-317.
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18. Hargreaves, G.H., **J.L. Chávez**, D. Jensen, 2001, "Reconnaissance Evaluations of Transbasin Water Transfers. Paper presented at the Transbasin Water Transfer Conference," In Proceedings of the 2001 USCID Water Management Conference, U.S. Committee on Irrigation and Drainage. Denver, CO, pp. 393 - 407.

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1. Edson Costa-Filho; José L. **Chávez**; Allan A. Andales; and Ansley J. Brown, 2022, "Updating Corn Crop Coefficients with Remote Sensing-Based Actual Evapotranspiration Algorithms," In Proceeding of the 2022 ASCE EWRI Congress, World Environmental and Water Resources Congress 2022, June 5–8, 2022, Atlanta,

Georgia, <https://doi.org/10.1061/9780784484258.058>, Published online: June 02, 2022.

2. **Chávez, J.L.**, 2019. "Irrigation Scheduling with Temperature Approaches," In Proceedings of the 31st High Plains Irrigation Association Conference in Kearny, NE. February 26-27, 2019. Published at: <https://www.ksre.k-state.edu/irrigate/oow/cpic19.html>
3. **Chávez, J.L.**, and López-Urrea, R. 2018. "Modeling corn surface resistance to estimate actual water use." In Proceedings of the 2018 ASCE EWRI World Environmental and Water Resources Congress 2018, Minneapolis, Minnesota, June 2-7, 2018, pp 62-73. Site: <https://ascelibrary.org/doi/book/10.1061/9780784481400>
4. **Chávez, J.L.** and H. Zhang. 2018. "Determining crop soil water deficit with an UAS." In Proceedings of the 30th Annual Central Plains Irrigation Conference (CPIC), Colby, KS, February 20-21, 2018, CPIA, 760 N. Thompson, Colby, KS. Website: <http://www.k-state.edu/irrigate/oow/cpic18.html>
5. **Chávez, J.L.** 2017. Fixed-Wing Unmanned Aerial Systems for Improved Irrigation Management. In Proceedings of the 29th Annual Central Plains Irrigation Conference (CPIC), Burlington, CO, February 21-22, 2017, CPIA, 760 N. Thompson, Colby, KS.
6. Andales, A., J.L. **Chávez**, and N.C. Hansen. 2017. Management strategies for adapting semi-arid corn production to limited irrigation conditions. In Proceedings of the 2017 UCOWR/NIWR Annual Conference "Water in a Changing Environment". June 13-15, 2017, Colorado State University, Fort Collins, CO
7. **Chávez, J.L.**, and J.C. Hathaway. 2016. Developing and Unmanned Aerial Remote Sensing of ET System. In Proceedings of the 2016 ASABE Annual Int'l Meeting, Orlando, FL, July 17-20, 2013. pp. 11.
8. Prasanna H. Gowda , Terry A. Howell , José L. **Chávez** , George Paul , Jerry E. Moorhead, Daniel Holman, Thomas H. Marek, Dana O. Porter, Gary H. Marek, Paul D. Colaizzi, Steve R. Evett, and David K. Brauer, 2015, A Decade of Remote Sensing and Evapotranspiration Research at USDA-ARS Conservation and Production Research Laboratory. In Proceedings of the 2015 ASABE/IA Irrigation Symposium: Emerging Technologies for Sustainable Irrigation, Long Beach, California November 10 – 12, 2015. Paper Number: 152141015, pp.
9. **Chávez, J.L.** and E. Kullberg, 2015, Handheld Infra-Red Thermometry Calibration: Monitoring Crop Water Stress. In Proceedings of the 2015 ASCE EWRI World Congress, May 17-21, Austin, TX, pp. 2024-2034.
10. **Chávez, J.L.**, 2015, "Using canopy temperature as an indicator of plant stress." In Proceedings of the 27th Annual Central Plains Irrigation Conference (CPIC), Colby, KS, February 17-18, 2015, CPIA, 760 N. Thompson, Colby, KS.
11. **Chávez, J.L.**, E. Kullberg, and B. Mefford, 2014, "Using a handheld IRT to determine crop water stress and use," In Proceedings of the 25th annual Central Plains Irrigation Conference, Burlington, CO, Feb. 25-26, 2014. CPIA, 760 N. Thompson, Colby, KS.
12. Taghvaeian[†], S., and **Chávez, J.L.**, 2014, "Thermal remote sensing for estimating crop water use," In Proc. of the ASABE Int'l Symposium on Evapotranspiration: Challenges in measurement and modeling from leaf to the landscape scale and beyond, control/ID paper 1877750, April 7-10, 2014, Raleigh, NC.
13. Alfieri, J.G., Kustas, W.P., Prueger, J.H., Evett, S.R., Neale, C.M.U., and **Chavez, J.L.**, 2014, "The Factors Influencing Field-Scale Measurements of Evapotranspiration ," In Proceedings of the ASABE Int'l Symposium on Evapotranspiration: Challenges in measurement and modeling from leaf to the landscape scale and beyond, control/ID paper 1826776, April 7-10, 2014, Raleigh, NC.
14. Mkhwanazi, M.M., and J.L. **Chávez**, 2013, "Mapping Evapotranspiration with the Remote Sensing ET algorithms METRIC and SEBAL under advective and non-advective conditions: Accuracy determination with weighing lysimeters." In Proceedings of 33rd Annual American Geophysical Union (AGU) Hydrology Days 2013 Conference. Fort Collins, CO. March 25 - 27, 2013.
15. Taghvaeian[†], S., J.L. **Chávez**, J. Altenhofen, T. Trout and K. DeJonge, 2013, "Remote sensing for evaluating crop water stress at field scale using infrared thermography: potential and limitations." In Proceedings of 33rd Annual American Geophysical Union (AGU) Hydrology Days 2013 Conference. Fort Collins, CO.
16. Subedi, A., J.L. **Chávez**, and A.A. Andales, 2013, "Preliminary performance evaluation of the Penman-

- Monteith evapotranspiration equation in southeastern Colorado,” In Proceedings of 33rd Annual American Geophysical Union (AGU) Hydrology Days 2013 Conference. Fort Collins, CO. March 25 - 27, 2013.
17. **Chávez, J.L.**, and Evett, S.R., 2012, “Using soil water sensors to improve irrigation management,” In Proceedings of the 24th Annual Central Plains Irrigation Conference, Colby, Kansas, Feb. 21-22, 2012.
 18. **Chávez, J.L.**, 2012, “Vegetation water use determination with energy balance models coupled with airborne multispectral imagery and weather data,” In Proceedings of the 32nd Annual AGU Hydrology Days, Colorado State University, March 21-23, 2012, Fort Collins, CO, pp. 20-28.
 19. **Rambikur, E.**, and **Chávez, J.L.**, 2012, “Scintillometer for evapotranspiration estimation over irrigated alfalfa and dry grassland,” In Proceedings of the 32nd Annual AGU Hydrology Days, Colorado State University, March 21-23, 2012, Fort Collins, CO, pp. 109-118.
 20. **Mkhwanazi, M.**, and **Chávez, J.L.**, 2012, “Using METRIC to estimate surface energy fluxes over an alfalfa field in eastern Colorado,” In Proceedings of the 32nd Annual AGU Hydrology Days, Colorado State University, March 21-23, 2012, Fort Collins, CO, pp. 90-88.
 21. **Taghvaeian†, S.**, **Chávez, J.L.**, and Hansen, N.C., 2012, “Ground-based remote sensing of corn evapotranspiration under limited irrigation practices,” In Proceedings of the 32nd Annual AGU Hydrology Days, Colorado State University, March 21-23, 2012, Fort Collins, CO, pp. 119-131.
 22. **Chávez, J.L.**, **S. Taghvaeian**, and T.J. Trout, 2012, “Evaluating remote sensing-based crop water use monitoring methods using soil moisture sensors,” In Proceedings of the 2012 ASABE Annual International Meeting. Paper No. 12-1337502. July 29-August 1, 2012. Dallas, Texas. St. Joseph, MI, pp. 1-12.
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 24. **Varble, J.**, and **Chávez, J.L.**, 2011, “Case Study: Improved agricultural irrigation scheduling using a soil water content sensor,” AGU Hydrology Days 2011. Colorado State University, Fort Collins, CO.
 25. Andales, A.A., and **J.L. Chávez**, 2011, “ET-based Irrigation Scheduling,” In Proceedings of the 23rd Annual Central Plains Irrigation Conference, Burlington, Colorado, Feb. 22-23, 2011, Colby, KS.
 26. Alfieri, J.G., W.P. Kustas, M.C. Anderson, P.D. Colaizzi, J.H. Prueger, L.E. Hipps, **J.L. Chavez**, S.R. Evett, K.S. Copeland, and T.A. Howell, 2011, “Use of a dual temperature-difference two-source model to estimate the turbulent energy fluxes under strongly advective conditions during BEAREX08,” In Proceedings of the 91st American Society of Meteorology Annual Meeting, 25th Conference on Hydrology, Washington State Convention Center, January 24-27, 2011.
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 30. **Chávez J.L.**, P.H. Gowda, T.A. Howell, C.M.U. Neale, and K.S. Copeland, 2008, “Estimating Seasonal ET from multispectral airborne imagery: An Evaluation of interpolation-Extrapolation Techniques,” In Proceedings of the 2008 ASABE Annual International Meeting, Paper No. 083637, June 29 - July 2, 2008, Providence, RI.
 31. **Chávez, J.L.**, P.H. Gowda, T.A. Howell, and K.S. Copeland, 2007, “Evaluating three evapotranspiration mapping algorithms with lysimetric data in the semi-arid Texas High Plains,” In Proceedings of the 28th annual international irrigation show, Dec. 9-11, 2007, Irrigation Association CD-ROM, San Diego, CA, pp 268-283.

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33. **Chavez J.L.**, P.H. Gowda, T.A. Howell, R. Griffin, S. Rivera, and C.M.U. Neale, 2007, "A simple empirical stream flow prediction model for Ungauged watersheds," In proceedings of the 2007 Annual International ASABE Meeting, Centennial Celebration. Paper No. 072003. June 17-20, 2007. Minneapolis, MN.
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37. Kim Y., R. Evans, F. Pierce, and **J. Chavez**, 2006, "Software design for wireless in-field sensor-based irrigation management," In Proceedings of the 2006 ASABE Annual Int'l Meeting, Paper No. 063074, Portland, OR.
38. **Chavez J.L.**, and F.J. Pierce, 2006, "Modeling Cart Movement to minimize precision irrigation errors for Linear Move systems," In Proceedings of the 8th Int'l Meeting on Precision Agriculture. Minneapolis, MN.
39. Pierce F.J., **J.L. Chavez**, and T.V. Elliot, 2006, "Remote, Real-time irrigation monitoring and control in permanent crops," In Proceedings of the 8th International Meeting on Precision Agriculture. Minneapolis, MN.
40. Neale, C.M.U., and **J.L. Chavez**, and R. Vinukollu, 2005, "Integration and weighting of remotely sensed energy balance fluxes." In Proceedings of the Int'l Society for Optical Engineering (SPIE), Europe International Remote Sensing Symposium. Remote Sensing for Agriculture, Ecosystems, and Hydrology VII Conference. Bruges, Belgium. September 19-22, 2005. Vol. 5976, pp. 59760M.
41. **Chávez, J.L.** and C.M.U. Neale, 2003, "Validating airborne multispectral remotely sensed heat fluxes with ground energy balance tower and heat flux source area (footprint) functions," In proceedings of the 2003 ASAE Annual Int'l Meeting, ASAE Paper No. 033128, St. Joseph, MI.
42. **Chávez J.L.**, and C.M.U. Neale, 2002, "Obtaining Spatial Air Temperature from Airborne Radiometric Crop Canopy," In Proceedings of the 2002 Annual International Meeting of the ASAE jointly with the XVth World Congress of the International Commission of Agricultural Engineering (CIGR). Chicago, Illinois.
43. Rivera, S., **J.L. Chávez**, and R. I. Guillen, 2002, "Mezcalar Watershed Sedimentation Study and GIS based Watershed Management Analysis," In Proceedings of the 2002 ASAE Watershed Management to meet Emerging Total Maximum Load (TMDL) Conference, Forth Worth, TX.

Book Review

- Chávez, J.L.**, 2009, "Remote Sensing of Global Croplands for Food Security," (Eds.) Prasad S. Theknkabail, John G. Lyon, Hugh Turrall, Chandrashekhara M. Biradar, In: Taylor & Francis Series in Remote Sensing Applications, Qihao Weng (Ed.), Taylor & Francis Group, Boca Raton, Florida USA (2009), 556 pp. with 48 color p., Hardback, ISBN 978-1-4200-9009-3. Review Published on-line in the Journal of Agricultural Water Management, 97 (2010) 490-491.
- Chávez, J.L.**, J. Schneekloth, A. Andales, S. Cronin, B. Haselbush, R. Jones, G. Murrey, J. Peel, R. Romano, and M. Stonehaker, 2013, "Small Acreage Irrigation Guide: Water rights and irrigation management," (Eds.) Boyd Byelich, Jennifer Cook, and Chayla Rowley. Published by USDA NRCS and Colorado State

Technical Report

1. **Chávez, J.L.**, September **2021**, Final report submitted to the Irrigation and Innovation Consortium (IIC), entitled “Satellite and UAS Imagery Use to Implement Timely Irrigation Strategies,” Project 7.
2. **Chávez, J.L.**, January **2020**, Final report submitted to University Corporation for Atmospheric Research (UCAR), NOAA, entitled “DEVELOPING DATA ASSIMILATION AND BIAS-CORRECTION SYSTEMS FOR NOAA’S NATIONAL REFERENCE EVAPOTRANSPIRATION REANALYSIS AND FORECAST PRODUCTS,” Sub-award No. SUBAWD000009.
3. **Chávez, J.L.**, October **2020**, Final report submitted to Colorado Water Conservation Board (CWCB) and Colorado Water Institute (CWI), “Assessing Temporal and Spatial Crop Water Consumptive Use with Unmanned Aerial Systems.”
4. **Chávez, J.L.**, January **2020**, Final report submitted to USDA ARS NIFA (CAES), “Monitoring Alfalfa, Grass, Corn and Potato Water Use under Full and Deficit Irrigation using a Spatially Distributed Temperature Model.” Project number: COL00688
5. **Chávez, J.L.** and A.A. Andales, September 2018, Annual report to WERA-1022 on “Documentation of crop coefficients used in irrigation scheduling,” “Efforts to promote adoption of improved irrigation scheduling technology, including computer models based on crop coefficients and ET_{ref}, remote sensing and instrumentation that will help producers more efficiently apply irrigation water,” and “development of quality control (QC) procedures for weather data used for irrigation scheduling.”
6. **José Chávez**, CSU (Fort Collins); Louise Comas, USDA-ARS WMR (Fort Collins); Huihui Zhang, USDA-ARS (Fort Collins); Jon Altenhofen, Northern Water (Berthoud); Joel Schneekloth, CSU (Akron); David Nielsen, USDA-ARS CPRMR (Akron); Ron Meyer, CSU (Burlington); Kevin Larson, CSU PRC (Walsh); Sean Gleason, USDA-ARS (Fort Collins); Kendall DeJonge, USDA-ARS (Fort Collins). 2018. Final Report, Colorado Corn Administrative Committee Research Grant Proposal. Title: “A Tool for Monitoring and Managing Water Stress in Corn.” Submitted to Colorado Corn Growers Association, August 2018.
7. Hansen, N., Cotrufo F., Paustian K., Andales A., **Chávez J.L.**, Khosla R., Longchamps L., and Reich R., 2017. “Decision support tools, drought tolerance, and innovative soil and water management strategies to adapt semi-arid irrigated cropping systems to drought.” Final project report, submitted to NRCS CIG program, December 2017.
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9. Cabot, P., A. Vashisht, and J.L. **Chávez**, 2017, “Using remote sensing assessments to document historical and current saved consumptive use (CU) on alfalfa and grass hayfields managed under full and partial-season irrigation regimes,” Completion Report, submitted to Colorado Water Institute, July 2017.
10. **Chávez, J.L.**, 2015, “Developing an Unmanned Aerial Remote Sensing of ET System,” Final project report, Submitted to Colorado Water Conservation Board (CWCB), pp. 46.
11. **Chávez, J.L.**, 2014, “Crop evapotranspiration determination using eddy covariance fluxes, high resolution remote sensing imagery, and a surface temperature approach,” Agreement No: SCA 58-6209-9-058. Accession No: 418392. Final project report, Submitted to USDA ARS CPRL, pp. 50.
12. Hansen, N., **Chávez, J.L.**, L. Garcia, and B. Lytle, 2014, “Lower South Platte Irrigation Research and Demonstration Project,” Final project report, Submitted to Colorado Water Conservation Board, June 2014, pp. 103.
13. **Chávez, J.L.**, 2014 “Reference Evapotranspiration Determination Using the Recursive Method and Surface Aerodynamic Temperature, Project progress report, Submitted to USDA NIFA, pp. 3.
14. **Chávez, J.L.**, 2014, “Borlaug Fellowship Program Final Report,” Submitted to Dr. Ajay Jha, Director of

the Institute for Global Technical Transfer (IGATT), Colorado State University, as part of a USAID funded project in Pakistan, pp. 2.

15. **Chávez, J.L.**, 2013, “Modeling and evaluating remote sensing-based crop ET with scintillometers and a heat flux source area function,” Final project report, Submitted to U.S. Dept. of Agriculture, CSREES, State Agricultural Experiment Stations (AES), Jan. 1st, 2013, pp. 2.
16. Andales, A.A., **Chávez, J.L.** (collaborator), 2013, “Determining the Consumptive Water Use of Crops in Colorado for Efficient Irrigation,” submitted to USDA NIFA, pp. 3.
17. **Chávez, J.L.**, and S. Taghvaeian, 2012, “Grass water stress and ET monitoring using ground-based and airborne-based remote sensing: Project Report,” Submitted to Northern Colorado Water Conservancy District, March 30, 2012, pp. 23.
18. **Chávez, J.L.**, 2011, “Crop water stress index and evapotranspiration monitoring using remote sensing techniques,” Submitted to Regenes Management Group, LLC, Jan. 2013, pp. 5.
19. **Chávez, J.L.**, 2011, “Wireless in-field soil water content monitoring project,” Report submitted to Central Colorado Water Conservancy District, March 9th, 2011, pp. 10.
20. **Chávez, J.L.**, 2011, “Irrigation water conservation tool,” Submitted to Central Colorado Water Conservancy District, May 17th, 2011, pp. 4.
21. **Chávez J.L.**, and Christopher M.U. Neale, 2003, “Airborne Remote Sensing of Evapotranspiration over Riparian Vegetation in the middle Rio Grande River,” Project Report submitted to the U. S. Bureau of Reclamation, Utah State University, Logan, UT, pp. 50.

Peer Reviewed Extension Fact Sheets

Chávez, J.L., Reich, D., Loftis, J.C., and Miles D.L., 2011, “Irrigation pumping plant efficiency.” Colorado State University Extension, Factsheet No. 4.712.

Andales, A., **Chávez, J.L.**, and Bauder, T.A., 2011, “Irrigation Scheduling: The Water Balance Approach,” Colorado State University Extension. Factsheet No. 4.707.

Reich, D., Godin, R., **Chávez, J.L.**, and Broner, I., 2009, “Subsurface Drip Irrigation (SDI),” Colorado State University Extension. Factsheet No. 4.716.

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

Invited Presentations – National and International

1. October 25, 2022, “Smart Irrigation Water Management Using Spatial Monitoring Technologies,” Pakistan Water Week 2022 International Conference, Serena Hotel, Islamabad, Pakistan. Organized by IWMI-Pakistan & the Pakistan Council of Research in Water Resources. Keynote Speaker in Thematic Area 3 Technologies & Innovations - Responding to the Challenges. Presentation delivered via Zoom.
2. October 4th, 2022. **Chávez, J.L.** “Crop Evapotranspiration Mapping based on the Aerodynamic Approach.” 24th Irrigation and Drainage Congress, hosted by the International Commission on Irrigation and Drainage, 4 Oct., Adelaide, South Australia. Congress Proceedings (abstracts) can be found at: [Link](#)
3. June 23, 2022, “Determination of Crop Water Stress using Multispectral and Thermal Remote Sensing Data,” Lecture for the Universidad de Castilla La Mancha (UCLM) master’s program entitled “Aplicaciones de la Teledetección y SIG a la Agricultura. Manejo de Cultivos, 3a Edición” (CAAG-3), via MS Teams.
4. May 24, 2022, “Remote Sensing in Irrigation Water Management,” Presented at the Sustainable Agricultural Water (SAW) Workshop May 22-25, 2022 Ridgeline Hotel, Estes Park, Colorado, USA.
<https://www.engr.colostate.edu/ce/SAW-BARD/>
5. March 4, 2022, “Monitoring Irrigation Water Use,” Drought Leadership Training, Crop Drought

Management Workshop– CSU Extension, Webinar, 10:30 am to 1:00 pm.

6. December 6, 2021, “A Decade of Unmanned Aerial Systems in Irrigated Agriculture in the Western U.S.,” presented at the ASABE/IA 6th Decennial National Irrigation Symposium entitled “Beyond 2020 vision of the Future,” San Diego, CA, Dec. 6-8, 2021. Presented orally by José L. Chávez.
7. December 7, 2021, “Evaluating the Use of True Color Unmanned Aerial System Images for Irrigation Scheduling in Citrus,” presented at the ASABE/IA 6th Decennial National Irrigation Symposium entitled “Beyond 2020 vision of the Future,” San Diego, CA, Dec. 6-8, 2021. Presented orally by Juan Enciso.
8. December 1, 2021, “Unmanned Aerial Systems Use in Agriculture and Irrigation Management,” webinar presented at the 2021 Eastern Colorado Crop Production Conference – CSU Extension, November 30th - December 10th.
9. June 3, 2021, “Satellite and UAS Imagery Use to Implement Timely Irrigation Strategies,” webinar sponsored by the Irrigation Innovation Consortium (IIC) for researchers.
10. May 12, 2021, “Unmanned Aerial Vehicles (UAVs): Applications in Agriculture and Irrigation Management,” webinar for the CSU monthly “Food Systems/Community Development” program.
11. February 10, 2020, “Mapping Crop Evapotranspiration Using a Temperature Method and Remote Sensing.” Presented at the 2nd Evapotranspiration Workshop “Novel Insights Through Models and Observations.” Hosted by Wageningen University & Research, sponsored by The Global Energy and Water Exchanges (GEWEX) project, as part of the World Climate Research Programme (WCRP).
12. December 16, 2020, “UAS Performance for Irrigation Management,” presented at the 57th Annual Joint North Dakota Water CONVENTION AND IRRIGATION WORKSHOP, December 3-4, 9-11, 15-16, 2020.
Website: <https://ndwater.org/wp-content/uploads/2020/12/Convention-Agenda-page-website-1.pdf>
13. July 15, 2020, “Satellite and UAS Imagery Use to Implement Timely Irrigation Strategies,” Special Session on the new “Irrigation Innovation Consortium,” invited presentation. Presented virtually at the 2020 ASABE Annual International Meeting (AIM).
<https://asabe.org/Events/2020-Annual-International-Meeting>
14. Nov. 30 – Dec 4, 2020, “Evaluating the Use of True Color Unmanned Aerial System images for Irrigation Scheduling in Citrus,” Juan Enciso, Uriel Cholula, Ashish Masih, Jose L. Chavez, Jorge Solorzano, Ayrton Laredo, *An ASABE Meeting Presentation, Paper Number: 20-032, 6th Decennial National Irrigation Symposium, Sponsored by ASABE, San Antonio, Texas*
15. February 18-19, 2020, “Remote Sensing: Spatial Irrigation Decision Support System (SIDSS) Using Multi-Scale data: UAS, Micro-Satellites & ground-based data,” Central Plains Irrigation Conference, Feb 18-19, 2020, Burlington, Colorado. <https://www.ksre.k-state.edu/sdi/revents/cpicprog20.pdf>
16. November 5, 8, 12, 15, 2019, “Using remote sensing for irrigation water management,” Invited lectures at Castilla La Mancha University, Albacete, Spain.
17. September 26-28, 2019, “A variable surface resistance approach to estimating maize actual evapotranspiration,” Invited speaker, 2019 Sustainable Agriculture & Food Systems Summit, Hotel Müggelsee Berlin, Müggelheimer Damm 145, 12559 Berlin, Germany.
18. July 30 – 31, 2019, “Very High Resolution Imagery from Satellite and Unmanned Aerial Systems to Improve Irrigation Water Management,” Presented at the International Forum on Irrigation and Drainage Development and Technological Innovation of the Belt and Road, Beijing, China. Hosted by China Institute of Water Resources and Hydropower (IWHR) and Chinese National Committee on Irrigation and Drainage (CNCID).
19. March 18, 2019, “Remote Sensing and Infra-red Thermometry Principles,” Presented through a workshop at the USDA ARS, Fort Collins, CO.
20. February 26-27, 2019, “Irrigation Scheduling with Temperature Approaches,” Presented at the

2019 High Plains Irrigation Association Conference in Kearny, NE.

21. December 5, 2018, “Continuous Move Variable Rate Irrigation,” Presented at the 2018 Eastern Colorado Crop production Conference, Country Steak Out Restaurant, Fort Morgan, CO. Sponsored by CSU Extension
22. June 25, 2018. “Center Pivot and Lateral Move Variable Rate Irrigation (VRI),” Presented at the 2018 Irrigation Association Agriculture Faculty Academy, at Colorado State University (CSU) Agricultural Research Development and Education Center (ARDEC), Fort Collins, CO
23. September 15, 2017. “Colorado Irrigation Technology Center (ITC): ITC project proposal,” Presented at the Northern Water Fall Field Day, Berthoud, CO
24. June 14, 2017. “Monitoring deficit irrigation with Unmanned Aerial System.” Presented at Escuela Tecnica Superior de Ingenieros Agronomos y de Montes, Universidad Castilla La Mancha, Albacete, Spain.
25. February 21-22, 2017. “Fixed-Wing Unmanned Aerial Systems for Improved Irrigation Management.” Presented at the 2017 High Plains Irrigation Association Conference in Burlington, CO.
26. January 12, 2017. “Use of an unmanned aerial system in aiding irrigation scheduling,” Presented at the 2017 4-States Irrigation Council Meeting, Fort Collins Hilton, Fort Collins, CO
27. November 8, 2016. “Irrigation water management aided by UAV remote sensing.” Presented at the 2nd World Irrigation Forum, Water Management in a Changing World: Role of irrigation for sustainable food production. Event SE-8 entitled “Key and Smart Technologies for Irrigation and Drainage.” Organized by the International Commission on Irrigation and Drainage (ICID), Nov. 6-8, 2016, Chiang Mai, Thailand.
28. June 2, 2015. Estimating crop water use or ET at different temporal and spatial scales. Presented at the "High-efficiency Water Use in Agriculture" Project (111 Plan) Workshop (Water and Food Security under Changing Environments), June 1-7, 2015. Center for Agricultural Water Research in China, China Agricultural University, Beijing, China.
29. February 17-18, 2015. Using canopy temperature as an indicator of plant stress. In Proceedings of the 26th Annual Central Plains Irrigation Conference (CPIC), Colby, KS.
30. January 8, 2015. Remote Sensing Principles: Multispectral Imagery Calibration. Presented at the “Centro de Investigación y Transferencia en Riego y Agroclimatología” (CITRA), Universidad de Talca, Talca, Chile.
31. November 3rd, 2014. A Remote Sensing of ET method based on Surface Aerodynamic Temperature. ASA, CSSA, and SSSA International Annual Meeting, Long Beach, California.
32. April 23rd, 2014. On Farm water management practices in the western USA. Seminar presented at Pir Mehr Ali Shah Arid Agriculture University, Islamabad, Pakistan. Sponsored by USDA/FAS and CSU.
33. April 22nd, 2014. On Farm water management practices in the western USA. Seminar presented at University of Agriculture Faisalabad, Faisalabad, Pakistan. Sponsored by USDA/FAS and CSU.
34. April 21st, 2014. Irrigation management using a handheld infra-red thermometer (IRT). Seminar presented at the Pakistan National Agricultural Research Council (NARC), Islamabad, Pakistan. Sponsored by USDA/FAS, NARC, CSU and ICARDA.
35. January 7th, 2014. Monitoring crop water use and stress using remotely sensed data. Seminar presented at E&J Gallo Winery, Modesto, CA
36. May 7th, 2013. Optimizing Irrigation Scheduling at Different Spatial Scales. Kansas State University, Manhattan, KS
37. May 10th, 2013. Crop water use monitoring at different spatial scales. Seminar presented to a group of 8 from Azerbaijan. At Colorado State University (CSU), Fort Collins, CO
38. Aug 9th, 2013. Crop evapotranspiration determination at different scales. Presented to the visiting Borlaug Fellows from Pakistan, CSU, Fort Collins, CO
39. Aug 9th, 2013. Crop water use determination at different scales. Presented to the Borlaug Fellows from Pakistan, Colorado State University, Fort Collins, CO.

40. May 7th, 2013. Optimizing irrigation scheduling at different spatial scales. Kansas State Univ., Manhattan, KS.
41. May 10th, 2013. Crop water use monitoring at different spatial scales. Prepared for the Azerbaijan Irrigation Cochran Fellows, Colorado State University, Fort Collins, CO.
42. Jan 31 and Feb 1, 2012. Soil moisture sensors in irrigation management. Presented at the 24th Annual High Plain No-Till Conference. Sponsored by the Colorado Conservation Tillage Association. Burlington, CO.
43. June 19, 2012. Water Use Management with Sensors and Remote Sensing. Seminar presented to the Agricultural Management Pakistani Delegation. At the Soil and Crop Sciences Department, Colorado State University.
44. Nov. 22, 2012. Monitoreo del uso del agua del cultivo a diferentes escalas espaciales utilizando sensores remotos para mejorar el manejo del agua. Presented at the Research and Extension Center for Irrigation and Agriculmatology (CITRA, Centro de investigacion y transferencia de riego agriclimatologia), Universidad de Talca, Talca, Chile.
45. October 20, 2011, **Chávez, J.L.**, 2011. "Precision Irrigation with Wireless Monitoring and Control System Technology," Presented before the Precision Agricultural Fall class of 2011 (Dr. Khosla's), at the Soil and Crop Science Department, Colorado State University, Fort Collins, CO.
46. April 15, 2011. **Chávez, J.L.** Spatial estimation of crop ET using remote sensing and micro-climatological data in Colorado, Instituto Tecnico Agronomico Provincial de Albacete, April 15, Albacete, Spain.
47. February 16, 2011. **Chávez, J.L.** Crop Water Stress Index and Evapotranspiration Monitoring using Remote sensing, DISARM Meeting, Regenesi Management Group. Presented at the USDA-ARS, Fort Collins, Colorado, Thursday February 16.
48. September 28, 2010. **Chávez, J.L.**, and Garcia, L.A. 2010. Use of remote sensing to obtain spatial ET estimates. Keynote presentation presented during the U.S. Commission on Irrigation and Drainage (USCID), Meeting Irrigation Demands in a Water-Challenged Environment Conference, Fort Collins, CO.
49. May 5, 2010. **Chávez, J.L.** Modeling and evaluating remote sensing-based crop ET with scintillometers and a heat flux source area function. Presented to the Colorado Agricultural Experiment Station 2010 Coordination Meeting and the Colorado Water Institute. Colorado State University, Fort Collins, CO.
50. April 23, 2010. **Chávez, J.L.** Mapping crop water use and stress in Colorado using remote sensing of ET algorithms. Presented at the "Food for Thought College of Science and Math Colloquium Series". Colorado State University, Pueblo, Colorado.
51. April 16, 2010. **Chávez, J.L.** 2010. Measuring and estimating crop water use at different temporal and spatial scales. Presentation given to the Colorado State University College of Engineering Advisory Board. At the Engineering Research Center. Fort Collins, Colorado (CO), USA.
52. March 22, 2010. Crop Water Stress Index and ET determination. 1st (First) World Water Day. Colorado State University. Fort Collins, CO.
53. February 18, 2010, "Remote sensing-based crop water stress (CWS) determination of limited MON87460 transgenic drought tolerant corn hybrids." MONSANTO corn drought academic review meeting. MONSANTO, Gothenburg, NE.
54. September 1, 2009. "ET-based scheduling basics." At the USDA-NRCS/CSU-Extension Irrigation Scheduling (Irrigation Water Management) Workshop, at the USDA Service Center, Delta, CO.
55. April 3, 2008. "Emerging irrigation water management technologies." At the Civil and Environmental Engineering Department, Colorado State University, Fort Collins, CO.
56. June 7, 2007. "MODTRAN4 Procedures to Calibrate Thermal Imagery." At the USDA-ARS, Conservation and Production Research Laboratory, Bushland, TX.
57. May 5, 2006. "Potencial de los Recursos Hídricos de la Cuenca Alta del Rio Grande." (Water Resource Potential of the Upper Rio Grande Watershed). At Prefectura of Santa Cruz, Santa Cruz, Bolivia.
58. April 26, 2006. "Efficient water management technologies: From the field to the irrigation district level". At

the USDA-ARS, Conservation and Production Research Lab., Bushland, TX.

59. March 6, 2006. “Remote Real-Time Continuous Move Irrigation Monitoring and Control System.” At the USDA-ARS-NPARL, Northern Plains Agricultural Research Lab, Sidney, MT.
60. February 15, 2006. “Remote Real-Time Continuous Move Irrigation Monitoring and Control System.” At the USDA-ARS-CPCRC, Pacific Northwest Columbia Plateau Conservation Research Center, Pendleton, OR.
61. January 25, 2006. “Remote Real-Time Continuous Move Irrigation Monitoring and Control System.” At the Center for Precision Agricultural Systems (CPAS), Washington State University, Prosser-WA.
62. February 2, 2005. “Validating surface energy balance fluxes derived from airborne remote sensing.” At the Center for Precision Agricultural Systems (CPAS), Washington State University, Prosser-WA.
63. January 14 -15, 2003. “Airborne and Surface Remote Sensing Measurements.” At the SMACEX 02 / SMEX 02. Workshop organized by the USDA-ARS Hydrology and Remote Sensing Laboratory (Beltsville, MD). Sheraton Hotel in Columbia, MD.
64. June 25 – 30, 2001. “Remote sensing and GIS applications to watershed management.” Quito-Ecuador. Before the Ecuadorian National Irrigation Association. Invited by the International Irrigation Center (IIC), BIE Dept. Utah State University; as part of the Technical Assistance Project to the Irrigation Sub-sector – Irrigation Systems Transfer to Farmers. USU Contract PAT-BIRF 3730EC.
65. July 1 – 30, 2001. “Remote sensing and GIS applications to Irrigation systems management.” Training provided to the INDRHI (Dominican Republic National Hydraulic Institute) personnel. Santo Domingo - Dominican Republic. This training was part of the Irrigated Areas Mapping Project – Irrigation Systems Management Studies financed by the Inter-American Development Bank (IDB) under the USU contract BID 905/OC-DR.

Invited Speaker/Presentations – Colorado, others

1. June 14th, 2023. Use of Remote Sensing to Estimate Actual Crop ET, Panelist, Session 20 “Remote Sensing Data and Modeling to Inform Intrastate Water Conservation Programs,” Universities Council On Water Resources (UCOWR), CSU Lory Student Center, Colorado State University, Fort Collins, CO. [Link](#)
2. April 26th, 2023. Food Systems Collaborations: 1st Annual Food Systems Institute Student Symposium, Panelist, Food Systems Institute & InTERFEWS, CSU Lory Student Center, Colorado State University, Fort Collins, CO
3. Nov 26th, 2013. Tools for improving water efficiency and optimizing irrigation timing. Colorado Crop Clinic: Soil & Crop Health. CSU Extension, Sterling, CO
4. May 30th, 2013. Implementation of deficit irrigation regimes: Demonstration and Outreach. Presented before the CO Corn Growers Association, Greeley, CO
5. Jan 31 and Feb 1, 2012. Soil moisture sensors in irrigation management. Presented at the 24th Annual High Plain No-Till Conference. Sponsored by the Colorado Conservation Tillage Association. Burlington, CO.
6. September 29, 2011. **Chávez, J.L.** Irrigation Water Management: Soil Moisture Measurements: Soil Water Tension and Content Sensors. Target group: U.S. Natural Resource Conservation Service, Delta, Colorado.

Workshops Delivered

1. August 8, 2018, “Agricultural Salinity Detection: Remote Sensing Algorithms that Can Aid in the Detection of Ag Soil Salinity.” Workshop delivered at the Center for Advanced Studies in Water, Mehran University of Engineering and Technology, Jamshoro, Pakistan.
2. August 9, 2018, “The Fairmont District: Field Data,” Workshop delivered at the Center for Advanced Studies in Water, Mehran University of Engineering and Technology, Jamshoro, Pakistan.
3. August 8, 2018, “Remote Sensing Principles: Remote Sensing and Agricultural Water Management,” Workshop delivered at the Center for Advanced Studies in Water, Mehran University of Engineering and Technology, Jamshoro, Pakistan.

4. October 13, 2016, “Deficit Irrigation in Colorado and Need for ET Monitoring,” presented at the 9th USCID Int’l Conference, ET Workshop sponsored by the ASCE EWRI, ASABE, and USCID. Hilton Hotel, Fort Collins, CO.
5. August 9, 2016, “USDA NRCS Irrigation Water Management Workshop,” presentation and demonstration (field) on soil moisture sensors (methods to estimate/measure soil moisture, field exercises), Organized by USDA NRCS, at CoBank Center for Agricultural Education, CSU-ARDEC, Fort Collins, CO.
6. April 21, 2016. “Alternative Agricultural Water Transfer Methods: Deficit Irrigation Monitoring”. Organized by Colorado State University Extension, Organizer and speaker, Fort Morgan, CO.
7. March 21, 2012. “2012 Evapotranspiration (ET)” Workshop: New Technologies and Methods for Estimating ET. Organized by Colorado State University Extension, USDA ARS, and Colorado Division of Water Resources, Role: Organizer and speaker, Fort Collins, CO.
8. Nov. 21, 2012. “Uso de percepcion remota en la estimacion de la ET” (Use of remote sensing in the estimation of ET). Centro de investigacion y transferencia en riego y agroclimatologia (CITRA), 2012. Workshop directed to researchers from the Research and Extension Center for Irrigation and Agriculmatology (CITRA), University of Talca, Role: Speaker/presenter. Talca, Chile.
9. September 29, 2011, “2011 Irrigation Water Management Training” Workshop. Presented the theme “Soil moisture measurements.” Workshop Organized by Colorado State University Extension, Role: helped organize it and speaker, Delta, CO.
10. March 12, 2010. “2010 Evapotranspiration (ET)” Workshop.” Presented the theme “Remote sensing to improve ET estimates.” Sponsored by Colorado State University, USDA ARS, and Colorado Division of Water Resources. Role: Speaker, Fort Collins, CO.
11. September 1, 2009. “2009 Irrigation scheduling based on the soil water balance approach.” Organized by Colorado State University Extension, Role: helped organize it and speaker, Delta, CO.

Presentations and newsletters articles

Note: Authors/speakers underlined are students or research associates advised by Dr. **Chávez**.

1. Edson Costa-Filho, José L. Chávez, Huihui Zhang, Allan Andales, and A. Brown. 2024. Calibration and Evaluation of a Multi-Scale Spatially Distributed Evapotranspiration Algorithm. Poster at the Annual Colorado Agricultural Experiment Station (AES) Conference, Ski Hi Center, Monte Vista, CO, 10 Jan.
2. Chávez, J.L., B. Craig, T.K. Gates, and A.J. Brown. 2023. Exploring the Contribution of Crop Water Use to the ability to Remotely estimate Soil Salinity in Irrigated Agriculture. In Proceedings of the USCID United States Committee on Irrigation & Drainage 2023 Conference, October 17-20, 2023, Hilton Fort Collins, Fort Collins, Colorado. [Link](#)
3. Francis A. Ulep, Troy S. Magney, Christopher YS Wong, Kevin Yemoto, Jose Chavez, and Andrew Schuh, 2023. Disentangling Plant Structure Complexities and Sun-Sensor Geometry Induced Changes in Tower-based Remote Sensing Signals. American Geophysical Union (AGU), 11-15 December 2023, [Link](#)
4. Edson Costa-Filho, José L. Chávez, Huihui Zhang, Allan Andales, and A. Brown. 2023. Multi-Scale Remote Sensing based Crop Evapotranspiration: Assessing the Performance of Maize Evapotranspiration Rates Estimates. Poster at the Annual AES Research Center Conference at the Spur Campus in Denver, 1 Feb.
5. Edson Costa-Filho, José L. Chávez, Allan A. Andales, and Ansley J. Brown, 2023. Improving estimates of corn evapotranspiration using remote sensing-based crop coefficients. Session 17: New Strategies for Managing Irrigation Water Depletion III. University Council on Water Resources (UCOWR), Lory Student Center, Colorado State University, Fort Collins, CO, 13 May 2023. Presented by Dr. Andales. [Link](#)
6. Huihui Zhang, Andrew Schuh, Jose Chavez, Kevin Yemoto, Josh Wenz, Louise Comas, Troy Magney, Francis Ulep, Jon Altenhofen, 2023. Assessing CO₂ Exchange, Water Use and Yield of Maize Crops Under Full and Deficit Irrigation Using UAV and Satellite Imagery. NASA Carbon Cycle (CCE) program Joint Workshop, poster presentation at The Hotel at the University of Maryland, College Park, MD, May 8-12,

2023. [Link](#)
7. Andrew Schuh, Ian Baker, Yao Zhang, Stephen Ogle, Troy Magney, Francis Ulep, David Barnard, Louise Comas, Huihui Zhang, Kevin Yemoto, Josh Wenz, Mary Whelan, Jose Chavez, Jon Altenhofen. 2023, Exploring SIF as Indicator of Dryland Agricultural Productivity. NASA CCE Joint Workshop, poster presentation at The Hotel at the University of Maryland, College Park, MD, May 8-12, 2023. [Link](#)
 8. Andrew E Schuh, Jon Altenhofen, Ian T Baker, David Barnard, Louise Comas, Troy Magney, Joseph Michaud, Stephen M Ogle, Francis Ulep, Joshua Wenz, Kevin Yemoto, Huihui Zhang, Yao Zhang, Jose L Chavez. 2023. What Can Solar Induced Fluorescence (SIF) Tell Us About the Condition of Crops in Dryland Agricultural Sites? A Study Case at USDA's Limited Irrigation Research Farm (LIRF) in Greeley, CO. Publication date 2023/12/14, Publisher AGU. [Link](#)
 9. Costa-Filho, E., J.L. Chávez, H. Zhang, A.A. Andales, Ph., A. Brown, 2023. Spatiotemporal Modeling of Maize Light Extinction Coefficient Using Sentinel-2 Multispectral Data. AGU Hydrology Days, Colorado State University, 21 March 2023, Fort Collins, CO. [Link](#)
 10. Zaid Al-Majali, José L. Chávez, Huihui Zhang, Jon Altenhofen, 2023. Preliminary Evaluation of aerial- and Spaceborne-based remote sensing estimation of Crop Biophysical Characteristics and Implications on Crop Water Use Estimates. AGU Hydrology Days, Col. State Univ., 21 March 2023, Fort Collins, CO. [Link](#)
 11. Chávez, J.L., 2022. Crop Evapotranspiration Mapping based on the Aerodynamic Approach. 24th Irrigation and Drainage Congress, hosted by the International Commission on Irrigation and Drainage, 4 Oct., Adelaide, South Australia. [Link](#)
 12. Chávez et al., 2022. Updating Corn Crop Coefficients with Remote Sensing-based Actual Evapotranspiration Algorithms. 2022 ASCE EWRI Congress, Atlanta, GA. [Link](#)
 13. Costa-Filho, E., J.L. Chávez, and H. Zhang, 2022. Evaluating one-source evapotranspiration models when using multispectral data from high-resolution satellites. AGU Hydrology Days, CEE Colorado State University, 25 April 2022, Fort Collins, CO. <http://hydrologydays.colostate.edu/>
 14. Chávez, J.L., 2022. Multiscale remote sensing of crop evapotranspiration. Presented during the Water Engineering and Science Seminar Series, 1 April 2022, Civil and Environmental Engineering Department, Colorado State University.
 15. Costa Filho, E., J.L. Chávez, and H. Zhang, 2021. Evaluation of daily maize evapotranspiration from reflectance-based crop coefficient approaches across different imagery spatial resolution platforms. ASA, CSSA, SSSA Int'l annual meeting, Nov. 7-10, Salt Lake City, Utah. <https://scisoc.confex.com/scisoc/2021am/meetingapp.cgi/Paper/137131>
 16. 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 using 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, poster 1102.
 17. Costa Filho, E., and J. L. Chavez, "Assessing Maize Crop Water Stress Using an Aerodynamic Temperature Approach," Graduate Student ShowCase poster presentation, Gold presenter, Colorado State Univ., Tuesday, November 12, 2019.
 18. Costa Filho, E., and J. L. Chavez, "Estimating Crop Water Stress Index for Maize Through a Remote Sensing Surface Energy Balance Approach for Semi-Arid Climate Conditions," Field Day poster presentation, August 22, 2019. USDA ARS LIRF, Greeley, CO.
 19. Seacrest, C., J. A. Ramírez, M. Hobbins, J. L. Chavez, "NOAA's Next-Generation Reference Evapotranspiration Dataset," Hydrology Days, AGU, March 28, 2019, at CSU, Fort Collins, CO.
 20. Banks, G., J. L. Chavez, "Development of a Simplified Transistor-Based Soil Matric Potential Sensor," Hydrology Days, AGU, March 29, 2019, at CSU, Fort Collins, CO.
 21. Costa Filho, E., J. L. Chavez, "Evapotranspiration modeling using an aerodynamic temperature approach

- based on weather and remote sensing data,” Hydrology Days, AGU, March 29, 2019, at CSU, Fort Collins, CO.
22. Wenz, JA, LH Coma, J Altenhofen, KR Willi, H Zhang, SM Gleason, JL Chavez, KC DeJonge and KR Douglas-Mankin “Using strategic deficit irrigation to increase water productivity,” Hydrology Days, AGU, March 29, 2019, at CSU, Fort Collins, CO.
 23. Craig, B.D., J.L. Chávez, T.K. Gates, A.J. Brown, “Satellite-Based Soil Electrical Conductivity Mapping to Assess Soil-Water Salinity Concentrations in an Irrigated Area,” ,” Hydrology Days, AGU, March 29, 2019, at CSU, Fort Collins, CO.
 24. Allan A. Andales, Timothy K. Gates, José L. Chávez, Ansley J. Brown, and Brian D. Craig. 2019. Estimating Impacts of Salinity on Irrigated Crop Production using Electrical Conductivity Surveys and Multi-level Remote Sensing,” Colorado Water Institute's publication *Colorado Water* upcoming issue on Geospatial Technology and Water Resources. In Press, Nov. 15, 2018
 25. Ashish Masih, José L. Chávez, Huihui Zhang, Kevin Yemoto. 2018. UAS multispectral & thermal imagery processing to map crop water use. Poster presented at the 2018 Ogallala Water Summit. Nov. 29.
 26. José L. Chávez, Huihui Zhang, Daran Rudnick, Joel Schneekloth. 2018. “UAS-based Variable Rate Irrigation: Is it possible?” Issue on “Irrigation Innovation and Technology” Colorado Water Newsletter, Nov/Dec 2018 issue, Volume 35, Issue 6, pages 24-27. On line access: http://cwi.colostate.edu/Media/img/newsletters/2018/CW_35_6.pdf
 27. Chávez, J.L. 2018. “Irrigation Water Management Technologies,” Brazilian delegation – USGS host (Gabriel Senay, William Hughes, Tamara Ivahnenko), Colorado State Univ., 22 Oct 2018.
 28. Chávez, J.L., Zhang, H., Capurro, M.C., Masih, A., Altenhofen, J. 2018. “Evaluation of multispectral unmanned aerial systems for irrigation management,” 2018 SPIE Conference 10664: Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping III, Orlando, FL, 17 April, 2018
 29. Brown, A.J., Andales, A.A., Gates, T.K., Chávez, J.L, and B.D. Craig. 2018. “Distribution of Soil Water Salinity and Impacts on Maize Yield in Gypsiferous Irrigated Fields with Subsurface Drainage,” Presented at the confe 2018 conference, CSU, March 20, 2018, Fort Collins, CO.
 30. Brian D. Craig, Jose L. Chávez, Timothy K. Gates, A.J. Brown, and Allan A. Andales. 2018 Remote Sensing of Soil Salinity for Use in Irrigation Water Management. Presented at the Hydrology Days 2018 conference, CSU, March 20, 2018, Fort Collins, CO.
 31. Sumit Gautam, Perry Cabot, and José L. Chávez. 2018. Evaluation of multispectral remote sensing derived vegetation indices to estimate reflectance-based crop coefficients and seasonal evapotranspiration rates for grass pastures in western Colorado. Presented at the Hydrology Days 2018 conference, CSU, March 20, 2018, Fort Collins, CO.
 32. Brown, A.J., Andales, A.A., Gates, T.K., and Chávez, J.L. 2018. Soil Salinity measurement and effects on corn in southwest Colorado. Poster presented at the 2018 Great Plains Soil Fertility Conference, Organized by the Int’l Plant Nutrition Institute, March 6-7, 2018, Double Tree by Hilton Hotel, Denver, CO
 33. Rudnick, Chávez, Aguilar, Irmak, Bordovsky, and Burr. 2017. Advances in irrigation technology. The Ogallala Aquifer. Published in Colorado Water, Colorado Water Institute, Nov/Dec 2017, pp 29-32.
 34. Jones, Andales, Chávez, McGovern, and Smith. 2017. Weather Data Integration into Irrigation Scheduling Tools. The Ogallala Aquifer. Published in Colorado Water, Colorado Water Institute, Nov/Dec 2017, pp 24-28.
 35. Interviewed by Nathan Hurst from the Smithsonian (on water stress monitoring research), on 8 sept, 2017. Comments on a recent technology from Penn State University were published at: <http://www.smithsonianmag.com/innovation/snap-sensor-could-tell-farmers-exactly-how-much-water-their-crops-180965036/>
 36. José L. Chávez, “How feasible is to monitor deficit irrigation with an unmanned aerial system?,” Presented at the ASCE EWRI Congress in Sacramento, CA, 23 May 2017.

37. Sumit Gautam, Perry Cabot, and José L. Chávez, “Ground-based multispectral remote sensing to estimate actual crop coefficients for alfalfa and grass pastures in the western slope Colorado,” Presented at the Hydrology Days 2017 conference, CSU, March 21, 2017, Fort Collins, CO.
38. Mahmoud Osman Soliman, Jose Chavez, Karan Venayagamoorthy, “Aerodynamic methods for estimating turbulent fluxes over irrigated crops,” Presented at the Hydrology Days 2017 conference, CSU, March 20, 2017, Fort Collins, CO.
39. **José L. Chávez** and Christopher Neale, “Remote Sensing in Irrigation: From Landsat to UAS,” Tech Corner, Irrigation Today Magazine, Irrigation Association, pp. 30-31, October 2016. Irrigationtoday.org
40. Amandeep Vashisht, **José L. Chávez** and Perry Cabot, “Remote Sensing Assessments of Full and Partial Irrigation Regimes to Estimate Conserved Consumptive Use of Agricultural Water in Western Slope of Colorado,” 2016 USCID Fall meeting, Fort Collins, CO, October 11-14, 2016
41. **José L. Chávez**, Joseph Yu Zhang, Huihui Zhang, and Wayne Woldt, “Issues Encountered Operating an UAS for Crop ET Estimations,” 2016 USCID Fall meeting, Fort Collins, CO, October 11-14, 2016
42. Abhinaya Subedi, **José L. Chávez** and Allan A. Andales, 2016, “Alfalfa Evapotranspiration Estimation: One Step Model,” 2016 USCID Fall meeting, Fort Collins, CO, October 11-14, 2016
43. **José L. Chávez**, Christopher Neale, Terry Howell, Marcos Carrasco-Benavides, Allan Andales, and Mahmoud Soliman, 2016, “Remote Sensing of ET Based on Aerodynamic Temperature,” 2016 USCID Fall meeting, Fort Collins, CO, October 11-14, 2016
44. Andales A., **José L. Chávez**, and Neil Hansen. “Irrigation Scheduling Strategies for Limited Irrigation Conditions.” Presented at the American Society of Agronomy (ASA), 2016 Annual Meeting, Phoenix, AZ, Nov 6-9, 2016
45. Huihui Zhang, Ming Han, **José L. Chávez**, Liwang Ma (2016), “Estimation of soil water deficit using canopy temperature with a water balance model,” Presented at the American Society of Agronomy (ASA), 2016 Annual Meeting, Phoenix, AZ, Nov 6-9, 2016
46. Vashisht, A., P. Cabot, and **J. Chávez** (2016), “Assessing conserved consumptive use of agricultural water for a potential Colorado Western Slope Water Bank,” In Proceedings of the 2016 UCOWR/NIWR Annual Water Resources Conference, June 21-23, 2016, Hilton Pensacola Beach Hotel, Pensacola Beach, FL
47. **Chávez, J.L.** (2016), “Monitoring crop water use under full and deficit irrigation using a spatially distributed temperature model.” Presented p to the Pakistan project audience at Univ. of Utah, from Colorado State University, Fort Collins, CO, March 25, 2016.
48. Comas LH, KR Willi, H Zhang, **JL Chávez**, M Han, J Altenhofen, SM Gleason, KC DeJonge, and JS Young. (2016). “Determining Stomatal Conductance and Transpiration From Remotely-Sensed Plant Parameters.” International Symposium on Sensing Plant Water Status – Methods and Applications in Horticultural Science. Int’l Society for Horticultural Sci. Oct. 5-7, 2016, Postdam, Germany.
49. Cabot, P., J. Brummer, C. Pearson, L. Jones, G. Litus, A. Berrada, **J. Chávez**, S. Gautam, A. Vashisht, J. Lafantasie, and J. Kruthaupt. (2016). Western Slope Research Update. AES Research Center Conference. Presented at the Colorado Agricultural Experiment Station (AES) Research Center Conference, Colorado State University, Fort Collins, CO, January 6, 2016.
50. **Chávez, J.L.** (2016), “Monitoring alfalfa, grass, com and potato water use under full and deficit irrigation using a spatially distributed temperature model.” Presented at the Colorado Agricultural Experiment Station (AES) Research Center Conference, Colorado State University, Fort Collins, CO, January 6, 2016.
51. Comas, L.H., J. Altenhofen, J.S. Young, K.R. Willi, S.M. Gleason, J.L. **Chávez**, H. Zhang, and K.C. DeJonge, (2016), “Using canopy temperature, stomatal conductance and transpiration from remotely-sensed plant parameters to determine plant water use.” Poster presented at the Western Photosynthesis Meeting in Tabernash, CO, Jan 4-6, 2016.
52. **Chávez, J.L.** (2015), “Monitoring crop water use and stress to inform irrigation,” article published in the Colorado Water Newsletter, Nov/Dec 2015, Volume 32, Issue 4, pp 10-11.

53. Andales, A.A., and **Chávez, J.L.** (2015), "Adapting irrigation cropping systems to drought," article published in the Colorado Water Newsletter, Nov/Dec 2015, Volume 32, Issue 4, pp 14-16co.
54. **Chávez, J.L.**(2015), "Remotely sensed canopy temperature: A tool to detect crop water stress." Presentation at the USCID Water Management meeting on Emerging Issues in Water Management Governance, Albuquerque, New Mexico, Nov. 17-20, 2015.
55. Hathaway, J.C. and **Chávez, J.L.**(2015), "Estimating soil water content and crop water requirements with unmanned aircraft systems (UAS) remote sensing." Poster presentation at the USCID Water Management meeting on Emerging Issues in Water Management Governance, Albuquerque, New Mexico, Nov. 17-20, 2015.
56. **Chávez, J.L.**(2015), "Developing an Unmanned Aerial Remote Sensing of ET System," presented before the Colorado Water Institute (CWI) advisory board, 06 Nov., at Denver Water, Denver, CO,
57. **Chávez, J.L.** and J.C. Hathaway. (2015). Unmanned Aerial Systems (UAS) for Sensing Actual Evapotranspiration. Presented at the CSU Soil & Crop Sci Seminar, October 22, Fort Collins, CO,
58. Mcebisi M. Mkhwanazi and José L. **Chávez.** (2015). Developing a remote sensing ET algorithm that accounts for advection with limited data. At the 2015 ASCE EWRI World Congress, May 19, Austin, TX,
59. **Chávez, J.L.** and E. Kullberg, 2015, Handheld Infra-Red Thermometry Calibration: Monitoring Crop Water Stress. At the 2015 ASCE EWRI World Congress, May 19, Austin, TX
60. M. Semin Barlak, **José L. Chávez,** Prasanna H. Gowda, and Steven R. Evett. (2015). Mapping evapotranspiration at high resolutions using the Surface aerodynamic temperature model and airborne multispectral remote sensing data. Presented at the Hydrology Days 2015 conference, March 23, 2015, Fort Collins, CO.
61. Emily G. Kullberg, **José L. Chávez,** and Kendall DeJonge. (2015). Evaluation of Water Stress Coefficient Methods to Estimate Actual Corn Evapotranspiration in Colorado. Presented at the Hydrology Days 2015 conference, March 23, 2015, Fort Collins, CO.
62. Abhinaya Subedi, **José L. Chávez,** Allan A. Andales. (2015). Monolithic weighing lysimeter-based alfalfa evapotranspiration rates evaluation using micrometeorological instruments. Presented at the Hydrology Days 2015 conference, March 23, 2015, Fort Collins, CO.
63. Marcos Carrasco-Benavides, Samuel Ortega-Farías, Luis Morales-Salinas and **José L. Chávez.** (2015). Estimation of sensible heat flux of a drip-irrigated vineyard using the aerodynamic temperature model in Talca-Chile. Presented at the Hydrology Days 2015 conference, March 23, 2015, Fort Collins, CO.
64. **Chávez, J.L.** (2015). Determining crop water use and stress using a range of instrumentation and methods. Presented before the "Partner Center for Advance Studies in Water," University of Utah, Salt Lake City, UT, March 2-3, 2015.
65. **Chávez, J.L.** (2015). Remote Sensing Principles: Multispectral Imagery Calibration. Presented at the "Centro de Investigación y Transferencia en Riego y Agroclimatología" (CITRA), Universidad de Talca, Talca, Chile, January 8, 2015.
66. **Chávez, J.L.** (2014). Irrigation Scheduling Research in Eastern Colorado: Report. 2014 Annual Meeting, WERA-1022, Meteorological and Climate Data to Support ET-based Irrigation Scheduling, Water Conservation and Water Resources Management. September 17-18, 2014, Castle Hotel, Orlando, FL.
67. **Chávez, J.L.** (2014). Determining crop water use and stress using remotely sensed and ground-based micro-met data. Presentation to visiting Spaniard Scholars (Dr. Luciano Mateos and Dr. Helena Gomez, Institute for Sustainable Agriculture (Spanish Council for Scientific Research) in Cordoba, Spain), Colorado State University, Fort Collins, CO, May 9, 2014.
68. Mefford, B., and **J.L. Chávez.** (2014). Assessing corn water stress using spectral reflectance. AGU Hydrology Days, Colorado State University, Fort Collins, CO, March 24-26, 2014.
69. Evett, Steven R., Kustas, William P., Alfieri, Joseph G., Prueger, John H., and **Chavez, José L.** (2013). Lessons learned from the Bushland Evapotranspiration and Agricultural Remote Sensing Experiment 2008

(BEAREX08). Geological Society of America Meeting. 2013 GSA Annual Meeting in Denver: 125th Anniversary of GSA (27-30 October 2013).

70. Saleh Taghvaeian and **José L. Chávez**. (2013). Corn Water Stress Thermography: Potentials and Limitations. Presented at the Seventh International Conference on Irrigation and Drainage, USCID. Phoenix, AZ, April 16-19, 2013.
71. **Chávez, José L.** (2013). Determining corn water use with thermal and weather data. Colorado Water Newsletter, Theme: Agricultural Water. Water Center of Colorado State University, July/August 2013, Vol 30, Issue 4, Fort Collins, CO.
72. **José L. Chávez**. (2013). Determining Corn Water Use with a Remote Sensing Based Within Canopy Air Temperature Method, USCID Water Management Conference, October 22-25, Denver, CO
73. Mcebisi M. Mkhwanazi, and **José L. Chávez**. (2013). Modified SEBAL Remote Sensing ET Algorithm to Account for Advection, USCID Water Management Conference, October 22-25, Denver, CO
74. Abhinaya Subedi, **José L. Chávez** and Allan A. Andales. (2013). Effects of Surface Non-Uniformity on Penman-Monteith Equation, USCID Water Management Conference, October 22-25, Denver, CO
75. Brenna Mefford, Kendall DeJonge, and **José L. Chávez**. (2013). Ground Based Remote Sensing of Shortwave Spectral Vegetation Indices, USCID Water Management Conference, October 22-25, Denver, CO
76. **Chávez, J.L.** (2013). Corn evapotranspiration estimates derived from a remote sensing based within canopy air temperature model. Symposium: Accuracy, uncertainty, and limitations of evapotranspiration quantification in agriculture. ASA, CSSA, & SSSA Int'l Annual Meeting, Nov. 3-6, 2013, Tampa, FL.
77. Allan A. Andales, **Jose Luis Chavez**, Lane Simmons and Michael Bartolo. (2013). Evapotranspiration Measurements Using Weighing Lysimeters: The Rocky Ford Experience. Symposium: Accuracy, uncertainty, and limitations of evapotranspiration quantification in agriculture. ASA, CSSA, & SSSA Int'l Annual Meeting, Nov. 3-6, 2013, Tampa, Florida.
78. Saseendran S. Anapalli, Lajpat R. Ahuja, Liwang Ma, Thomas J. Trout, David C. Nielsen, Allan A. Andales, **José L Chávez**, and Jay Ham. (2013). Exploring Options for Enhancing Water Stress Responses of Corn (*Zea mays* L.) in RZWQM2. Symposium: Accuracy, uncertainty, and limitations of evapotranspiration quantification in agriculture. ASA, CSSA, & SSSA Int'l Annual Meeting, Nov. 3-6, 2013, Tampa, Florida.
79. **Chávez, J.L.**, and S. Taghvaeian. 2012. Grass water stress and ET monitoring using ground-based and airborne-based remote sensing: Project Report. Submitted to Northern Colorado Water Conservancy District. March 30, 2012.
80. **José Chávez**, Saleh Taghvaeian, Thomas Trout, William Sanford. 2012. Monitoring Corn Water Stress and Actual ET with Remote Sensing. 2012 World Environmental & Water Resources Congress, ASCE-EWRI, Albuquerque, NM, May 23, 2012.
81. Mkhwanazi, M., and **Chávez, J.L.** (2012). Using surface aerodynamic temperature in remote sensing-based ET models (Aerodynamic Surface Temperature Modeling Under Various Surface Conditions). Presented at the 2012 Annual International ASA-CSSA-SSSA Conference Meeting. Symposium--Evapotranspiration: Monitoring, Modeling and Mapping At Point, Field, and Regional Scales. Cincinnati, Ohio, 23 Oct.
82. David Gleason, Troy Bauder, Allan Andales, and **Jose L. Chavez**. (2012). Performance of atmometers in estimating reference evapotranspiration in a semi-arid environment. Presented at the 2012 ASA, CSSA, SSSA Int'l Annual Meetings, Oct. 21-24, 2012, Cincinnati, Ohio.
83. **Chávez, J.L.**, Reich, D., Loftis, J.C., and Miles D.L. 2011. Irrigation pumping plant efficiency. Colorado State University Extension, Factsheet No. 4.712.
84. Andales, A., **Chávez, J.L.**, and Bauder, T.A. 2011. Irrigation Scheduling: The Water Balance Approach. Colorado State University Extension. Factsheet No. 4.707. Published on-line, July 2011.
85. **Chávez, J.L.** 2011. Monitoring crop water stress to quantify water savings for agricultural water transfer purposes. USCID NewsLetter, Spring 2011, Issue No 108. ISSN: 1083-1320.
86. **Chávez, J.L.**, 2011. Irrigation water conservation tool. Submitted to Central Colorado Water Conservancy

District. May 17th, 2011.

87. **Chávez, J.L.** 2011. Wireless in-field soil water content monitoring project. Report submitted to Central Colorado Water Conservancy District. March 9th, 2011.
88. Gowda, P.H., T.A. Howell, P.D. Colaizzi, N. Rajan, **J.L. Chavez, S.R. Evett.** 2010. Lysimetric evaluation of eddy covariance fluxes over irrigated sunflowers in the Texas High Plains. ASA-CSSA-SSSA 2010 Int'l Annual Meeting. Oct. 31-Nov. 4, Long Beach, CA.
89. **Chávez, J.L.,** W.P. Kustas, P.H. Gowda, T.A. Howell, J.H. Prueger, L.E. Hipps, S.A. O'Shaughnessy, P. Colaizzi, S.R. Evett, C.M.U. Neale, M.C. Anderson, and K.S. Copeland. 2009. Aerodynamic temperature derived from flux-profile measurements and two-source model predictions over a cotton row crop in an advective environment. ASA-CSSA-SSSA 2009 Int'l Annual Meeting. Nov. 1-5, Pittsburgh, PA.
90. Hipps, L.E., W.P. Kustas, J.H. Prueger, J.L. **Chavez.** 2009. How well we can diagnose the effects of coupling of the regional atmosphere on ET of an irrigated surface under extreme advection of heat. ASA-CSSA-SSSA 2009 Int'l Annual Meeting. Nov. 1-5, Pittsburgh, PA.
91. Anderson, M.C., W.P. Kustas, C.M.U. Neale, J.H. Prueger, D.G. Williamson, S. Evett, J.L. **Chavez,** and P. Gowda. 2009. Mapping evapotranspiration and moisture stress in an advective environment using multi-scale thermal remote sensing data. ASA-CSSA-SSSA 2009 Int'l Annual Meeting. Nov. 1-5, Pittsburgh, PA.
92. Prueger, J.H., W.P. Kustas, L.E. Hipps, J.L. **Chavez,** S. Evett, A. French, and J.L. Hatfield. 2009. BEAREX_08 Eddy covariance intercomparison. ASA-CSSA-SSSA 2009 Int'l Annual Meeting. Nov. 1-5, Pittsburgh, PA.
93. Alfieri, J.G., J.H. Prueger, W.P. Kustas, L.E. Hipps, J.L. **Chavez,** and A. French. 2009. Comparison of turbulent statistics and spectral characteristics under strong advective conditions. ASA-CSSA-SSSA 2009 Int'l Annual Meeting. Nov. 1-5, Pittsburgh, PA.
94. Kustas, W.P., J.H. Prueger, L. Hipps, J.L. **Chávez,** and A. French. 2009. Evaluating flux-variance relationships under strongly advective conditions during BEAREX08. ASA-CSSA-SSSA 2009 Int'l Annual Meeting. Nov. 1-5, Pittsburgh, PA.
95. **Chávez, J.L.,** P.H. Gowda, T.A. Howell, C.M.U. Neale, P.D. Colaizzi, and K.S. Copeland. 2008. ET mapping with METRIC algorithm using airborne high resolution multispectral remote sensing imagery. ASA-CSSA-SSSA 2008 Int'l Annual Meeting. Oct. 5-9, Houston, TX.
96. Howell, T.A., S.R. Evett, J.A. Tolk, P.D. Colaizzi, P.H. Gowda, J.L. **Chavez,** and K.S. Copeland. 2008. Energy balance of irrigated and dryland cotton in the Southern High Plains. ASA-CSSA-SSSA 2008 Int'l Annual Meeting. Oct. 5-9, Houston, TX.
97. Colaizzi P.D., W.P. Kustas, S.A. O'Shaughnessy, R.C. Schwartz, S.R. Evett, T.A. Howell, J.L. **Chavez,** P.H. Gowda, and J.A. Tolk. 2008. Radiometric surface temperature components for row crops. ASA-CSSA-SSSA 2008 Int'l Annual Meeting. Oct. 5-9, Houston, TX.
98. **Chavez, J.L.,** P.H. Gowda, T.A. Howell, and K.S. Copeland. 2007. An Aerodynamic Temperature-based Regional ET model Evaluation for Texas High Plains. ASA-CSSA-SSSA 2007 Int'l Annual Meeting. ASA Centennial, Nov. 4-8, New Orleans, LA.
99. Gowda, P.H., B.R. Scanlon, T.A. Howell, C.M.U. Neale, A.N. French, P.D. Colaizzi, S.R. Evett, and J.L. **Chavez.** 2007. Bushland Evapotranspiration and Agricultural Remote Sensing Experiment – 2007 (BEAREX07). ASA-CSSA-SSSA 2007 Int'l Annual Meeting. ASA Centennial, Nov. 4-8, New Orleans, LA.
100. Colaizzi P.D., S.R. Evett, T.A. Howell, R.C. Schwartz, J.A. Tolk, P.H. Gowda, and J. **Chavez.** 2007. Evaluation of radiation partitioning models at Bushland, TX. ASA-CSSA-SSSA 2007 Int'l Annual Meeting. ASA Centennial, Nov. 4-8, New Orleans, LA.
101. **Chavez, J.L.,** P.H. Gowda, P.D. Colaizzi, S.R. Evett, T.A. Howell, and K.S. Copeland. 2007. METRIC estimated ET evaluation on the semi-arid Southern High Plains. AGU Jointly Assembly. Acapulco, Mexico. May 22-26.
102. P.H. Gowda, J.L. **Chavez,** P.D. Colaizzi, S.R. Evett, T.A. Howell, and K.S. Copeland. 2007. Two-Source

energy balance model evaluation for mapping evapotranspiration on the semi-arid Southern High Plains. 2007 AGU Jointly Assembly. Acapulco, Mexico. May 22-26.

103. Perry E.M., P. Andrade, J. **Chavez**, and F. Pierce. 2006. Spatial and temporal resolution requirements for real-time temperature measurements in perennial crops. ASA-CSSA-SSSA 98th Int'l Annual Meeting. Nov. 12-16, Indianapolis, IN.
104. **Chavez** J.L., F.J. Pierce, G. Matthews, and T.V. Elliot. 2005. Evaluation of an Integrated Wireless Irrigation Control System for Variable Rate Water Application. ASA-CSSA-SSSA 2005 97th Int'l Annual Meeting. Nov. 6-10, Salt Lake City, UT.
105. F.J. Pierce, **Chavez** J.L., T.V. Elliot, G. Matthews, R. Evans, and J. Kim. 2005. An integrated wireless approach for remote, real-time irrigation monitoring and control. ASA-CSSA-SSSA 2005 97th Int'l Annual Meeting. Nov. 6-10, Salt Lake City, UT.

CONTRACTS & GRANTS

Externally-Funded Projects as PI

- (2023-2024) "Using Remote Sensing Data to Highlight Salinization Patterns Across an Irrigated River Basin in Relation to Contributing Factors." Sponsor: Colorado Water Conservation Board, Amount: **\$50,000**.
- (2021-2024) "MCA: Modeling Surface Aerodynamic Temperature over Agricultural Fields," Submitted on 02/01/2021 to the National Science Foundation (NSF) – Amount Requested: **\$293,334**.
- (2020-2023) "Calibration and Evaluation of a Multi-Scale Spatially Distributed ET Algorithm," PI: J.L. **Chavez**, Collaborators: USDA ARS. Funded by USDA NIFA through CO AES. Grant Amount: **\$90,000**
- (2020-2023) "Calibration and Evaluation of a Multi-Scale Spatially Distributed ET Algorithm," PI: J.L. **Chavez**, Collaborators: USDA ARS Fort Collins. Funded by Northern Water (NW). Grant Amount: **\$37,500**
- (2020-2023) "Calibration and Evaluation of a Multi-Scale Spatially Distributed ET Algorithm," PI: J.L. **Chavez**, Collaborators: USDA ARS Fort Collins. Funded by the Irrigation Innovation Consortium (IIC). Grant Amount: **\$37,500**
- (2020-2021) "Evaluating WISE Performance for Corn when Updated with Remote Sensing-based Actual Crop Coefficients: Full and Deficit Irrigation," Funded by Colorado Corn through IIC, **\$50,000**
- (2019-2021) "Satellite and UAS Imagery Use to Implement Timely Irrigation Strategies," PI: J.L. **Chavez**, Collaborators: Huihui Zhang (USDA), Daran Rudnick (UNL), Joel Schneekloth (CSU), Jonathan Aguilar (Kansas State), Juan Enciso (Texas A&M), and Florence Cassel (CA State), Sponsor: FFAR through the Irrigation Innovation Consortium (IIC), Period: 02/01/19 – 06/30/21, Total project cost (including cost share 1:1): **\$223,272.44**. Amount to PI from FFAR-IIC: **\$26,850.00**
- (2017 – 2019) "Developing Data Assimilation and Bias-correction Systems for NOAA," PI: J.L. **Chavez**, Sponsor: UCAR, NCAR (NOAA), Period: 05/25/17 – 31/12/19, Grant Amount: **\$126,961.00**
- (2018-2019) "UAS-based Variable Irrigation," PI: J.L. **Chavez**, Collaborators: Huihui Zhang (USDA), Daran Rudnick (UNL), Sponsor: Irrigation Innovation Consortium (IIC-FFAR), Period: 07/01/18 – 06/30/19, Grant Amount: **\$21,860.33**
- (2018-2019) "Assessing Temporal and Spatial Crop Water Consumptive Use with Unmanned Aerial Systems," PI: J.L. **Chavez**, Collaborators: Huihui Zhang, Daran Rudnick, Ashish Masih, Allan Andales; Sponsor: Colorado Water Conservation Board (CWCB) through Colorado Water Institute (CWI), Period: 07/01/18 – 06/30/19, Grant Amount: **\$49,999.00**
- (2016-2017) "Colorado Irrigation Center Design and Concept Development." PI: J.L. **Chavez**, Co-PI: R. Waskom, and Stephen Smith, Sponsor: Colorado Water Conservation Board (CWCB) through Colorado Water Institute (CWI), Period: 07/01/16 – 06/30/17, Grant Amount: **\$49,876.00**
- (2015-2019) "Monitoring alfalfa and grass water use under deficit irrigation using a spatially distributed temperature model." PI: J.L. **Chavez**, Co-PI: K. Venayagamoorthy and Perry Cabot, Sponsor: USDA NRCS (CO AES), Period: 07/01/15 – 06/30/19, Grant Amount: **\$129,904.00**

- (2015-2017) “Evaluation of a methodology to monitor biofuel crop water status using remote sensing,” PI: J.L. **Chavez**, Sponsor: USDA ARS Cooperative Agreement, Period: Aug 1 2015 – Dec 31 2016, Grant Amount: **\$67,000.00**.
- (2015-2016) “Collaboration in the development of a tool for monitoring corn water stress,” PI: J.L. **Chavez**, Sponsor: USDA ARS Cooperative Agreement, Period: 07/01/15 – 06/30/16, Grant Amount: **\$6,641.00**
- (2014-2015) “Corn Yield Spatial Analysis for Deficit Irrigated Fields,” Sponsor: USDA-US Dept. of Agriculture ARS WMRU Cooperative Agreement, Period: June 1 – Nov 30, 2014, Grant Amount: **\$18,458.00**.
- (2014-2015) “Developing an Unmanned Aerial Remote Sensing of ET System,” PI: Sponsor: Colorado Water Conservation Board (CWCB), July 1st 2014 – June 30th 2015. Amount **\$50,000.00**.
- (2013-2013) “Accuracy assessment of the CWSI-based ET estimates considering different spatial resolutions from multiple remote sensing platforms (Phase I),” Sponsor: Regenes Management Group, LLC, (overall project budget, Phase I and II: \$150,645.00), Amount **\$37,661.00**.
- (2013-2015) “Implementation of Deficit Irrigation Regimes: Demonstration and Outreach,” Sponsor: Colorado Water Conservation Board (CWCB), Period: 9/28/2013 - 12/31/2015 Amount: **\$124,743.00**.
- (2013-2015) “Implementation of Deficit Irrigation Regimes: Demonstration and Outreach,” Sponsor: Central Colorado Water Conservancy District, Period: 9/28/2013 - 9/30/2015, Amount: **\$10,000.00**.
- (2013-2015) “Estimating Evapotranspiration and Plant Water Stress with Remote Sensing,” Sponsor: USDA-US Dept. of Agriculture Cooperative Agreement, ARS, WMRU, Period: Sept 1, 2013 – Sept 30, 2015, Grant Amount: **\$5,000.00**.
- (2013-2015) “Implementation of Deficit Irrigation Regimes: Demonstration and Outreach,” Sponsor: West Greeley Conservation District, Period: 9/28/2013 - 9/30/2015, Grant Amount: **\$15,000.00**
- (2013-2015) “Implementation of Deficit Irrigation Regimes: Demonstration and Outreach,” Sponsor: Northern Colorado Water Conservancy District, Period: 9/28/2013 - 9/30/2015, Amount: **\$10,000.00**.
- (2012-2015) “Reference evapotranspiration determination using the recursive method and surface aerodynamic temperature.” USDA-CSREES and Colorado Agricultural Experiment Station. PI: Jose **Chavez**, coPI: Allan Andales, Jul 2012 – June 2015. Amount **\$90,000.00**.
- (2011-2012) “Grass water stress and ET monitoring using ground & airborne-based remote sensing,” Northern Colorado Water Conservation District, Jul 2011 – Jun 2012. Amount **\$8,680.00**.
- (2010-2011) “Irrigated Agriculture Water Conservation Tool.” Central Colorado Water Conservancy District, Apr 2010 – May 2011, Amount **\$29,242.00**.
- (2010-2013) “Crop Water Stress Index and Evapotranspiration Monitoring Using Remote Sensing Techniques.” Regenes Management Group, LLC, Amount **\$199,063.00**.
- (2009-2010) “Remote sensing-based crop water stress determination of limited irrigation MON87460 transgenic drought tolerant corn hybrids,” Monsanto, Amount **\$43,677.00**.
- (2009-2011) “Wireless in-field soil water content monitoring,” Central Colorado Water Conservancy District (CCWCD) July 2009 – May, 2011, Amount **\$39,703.00**.
- (2009-2014) “Crop evapotranspiration determination using eddy covariance fluxes, high resolution remote sensing imagery & a surface temperature approach,” USDA-ARS, CPRL, Cooperative Agreement, Grant Amount **\$40,000.00**.
- (2009-2012) “Modeling and evaluating remote sensing-based crop ET with scintillometers and a heat flux source area function.” USDA-CSREES and Colorado Agricultural Experiment Station. PI: J.L. **Chavez**, Jul 2009 – June 2012. Amount **\$105,000.00**.

Externally-Funded Projects as Co-PI

- (2023-2026) “Assessing the Economic and Technical Potential of Irrigation Curtailment Practices to Jointly-Sustain Livestock Production and Water Conservation in the Upper Colorado River Basin,” Sponsor: Conscience Bay Research Foundation, Amount: **\$449,165**. Role: co-PI.
- (2023-2024) “High Resolution Geospatial Evapotranspiration Modeling and Plant Health Monitoring of Irrigated Crops, Orchards and Vineyards Using Multispectral and Thermal Imagery,” Sponsor: Colorado

Water Center, Amount: **\$75,000**. Role: co-PI.

- (2023-2024) “Impact of regenerative agricultural practices on containing non-point source pollution in corn and wheat production systems of Western Colorado,” Sponsor: Colorado Water Center, Amount: **\$75,000**. Role: co-PI.
- (2022-2025) “Characterizing agro-environmental threats from salinity in the South Platte River Basin,” PI: Tim Gates, co-PI: Jose Chavez, Sponsor: USDA NIFA - AES, Amount: **\$90,000.00**
- (2022-2024) “Optimization of Soil Water Content and Deficit Products from Soil Water Sensor Data,” PI: Gaofeng Jia, co-PI: Jose Chavez, Sponsor: USDA NIFA - AES, Amount: **\$60,000.00**
- (2021-2023) “Improving irrigation efficiency through the development of the hydraulic infrastructure at Irrigation Innovation Consortium Headquarters,” Andales, A.A. (PI), and J.L. Chávez (co-PI), Submitted to Colorado Water Conservation Board, on 12/01/2020, Amount requested: **\$157,384**
- (2018-2023) “Irrigation Innovation Consortium” (*Strategic collaborative partnerships developing new synergies to create water productivity innovation in agriculture and the irrigated landscape*). Andales A.A. (PI), **Chávez J.L.** (co-PI). Foundation for Food and Agriculture Research. Amount: **\$4,999,968 .00**
- (2015-2016) “Using remote sensing assessments to document historical and current saved consumptive use (CU) on alfalfa and grass hayfields managed under reduced and full irrigation regimes: A new CU documentation system,” PI: Perry Cabot, co-PI: J.L. **Chavez**, Sponsor: Colorado Water Conservation Board - CWCB (through CWI), Grant Amount: **\$50,000.00**
- (2015-2017) “Monitoring Consumptive Use and Agronomic Sustainability for Fallowed Alfalfa and Grass Hayfields Under the Auspices of a Western Slope Water Bank.” PI: Perry Cabot, Co-PIs: Jose **Chavez**, Joe Brummer; Sponsor: Colorado River District, Trout Unlimited, The Nature Conservancy, West Water Conservancy District, Southwest Water Conservancy District, and Colorado Water Conservation Board (Water Bank Partners); Grant Amount: **\$300,000.00**.
- (2014-2017) “Decision support tools, drought tolerance, and innovative soil and water management strategies to adapt semi-arid irrigated cropping systems to drought.” PI: Cotrufo, CoPIs: Paustian, Khosla, **Chávez**, and Andales. Sponsor: USDA-NRCS CIG, Period: 1 Feb. 2014 to 31 Jan. 2017. Grant Amount: **\$851,800.00**. (Total Project cost: \$1,703,600.00; 50% cost sharing).
- (2014-2019) “Arid Climate Water Management Strategies.” PI: Ramchand Oad, CoPI: J.L. Chavez. Sponsor: Platte River Water Development Authority, Period: 8/1/2014 - 12/31/2019. Grant Amount: **\$332,976**
- (2011-2013) “Lower South Platte irrigation research & demonstration project,” PI: Neil Hansen, Co-PI: Jose **Chavez**, Sponsor: Parker Water & Sanitation District, May 2011 – Dec 2013. Grant Amount: **\$280,160.00**
- (2009-2012) “Using the ASCE Standardized Reference ET equation and appropriate crop coefficients for irrigation management.” USDA/NRCS. PI: Allan Andales, Co-PI: Jose **Chavez**, Sponsor: USDA NRCS CIG, Sept 2009 – Sept 2012. Grant Amount: **\$74,143.00**.

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

- (2016 – **2021**) “Sustaining Agriculture through Adaptive Management to Preserve the Ogallala Aquifer under a Changing Climate,” PI: Meagan Schipanski, Collaborator: **J.L. Chavez**, Period: 15-Mar-16 to 30-Mar-21, Sponsor: USDA-NIFA-National Institute of Food and Agriculture. Grant Amount: **\$2,490,000.00**
- (2015 - **2020**) “Global Center for Advanced Studies on Water (GCAS-W): A Partnership with Mehran University of Engineering and Technology to Achieve Water Sustainability.” PI: Tim Gates, Collaborator: **Jose Chavez**, Sponsor: University of Utah (USAID), Grant Amount: **\$1,599,136.00**

Internally-Funded Awards

- (2023-2024) “Application for Research Equipment in Support of Water and Water-Related Environmental Research Efforts: Borland Grant,” PI: Jose Chavez, Sponsor: CSU Civil and Env. Eng. Dept., for the acquisition of three (3) LI-710 Evapotranspiration Sensors from LICOR. **\$14,925.00**

- (2022-2023) “Evaluation of proximal- aerial- and Spaceborne-based remote sensing estimation of Crop Biophysical Characteristics and Water Use,” PI: Jose **Chavez**, Sponsor: Colorado Water Center, Water Fellow, CSU Competitive Grant Program, 20 January 2022. Amount: **\$14,989.00**
- (2022-2023) “A Combined Machine-Learning and Kriging Surface Temperature Approach for Crop Water Stress Mapping,” PI: Edson Costa-Filho, Advisor: Jose Chavez, Sponsor: CoWC, Amount: **\$10,000.00**
- (2021-2022) “Application for Research Equipment in Support of Water and Water-Related Environmental Research Efforts: Borland Grant,” PI: Jose **Chavez**, Sponsor: CSU Civil and Env. Eng. Dept. (Borland funds), for the acquisition of an active remote sensing sensor and field rogue notebook, has been approved for funding on 11.02.21. Amount: \$9,593.00
- (2020-2020) “Development of Sustainable Agricultural Water (SAW) Research Consortium with Israeli Institutions,” workshop funding, PI: Thomas Borch, co-PIs: Jens Blotevogel, Jose Chavez, Karan Venayagamoorthy, Sponsor: CSU Quarterly OVPR Investment Funding, **\$20,000** (+\$10k matching from CAS, WSCOE, CIVE).
- (2018-2018) “Borland Equipment Grant,” PI: Jose **Chavez**, Sponsor: CSU Civil and Env. Eng. Dept. (Borland funds). Fort Collins, CO. November 2, 2018. To acquire a LI-COR gas analyzer. **\$19,945**
- (2017-2017) “Borland Equipment Grant,” PI: Jose **Chavez**, Sponsor: CSU Civil and Env. Eng. Dept. (Borland funds). Fort Collins, CO. November 2017. To acquire a Fluke IR calibrator (blackbody). Amount **\$9,635.00.**
- (2013-2015) “Borland Chair of Hydrology,” PI: Jose **Chavez**, Sponsor: CSU Civil and Env. Eng. Dept. (Borland funds). Fort Collins, CO. Period: 2013 – 2015. Amount **\$50,000.00.**
- (2013-2014) “Internal RFP for Research Equipment and Instrumentation in Support of Water and Water-Related Environmental Research Efforts: Borland Grant,” PI: Jose **Chavez**, coPI: Saleh Taghvaeian, Jeff Niemann, Sponsor: Civil and Environmental Engineering Department, Colorado State University, Borland Program, Oct. 2013 – June 2014. Amount **\$16,295.00.**
- (2012-2012) “Variable Rate Irrigation (center pivot) system for CSU ARDEC field 3100,” PI: Dr. Raj Khosla and co-PIs: Drs. José L. **Chávez** and Allan Andales; 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; **\$145,000** of total project funds. (Facility improvement project; Provided design computations necessary to select the center pivot and sizing of irrigation pump and water storage pond).
- (2011-2011) “Precision irrigation center pivot system.” PI: Jose **Chavez**, Sponsor: CSU Civil and Environmental Engineering Department, Borland Grant, Oct 2011, Grant Amount: **\$18,430.00**

Course Titles (Courses Taught 2010-2023)

CIVE 512 – Irrigation Systems Design

CIVE 519 - Irrigation Water Management

CIVE 549 - Drainage and Wetlands Engineering

CIVE 525 - Water engineering for international development*

This course was team taught. I was responsible for the last 25% of the content (4 weeks). It was an interdisciplinary course (i.e., water distribution 50%, sanitation 25%, and irrigation 25%)

CIVE581A3 - Irrigation Water Management (Experimental course)

CIVE 695J – (IWC): Independent Study - Bioresources Agricultural Engineering (Irrigation water conservation)

CIVE 695J – (RS): Independent Study – Bioresources Agricultural Engineering (Remote Sensing of crop evapotranspiration)

CIVE 695J – (ET): Independent Study – Irrigation Engineering (Crop water demand and irrigation scheduling)

CIVE 799J – Dissertation Bioresource and Agricultural Engineering

Course Syllabi, Assignments, and Other Materials

CIVE 519 (Irrigation Water Management) is a graduate level course; both offered to resident and off-campus (distance program through CSU Online Plus) students. This course prepares the student to apply basic soil, plant, water, and atmospheric engineering principles for the purpose of determining the crop water need (use), or evapotranspiration (ET), both in time and amounts, to sustain agricultural production while protecting the environment. The course covers a range of methods and instrumentation available to determine ET (crop water requirements), irrigation scheduling, and effective water use, including remote sensing of ET. This course requires a term project which is a design project in which student select field data from soil water content (“moisture”) and/or soil water potential sensors, from remote sensing platforms, and/or micro-meteorological energy balance and weather stations to apply a crop water use monitoring method and evaluation water application strategies. This course was fully developed by Dr. **Chávez**.

CIVE 512 (Irrigation Systems Design) is also a graduate level course offered to resident and distance students. This course provides an understanding of basic engineering principles and procedures which are necessary for the successful selection, design and operation of pressurized and surface (free flow) irrigation systems. This course was adapted/updated from an existing course. New software for design and evaluation were introduced in the course program as well as problem exercises using MS Excel spreadsheets.

CIVE 549 (Drainage and Wetlands Engineering) is also a graduate level course offered to resident and distance students. This course is a drainage and wetlands design program for agricultural and natural resources applications. Addresses water table modification for nonpoint sources pollution control. This course was adapted/updated from an existing course. A drainage software for design and evaluation was introduced in the course program as well as problem exercises using MS Excel spreadsheets.

Participation in Professional Development Activities Related to Teaching

March 4, 2022, Drought Leadership Training, Crop Drought Management Workshop—CSU Extension, Webinar, 10:30 am to 1:00 pm.

January 31, 2019, WSCOE Master Teacher Initiative (MTI) Workshop on ‘*Teaching our students about diversity, inclusion and societal impacts of engineering.*’ Delivered by Dr. Becky Atadero, LSC, Colorado State University, Fort Collins, CO,

July 14-15, 2014, Advanced National Effective Teaching Institute (NETI-2), “*Cooperative learning and inductive teaching and learning* (inquiry-based and problem-based learning)” workshop, American Society for Engineering Education, at the Le Westin Montreal, Canada. Learning how students could improve learning by working in groups to solve practical engineering problems utilizing PBL techniques.

May 22, 2013, Attending seminar on "Is Culture important in STEM?" provided by CSU TILT, Fort Collins, CO. Understanding how cultural background affects the way students learn. Learning to present academic material in a fashion that would be understood and retained by most students.

May 22, 2013, Attending seminar on "Critical Thinking in Content Writing: Write-to-Learn strategies for the large classroom" provided by CSU TILT, Fort Collins, CO.

May 23, 2013 Attending seminar on "Rubrics: What's communication got to do with it?" provided by CSU TILT, Fort Collins, CO.

May 23, 2013, Attending seminar on "Fostering and Assessing the Learning Environment" provided by CSU TILT, Fort Collins, CO.

July 24, 25, and 26, 2013 “How to Engineer Engineering Education.” Attending the workshop to acquire skills on active learning, collaborative learning, and problem based learning techniques. Hrs: 20, 3-day workshop, Bucknell University, Lewisburg, PA.

April 19, 2012, RamCT Blackboard Advanced Tests, Question Sets, Metadata, and Statistics. Contact Hours: 2, Training provided by CSU Libraries, Fort Collins, CO.

April 12, 2012, RamCT Blackboard Communication Basics and Discussions. CSU Library. Fort Collins, CO.

April 23, 2012, RamCT Blackboard Grade Center Basics. Attending the new RamCT Blackboard workshop on

Grading. Contact Hours: 2. CSU Library. Fort Collins, CO.
May 16, 2012, Using problem-based, integrative learning to support student engagement and critical thinking. Summer Conference. Attending the conference at CSU, The Institute for Learning and Teaching (TILT). Contact Hours: 6, Fort Collins, CO.
December 2, 2010. Best Practices / Online. The Institute for Learning and Teaching (TILT), Colorado State University, Fort Collins, CO.
February 19-20, 2009, Effective College Teaching Workshop, American Society for Engineering Education, University of Colorado, Boulder, CO.

Professional Development Activities

26 April, 2023, “Irrigation and Conservation in a Changing Climate Webinar,” Organized by the University Council On Water Resources, UCOWR, speaker: Dr. Mallika Nocco. Webinar. 1 hr.

18 January 2023, “Introduction to Using Direct Flux Measurements for Immediate Societal Benefits,” LICOR, Webinar via Zoom. 1 hr. Abstract: Description: In this webinar, you will become familiar with direct real-time measurements of GHG emissions and uptakes into and out of the air, and direct evapotranspiration and heat flux measurements, made using the eddy covariance method, which is now increasingly employed in industrial monitoring, evaluating carbon sequestration efforts, production agriculture, emissions regulations, and many other applications that inform societal response to global environmental challenges.
George Burba will discuss the 2022 edition of his book Eddy Covariance Method for Scientific, Regulatory, and Commercial Applications, which was written for both scientists and non-scientists working on issues related to climate change and the environment.

31 August 2022, “Symphony Tool for Sponsored Award Management,” Office of Sponsored Programs and CoE, CSU LSC room 306, 1 hr.

23-25 May 2022, “Sustainable Agricultural Water (SAW) Workshop,” May 22-25, 2022, Ridgeline Hotel, Estes Park, Colorado, USA. <https://www.engr.colostate.edu/ce/SAW-BARD/>

29 April 2022, “Radiometric Calibration of PlanetScope and SkySat Data,” Planet, Inc., webinar via GoToWebinar, 1 hr.

22 April 2022, “A PROGRESSION OF PIV: RECENT ADVANCES IN REMOTE SENSING OF RIVER FLOW VELOCITIES,” by Carl Legleiter (USGS), organized by CSU Civil and Environmental Engineering and Science Webinar (series), via Zoom.

15 February 2022, “Updates and Advances to the FAO56 Crop Water Requirement Methods,” Webinar sponsored by the International Commission on Irrigation and Drainage (ICID), 5 presenters, 3 hrs.

28 January 2022, “Planet Science Training: Introduction to PSScene Assets,” Planet, Inc., Webinar, 1 hr.

6 and 7 December 2021, “ASABE/IA 6th Decennial National Irrigation Symposium,” Beyond 2020 – Vision of the Future, San Diego, CA, in person meeting, ~16 hrs.

14 and 15 September 2021, “LICOR Online Eddy Covariance Training Course,” LICOR, Inc., Lincoln, NE, 14 hrs., through Zoom.

23 and 24 June 2021, “GCIM Mentor Well Program,” CSU Graduate School - Graduate Center for Inclusive Mentoring (GCIM), advances best practices mentoring by faculty. Faculty develop mentoring skills to elevate the personal and professional wellbeing of their mentees through scientifically based, effective methods. 12 hrs., through Zoom. Fort Collins, CO

11 June 2021, “2021 Agriculture Faculty Academy: Innovations in Surface Irrigation and Conveyance Systems,” Irrigation Association (IA), Sponsored by Rain Bird, webinar Zoom, 1 hr.

07 June 7, 2021, “NSF Proposal Preparation,” Spring 2021 Virtual Grants Conference, Zoom, 1 hr.

21 April 2021, “Beyond COVID: Providing Student Choice in Course Delivery with Hybrid Teaching”, ECHO360 webinar, through Zoom, 1hr.

18 March 2021, “Irrigation Technology Management and Scheduling,” Irrigation Association, Netafim, and Valley, webinar, Gotowebinar. 1 hr.

12 March 2021, “MATLAB Onramp,” basic course training online (self-paced), MathWorks Inc.

11 March 2021, “The Future of Agriculture in America: The Role Irrigation Plays in Sustainability,” Irrigation Association, Education Week, co-sponsored by Netafim and Valley, Thu, Webinar, 2:00 PM - 3:00 PM EST.

10 March 2021, “Matlab for new users,” MathWorks, Webinar, 2 hrs.

26 February 2021, “Planet Google Earth Engine Integration,” Planet, webinar.

04 February 2021, “Precise Irrigation with actionable insights from satellites,” Irrigation Association, webinar 1 hr, co-sponsored by Netafim and Valley.

17 December 2020, “Sustainability of Irrigated Agriculture in the Central Valley of California,” via GoToWebinar, Irrigation Association, Education Week+, webinar delivered by Dr. Isaya Kisekka, Sponsored by IA, Netafim, and Valley.

16 December 2020, “Irrigation Workshop,” North Dakota State University Webinar.

10 December 2020, “FY 2021 AFRI Sustainable Agricultural Systems RFA Webinar.”

09 December 2020, “E3 Ag Career Panel,” Irrigation Association, IA, 1:15 hrs webinar.

08 December 2020, “E3 Program: Sponsor Time with The Toro Company,” IA, 2 hours.

04 December 2020, “Irrigated Soils,” Irrigation Association (IA) Education Week, 2 hours.

30 Nov – 03 Dec 2020, “Drip Irrigation Design and management,” Irrigation Association (IA) Education Week, course for the certified agricultural irrigation specialist program, 16 hours.

30 Nov – 03 Dec 2020, “Agricultural Irrigation Management,” Irrigation Association (IA) Education Week, E3 Winner, 16 hours.

19 November 2020, “IIC Research Steering Committee Webinar,” Organized by the Irrigation Innovation Consortium, FFAR, 12:00 pm.

18 November 2020, “Office of International Science & Engineering Webinar,” NSF 2020 virtual grant conference webinar series, 1:00 pm MST.

05 November 2020, “Agricultural Irrigation Summit,” Organized by the Irrigation Association, Sponsored by Netafim, Lindsay, Jain, and Valley irrigation industries, webinar, 9:00 am – 1:30 pm.

14 October 2020, “Towards A Sensor Fusion Future: A Deep Dive Into Planet's New Seamless, Gap-filled Analysis Ready Data,” Rasmus Houborg Geospatial Systems Engineer and Scientist, Webinar, Planet Explore 2020 Conference, From Discovery to Impact.

14 October 2020, “CSU Food Systems/Community Development Webinar Series: Dr. Sonia Kreidenweis and Dr. Jan Leach Opportunities for Cross-College Collaboration: Connections between CSU's Colleges of Agricultural Sciences and Engineering. Webinar, 12:00 pm MDT. Fort Collins, CO. You can now find the webinar posted here: <https://foodsystems.colostate.edu/webinars/>.

11 August 2020, “Save Time and Speed Up Image Processing and Analysis With ENVI Server,” L3Harris, webinar, 12:00 pm MDT, Broomfield, CO. <https://www.harrisgeospatial.com/>

07 August 2020, “Evaluation of Smart Irrigation Controllers,” by Mark Crookston, Sponsored by the Irrigation Innovation Consortium (IIC), webinar interactive, Fort Collins, CO

05 August 2020, “CSU Online Open House in Canvas,” CSU Online, webinar, several presenters, 8 am

05 August 2020, “CSU Online ECHO360 Open Lab,” CSU Online, Marianne Bauer, webinar, 1 pm

13-15 July 2020, “2020 ASABE Annual International Meeting (AIM),” American Society of Agricultural and Biological Engineers, virtual meeting,
https://www.asabemeetings.org/documents/Virtual%20Agenda_updated7_7.pdf

30 June 2020, “Strengths Based Leadership,” CSU Training and Organizational Development, 9:00 am – 11:30 pm, CSU, FC, CO

12 June 2020, “Automation & Monitoring Tools for Ag,” Irrigation Association (IA) Ag Faculty Academy webinar series. Friday, June 12, 1-2 p.m. EST,

11 June 2020, “Remote Sensing & Use of Aerial Imagery in Ag.,” Irrigation Association (IA) Ag Faculty Academy webinar series. Thursday, June 11, 4-5 p.m. EST.

11 June 2020, “Irrigation Design: IRRICAD,” Irrigation Association (IA) Ag Faculty Academy webinar series. Thursday, June 11, 12-13 p.m. EST.

01 May 2020, “Cost-Effective Flow Monitoring for Agriculture,” webinar by In-Situ, 7-8 a.m.

02 February 2020, “The Fulbright U.S. Scholar Program: What's New for 2021 – 2022,” online IIE, 12 – 13 pm.

17 June 2019, “Inclusive Excellence Part 1: Diversity and Inclusion at CSU,” CSU Training and Organizational Development, 9:00 am – 11:30 pm, CSU, FC, CO

24 April 24, 2019, “Mindset for Supervisors,” CSU Training and Organizational Development, 8:30 am – 12:30 pm, CSU, FC, CO

16, 17, 18 April 2019, “Eddy Covariance Training Course”, LI-COR Biosciences, Lincoln, Nebraska.

10 April 2019, “How to calibrate an infrared thermometer,” webinar through webex, FLUKE, Wednesday, April 10, 2019 7:00 am, Pacific Daylight Time (San Francisco, GMT-07:00).

4 April 2019, “Inclusive Excellence Part 2: Uncovering Bias,” CSU Training and Organizational Development, 1 – 3:30 pm, CSU, FC, CO

3 April 2019, “Coaching Basics for the Workplace,” CSU Training and Organizational Development, 9 am – 12 pm, CSU, FC, CO

25 October 2018, “Keeping Up with GIS Technologies: open source/free geospatial technologies as QGIS, Spatial SQL with PostGIS, Python, and Big Data Analytics with Manifold.” Organized by CSU Geospatial Centroid,” at CSU Morgan Library, 9 am -4:30 pm, CSU, FC, CO

11 July 2018, “Hidden Gems in the Western Hemisphere,” Fulbright, instructor Peter Raucci, Outreach and Recruitment Specialist, Institute of Int’l Education, Webminar, 12 – 13 pm MDT.

9 April 2018, “Supervisor Development Program: Rules of the road,” CSU Human Resources, CSU OEO, instructor: Mark Flynn, 1-5 pm, CSU, Fort Collins, CO

5 March 2018, “Place-based Agricultural Monitoring Using Satellite Data and Cloud Computing,” Webinar delivered by Dr. Dan McEvoy, WRCC (Western Regional Climate Center) Regional Climatologist, sponsored by the Desert Research Institute and University of Idaho, delivered through Zoomlink.

31 January 2018, “Implementing Variable Rate Irrigation,” 12pm – 1pm (MST). Irrigation Association, Irrigation Foundation.

8 December 2017, “Proposal & Award Policies & Procedures Guide (PAPPG) Update Webminar with NSF,” By Gene Feldman, via YouTube. 2-3:15 PM EST

7 December 2017, “ASCE Webminar: Applications of Remote Sensing to Water Resources Engineering,” 12pm – 1pm. Presentation of the American Academy of Water Resources Engineers.

4 August 2017, “WEKA – Data Mining Software in Java,” emerging data management software suitable for modeling and forecasting, Speaker: Dr. Sajjad Ahmad, University of Nevada Las Vegas, US-Pakistan Center for Advanced Studies in Water (USPCASW), Jamshoro, Pakistan

3-4 August 2017, “Human Subjects Research Workshop Overview,” including statistical analysis and software, Speaker: Dr. Jim Van Derslice from University of Utah, US-Pakistan Center for Advanced Studies in Water (USPCASW), Mehran University of Engineering and Technology (MUET), Jamshoro, Pakistan

11 May 2017, “Successful Ag Water Leasing in Colorado: Real-world Examples of How Alternative Transfer Mechanisms (ATMs) Work for Irrigators,” Speakers: Chris Kraft and Jack Goble, Host: Colorado Cattlemen's Association, Thu, May 11, 12:00 pm | 1 hr 15 min. Webinar through Cisco Webex.

25 April 2017, “A Booming Interest in Groundwater Conservation in Kansas - Why Now?,” Speaker: Dr. Bill Golden, OWCAP webinar, USDA NIFA CAP Ogallala project, through Extension Zoom, Colorado State University

8 April 2017, “ICID Webinar on Water Accounting and Audit,” Speaker: Dr. Win Bastiaanssen (UNESCO), through YouTube, International Commission on Irrigation and Drainage (ICID).
http://www.icid.org/icid_webinar.html

10 January 2017, “Up in the Sky! What you Need to Know About Flying Unmanned Aircraft Systems at CSU,” Professional Development Institute, Colorado State University, Fort Collins, CO

9 January 2017, “Introducing CSU’s New Supervisory Development Program, TA DA!,” Professional Development Institute, Colorado State University, Fort Collins, CO

9 January 2017, “Beginner Active Assailant: Emergency Classroom Preparedness,” Professional Development Institute, Colorado State University, Fort Collins, CO

9 January 2017, “Publish or Perish: Effective Writing Practices to Help You Flourish!,” Professional Development Institute, Colorado State University, Fort Collins, CO

28 October, 2016, “Opentober, open access, open data, open education, October 2016” Open Access Symposium, Morgan Library Event Hall, Colorado State University, Fort Collins, CO

28 September, 2016, “Unmanned Aerial Systems (UAS),” seminar presented by Trihydro, sponsored by Rocky Mountain States Section of the Air & Waste Management Association, Fort Collins, CO.

10 August, 2016, Workshop, “Irrigation Water Management: Infiltration Physics & Plant Available Water Concepts,” Natural Resources Conservation Service, CoBank Center for Agricultural Education, CSU-ARDEC, Fort Collins, CO

9 August, 2016, Webminar, “Geospatial Analytics in the cloud with ENVI and Amazon web services,” Harris Geospatial Solutions and Amazon webservices, via Goto Webminar.

17 July, 2016, Workshop, “Hyperspectral Imaging and Data Analysis,” Continuing professional development course, 8 hrs, presented by USDA ARS at the ASABE Int’l Meeting, Orlando, FL.

17-18 May, 2016, Workshop, “Wyoming Unmanned Aerial Vehicle Symposium,” Marian H. Rochelle Gateway Center, University of Wyoming, Laramie, Wyoming.

11 May, 2016, Webinar, “Get the Most from Your UAV and Aerial Data,” Harris Geospatial Solutions and Exelis VIS, via Goto Webminar.

29 March, 2016, Webinar: "Partnership Pays: Building a Relationship with ARS to Enhance Your USDA SBIR Proposal", Arkansas Small Business and Technology Development Center, via Goto Webminar.

18 March, 2016, Webinar: Using Soil Moisture Sensors. Irrigation Association (IA), via Goto Webminar.

10 March, 2016, Webinar: UAV image import and processing in ERDAS IMAGINE Photogrammetry. Hexagon

Geospatial, via WebEx Event Manager.

09 March, 2016, Webinar: UAS and Remote Sensing - The Present and the Promise. Sponsored by American Society of Agronomy (ASA). Delivered by Nathan Stein, Ag Solutions Manager, SenseFly.

18 March 2016, Webinar: Using Soil Moisture Sensors, by Brent Mecham, Diganta D. Adhikari, and Jon J. Peters, Irrigation Association.

29 February, 2016, Informational Roundtable on Ownership of Academic Materials at CSU, CSU Chapter of the American Association of University Professors (AAUP), CSU, Fort Collins, CO.

23-24 February, 2016, Central Plains Irrigation Conference and Exposition, February 23-24, 2016, City Limits Convention Center, Kearney, Nebraska.

25 March 2015, Webinar: ET & Plant Factors, dealing with drought & deficit irrigation, by Brent Mecham, Industry development director, Irrigation Association.

30 September 2015, Search Chair Training, OEO, CSU.Comm

ADVISING:

UNDERGRADUATE STUDENTS ADVISED: 50

GRADUATE STUDENTS CURRENTLY ADVISED (Research Committee Chair):

Adwoa Amankwaa (PhD), started Spring 2024

Debashree Halder Tuli (MS), Fall 2023

Kieri Karpa (MS), started Spring 2024

Grady Cole (ME), Fall 2023

Ryan Kelley (ME distance), Fall 2022

Zaid M. Al-Majali (MS), Fall 2022

Zachariah Malach (ME), Fall 2022,

Jamie Lynn Royer (ME), Fall 2021

Edson Costa Filho (PhD), started Fall 2019, anticipated graduation Spring/Summer 2024

Current Graduate Committee Memberships (excluding those chaired): 1 PhD level

Current: Donna Harrison (PhD)

Past: Ivan Arias Hernandez (PhD, Chandra, 2023), Jason Eugene Hodkin (PhD, Chandra, 2022), Maria Cristina Capurro (PhD, Andales, 2023), Ahmad Shukran Sahaar (PhD, Niemann, 2023), Ansley Joseph Brown (MS, defended MS Thesis on 10/25/21, advisor Andales), Sergio D. Graniello (MS, Chandra, defended on 06/21/21), Ryan Gooch (PhD, Chandra, graduated in the Spring of 2020), Clive Peter Sugama PhD syst. Eng. (Chandra, graduated on Fall 2020), Haiming Tan (MS computer science, Chandra, graduated in Sp 2018) Wesley Gunnar White PhD in syst. Eng. (Chandra, graduated in 2018), Bilal Alpaslan (MS Plan B, graduated F2017), Saddam Qahtan Waheed (PhD, Jorge R.), Peter Goble (MS, Atmospheric Science, Russ Schumacher, Nolan Doesken, defended on 02/08/15) defended Sp 2016, Dave Barnard (PhD, Horticulture, Bill Bauerle), Armin Sabet (MS Plan B, CEE, Ryan Bailey) submitted final report and approved March 2015, Kelsey Dudziak (Dr. Neil Grigg) defended and graduated Sp 2015. PhD student Camilo Riveros Burgos (Universidad de Talca, Chile). Graduate Committee Memberships (for past 5 years, not including those above)

Graduate Degrees Completed Under Your Supervision:

Brian Craig (MS), Fall 2023

Garrett Banks (ME), Fall 2021

John Porter (ME), Spring 2021

Edson Costa Filho (MS), Summer 2019

Sumit Gautam (MS), Summer 2018

Mahmoud Soliman (ME), Summer 2017

Jeffrey Hathaway (MS), Spring 2016

Semin Barlak (MS), Fall 2016

Abhinaya Subedi (PhD), Fall 2016
Amandeep Vashisht (MS), Fall 2016
Ryne Schroder (MS), Spring 2016
Emily Kullberg, 2015, MS
Ramsey Pickard, 2015, MS Plan B
Brenna Mefford, 2014, MS
Mcebisi Mkhwanazi (PhD), Spring 2014
Evan Rambikur, 2012, MS
Jordan Varble, 2011, MS
Stuart Joy, 2011, MS

POSTDOCTORAL STUDENTS/RESEARCH ASSOCIATES hosted:

Dr. Francisco Montoya, Spain, September – December 2023
Dr. Juan Manuel Sanchez, Spain, Visiting Scholar, April – August 2022
Doctoral candidate, Liyuan Zhang, China, Fall 2019 – Fall 2021, Research Associate
MS. Ashish Masih, India, Fall 2017 – Spring 2020, Research Associate
Dr. Saleh Taghvaeian, 2011-2013, Postdoctoral Fellow
Dr. Ming Han, Dec 2015 – May 2017, Postdoctoral Fellow
Dr. Ramón López-Urrea, Spain, Jan-April 2016, Visiting Scholar
MS. Ilyes Chalgaf, 2012, Visiting Scholar
Doctoral candidate, MS. Camilo Riveros-Burgos, Chile, May-Aug 2017, Visiting Scholar
Dr. Aymm Elhaddad, Fall 2017 – 2019, Research Associate

Descriptions of Mentoring Activities (visiting scholars)

Fall 2019-2021: Liyuan Zhang, PhD student in Agricultural Engineering, College of Mechanical and Electronic Engineering, Northwest A&F University (985), Yangling, Shaanxi, P.R. China.
Fall 2018: Waqas Inam, thru USPCASW. MS Thesis research mentoring (Mapping soil salinity).
Spring 2018: Nabeel Khan, thru USPCASW. MS Thesis research mentoring (METRIC algorithm application).
Summer 2013 and April 2014: Zain Nawaz, vising engineer from the Water Management Research Centre, University of Agriculture Faisalabad (UAF), Faisalabad, Pakistan. Mentoring was provided in regards to computations of reference crop (alfalfa and grass) evapotranspiration using agricultural weather station (network) data, the REF-ET software and applications in MS Excel spreadsheets. Also, on on-demand irrigation decisions by implementing an irrigation scheduling program based on a soil water balance approach. Mentoring was provided throughout the summer of 2013 when he visited CSU, throughout the Fall of 2013 via distance mode, and in Pakistan in April of 2014.
Summer 2012: Ilyes Chalgaf, a PhD candidate from the Centro de investigación y tecnología agroalimentaria de Aragón (CITA-DGA), Unidad de Suelos y Riegos, Zaragoza, Spain, was mentored during the summer of 2012 on mapping crop water use using satellite imagery and several energy balance based remote sensing algorithms.

Evidence of Outreach/Service

SUMMARY OF EXTENSION WORK

As part of the CSU Extension Water Team, I have participated in outreach activities both nationally and internationally. Briefly, my role as an extension specialist in irrigation and drainage engineering is to assist farmers directly (through emails and phone calls), and to assist extension agents with technical advice and material regarding pressing issues in different counties in Colorado (e.g., drought and irrigation management, soil moisture sensor selection/installation, etc.). Besides direct communications with extension agents during the year there is an annual CSU Extension Forum (typically in November) where Extension Specialists participate to discuss county technical assistance needs.

Other activities have included writing fact sheets, presenting in extension related workshops and seminars, presenting research results at local, state, and national conferences, publishing research results in journal articles,

seeking funding for research and extension activities from local farmer associations, water conservation districts, the state of CO, and federal agencies (e.g., USDA).

In particular, I have been part of several workshops and seminars contributing to the topics of soil moisture sensors, infra-red thermometry, and remote sensing in the improvement of irrigation water management. Also, every year I am invited to be a speaker at the Central Plains Irrigation Conference, organized by the Central Plains Irrigation Association (CPIA). Every year the location of the presentation rotates among Burlington (CO), Kolby (KS), and Kearny (NE).

In terms of coordinating with Extension specialists at the national level, I am a member (Chair in 2015) of the Western Extension and Research Activities (WERA-1022) group. In particular, I participate in WERA in the topic of irrigation scheduling, crop coefficients, and weather station data.

A working relationship has been developed with the following institutions to better address their knowledge needs: USDA-ARS, State Water Resources Division, Central Colorado Water Conservancy District, Northern Colorado Water Conservancy District, West Greeley Conservancy District, and CSU faculty from different Departments.

COMMITTEES

University Committee

CSU Drone Center Steering Committee member, 2018-2023

CSU Irrigation Innovation Consortium (IIC) Advisory Committee member, 2018-2022

Faculty Council At-large member representing the College of Engineering, 2013-2016,
Executive committee of the faculty council, 2015-2016,

College Committee

Search Committee Chair, Spring-Summer 2018 (March-June), for UAS Center Coordinator.

Department Committees

Awards Committee, 2014-2016,

Graduate Admission Committee (GAC), 2010-2014,

Borland Committee, Chair of Hydrology, 2013- 2016,

Internal Departmental (CEE) Advisory Committee, 2013-present,

Graduate Instructional Committee (GIC), 2009-2012, Fall 2021 - present

Other Committees

USCID Fall 2023 meeting organizing committee

CoWC Colorado Water Center Student Water Fellows faculty lead, Dec 2022-2023

Foundation for Food and Agriculture Research, FFAR-IIC research steering committee, 2020-2022

ASABE MS-60, Unmanned Aerial Systems, 2017-2020

CoAgMet network advisory board, 2016-present,

CSU Extension Water Team, 2009-present,

Food Security & Sustainability, co-organizer of session (and panelist) entitled “How Technology Can Contribute Significantly to Improving Agricultural Water Management.” Nov 29, 2016, CSU, Fort Collins, CO

USCID Fall 2016 meeting organizing committee

ET workshop organizing committee (Fall 2016), ASCE EWRI

CSU-Extension Search Committee, 2010, to fill four 4H STEM positions

USDA ARS Remote Sensing Physical Scientist Search committee panel member, 2014

Evapotranspiration Committee (Task Force) of the American Society of Civil Engineers (ASCE) Environmental and Water Resources Institute (EWRI), 2009-2015

USCID Fall 2013 Conference planning committee

WERA-1022, Western Extension and Research Activities group, Irrigation Scheduling and Weather Station data committee. Chair 2015-2016

USDA ARS LIRF, FC CO, focus group discussion, 21 Aug 2015, Greeley, CO

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

Memberships in professional societies

American Society of Civil Engineers (ASCE), American Society of Agricultural Engineers (ASABE), Irrigation Association (IA), and United States Commission on Irrigation and Drainage (USCID).

Office in professional societies

Chair, 2015-2016, and Vice-Chair, Secretary, 2014-2015, Western Extension and Research Activities (WERA-1022). Meteorological and Climate Data to Support ET-based Irrigation Scheduling, Water Conservation and Water Resources Management.

Review/editorial boards

Associate Editor, ASCE Journal of Irrigation and Drainage Engineering, 2020-present

Editor-In-Chief, Irrigation Science Journal, 2018-2020,

Associate Editor, Irrigation Science Journal, 2013 – 2018,

Associate Editor, Agronomy Journal, 2017-2018,

Grant Refereeing

Research proposal review for the US-Israel Binational Agricultural Research and Development Fund (BARD), Dec. 07, **2023**.

Research project proposal (reviewer) for the Israel Ministry of Science and Technology, China-Israel Scientific Research program, September 30, 2021.

Research proposal review (panelist) for the US-Israel Binational Agricultural Research and Development Fund (BARD), Feb. 27-29 @ March 1st, **2021**, virtually via MS Teams.

Project proposal reviewed for the **Natural Sciences and Engineering Research Council of Canada**, on December 14-17, **2020**. Proposal title “NSERC CREATE in DATA4Ag - Digital Applications and Technology Adoption for Agricultural Production Systems.” Report submitted on 17 December **2020**.

Irrigation Innovation Consortium (IIC) 2021-2022 period grant reviewer. Reviewed three proposals. December **2020**.

Research proposal review for **FONDECYT-CHILE (Chilean National Science and Technology Commission)**, submitted on October 15, **2020**.

Foundation for Food and Agriculture Research, Research proposals (3) reviewed on August 16-19, **2020**

Research proposal review for the US-Israel Binational Agricultural Research and Development Fund (BARD), February 27-29, **2020**, Baltimore, MD.

Research proposal review for Arkansas Biosciences Institute at Arkansas State University, December, 2018

Research proposal review for the Foundation for Food and Agriculture Research (FFAR), October 16, 2018

Research proposal review for the Israeli Ministry of Education, German-Israeli Cooperation, September 3, 2018

Research Proposal for an international organization, NWO division Earth and Life Sciences, Netherlands, 2014

Research Proposal for FONDECYT-CHILE (Chilean National Science and Technology Commission), December 16, 2016.

Manuscript Refereeing (reviewer)

Agricultural and Forest Meteorology

Journal of Applied Remote Sensing (JARS)

Hydrological Processes

Journal of Hydrology

Remote Sensing
Agricultural Water Management
ASCE Journal of Irrigation and Drainage Engineering
Soil Science Society of America
Transactions of ASABE
Applied Eng. in Agriculture
Remote Sensing of the Environment
Water Resources Research
Irrigation Science
Acta Horticulturae
Agronomy Journal

OTHER ACTIVITIES/ACCOMPLISHMENTS – SERVICE/OUTREACH

Member of the USCID 2023 Conference organizing committee. Fort Collins, CO.

Evaluated the promotion dossier of an assistant professor of the Civil and Environmental Engineering Department of Utah State University, who applied for promotion to associate professor. Submitted on 03 November 2022.

Evaluated the promotion dossier of a Cooperative Extension professor from the University of California, Davis, who applied to be promoted to full professor. Submitted on 22 August 2022.

Field Day: Delivered a presentation on “Sensors/Tools for Evapotranspiration, crop response and farm water management,” at the USDA ARS LIRF Field Day, Greeley, CO. Approximately 120 farmers, consultants, and engineers attended the event, on 08/04/2022.

External evaluation of the PhD Candidate’s Profile within the new Engineering Doctoral program, Universidad Católica del Maule, Talca, Maule, Chile, on 10.07.2021.

USDA ARS Scientist promotion interview provided, 02/19/2021

Informational Interview - Spanish Affinity Coach and Mentoring – JFK, Nathalie Valencia (DPS), 02/03/2021

Cooperative Agreement with USDA ARS, Dr. H. Zhang, period: 09/01/2020 – 08/30/2023

Interviewer for a CSU ECE faculty position. Interviewed Dr. H. Chen on Thursday March 26, 2020.

Chair (moderator) of the Soil Moisture - Salinity - Water & Health I session in Hydrology Days, AGU, Colorado State University, March 20, 2018, Fort Collins, CO.

Chair (moderator) of the Eco-Hydrology – Interdisciplinary WATER research session in Hydrology Days, AGU, Colorado State University, March 23, 2015, Fort Collins, CO.

Outside reviewer for report entitled “Validation, Calibration, and Improvement of Remote Sensing ET Algorithms in Mountainous Regions,” for The New Mexico Water Resources Research Institute, 2014

Provided technical advice regarding crop evapotranspiration models to Dr. José Salas for his “Introduction to Hydrology” Chapter. Handbook of Engineering Hydrology, Vol.15 Modern Water Resources Engineering, Eds. Lawrence k. Wang and Chih Ted Yang. Humana Press, Springer Science 2014.

CEE Department Irrigation and Drainage (IRR) Engineering Program Coordinator, 2013-present

CSU Engineers Without Borders (EWB), Advisor, 2009

5th National Decennial Irrigation Conference, Proceedings Associate Editor, Associate Editor, 2010