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Civil and Environmental Engineering
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EDUCATION

Ph.D. 2011 Utah State University, Logan, Utah: Civil and Environmental Engineering
M.S. 2006 Utah State University, Logan, Utah: Biological and Irrigation Engineering
B.S. 2000 La Molina National Agrarian University: Agricultural Engineering

ACADEMIC EXPERIENCE

2017-current: Assistant Professor, Civil and Environmental Engineering, Utah Water Research Laboratory, Utah State University, Logan, UT.

2013-2017: Research Engineer, Utah Water Research Laboratory, Utah State University, Logan, UT.

2011-2013: Post-doc Fellow, Utah Water Research Laboratory, Utah State University, Logan, UT.

2007-2011: Graduate Research Assistant, Utah State University, Logan, UT.

2006-2007: Graduate Research Assistant, Utah State University, Logan, UT.

AWARDS

- USU Graduate Research Assistantship 2007-2011
- Scholarship - Broadening Participation in Data-Mining Workshop (2012)
- USU Graduate Research Assistantship 2006-2007

CURRENT/RECENT RESEARCH PROJECTS

Current Projects

1. Verification of Water Conservation from Deficit Irrigation Pilot Projects in the Upper Colorado River Basin (Walton Family Foundation & S.D. Bechtel, Jr. Foundation); 2015-2017, \$146,000, (Torres, Co-I, ~\$85,000).
2. Using High Resolution Remote Sensing Information for Yield Estimation under Deficit Irrigation (USU Extension Grants); 2016-2017 \$25,260, (Torres, Co-I, ~\$20,000),
3. Satellite-Based Estimation of Actual Evapotranspiration of Golf Course Cool Season Turf, (US Golf Association); 2017-2019, \$90,000 (Torres, Co-I, ~\$10,000)
4. Monitoring Vineyard Water Use and Vine Water Status with Land Surface Temperature for Improved and Sustainable Water Management from Field to Regional Scales (NASA), 2017-2019, \$1,347,823. (Torres, PI, ~\$800,000),
5. Use of sUAS for mapping wetland flow paths and consumptive use on the San Rafael River, Utah, (USGS State Water Resources Research Institute (WRII) Program); 2017-2018, \$39,000, (Torres, PI, ~\$39,000),

Completed Projects

6. Utility of Evapotranspiration and Plant Stress Mapping over Vineyards Using UAS High Resolution Remote Sensing Data, (ARS-USDA); 2014-2016; \$24,000 (Senior Personnel),
7. Sevier Basin Soils Moisture Forecasting, (Utah Mining Lease Funds), 2011-2015, \$50,000 (Senior Personnel)

8. Spatial Crop Water Demand Monitoring for the State of Utah, (Utah Mining Lease Funds); 2014-2016 \$50,000 (Senior Personnel)
9. USU College of Agriculture for Estimation of Vegetation Water Use at Urban Areas, (2015), \$5,000 (Senior Personnel).
10. USGS External Team for NASA Landsat servers for scientific applications (2013)

PEER REVIEWED PUBLICATIONS

Referred Journal Articles:

1. Hassan-Esfahani, L., Ebtehaj, A.M., **Torres-Rua, A.** and McKee, M., (2017). “*Spatial Scale Gap Filling Using an Unmanned Aerial System: A Statistical Downscaling Method for Applications in Precision Agriculture*”. *Sensors*, 17(9), p.2106. doi: 10.3390/s1709210. Impact Factor: 2.677
2. **Torres-Rua, A.** (2017). “*Vicarious Calibration of sUAS Microbolometer Temperature Imagery for Estimation of Radiometric Land Surface Temperature*”. *Sensors*, 17(7), 1499. doi:10.3390/s17071499. Impact Factor: 2.677
3. **Torres-Rua, A.**, Ticlavlilca, A., Bachour, R., McKee, M., (2016) “*Estimation of Surface Soil Moisture by Assimilation of Landsat Vegetation Indices, Surface Energy Balance Products and Relevance Vector Machines*”, *Water* 2016, 8(4), 167; doi:10.3390/w8040167. Impact factor 1.832
4. Hassan-Esfahani, L.; **Torres-Rua, A.**; McKee, M. (2015) “*Assessment of optimal irrigation water allocation for pressurized irrigation system using water balance approach, learning machines, and remotely sensed data*”. *Agricultural Water Management*. 153, 42-50. doi:10.1016/j.agwat.2015.02.005. Impact Factor 2.848
5. Hassan-Esfahani L, **Torres-Rua A**, Jensen A, McKee M. (2015) “*Assessment of Surface Soil Moisture Using High-Resolution Multi-Spectral Imagery and Artificial Neural Networks*”. *Remote Sensing* 7(3):2627-2646. doi:10.3390/rs70302627. Impact Factor 3.244
6. Elarab M., Ticlavlilca, A. M., **Torres-Rua, A. F.**, McKee, M., Maslova, I. (2015) “*Estimating chlorophyll with thermal and broadband multispectral high resolution imagery from an unmanned aerial system using relevance vector machines for precision agriculture.*” *International Journal of Applied Earth Observation and Geoinformation*, 2015, doi: 10.1016/j.jag.2015.03.017 Impact Factor 3.930
7. Bachour, R., Walker, W. R., **Torres-Rua, A. F.**, McKee, M., “*Assessment of Reference Evapotranspiration by the Hargreaves Method in the Bekaa Valley, Lebanon*”, *Journal of Irrigation and Drainage Engineering*, 139, 11, 933-938, 2013, doi:10.1061/(ASCE)IR.1943-4774.0000646. Impact Factor 1.983
8. **Torres-Rua, A. F.**, Ticlavlilca, A. M., Walker, W. R., McKee, M., “*Machine Learning Approaches for Error Correction of Hydraulic Simulation Models for Canal Flow Schemes*”, *Journal of Irrigation and Drainage Engineering*, 138, 11, 999-1010, 2012, doi: 10.1061/(ASCE)IR.1943-4774.0000489. Impact Factor 1.983
9. **Torres, A. F.**, Walker, W. R., McKee, M., “*Forecasting daily potential evapotranspiration using machine learning and limited climatic data*”, *Agricultural Water Management*, 98, 4, 553-562, 2011, Elsevier, doi: 10.1016/j.agwat.2010.10.012. Impact Factor 2.848
10. **Torres, A. F.**, Merkley, G. P., “*Cutthroat measurement flume calibration for free and submerged flow using a single equation*”, *Journal of irrigation and drainage engineering*, 134, 4, 521-526, 2008, doi: 10.1061/(ASCE)0733-9437(2008)134:4(521). Impact Factor 1.983

11. Weber, R. C., Merkle, G. P., Skogerboe, G., **Torres, A. F.**, “*Improved calibration of Cutthroat flumes*”, Irrigation Science, 25, 4, 361-373, 2007, doi: 10.1007/s00271-006-0052-x. Impact factor: 1.822

Book Chapter/Sections

None

CONFERENCE PAPERS

- **Torres-Rua, A;** (2017) “*Use of UAV for support of intensive agricultural management decisions: from science to commercial applications*”, SPIE Proceedings Volume 10218, Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping II; 102180A (2017); doi: 10.1117/12.2267725
- Hassan-Esfahani, L; **Torres-Rua, A.**; Jensen, A.; McKee, M. (2014) “*Topsoil moisture estimation for precision agriculture using unmanned aerial vehicle multispectral imagery*”. In Proceedings of the 2014 IEEE International Geoscience and Remote Sensing Symposium (IGARSS), Quebec City, QC, Canada, 13–18 July 2014; pp. 3263–3266. doi:10.1109/IGARSS.2014.6947175
- Al-Arab, Manal; **Torres-Rua, Alfonso F;** Ticlavilca, A; Jensen, A; McKee, M, (2013) “*Use of high-resolution multispectral imagery from an unmanned aerial vehicle in precision agriculture.*” Geoscience and Remote Sensing Symposium (IGARSS), 2013 IEEE International”, 2852-2855, 2013, IEEE. doi:10.1109/IGARSS.2013.6723419

PROFESSIONAL PRESENTATIONS

- 2017 - **Torres-Rua, A.**; “Remote Sensing as A Tool for Water Management”; USU Spring Runoff. Logan, UT.
- 2016 – **Torres-Rua, A.** “*Vicarious Calibration of sUAS Thermal Imagery for Scientific Remote Sensing Applications*”. American Geophysical Union – Fall Meeting.
- 2016 – Hassan-Esfahani, L.; Ebtehaj, A.; **Torres-Rua, A.**; Jensen, A.; McKee, M.; “*Application of Unmanned Aerial Systems in Spatial Downscaling of Agricultural Parameters*”. American Geophysical Union – Fall Meeting
- 2015 - Nieto, H; Kustas, W; **Torres-Rua, A;** Al-Arab, M; et al; “*Advances in the Two Source Energy Balance (TSEB) model using very high resolution remote sensing data in vineyards*” American Geophysical Union – Fall Meeting.
- 2015 – **Torres-Rua, A.**; Ticlavilca, A.; Bachour, R.; McKee, M. “*Spatial Surface Soil Moisture Using Landsat VI, ET, And Relevance Vector Machines*”, UCOWR/NIWR/CUAHSI, Las Vegas, NV.
- 2015- King, T; Nielson, B, Jensen, A; **Torres-Rua, A;** et al.; “*High resolution channel geometry from repeat aerial imagery*” American Geophysical Union – Fall Meeting.
- 2015- McKee, M; **Torres-Rua, A;** **Al-Arab M;** Hassan-Esfahani, L; Jensen, A; “*Use of UAS to Support Management in Precision Agriculture: The AggieAir Experience*” American Geophysical Union – Fall Meeting.
- 2012 - American Geophysical Union – Fall Meeting, San Francisco, CA.
- 2012 - AWRA – 40th Annual Utah Session Water Resources Conference, Salt Lake City, UT.
- 2012 - SIAM International Conference in Datamining, Anaheim, CA.

- 2012 - Utah State University – Spring Runoff Conference, Logan, UT.
- 2010 - Utah State University – Spring Runoff Conference, Logan, UT.
- 2010 - Utah Water Users Workshop, St. George, UT.
- 2009 - AWRA – Summer Specialty Conference, Snowbird, UT.
- 2008 - AWRA – Annual Water Resources Conference, New Orleans, LA.
- 2007 - USCID – International Congress of Irrigation and Drainage, Sacramento, CA.

AREAS OF EXPERTISE

Current Research Areas

- Identify and correct high resolution local phenomena affecting agricultural products in UAVs. (shadows, micro-topography, atmospheric conditions)
- Use of high resolution imagery for plant water use estimation in natural environments.
- Assess local and spatial rainfall sources for real-time agricultural water balance.
- Integrate high- and low-resolution imagery (UAVs and satellites) for vertical estimation of Evapotranspiration.
- Evaluating available cloud-solutions for bigdata/datamining approaches in agriculture.

Prior Areas of Research

- Develop water structure calibration and modeling approaches.

PROFESSIONAL ACTIVITIES

Reviewer:

Journals

(10) 2017

- (1) Hortscience: A Publication of the American Society for Horticultural Science
- (2) Journal of Irrigation and Drainage Engineering
- (1) Sensors
- (1) Journal of Applied Remote Sensing
- (1) Transactions of the ASABE
- (1) Remote Sensing
- (1) Irrigation Science
- (1) Advances in Space Research
- (1) Water

(5) 2016

- (1) Agricultural Water Management
- (1) Journal of Irrigation and Drainage Engineering
- (3) Water

Government Documents

None

Proposal Review Panels

None

Invited Lectures/Presentations

- 2017 – SACNAS, USDA Panel “From Science to Commercial Applications: UAVs for Decision Making in Agriculture”, Salt Lake City, UT.
- 2016 – AUVSI, “Using UAS in Agriculture: The AggieAir Experience”, New Orleans, LA.
- 2016 – Rural Water technology Alliance Workshop, “Emerging Opportunities for Using Satellite Data in Farm Operations (for almost Free!)”, Orem, UT.
- 2015 – SusTech, “Development of Unmanned Aerial Systems for Use in Precision Agriculture: The AggieAir Experience”, Salt Lake City, UT.
- 2015 – World Bank, “UAVs Applications for ET Mapping” in International Workshop on Evapotranspiration Mapping for Water Security. DC
- 2012 - Optimization and Learning Machine Models for Water Resources Management, La Molina Agricultural National University, Lima Peru.

Additional Service:

External

- (2013) Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH & Ministry of Economy of Peru.
- (2006) Utah Department of Natural Resources, Division of Water Rights on water delivery system improvements.

Internal

- (2013) USU– Peru MOU on research, capacity building and training in water resources.

PROFESSIONAL SOCIETIES

- American Geophysical Union – 2010-2016
- American Society of Agricultural and Biological Engineers– 2016-current
- American Society of Civil Engineers- 2011

SCIENTIFIC OUTREACH

Viticulture from Space: USU-NASA Study Analyzes Vineyard Water Use (2017). Utah State Engineer -USU. Oct 2, 2017 <https://engineering.usu.edu/news/2017-10-02-viticulture>. Accessed Oct 27, 2017.

Episode 4: Forecasting a Crop's Water Needs, Utah Public Radio (2013) – USU. October 22, 2013 <http://upr.org/post/episode-4-forecasting-crops-water-needs>. Accessed Oct 27, 2017

PROFESSIONAL DEVELOPMENT

- Google Earth Engine Workshop, Palo Alto, CA, 2017.
- NSF CISE Career Proposal Workshop, DC, 2017.
- Write Winning Grants Workshop, Logan, UT, 2017.
- USU Teaching Academy, 2017.
- Proposal Writing Institute, Logan, UT, 2016.

- NASA Applied Remote Sensing Training (2014 - present)
- METRIC – Spatial Evapotranspiration Workshop, 2012, Reno, NV (2012).
- Western States Evapotranspiration Workshop 2011, Boise, ID. (2011).
- Inter-American Development Bank, “Project Management Series” (2004).

STUDENTS

Current Graduate Students

- Mahyar Aboutalebi, Ph.D., CEE (Advisor)
- Ayman Nassar, Ph.D., CEE (Advisor)
- Tyler King, Ph.D., CEE (Committee Member)
- Leah Richardson, M.S., CEE (Committee Member)
- Irene Garousi, Ph.D., CEE (Committee Member)
- Kshitij Parajuli, Ph.D., PSC (Committee Member)

Undergraduate Students

None

Post-doctoral Fellows

MaryJane Diniz De Araujo Gomes, Spring 2017 (Visiting Fellow)

Previous Graduate Students

- Roula Bachour, Ph.D., CEE 2013 (Project Director)
- Manal Elarab, Ph.D., CEE 2016 (Project Director)
- Leila Hassan, Ph.D., CEE 2015 (Project Director)

TEACHING

University

- CEE5003/6003 Remote Sensing of Land Surfaces, Spring 2017, 2018
- CEE 5001/6001 Field Irrigation System Design and Evaluation, Fall 2016
- CEE 5008/6008 Management of Irrigation Systems, Spring, 2014

Workshops

- First Workshop on Data Mining Techniques applied to Water Resources (5 of 5 sessions)– Utah State University (2011).
- CEE 6410 - Water Resources Systems Analysis - Lecture on Datamining and Optimization (2013)
- CEE 6500 Open Channel Hydraulics – Lecture on Hydraulic Modeling (2011)
- BIE 6150 Surface Irrigation Design, - Lecture on Remote Sensing Applications (2010)
- CEE 6800 Division of Environmental Engineering Seminar - Lecture on Datamining (2009)