

# DR. ANA ANDREU

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## Education & Training

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**2018 (/2020)** Marie Curie Fellowship MSCA-IF-SWATCH GA 703978 Savanna WATER and Carbon fluxes modelling integrating Earth Observation data.

**2016/2017** Postdoc in the United Nations University, Institut for Integrated Management of Material Fluxes and of Resources, Dresden, Germany.

European leader of the TIGER project "Remote Sensing on water use and stress in African savanna ecosystem from local to regional scale: Implications for land productivity", start date February 2016, end date December 2017

**2015** Postdoc in the Dept. of Environmental Science, Policy and Management at the University of California (Berkeley).

Collaboration with D. D. Baldocchi.

**2010/2014 PhD in Biogeochemical Fluxes Dynamics and its Applications** (Cum laude), University of Córdoba (UCO) and IFAPA, Spain. *"Water monitoring in vegetation covers through multi-scale energy balance modelling using time series of remotely sensed data"*

**2013** Visiting scientist in the Department of Water Resources (WRS), Faculty of Geo-Information Science and Earth Observation (UT-ITC). University of Twente. Collaboration with **W. J. Timmermans**.

**2013** Data statistical analysis, IFAPA, Cabra. Co-funded by European Social Funds of Andalusia 2007-2013.

**2012** Visiting scientist: USDA ARS Hydrology and Remote Sensing Laboratory, US. Supervised by **Dr. William P. Kustas**.

**2012** 5<sup>th</sup> EUFAR FP7-EUROSPEC Training On "Regional Experiments For Land-Atmosphere Exchanges-REFLEX".UT-ITC.

**2011** Visiting scientist in the Forschungszentrum, Jülich, Germany. Supervised by **Dr. Graf**.

**2011** Integrated control over *dehesa*. IFAPA. Co-funded by the European Social Fund of Andalusia 2007.

**2011** Hydrological Applications of Geographic Information Systems (GIS). UCO. Córdoba, Spain

**2011** *Numerical Methods in Transport Processes in Aquatic Systems*. Prof. Eleuterio Toro. Trento Univ. UCO.

**2009/2010 MSc Environmental Hydraulics** – Watershed management (Outstanding), University of Granada and UCO, Spain. *"Vegetation water use monitoring over agricultural areas integrating satellite images into TSEB"*

**2008/2009 MSc Water and Sanitation Projects in International Cooperation**, Business School, EOI, Sevilla, Spain. *"Water advocacy strategy for Intermon Oxfam in Ethiopia"*

**2009** Creative communication management on NGOs, CIPO Company Creative Communication, Madrid.

**2002/2008 BSc Agricultural Engineering**, Polytechnic University of Valencia, Spain. N° 9/142 students. Dissertation (Outstanding) *"Effect of weaning age and commercially available oil Akomed R as a resource of fat and lipase addition on performance, digestibility of nutrients and animal carcass parameters"*

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## Research experience

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I'm a Marie Curie Fellow at Prof. Baldocchi Biometlab (**University of California, Berkeley**), with IFAPA Research Center (Cordoba, Spain) and Dr. Gonzalez-Dugo department as my core institution, modelling savanna water and carbon fluxes integrating multiple source-scale Earth Observation data. During this period I'm also collaborating with the USDA researcher Dr. William Kustas, and the wine project GRAPEX. During the end of 2015 I joined the **UNU-FLORES** institute (Dresden, Germany), where I was contributing to the development of the "Nexus Water-Soil-Waste approach", being also the European leader of the **TIGER project** "Remote Sensing of water use and water stress in African savanna ecosystem from local to regional scale: Implications for land productivity". After my PhD I was a postdoc in the Dept. of Env. Science, Policy and Management at the Univ. of California (Berkeley), also under the supervision of **Prof. Dennis D. Baldocchi**, where I continued my research on water dynamics over semi-arid ecosystems, evaluating the Tonzi savanna rangeland. I completed my **PhD in December 2014**, supervised by **Dr. González-Dugo** and Prof. Polo-Gómez. My studies focused on the assessment of surface energy balance components over complex Mediterranean ecosystems, integrating remote-sensed thermal/visible information into two-source models and distributed soil water balance approaches. My main research was conducted on productive Spanish oak savannas (*dehesas*), and to a lesser degree on agricultural landscapes and forest. During this period, I have acquired expertise in EO (ranging from sensor/satellite image acquisition to data/image

processing and its application in hydrology modelling) and micrometeorological techniques (Eddy Covariance-EC towers, including programming and set-up of instrumentation, design of protocols, maintenance, and data post-processing). I have been responsible for setting up and maintaining the Santa Clotilde EC experimental site during my graduate period, supervising and training the IFAPA group. I have participated in several airborne-UAV flights campaigns, and have relevant expertise in field radiometry and biophysical measurements to characterize vegetation. After the 5TH Regional Experiments For Land-Atmosphere Exchanges course, I started a collaboration with **Ir. Timmermans**, analysing the influence of observed thermal components in dual-source energy flux estimates, which led to a scientific visit (UT-ITC, The Netherlands). In 2012 I was supervised by **Dr. Kustas** as a visiting scientist at the USDA ARS HRSL (USA), analysing the influences of complex woody ecosystems on TSEB. Early in my PhD studies I was trained by **Dr. Graf** in EC technique and flux data post-processing, as a visiting scientist on the Institute of Bio- and Geosciences Forschungszentrum Jülich (Germany). During my **MSc in Environmental Hydraulics (2009/2010)**, I acquired experience in EO techniques, ecosystem water dynamics, numerical methods and programming. I was awarded a Researcher in Training Fellowship, to work with the Univ. of Cordoba, that I conducted before obtaining the Research in Training Fellowship from IFAPA, that better suited my abilities and concerns. My career shifted to water management and supply in 2008, when I started the **Water Supply and Sanitation Projects for International Cooperation MSc**, where I built a holistic understanding of global water use and supply problems, realising that European institutions and citizens have the responsibility to face these challenges. This period led to my involvement with the NGO Engineering Without Borders (ISF), with which I participated (2010) in the implementation of Gender and Socio-economic Indicators in a project with rural Peruvian communities. The knowledge gathered during this period reinforced my social perspective and communication skills. During my **BSc in Agricultural Engineering (2002/2008)** I acquired the physics-mathematics-biological knowledge that form the “base” of my current career. I can provide the contact information for several supervisorial references upon request.

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### Fellowships and awards

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2016 H2020-MSCA-IF-2015 SWATCH GA 703978. 239,191.20 €. Start date 1 February 2018.

2016 TIGER project 401 “Remote Sensing of water use and water stress in African savanna ecosystem from local to regional scale: Implications for land productivity” – Framework “TIGER Bridge” funded by the European Space Agency. A. Andreu (European leader) in collaboration with Dr. Dube (African leader). 31K€ Travel grant funded by the European Social Funds of Andalusia: 2015 ESPM Department UC Berkeley, US. 6050 €; 2013 ITC-UT, The Netherlands. 1268.85 €; 2012 USDA ARS, US. 3480.22 €; 2010 Forschungszentrum, Jülich, Germany. 2600 €.

2013 EC Student Grant to attend the Living Planet Symposium 2013, Edinburgh. 350 €.

2012 5<sup>th</sup> REFLEX EUFAR FP7-EUROSPEC Training Course funded and supported by EUFAR.

2010 Training programme for researchers, IFAPA, financed by European Social Fund of Andalusia. 76920 €.

2009 Scholarship to participate in the Otuzco III Cooperation Project with ISF. 2000 €.

2009 Training programme for researchers. Excellence Projects 2009. “Dynamic of suspended solids in estuaries”. 68000 €.

2009 Scholarship funded by the Education, Culture and Sport Ministry of Spain for MSc studies. 3200 €.

2008 Scholarship funded by EOI for studying Ms in Water & Sanitation in International Coop. Projects. 9000 €.

2007 EuRoPean Community Action Scheme for the Mobility of University Students (Erasmus). 3000 €.

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### Publications and submissions to international peer-reviewed journals.

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1. **Andreu A.**, William P. Kustas, Maria Jose Polo, Arnaud Carrara and Maria P. González-Dugo. Modeling Surface Energy Fluxes over a Dehesa (Oak Savanna) Ecosystem Using a Thermal Based Two Source Energy Balance Model (TSEB) II—Integration of Remote Sensing Medium and Low Spatial Resolution Satellite Images. *Remote Sens.* 2018, 10(4), 558; doi:10.3390/rs10040558
2. **Andreu A.**, William P. Kustas, Maria Jose Polo, Arnaud Carrara and Maria P. González-Dugo. Modeling Surface Energy Fluxes over a Dehesa (Oak Savanna) Ecosystem Using a Thermal Based Two-Source Energy Balance Model (TSEB) I. *Remote Sens.* 2018, 10(4), 567; doi:10.3390/rs10040567
3. González-Dugo, M.P. , Chen, X., **Andreu, A.**, Carpintero, E., Gómez-Giráldez, P., Su, Z. 2017. Evolution of evapotranspiration and water stress of oak savanna vegetation in the Iberian Peninsula (2001-2015). *Revista de Teledetección*, 50, 27-36. <https://doi.org/10.4995/raet.2017.8916>
4. Carpintero E., Gonzalez-Dugo MP., Hain H., Nieto H., Gao F., **Andreu A.**, Kustas WP. and Anderson MC.

- Continuous evapotranspiration monitoring and water stress at watershed scale in a Mediterranean oak savanna (2016). *Proc. SPIE* 9998, Remote Sensing for Agriculture, Ecosystems, and Hydrology XVIII, 99980N (October 25, 2016); DOI: [10.1117/12.2241521](https://doi.org/10.1117/12.2241521)
5. **Andreu A.**, Timmermans WJ, Skokovic D, González-Dugo MP. (2015) Influence of component temperature derivation from dual angle thermal infrared observations on TSEB flux estimates over an irrigated vineyard. *Acta Geophysica*. ISSN (Online) 1895-7455, DOI: [10.1515/acgeo-2015-0037](https://doi.org/10.1515/acgeo-2015-0037)
  6. Timmermans WJ, Kustas WP, **Andreu A.** (2015) Utility of an automated thermal-based approach for monitoring evapotranspiration. *Acta Geophysica*. ISSN (Online) 1895-7455, DOI: [10.1515/acgeo-2015-0016](https://doi.org/10.1515/acgeo-2015-0016)
  7. Corbari C, Timmermans WJ, **Andreu A.** (2014) Intercomparison of surface energy fluxes estimates from the FEST-EWB and TSEB models over the heterogeneous REFLEX 2012 site (Barrax, Spain). *Acta Geophysica*. ISSN (Online) 1895-7455, DOI: [10.2478/s11600-014-0258-x](https://doi.org/10.2478/s11600-014-0258-x)
  8. Timmermans WJ, [other 21 authors], **Andreu A.**, [other 21 authors]. (2014) An overview of the Regional Experiments For Land-atmosphere Exchanges 2012 Campaign. *Acta Geophysica*. ISSN 1895-7455, DOI: [10.2478/s11600-014-0254-1](https://doi.org/10.2478/s11600-014-0254-1)
  9. **Andreu A.**, González-Dugo MP, Kustas WP, Polo MJ, Anderson MC. (2013) Modelling surface energy fluxes over a *dehesa* ecosystem using a two-source energy balance model and medium resolution satellite data. *Remote Sensing for Agriculture, Ecosystems, and Hydrology XV*, C. M. U. Neale, A. Maltese (Eds.). *Proc. Of SPIE* Vol 888717; DOI: [10.1117/12.2029235](https://doi.org/10.1117/12.2029235)
  10. **Andreu A.**, González-Dugo MP, Aguilar C, Polo MJ, Carpintero E. (2012) Basin-scale evapotranspiration assessment based on vegetation coefficients derived from thermal remote sensing. *Remote Sensing for Agriculture, Ecosystems, and Hydrology XIV*, C. M. U. Neale, A. Maltese (Eds.), *Proc. Of SPIE* Vol 8531; DOI: [10.1117/12.974658](https://doi.org/10.1117/12.974658)
  11. González-Dugo MP, González-Piqueras J, Campos I, **Andreu A.**, Balbotin C, Calera A. (2012) Evapotranspiration monitoring in vineyard using satellite-based thermal remote sensing. In: *Remote Sensing for Agriculture, Ecosystems, and Hydrology XIV*, C. M. U. Neale, A. Maltese (Eds.), *Proc. SPIE* Vol 8531; DOI: [10.1117/12.974731](https://doi.org/10.1117/12.974731)
  12. **Andreu A.**, González-Dugo MP, Polo MJ, Padilla FLM, Gavilán P. (2011) Energy balance modelling of agricultural areas by remote sensing. In: *Remote Sensing for Agriculture, Ecosystems, and Hydrology XIII*, C. M. U. Neale, A. Maltese (Eds.), *Proc. SPIE* 8174; doi:10.1117/12.898040; DOI: [10.1117/12.898040](https://doi.org/10.1117/12.898040)

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### Book Chapters, policy papers and PhD dissertation

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1. **Andreu A.**, Kimonye E and Dube T. (2017) TIGER SAVANNA TOOL HANDBOOK, Remote Sensing of Water Use and Water Stress in African Savanna Ecosystem from Local to Regional Scale. Dresden: United Nations University Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES) <http://collections.unu.edu/view/UNU:6152>
2. Berger, V., Fan, F., Gabel, F., Galvão, P., Gies, M., Grabner, D., Langhans, S., Machado, A., Manzione, R., Matta, E., **Andreu A.**, de Moraes, M., Morihama, A., Macedo-Moura, P., de Paiva, A., Periotto, N., Porst, G., Rigotto, C., Roters, B., Schulz, S., Silva, T., de Sousa, M., Suhogusoff, A., Wahnfried, I., Wolf. (2017). How Do We Want to Live Tomorrow? Perspectives on Water Management in Urban Regions. German National Academy of Sciences Leopoldina, Brazilian Academy of Sciences, Centre for Water and Environmental Research at the University of Duisburg-Essen (Publishers), Halle/Saale, Rio de Janeiro, Essen.
3. **Andreu A.** (2014) Water monitoring in vegetation covers through multi-scale energy balance modelling using time series of remotely sensed data. (Doctoral dissertation) Published by the University of Córdoba. Directed by González-Dugo MP, and Polo MJ, review by Kustas WP, and Campos I, Thesis committee González-Piqueras J, Taguas EV, and Neale C. <http://hdl.handle.net/10396/12478>
4. Polo MJ, González-Dugo MP, Aguilar C, **Andreu A.** (2013) Surface soil moisture monitoring by remote sensing: applications to ecosystems processes and scale effects. In: *EARTH OBSERVATION OF ECOSYSTEM SERVICES*. Alcaraz Segura D, Di Bella CM, Straschnoy LV. CRC Boca-Ratón (FL, USA), Ch. 14, 293-318.

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### Oral and poster communications at international conferences and scientific workshops (15 selected)

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1. **Andreu A.**, Gonzalez-Dugo MP, Dube T. 2018. Remote e Sensing of Water Use and Water Stress in the African Savanna Ecosystem, from local to watershed scale. *Geophysical Research Abstracts*. Vol. 20, EGU2018-9646, EGU General Assembly 2018
2. Dube T, **Andreu A.**, Mudau T, Nieto H, Gonzalez-Dugo MP, Huelsmann S. Operational applications of the TIGER Savanna water-use/stress modelling framework in mapping and monitoring savanna rangelands

- water stress: A case of the Kruger National Parks, South Africa. 18th WaterNet 2017, 25<sup>th</sup> to 27<sup>th</sup> October
3. **Andreu A**, Dube T, Andreu, A, Dube T, Nieto H, Mudau A, Guzinski R, Kimonye E, Gonzalez-Dugo MP, Ramoelo A and Hülsmann S. 2017. "Monitoring of South African savanna's water use and water stress using Earth Observation data". Dresden Nexus Conference – DNC 2017, SDGs & Nexus Approach: Monitoring and Implementation.
  4. Dube T, **Andreu A**, et al., 2017. Exploring the joint potential of Sentinel 2 and 3 in monitoring water use and stress in African savanna ecosystems: a case of the Kruger National Park, South Africa. The 37th International Symposium on Remote Sensing of Environment, Earth Observation for Development and Adaptation to a Changing World (ISRSE37), Tshwane, South Africa, 8 – 12 May 2017.
  5. **Andreu** et al., 2017, Monitoring African savanna water use and water stress from local to regional scale: supporting rangeland management (pilot experience in Kruger National Park, South Africa). EGU General Assembly 2017, Vol. 19, EGU2017-15954, 2017.
  6. **Andreu A**, Dube T, Nieto H, Mudau A E, Guzinski R, Hülsmann S and González-Dugo MP. (2016) Remote Sensing of Water Use and Stress in African Savannah Ecosystem (Kruger National Park) from Local to Regional Scale: TIGER." 11<sup>th</sup> International Conference of the African Association of Remote Sensing in Kampala, Uganda (24<sup>th</sup> - 28<sup>th</sup> October 2016).
  7. González-Dugo MP, Chen X, **Andreu**, A, Carpintero E, Gomez-Giraldez P, Su Z. (2016) Water-stress monitoring of oak savanna woodlands using satellite thermal data. Nasa Direct Readout Conference (NDRC-9). The 9<sup>th</sup> International EOS/S-NPP Direct Readout Conference.
  8. Kustas WP, Nieto H, **Andreu A**, Kool D, Agam N and Alfieri J. G. (2016) Impacts of Differing Aerodynamic Resistance Formulae on Modeled Energy Exchange at the Above-Canopy/Within-Canopy/Soil Interface. 32<sup>nd</sup> Conference on Agricultural and Forest Meteorology. American Meteorology Society.
  9. **Andreu**, A, Ma, S, Verfaillie, J, González-Dugo, MP, Hulsman, S, Baldocchi, D. (2015) Scale-dependent effects on the surface energy fluxes modelling in heterogeneous/complex ecosystems using the Two-Source Energy Balance (TSEB). Abstract H31J-04 presented at 2015 Fall Meeting, AGU, San Francisco, CA, 14-18 Dec.
  10. Carpintero E, **Andreu A**, González-Dugo MP. (2015) Vegetation monitoring and estimation of evapotranspiration using remote sensing-based models in heterogeneous areas with patchy natural vegetation and crops. Vol. 17, EGU2015-945 2015, EGU General Assembly 2015.
  11. Timmermans WJ, **Andreu A**, Porte-Agel F, Albertson J. (2015) Influence of sub-grid scale parameterizations on atmospheric variability over a heterogeneous agricultural area. Geophysical Research Abstracts, Vol. 17, EGU2015-4784, 2015, EGU General Assembly 2015.
  12. **Andreu A**, Timmermans WJ, Skokovic D, González-Dugo MP. (2014) Influence of thermal component derivation for dual source energy flux estimates over a drip-irrigated vineyard. 4<sup>th</sup> International Symposium Recent Advances in Quantitative Remote Sensing, 22 – 26<sup>th</sup> September 2014, Torrent (Valencia), Spain.
  13. González-Dugo MP, **Andreu A**, Carpintero E, Gómez-Giraldez P, Polo MJ. (2014) Vegetation water stress monitoring with remote sensing-based energy balance modelling. Geophysical Research Abstracts, Vol. 16, EGU2014-13298, EGU General Assembly 2014.
  14. Timmermans WJ, **Andreu A**, Porté-Agel F, Albertson JD. (2014) Influence of atmospheric variability on turbulent flux estimates over the heterogeneous Barrax site. 4<sup>th</sup> International Symposium Recent Advances in Quantitative Remote Sensing, 22 – 26<sup>th</sup> September 2014, Torrent (Valencia), Spain.
  15. **Andreu A**, Timmermans WJ, Timmermans J, Van der Tol C, Su Z. (2013) Influence of thermal component derivation in dual source energy flux estimates results from the REFLEX 2012 Campaign. ESA living Planet Symposium 2013, Edinburgh, 2013. Oral presentation.
  16. **Andreu A**, Kustas WP, Anderson MC, Carrara A, González-Dugo MP. (2013) Modelling surface energy fluxes over a *Dehesa* ecosystem using a two-source energy balance model. Geophysical Research Abstracts, Vol. 15, EGU2013-977, 2013, EGU General Assembly 2013. Oral presentation.

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### Participation in funded projects and – description of task & role as supervisor

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2018 Project leader, H2020-MSCA-IF-2015 SWATCH GA 703978 Savanna WATER and Carbon fluxes modelling integrating Earth Observation data.

2016-2017 Dresden Nexus Conference 2017, SDGs & NEXUS APPROACH: Monitoring and Implementation.

2016-2017 **Project leader** TIGER project 401 "Remote Sensing of water use and water stress in African savanna ecosystem from local to regional scale: Implications for land productivity" – Framework "TIGER Bridge" funded by the European Space Agency. Project manager.

2016 July 11<sup>th</sup> to September 9<sup>th</sup> **Internship supervision:** Ms. Eva Kimonye, master student from the Pan African University Institute of Water and Energy Sciences.

2015 Quantifying and Understanding Interannual Variability of Carbon, Water and Energy Exchange of an Oak Savanna and an Annual Grassland Ecosystem AmeriFlux Site. - Field work and experimental planning.

2012 – 2014 LIFE+ BioDehesa (11/BIO/ES/000726). Agencies: IFAPA, UCO, etc. Oct. 2012/May 2017. Funding by EU Commission PI: M.P. González-Dugo. - Experimental planning/field support, data analysis and workshops.

2012 – 2014 Coupling land surface Energy and water balance from Remote sensing for mapping Evapotranspiration, Water Stress and Soil Moisture (CERESS, CGL2011-30498-c02-02). Jan. 2012/Dec. 2014. Agencies: IFAPA, etc. Funding by Spanish Ministry of Science & Education. PI: González-Dugo. - Technical support, modelling/data analysis, seminars.

2012 – 2013 Integral improvement of the management of Andalusian oak savanna ecosystems. Agencies: IFAPA. June 2010 to December 2012. Funding by IFAPA. PI: F. A. Arrebola. Participation in field experiments.

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### **Teaching activities, organisation of scientific meetings, workshops and seminars.**

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2018 Scientific Committee and Moderator of the 4<sup>th</sup> Remote Sensing and Hydrology Symposium (RSHS'18), Córdoba, Spain, from May 8<sup>th</sup> to 10<sup>th</sup>, 2018.

2018 Mentorship for the WiSE Women in Science and Engineering Theme Program.

2017 20<sup>th</sup> to 22<sup>nd</sup> of September. Organizer of the workshop on "Remote Sensing of Water Use and Water Stress in the African Savanna Ecosystem from Local to Regional Scale", University of Limpopo, Turfloop Campus, Polokwane, South Africa. <https://flores.unu.edu/en/news/news/hands-on-workshop-on-remote-sensing-for-monitoring-water-fluxes-in-african-savannas.html#info>

2017 20<sup>th</sup> to 22<sup>nd</sup> September, Participation on the organization and support of the International Dresden Nexus Conference 2017. DNC 2017, SDGs & Nexus Approach: Monitoring and Implementation.

2017 10<sup>th</sup> April Nexus Seminar No. 19: Remote Sensing for Water Management in African Savanna (Kruger National Park). 10th April 2017. Lecturers: Dr. Ana Andreu and Dr. Timothy Dube. United Nations University, Institute for Integrated Management of Material Fluxes of Resources. <https://flores.unu.edu/en/nexus-seminars/remote-sensing-for-water-management-in-african-savanna-kruger-national-park-nexus-seminar-no-19.html#overview>

2016/2017 PAUWES-UNU webinars: 25th August 2017 "Remote Sensing for water management on semiarid ecosystems (modelling water scarcity situations)" and 30th March 2016 "Water management in drought-prone areas", in the frame of a summer school organized by ZEF and UNU-EHS for students of the Pan African University Institute for Water and Energy Science in the African Union.  
[https://www.youtube.com/watch?v=7HHV\\_HrGobY](https://www.youtube.com/watch?v=7HHV_HrGobY)  
<https://flores.unu.edu/en/news/news/unu-flores-webinar-at-pauwes-summer-school-in-bonn.html>

2016 TIGER Workshop & TIGER KO-meeting 2016: Water for Agriculture. Hosted by UNECA in Addis Ababa, Ethiopia.

2016/2017 UNU-FLORES QGIS Basic Course: "QGIS and remote sensing tools for environmental management" & DPIM04 Course, Module Systems and Processes - Doctoral Degree Programme in Integrated Management of Water, Soil and Waste: "Ecosystems monitoring and modelling." Dresden, Germany.

2016 24<sup>th</sup> to 28<sup>th</sup> October WMO & ENVISAT "Training course in the use of satellite products for drought monitoring and agro-meteorological applications", in Harare (Zimbabwe), for experts from agricultural and meteorological ministries from African countries. <https://flores.unu.edu/en/news/news/earth-observation-tools-to-build-disaster-management-capacity-in-africa.html>

2014 Organisation of the international workshop "Remote sensing-based water and energy fluxes estimation in a changing environment", by IFAPA (CERESS and Panta Rhei Research initiative of the IAHS, Working Group Water and Energy Fluxes in a Changing Environment), Córdoba, Spain.

2014 Seminar: Available data sources to model agroforestry systems on different scales. IFAPA. Córdoba, Spain.

2010/2014 Seminars about my outgoing research, presented annually at MSc course in Environmental Hydraulics. Official postgraduate programme from the UGR-UCO-UMA Environmental Flow Dynamics and its Applications.

2011/2014 Teaching assistant in the Module X "Integrated Watershed Management" from MSc course in Environmental Hydraulics.

2013 Teacher on the course "Calculation of water quality parameters by remote sensing techniques",

organized by the Environmental Flow Dynamics and Hydrology Group, UCO.  
2013 Teacher on the course "Trends in water, energy and CO<sub>2</sub> accounting: from high-resolution field measurement to remote-sensing techniques", by Agrifood Campus of International Excellence (ceiA3).

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### **Outreach activities (organisation/planning/participation):**

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From 2010 to date: voluntary work for the NGO Engineering without borders Andalucía.  
From 2017 to date: Semillas Dispersas Radio show with Engineering without borders Andalucía.  
2016 & 2017 Radio show on ColorRadio Dresden, Germany.  
2014 Round table: "Participative processes", Centro Social Rey Heredia, Córdoba.  
2013 Film series: Critical cinema for restless nights, Córdoba (Spain). Make L'Off project (ISF)  
2012 Workshop "Urban Gardens", Córdoba (Spain). Make L'Off project (ISF)  
2012 Conference Water: today's and future challenges. University of Córdoba (Spain).  
2012 Conferences: Consumption alternatives, Córdoba (Spain). Make L'Off project (ISF)  
2011 Alternative World Water Forum, Marseille (France) with AEOPAS (Spanish public water operators).  
2011 Workshop 3R (Bicycles, Responsible use of technologies, Home Preserved Food). Make L'Off (ISF)  
2011 Photography exposition Observe and Capture L'Off. UCO, La Casa Azul, Civic Centre. (Spain).  
2011 Round table: Advocacy for Public Water, achieving the formal agreement between the municipal political parties for managing urban water under sustainable social, environmental and economic criteria. Spain.  
2011 Participation in the programming, evaluation and analysis of Make L'Off project (ISF) (Budget 84508 €)  
2010 Conferences: Rediscovering the sense of limits, Córdoba (Spain). (EpD project for Development, Millennium Goals and Technology, ISF).  
2010 Conferences: Gender fight as seed of social change. EpD project (ISF).  
2010 Participation in the programming, evaluation and analysis of the EpD project of ISF (Budget 153456 €)  
2009 Annual ISF Meeting. Córdoba, Spain.  
2009 Evaluation of the Integral Development, Water and Sanitation Project- Otuzco (Peru) (Budget 616344 €)  
2009 Conference: Technology for human development. Córdoba (Spain). EpD project (ISF)  
2009 Conference: Responsible consumption and fair trade, with the International Area, UCO. EpD project-ISF  
2009 Outdoor Summer Film Series. EpD project (ISF)  
2008 Conferences: Education for Sustainable Development in Seville. EpD project (ISF)

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### **Other skills**

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Languages: Spanish and Catalan (native), English (fluent), French (basic).  
Technical skills: programming and installation of meteorological/micrometeorological sensors, reflectivity measurements (ASD FieldSpec and HandHeld spectroradiometer, Ocean Optics USB2000), biophysical parameters measurements (LI-COR 2000, water potential measurements, LI-COR 6400, AccuPAR Ceptometer, soil properties measurement, etc). Set-up of anchors and safety installations (climbing).  
Software: MATLAB, R, Octave, QGIS, ArcGIS, ENVI, ERDAS Imagine, WiMMed, HidroDEM, LoggerNet, GIMP, Photoshop, Libreoffice, Office, SPSS, TK3. Starting with Python.