



CURRICULUM VITAE (CVA)

Part A. PERSONAL INFORMATION

CV date September. 26th, 2022

First name	Héctor		
Family name	Nieto Solana		
e-mail	hector.nieto@ica.csic.es	https://github.com/hectornieto	
Open Researcher and Contributor ID (ORCID) (*)	0000-0003-4250-6424		

A.1. Current position

Position	Tenured Scientist (<i>Científico Titular</i>)		
Initial date	December 1st, 2021		
Institution	CSIC		
Department/Center	ICA	Institute of Agricultural Sciences	
Country	Spain	Teleph. number	+34 91 333 31 25
Key words	Remote Sensing / Evapotranspiration / Thermal Infrared / Crop Stress / Precision Agriculture / Hydrology		

A.2. Previous positions (research activity interruptions, art. 14.2.b))

Period	Position/Institution/Country/Interruption cause
Dec. 2018 - Nov. 2021	Torres Quevedo Grant, COMPLUTIG SL, Spain
Jan. 2017 - Nov. 2018	INIA-DOC, IRTA, Spain
Oct- 2014 - Sep. 2016	Talentia Marie Curie - COFUND, IAS-CSIC, Spain
Sep. 2009 - Set. 2014	Postdoc, University of Copenhagen, Denmark
Jul. 2006 - Jun 2009	FPI PhD student, University of Alcala
Jul 2003 - May 2004	Research assistant ("Stagiaire"), CEMAFREF, France

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Ph.D. Cartography, GIS & remote sensing	University fo Alcala, Spain	2010
Forest Engineering	Polytechnic University of Madrid, Spain	2004

Part B. CV SUMMARY (*max. 5000 characters, including spaces*)

Hector Nieto has recently become Tenured Scientist at ICA-CSIC. Right before then he was awarded a Torres Quevedo fellowship at COMPLUTIG SL for conducting industrial research and technology transfer in remote sensing and agriculture. At COMPLUTIG he promoted R+D+i at the industry leading an Operative Innovation Group (AGROTIG) and participating in another one (SIEGA) both in collaboration with the agricultural unions (ASAJA) and regional agricultural research centers. As part of this job, he conducted capacity building activities to technicians in precision agriculture and remote sensing, as well as demonstration and dissemination activities to farmers and downstream companies. He has also been WP leader in international projects, ET4FAO and SENET both funded by the European Space Agency and lead by DHI, to evaluate Copernicus data for near-real time monitoring of evapotranspiration and water use at different spatial and temporal scales. These two projects have resulted in a freely open source tool for producing ET maps with Sentinel images (<https://www.esa-sen4et.org/news6>) and demonstrated to FAO the utility of Copernicus data for water accounting (<https://et4fao.dhigroup.com/#/>) .



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From 2017-2019 he was part of the Efficient Use of Water program in Agriculture at IRTA thanks to a INIA-Doc grant where he focused on precision irrigation using thermal and multispectral airborne and satellite imagery. Between 2014 and 2016 he received a Marie Curie COFUND Talentia fellowship to conduct a postdoc at IAS-CSIC and USDA, working on the evapotranspiration modelling in heterogeneous crop (vineyards) and tree-grass canopies (*dehesas*) using very high spatial resolution imagery. In these years he adapted an energy balance model (TSEB) to accommodate for specific processes occurring in row and woody crops such as differential radiation transmission or turbulent transport of water and heat between soil and the canopy. As a result of these activities, and besides of the scientific publications, he delivers the whole TSEB modelling framework through an open source repository (<https://github.com/hectornieto/pyTSEB>, DOI:10.5281/zenodo.594732) that is widely used by both the scientific and industrial communities.

During the period 2009-2014 he was a postdoctoral researcher at the University of Copenhagen at the Hydrology Observatory of Denmark working on the estimates of evapotranspiration using satellite remote sensing at different scales. He evaluated the use of multi-angular and multi-temporal thermal infrared data for the estimation of sensible and latent heat fluxes using resistance energy balance models for catchment hydrology. One of the result of these activities, he and his colleagues published in 2016 one of the first papers that used and validated unmanned aerial vehicles to estimate evapotranspiration.

His research has been focused in developing new knowledge in evapotranspiration modelling, focused on remote sensing applications at different scales from proximal sensing to airborne and satellite platforms. His H-index is 24 with more than 60 publications registered in Web of Science from which he has more than 1800 citations. Besides the dissemination to the scientific community he also shares his models/algorithms in public open-source repositories at <https://github.com/hectornieto>. Finally he has been co-supervisor of 4 graduated PhD students and is currently co-supervising another 2 PhD students. He participated as well in high-education teaching, at either BSc, MSc and PhD levels, and capacity building activities, for which he distributes teaching material using the latest technologies that combine open source repositories, interactive notebooks and containerized software (<https://mybinder.org/v2/gh/hectornieto/curso-WUE/HEAD>).

Part C. RELEVANT MERITS (*sorted by typology*)

C.1. Publications (Selected relevant publications for the last 10 years)

- Nieto, H., Alsina, M.M., Kustas, W. P., et al. & Dokoozlian, N. (1/16). Evaluating different metrics from the thermal-based two-source energy balance model for monitoring grapevine water stress. (2022) *Irrigation Science*, 40, 697-713, DOI: 10.1007/s00271-022-00790-2
- Kustas, W. P., Nieto, H., García-Tejera, O., et al. & Dokoozlian, N. (2/17). Impact of advection on two-source energy balance (TSEB) canopy transpiration parameterization for vineyards in the California Central Valley. (2022) *Irrigation Science*, 40, 575-591, DOI: 10.1007/s00271-022-00778-y
- Burchard-Levine, V., Nieto, H., Kustas, W.P., et al. & Dokoozlian, N. (2/17). Application of a remote-sensing three-source energy balance model to improve evapotranspiration partitioning in vineyards (2022). *Irrigation Science*, 40, 593-608. DOI: 10.1007/s00271-022-00787-x
- Simpson, J.E., Holman, F. H., Nieto, H., et al. & Kaplan, J.O. (3/11). UAS-based high resolution mapping of evapotranspiration in a Mediterranean tree-grass ecosystem. (2022) *Agricultural and Forest Meteorology*, 321, 108981, DOI: 10.1016/j.agrformet.2022.108981



- Burchard-Levine, V., Nieto, H., Riaño, D., et al. & Martín, M. P. (2/12). A remote sensing-based three-source energy balance model to improve global estimations of evapotranspiration in semi-arid tree-grass ecosystems. (2022) *Global Change Biology*, 28(4), 1493– 1515. DOI: 10.1111/gcb.16002
- Aguirre-García, S.-D., Aranda-Barranco, S., Nieto, H., Serrano-Ortiz, P., Sánchez-Cañete, E.-P. & Guerrero-Rascado, J.-L. Modelling actual evapotranspiration using a two source energy balance model with Sentinel imagery in herbaceous-free and herbaceous-cover Mediterranean olive orchards (2021) *Agricultural and Forest Meteorology*, 311, art. no. 108692. DOI: 10.1016/j.agrformet.2021.108692
- Burchard-Levine, V., Nieto, H., Riaño, D., Migliavacca, M., El-Madany, T.S., Guzinski, R., Carrara, A. & Martín, M.P. The effect of pixel heterogeneity for remote sensing based retrievals of evapotranspiration in a semi-arid tree-grass ecosystem (2021) *Remote Sensing of Environment*, 260, art. no. 112440. DOI: 10.1016/j.rse.2021.112440
- Bellvert, J., Nieto, H., Pelechá, A., Jofre-Čekalović, C., Zazurca, L. & Miarnau, X. Remote sensing energy balance model for the assessment of crop evapotranspiration and water status in an almond rootstock collection (2021) *frontiers in plant science*, 12, art. no. 608967. DOI: 10.3389/fpls.2021.608967
- Guzinski, R., Nieto, H., Sanchez, J.M., Lopez-Urrea, R., Boujnah, D.M. & Boulet, G. Utility of Copernicus-based Inputs for actual evapotranspiration modelling in support of sustainable water use in agriculture (2021) *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*. DOI: 10.1109/JSTARS.2021.3122573
- Knipper, K.R., Kustas, W.P., Anderson, M.C., et al. & Sanchez, L. (4/11) Using high-spatiotemporal thermal satellite ET retrievals to monitor water use over California vineyards of different climate, vine variety and trellis design (2020) *Agricultural Water Management*, 241, art. no. 106361. DOI: 10.1016/j.agwat.2020.106361
- Guzinski, R., Nieto, H., Sandholt, I. & Karamitilios, G. Modelling high-resolution actual evapotranspiration through Sentinel-2 and Sentinel-3 data fusion (2020) *Remote Sensing*, 12 (9), art. no. 1433. DOI: 10.3390/RS12091433
- Burchard-Levine, V., Nieto, H., Riaño, D., Migliavacca, M., El-Madany, T.S., Perez-Priego, O., Carrara, A. & Martín, M.P. Seasonal adaptation of the thermal-based two-source energy balance model for estimating evapotranspiration in a semiarid tree-grass ecosystem (2020) *Remote Sensing*, 12 (6), art. no. 904. DOI: 10.3390/rs12060904
- Nieto, H., Kustas, W.P., Torres-Rúa, et al & McKee, L.G. (1/13) Evaluation of TSEB turbulent fluxes using different methods for the retrieval of soil and canopy component temperatures from UAV thermal and multispectral imagery (2019) *Irrigation Science*, 37 (3), pp. 389-406. DOI: 10.1007/s00271-018-0585-9
- Nieto, H., Kustas, W.P., Alfieri, et al. & Anderson, M.C. (1/9) Impact of different within-canopy wind attenuation formulations on modelling sensible heat flux using TSEB (2019) *Irrigation Science*, 37 (3), pp. 315-331. DOI: 10.1007/s00271-018-0611-y
- Guzinski, R. & Nieto, H. Evaluating the feasibility of using Sentinel-2 and Sentinel-3 satellites for high-resolution evapotranspiration estimations (2019) *Remote Sensing of Environment*, 221, pp. 157-172. DOI: 10.1016/j.rse.2018.11.019
- Kustas, W.P., Alfieri, J.G., Nieto, H., Wilson, T.G., Gao, F. & Anderson, M.C. Utility of the two-source energy balance (TSEB) model in vine and interrow flux partitioning over the growing season (2019) *Irrigation Science*, 37 (3), pp. 375-388. DOI: 10.1007/s00271-018-0586-8
- Li, Y., Kustas, W.P., Huang, C., Nieto, H., et al. & Scott, R.L. (3/9) Evaluating soil resistance formulations in thermal-based Two-Source Energy Balance (TSEB)



- model: Implications for heterogeneous semiarid and arid regions (2019) *Water Resources Research*. DOI: 10.1029/2018WR022981
- Hoffmann, H., Jensen, R., Thomsen, A., Nieto, H., Rasmussen, J. & Friberg, T. Crop water stress maps for an entire growing season from visible and thermal UAV imagery (2016) *Biogeosciences*, 13 (24), pp. 6545-6563. DOI: 10.5194/bg-13-6545-2016
- Kustas, W.P., Nieto, H., Morillas, L., et al. & Garcia, M. (2/9) Revisiting the paper “Using radiometric surface temperature for surface energy flux estimation in Mediterranean drylands from a two-source perspective” (2016) *Remote Sensing of Environment*, 184, pp. 645-653. DOI: 10.1016/j.rse.2016.07.024
- Hoffmann, H., Nieto, H., Jensen, R., Guzinski, R., Zarco-Tejada & P., Friberg, T. Estimating evaporation with thermal UAV data and two-source energy balance models (2016) *Hydrology and Earth System Sciences*, 20 (2), pp. 697-713. DOI: 10.5194/hess-20-697-2016
- Guzinski, R., Nieto, H., Stisen, S. & Fensholt, R. Inter-comparison of energy balance and hydrological models for land surface energy flux estimation over a whole river catchment (2015) *Hydrology and Earth System Sciences*, 19 (4), pp. 2017-2036. DOI: 10.5194/hess-19-2017-2015
- Guzinski, R., Nieto, H., Jensen, R. & Mendiguren, G. Remotely sensed land-surface energy fluxes at sub-field scale in heterogeneous agricultural landscape and coniferous plantation (2014) *Biogeosciences*, 11 (18), pp. 5021-5046. DOI: 10.5194/bg-11-5021-2014
- Guzinski, R., Anderson, M.C., Kustas, W.P., Nieto & H., Sandholt, I. Using a thermal-based two source energy balance model with time-differencing to estimate surface energy fluxes with day-night MODIS observations (2013) *Hydrology and Earth System Sciences*, 17 (7), pp. 2809-2825. DOI: 10.5194/hess-17-2809-2013

C.2. Congress

12 congress proceedings indexed in Scopus between 2011 and 2021. Not listed to save space.

Invited speaker at:

- IEEE International Geoscience and Remote Sensing Symposium - IGARSS '17 (Fort Worth, USA)
- 8th International Conference on Meteorology and Climatology of the Mediterranean - MetMed'21 (virtual congress).

C.3. Relevant research projects

ET4FAO, Increasing Crop Water Use Efficiency at Multiple Scales Using Sentinel Evapotranspiration. Funded by the European Space Agency. PI Radoslaw Guzinski. At COMPLUTIG from 01/04/2020 to 31/03/2021. 150 000 €. WP leader.

MOIST, Managing and Optimizing Irrigation with Satellite Tools. Funded by the Innovation Fund of Denmark. PI Inge Sandholt. At IRTA from 01/09/2017 to 31/08/2020. 1 500 000 €. Steering committee member.

UAV-ET, Unmanned Aerial Vehicles for improved Evapotranspiration. Funded by Marie Skłodowska-Curie actions COFUND Talenta. PI Héctor Nieto Solana. At IAS-CSIC from 01/10/2014 to 30/09/2016. 154 381 €. PI of individual project.

SENET, Sentinels for Evapotranspiration. Funded by the European Space Agency. Responsible: Torsten Bondo (DHI). At IRTA from 01/10/2017 to 30/09/2019. 200 000 €. WP leader.

HOBE, Hydrological Observatory of Denmark. Funded by Villum Fonden. PI: Karsten Høgh Jensen. At University of Copenhagen, from 01/10/2009 to 31/09/2012, Postdoc



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FluXpec. Funded by Fundación Española para la Ciencia y la Tecnología. PI María Pilar Martín Isabel. (IEGD-CSIC). At University of Copenhagen from 01/01/2012 to 31/12/2015. Scientific Advisor.

BioSpec. Funded by Fundación Española para la Ciencia y la Tecnología. PI María Pilar Martín Isabel. (EGD-CSIC). At University of Copenhagen from 01/01/2009-31/12/2011. Research Team member.

C.4. Contracts, technological or transfer merits

SIEGA: Geographic Information System for a Extensive Livestock Decision Support System. Innovation project funded by the Department of Agriculture of Spain. At COMPLUTIG SL from 15/08/2019 to 15/07/2021. 479 561,90 €

AGROTIG: Decision Support System for cereal crops using remote sensing. Innovation project funded by the Department of Agriculture of Spain. At COMPLUTIG SL from 15/07/2018 to 15/07/2020. 372·411,05 €

Knowledge based climate adaptation in West Africa. Funded by the Danish international cooperation agency, DANIDA. At University of Copenhagen from 01/01/2012 to 01/10/2014. 3 351 645 €.

C.5 PhD Thesis supervised (finished in the last 10 years and ongoing)

Monitoring Water Fluxes in Complex Landscapes: Improving remote sensing-based evapotranspiration models for tree-grass ecosystems. PhD student: Vicente Felipe Burchard Levine. Co-directors: María Pilar Martín Isabel and David Riaño Arribas University: University of Alcalá. Year: 2021, Qualification: Outstanding. Currently: CCHS-CSIC

The role of evapotranspiration in water resources management: Local measurements and regional estimates. PhD student: Alberto de Tomás Calero. Co-directors: Francisco Javier Salas Rey and Pedro Berliner University: University of Alcalá. Year: 2015, Qualification: Outstanding. Currently: IDOM.

Water fluxes estimation between soil, vegetation and atmosphere using remote sensing. PhD student: Gorka Mendiguren González Co-directors: María Pilar Martín Isabel and David Riaño. University: University of Alcalá. Year: 2014, Qualification: Outstanding. Currently: Natural History Museum of Denmark, Københavns Universitet.

Advancements in Modeling of Land Surface Energy Fluxes with Remote Sensing at Different Spatial Scales. PhD student: Radoslaw Guzinski. Co-directors: Inge Sandholt and Rasmus Fensholt. University: University of Copenhagen KU. Year: 2014, Qualification: Apt. Currently: DHI-GRAS, Denmark.

Title of the thesis: Development of a monitoring system for forest health in the Autonomous Region of Madrid using remote sensing techniques. PhD student: Pablo Jesús Torres Hernández. Co-director: Mariano García Alonso. University: University of Alcalá. Year: on-going