CURRICULUM VITAE

Kaniska MALLICK, Scientific Researcher
Centre for Space Studies of the Biosphere (CESBIO), University of Toulouse
(CNRS, CNES, IRD, INRAE), Toulouse, France

1. DOMAIN OF RESEARCH

Ecohydrology; Vegetation ecophysiology; Remote sensing (spatial modeling of water stress, plant water use and ecosystem functioning by integration of satellite data); arid and semi-arid ecosystems

2. CAREER PROGRESS

2026 - present **Scientific Researcher** (TRISHNA Mission), CESBIO, Toulouse, France (*Studying the impact of stomatal control on water flux partitioning using high-resolution remote sensing*)

2024 - 2025 **Principal R&T Scientist**, LIST - Environmental Sensing & Modeling, Luxembourg (*Studying the impact of water stress and aridity on evapotranspiration variability using high-resolution remote sensing*)

2023 - 2024 **Lead R&T Associate**, LIST - Environmental Sensing & Modeling, Luxembourg (*Studying the impact of water stress and aridity on evapotranspiration variability using high-resolution remote sensing*)

2020 - 2023 **International Mobility Research Fellow**, UC Berkeley - Biometeorology Lab (host: Prof. D. Baldocchi) (*Studying the impact of stomatal control on water-carbon flux and Model-based partitioning of ecosystem evapotranspiration*)

2015 - 2022 **Senior R&T Associate**, LIST - Environmental Sensing & Modeling, Luxembourg

2013 - 2014 **Project Leader**, Earth Observation & Ecohydrology, CRP - Gabriel Lippmann, Luxembourg

2011 - 2013 **Postdoctoral Fellow**, Jet Propulsion Laboratory / Caltech, Pasadena, CA (Water & Carbon Cycles) (*Global evapotranspiration modeling*)

2008 - 2011 **Postdoctoral Fellow**, Lancaster University - Lancaster Environment Centre, UK (*Understanding the ecophysiology of transpiration and evaporation using eddy covariance and satellite remote sensing*)

3. ACADEMIC QUALIFICATION

06/2008 Ph.D., Environmental Sciences (Satellite Agrometeorology), 2008; **Space Applications Centre, Ahmedabad (Thesis at University of Pune), India**

Thesis title: *Characterizing Moisture Availability and AET using Space-based Remote Sensing Techniques.*

02/2002 M.Sc., Agricultural Meteorology, 2001; **Punjab Agricultural University, Ludhiana, India**

Thesis title: *A Comparison of Rice Yield Prediction using Statistical and Dynamic Crop Simulation Modeling.*

4. PUBLICATIONS

1. Jia A, Mallick K, Lin Z, Sulis M, Szantoi Z, Zhang L, Corbari C, Munoz PT, Nieto H, Roujean J-L, Etchanchu J, Demarty J, Mwangi S, Olioso A, Merlin O, Boulet G (2026): Sensitivity of Thermal Evapotranspiration Models to Surface and Atmospheric Drivers Across Ecosystems and Aridity, Agricultural and Forest Meteorology, 376, 110930, https://doi.org/10.1016/j.agrformet.2025.110930.
2. Chintala S, Kambhammettu BVNP, Mandadi AR, Jatoth V, Mallick K (2026): From leaf to ecosystem: Multi-scale dynamics and drivers of Maize water use efficiency in semi-arid tropics, Agricultural and Forest Meteorology, 389, 111432, https://doi.org/10.1016/j.agrformet.2026.111432.
3. Jia A, Mallick K, Upadhyaya D, Szantoi Z, Bhattacharya BK, Sekhar M, Skoković D, Sobrino JA, Ruiz L, Boulet G (2025): Deriving a Clear-Sky Soil Moisture Index from ECOSTRESS Land Surface Temperature, Remote Sensing of Environment, 329, 114945, https://doi.org/10.1016/j.rse.2025.114945.
4. Cross J, Mallick K, Aslan-Sungur G, VanLoocke A, Drewry DT (2026): A Hybrid Biophysical-Machine Learning Framework for Diurnal Surface Energy Flux Estimation Using Proximal Sensing, Water Resources Research, 62, e2025WR041510. https://doi.org/10.1029/2025WR041510.
5. Wang T, Mallick K, Verfaille J, Szutu D, & Baldocchi DD (2025): Water scarcity in semi-arid California compromises perennial alfalfa's high yield and carbon sinking potentials, Agricultural Water Management, 308, https://doi.org/10.1016/j.agwat.2024.109284.
6. Ahmadi A, Mallick K, Yi K, & Baldocchi DD (2025): Interpretable machine learning reveals the crucial role of water availability in regulating thermal optimality of terrestrial ecosystems, Journal of Geophysical Research: Machine Learning and Computation, 2(2), e2024JH000445, https://doi.org/10.1029/2024JH000445.

7. Baldocchi DD, Mallick K (2024): Towards Sharing Water Better, With Near-Real Time Maps on Evaporative Water Use by Crops and Natural Vegetation, Nature Water, https://doi.org/10.1038/s44221-023-00183-5.
8. Mallick K, Baldocchi DD, Verfaillie J, Szutu D, Wang T, Ortiz AA, Hu T, Shortt R, Fisher JB, Szantoi Z, Boulet G (2024): Net Fluxes of Broadband Shortwave and Photosynthetically Active Radiation Complement NDVI and Near Infrared Reflectance of Vegetation to explain Gross Photosynthesis Variability Across Ecosystems and Climate, Remote Sensing of Environment, 307, 114123, https://doi.org/10.1016/j.rse.2024.114123.
9. Bhattacharya BK, Mallick K, Desai D, Bhatt GS, and Morrison R (2022): A Coupled Ground Heat Flux-Surface Energy Balance Model of Evapotranspiration Using Thermal Remote Sensing Observations, Biogeosciences, 19, 5521–5551, https://doi.org/10.5194/bg-19-5521-2022.
10. Mallick K, Baldocchi DD, Jarvis AJ, Hu T, Trebs I, Sulis M et al. (2022): Insights into the aerodynamic versus radiometric surface temperature debate in thermal-based evaporation modeling. *Geophysical Research Letters.* https://doi.org/10.1029/2021GL097568
11. Trebs I, Mallick K, Cleverly J, Woodgate W, Beringer J, Su Z and Boulet G (2021): The role of aerodynamic resistance in thermal remote sensing-based evapotranspiration models, Remote Sensing of Environment, 264, 112602, https://doi.org/10.1016/j.rse.2021.112602.
12. Bhattarai N, Mallick K, Niraula R, Sen S, Stuart J, and Jain M (2019): An automated multi-model evapotranspiration mapping framework using remote sensing and reanalysis data, Remote Sensing of Environment, 229, 69 – 92, https://doi.org/10.1016/j.rse.2019.04.026.
13. Mallick K, Toivonen E, Trebs I, Boegh E, Cleverly J et al. (2018): Bridging thermal infrared sensing and physically-based evapotranspiration modeling: from theoretical implementation to validation across an aridity gradient in Australian ecosystems. *Water Resources Research,* 54, 3409–3435. https://doi.org/10.1029/2017WR021357.
14. Mallick K, Trebs I, Boegh E, Giustarini L, Schlerf M, Drewry DT, Hoffmann L, von Randow C, Kruijt B, Araùjo A, Saleska S, Ehleringer, JR, Domingues TF, Ometto JPHB, Nobre AD, de Moraes OLL, Hayek M, Munger JW, and Wofsy SC (2016): Canopy-scale biophysical controls of transpiration and evaporation in the Amazon Basin, Hydrology and Earth System Sciences, 20, 4237–4264, http://doi.org/10.5194/hess-20-4237-2016.
15. Mallick K, Boegh E, Trebs I, Alfieri JG, Kustas WP et al. (2015): Reintroducing radiometric surface temperature into the Penman-Monteith formulation. *Water Resources Research,* 51, 6214–6243. https://doi.org/10.1002/2014WR016106

5. SYNERGISTIC ACTIVITIES

1. **ESA TERESA - PI & Coordinator (€800K, 2024–2026):** Led a multi-institution consortium (ESA Sentinel User Preparation call) integrating Earth observation data and agro-hydrological models to devise new approaches for sensing drought, monitoring water balance, estimating crop yields, and developing water-food security metrics. Coordinated partners across Europe and managed all scientific and financial reporting to ESA.
2. **ANR/FNR HiDRATE - PI (€451K, 2023-2027):** French National Research Agency and FNR Luxembourg co-funded project testing and validating a new evaporation partitioning scheme by integrating thermal and shortwave infrared remote sensing in surface energy balance models. Investigates stomatal regulation of transpiration under soil and atmospheric drought through both parametric and non-parametric approaches. Results feed directly into algorithm development for the Indo-French TRISHNA satellite mission.
3. **ESA ECOSTRESS HUB Phase 1 & 2- Sole PI (€300K + €500K, 2020-2026):** Developed and operationalized a cloud-based hub (ESA DIAS/Copernicus environment) generating LST, ET, GPP, and water use efficiency products over Europe and Africa from ECOSTRESS and Sentinel-2 data. Advanced LST and ET algorithms deployed in the ECOSTRESS processing chain; outcomes directly support the Copernicus Land Surface Temperature Monitoring (LSTM) mission development.
4. **ESA UNITE & FNR MONASTIC - PI (€200K + €154K, 2021–2026):** UNITE investigates diurnal hysteresis in evaporation and stomatal control across all sky conditions using geostationary and polar-orbiting thermal remote sensing with emphasis over Africa. MONASTIC (hosted at UC Berkeley with Prof. D. Baldocchi) developed a novel hydro-biophysical non-parametric scheme for directly retrieving canopy-scale transpiration from thermal remote sensing, segregating transpiration from lumped ET and advancing understanding of physiological water regulation under a changing water cycle.

5. **ARIES**: EO Africa Explorers, European Space Agency (ESA); 10/2022-09/2024; **130,000** € (total budget: 250,000 €). I led the development of crop water stress for African agriculture.
6. **Science Team Member & Algorithm Developer**, TRISHNA (Indo-French thermal Earth observation mission, CNES/ISRO, 2018 -): responsible for ecosystem water stress and evapotranspiration retrieval algorithms.
7. **PhD Supervision** (completed): Anne Hoek van Dijke (Wageningen, 2022), Loise Wandera (Twente, 2018), Jinyuan Wang (Luxembourg, 2024); ongoing: Bilal Al-Saeedi (TU Köln, exp. 2028). MSc supervision: 4 completed, 2 ongoing.
8. **Invited lectures**: NASA Ames Research Center (2024), IIT Mumbai (2024), ISRO/SAC Ahmedabad (2024), IISc Bangalore (2024), Ohio State University (2024), UC Berkeley / Biosphere-2 / Wageningen (2022–2023); plenary talk, Hydrospace 2023, Lisbon.