Geography Seminar Series

Introduction to the ARTMO toolbox for converting optical remote sensing data into biophysical variables

Where: Zoom https://ucd-ie.zoom.us/j/66632988518 | Date: 2 December 2021 | Time: 3:00-4:00 pm

Abstract

This presentation will be on the use of ARTMO's (Automated Radiative Transfer Models Operator), retrieval toolboxes and post-processing tools (https://artmotoolbox.com/) for the generation and interpretation of optical remote sensing data. ARTMO brings together a diverse collection of leaf, canopy and atmosphere radiative transfer models (RTMs) into a synchronized user-friendly GUI environment. Essential tools are provided to create databases of simulations, so-called look-up tables (LUT). These LUTs can then subsequently be used for mapping applications from optical images. A LUT, or user-collected field data, can subsequently be inserted into three types of mapping toolboxes: (1) through parametric regression (e.g. vegetation indices), (2) nonparametric methods (e.g. machine learning methods), or (3) through LUT-based inversion strategies. In each of these toolboxes various optimization algorithms are provided so that the best-performing strategy can be applied for mapping applications. When coupled with an atmosphere RTM retrieval can take place directly from top-of-atmosphere radiance data. Further, ARTMO's RTM post-processing tools include: (1) global sensitivity analysis, (2) emulation, i.e. approximating RTMs through machine learning, and (3) synthetic scene generation. Here we plan to present ARTMO's mapping capabilities using coupled leaf-canopy RTMs.

Presenter's information

Dr. Jochem Verrelst received the M.Sc. degree in tropical land use and in geo-information science both in 2005 and the Ph.D. in remote sensing in 2010 from Wageningen University, Wageningen, Netherlands. His dissertation focused on the spaceborne spectrodirectional estimation of forest properties. In 2010, he moved to the Laboratory of Earth Observation (LEO), Image Processing Laboratory (IPL), University of Valencia, Spain. He has been involved in preparatory activities of ESA's 8th Earth Explorer FLEX. His research interests include retrieval of vegetation properties using airborne and satellite optical (hyperspectral) data, canopy radiative transfer modelling and emulation, and hyperspectral data analysis. He is the founder of the ARTMO software package that brings together radiative transfer models and machine learning algorithms. In 2017 he received a H2020 ERC Starting Grant to work on the development of vegetation products based on synergy of FLEX and Sentinel-3 data (https://ipl.uv.es/sentiflex/). Since 2018, he is the vice-chair of the COST Action SENSECO that focuses on Optical synergies for spatiotemporal SENsing of Scalable ECOphysiological traits (https://www.senseco.eu/).