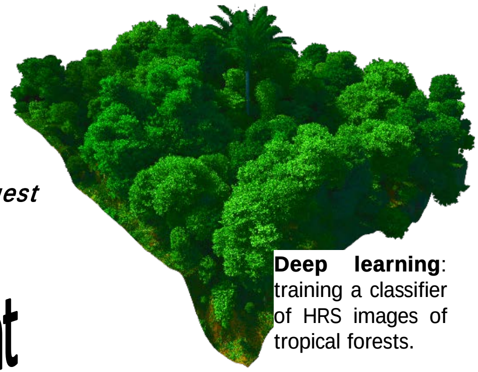
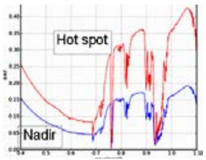
Délégation Occitanie Ouest



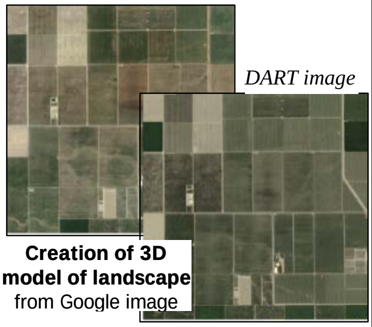
Deep learning: training a classifier of HRS images of tropical forests.



TOA reflectance spectra

Google map

DART image



Creation of 3D model of landscape from Google image

Announcement

DART Tutorial 2024

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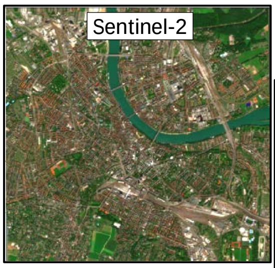
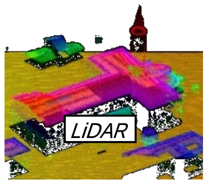
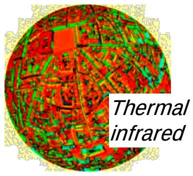
The DART model Developed since 1992 at CESBIO (www.cesbio.cnrs.fr/dart) - Toulouse III University, CNES, CNRS, IRD, INRAE -	DART (https://dart.omp.eu) is an ever-evolving radiative transfer model. It simulates the 3D radiative budget (RB), including sun induced chlorophyll fluorescence (SIF), and remote sensing (RS) satellite, airborne and in-situ signals (spectroradiometer image, LiDAR FWF, SPL, point cloud) of natural and urban landscapes, from visible to thermal infrared. It is a reference tool for a wide range of RS studies (sensitivity studies, inversion of RS images, design of new RS sensor, etc.). Licenses are free for research and education.
Objective of the tutorial	To discover/deepen DART theory, functionalities and use in 5 steps: 1) Short review of physical bases, 2) DART theory, functionalities and novelties (Jacobian, per light source images, etc.) 3) Study of schematic cases through prepared exercises, 4) Presentation of tools: Pytools4DART, DAO, inversion of satellite images,... 5) Case studies of interest to each participant.
Program of the training	**1. SHORT REVIEW OF PHYSICAL BASES** (optical remote sensing, radiative budget) • Why 3D modeling for remote sensing studies? • Major radiative mechanisms: sun radiation, thermal radiation, LiDAR • Measured / DART radiometric quantities: radiance, brightness temperature, etc. **2. DART THEORY AND FUNCTIONALITIES** • **Theory**: 3D radiative transfer modeling and major parameters • **Major functionalities** (interactive presentation) - DART modes: passive and active (LiDAR) remote sensing and radiative budget. - Optical properties: surface (anisotropic facets) & volume (turbid, fluid and air) - Landscape simulation: buildings, vegetation, relief,... and display tools - Atmosphere simulation: gases, aerosols,... - Satellite / airborne sensors (orthographic and perspective projection) - Sequencer and LUT (SQL database) creation - Products (NetCDF): remote sensing and radiative budget, and display tools - Atmosphere: gas and aerosol vertical profiles. - Post processing tools: satellite broad bands,... - Use of command lines: DART, its modules and its sequences



Sentinel 2 inversion
Basel city (5kmx6km)





Program of the training	**3. PRACTICE OF DART WITH EXERCISES, FROM SIMPLE TO COMPLEX** This is the main part of the training, with exercises from simple to complex. • Flat surfaces: VIS / NIR and TIR spectral domains. Examples of case study: for which experimental / instrumental configuration can we detect a fire in a thermal infrared (TIR) pixel? • 3D landscapes: forest, agricultural and urban scenes, with atmosphere Functionalities and landscapes will be presented according to the interests of participants who will probably work in "thematic" groups focused on specific landscapes or functionalities: - Importation of 3D objects (maize, tree,...) and scenes (town). - Atmosphere simulation: gas and aerosol models, etc. - Sun induced chlorophyll fluorescence, LiDAR, etc. - Simulation of observations by camera, pushbroom, etc. - Computation of the exitance and albedo of landscapes in the short waves. - Tools: * Inversion of satellite images to create maps of optical properties * Derivation of atmosphere parameters from irradiance in local flux towers * DAO for the direct creation of 3D scenes from 3D LiDAR, etc. * Pytools4DART (gitlab.com/pytools4dart/pytools4dart) developed by created by TETIS (www.umr-tetis.fr) for massive simulations, etc. 5. **IMPLEMENTATION BY EACH PARTICIPANT OF HIS/HER OWN CASE STUDY** Four examples are listed. • Scene creation (forest, crop, etc.). • Time series of 3D radiative budget or remote sensing signal. • Sensitivity study: forest or crop field reflectance / brightness temperature as a function of LAI, sun/view direction, topography,..., and others. • Radiative budget: forest, urban landscape, etc.
Audience	No specific requirements. PCs are provided, but to bring a "good" laptop is advised
Advice (before the training)	Get a free DART license & User Manual (https://dart.omp.eu). Transmit your case study
Number of participants	**14**
Date	**June 4 / 5 / 6, 2024** (9 am - 6 pm)
Registration deadline	**May 6, 2024**
Place of DART tutorial	Toulouse III University,1 Rue Tarfaya, 31400 Toulouse (https://www.mfja.fr), room 311

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