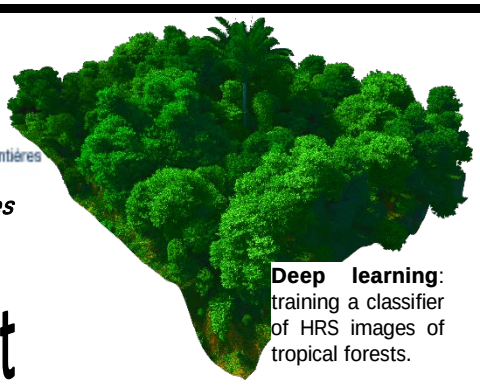
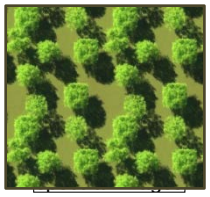
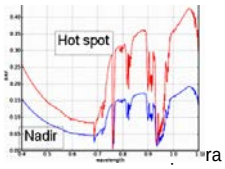
Délégation Midi Pyrénées



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





Google map

DART image

Creation of model of lands from Google im

Announcement

DART Tutorial 2023

Contact: jean-philippe.gastellu@cesbio.cnes.fr, yingjie.wang@univ-tlse3.fr, omar.regaieg@univ.tlse3.fr

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 (DART-Lux bi-directional MC, texture, etc.) 3) Study of schematic cases through prepared exercises, 4) Presentation of Pytools4DART, and 5) Case studies of interest to each participant.
Program of the training	**1. SHORT REVIEW OF PHYSICAL BASES** (optical remote sensing, radiative budget) Radiance, reflectance, emissivity, brightness temperature, radiative budget, etc. **2. DART THEORY AND FUNCTIONALITIES** **a) Theory**: standard DART-FT and latest DART-Lux (bi-directional Monte Carlo) **b) Major functionalities** (interactive presentation) • Mode of operation: spectroradiometer (modes R, T, R+T), LiDAR, RB. • Landscape modeling: - Geometry: scene dimensions, spatial resolution, topography, coordinates, etc. - Components: * directly simulated trees, houses, crops, topography, etc. * imported 3D element and landscape (urban database, tree, etc.) *4 basic elements (facets, turbid (vegetation), fluid (air, water), atmosphere). - Optical properties: surface (anisotropic facets) & volume (turbid, fluid and air) - Atmosphere: gas and aerosol vertical profiles. • DART remote sensing (RS) and radiative budget (RB) products • LUT (SQL database) creation/management with the DART sequencer • Post processing tools: correction of topographic effects, satellite broad bands • Use of command lines: DART, its modules and its sequences

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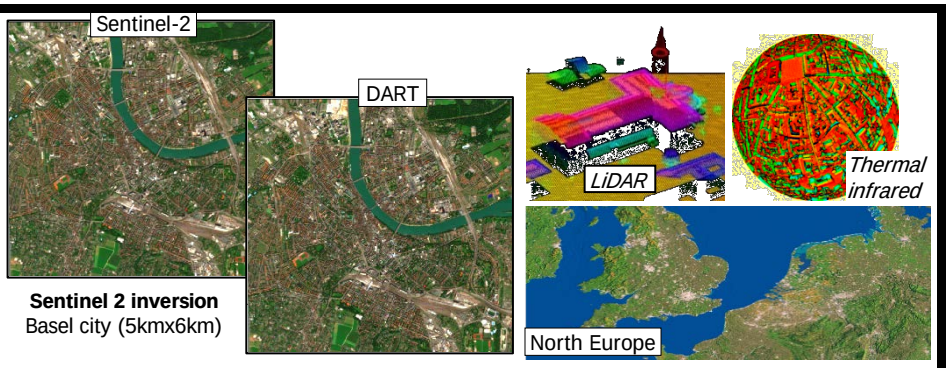
Service des Ressources Humaines
Bureau de la Formation Permanente



Sentinel 2 inversion
Basel city (5kmx6km)

Announcement

Program of the training	**3. PRACTICE OF DART WITH EXERCISES, FROM SIMPLE TO COMPLEX** **3.a** ***Flat surfaces - VIS / NIR / TIR spectral domains*** Basic DART functionalities are introduced with simple 2D landscapes: scene creation, simulation of images (irradiance, albedo, exitance, directional radiance / reflectance / brightness temperature), radiative budget, sequence of simulations (landscape reflectance spectra, satellite broad bands, time series, etc.). *Example of basic case study*: for which experimental / instrumental configuration, can we detect a fire in a thermal infrared (TIR) pixel? Can we distinguish ice and ground TIR pixels with the same thermodynamic temperature? **3.b** ***Simulation of realistic 3D landscapes*** The presentation focuses on functionalities / landscapes of interest to attendees: - Atmosphere simulation: gas and aerosol models, atmosphere geometry, etc. - Creation of complex forest, agricultural or urban scene with topography, etc. - Importation of 3D elements and /or landscapes - Simulation of fluorescence, LiDAR, etc. 4. **PRESENTATION OF PYTOOLS4DART** (https://gitlab.com/pytools4dart/pytools4dart) API python created by TETIS (www.umr-tetis.fr) for DART massive simulations. 5. **IMPLEMENTATION BY EACH PARTICIPANT OF HIS / HER OWN CASE STUDY** - Radiative budget: forest, urban landscape, etc. - Scene creation (forest, crop, etc.) with imported 3D objects (tree, maize, etc.) - Sensitivity studies (e.g., variation of forest reflectance / brightness temperature with LAI, view direction, topography, thermodynamic temperature). - Inversion of satellite image of city as map of optical property per urban element - LiDAR: waveform, solar noise, 3D points derived from waveforms, 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 12 / 13 / 14, 2023** (9 am - 6 pm)
Registration deadline	**April 28, 2023**
Place of DART tutorial	Toulouse III University,1 Rue Tarfaya, 31400 Toulouse (https://www.mfja.fr), room 313

Service des Ressources Humaines - Pôle Accompagnement des Parcours Professionnels
Hélène Feuillerat - ☎ 05 61 33 60 05 - Helene.Feuillerat@dr14.cnrs.fr
16 avenue Edouard Belin – BP 24367 - 31055 Toulouse cedex 4 - http://www.cnrs.fr/midi-pyrenees