RESEARCH ACTIVITY HYLIGHT

Integration of airborne hyperspectral imagery and laser scanning data to improve processing and interpretation

Airborne hyperspectral imaging (HSI) sensors provide the opportunity to generate imagery with more detailed information on the spectral properties (reflectance or spectral signature) of the Earth's surface far beyond the capabilities of broad-band multispectral sensors. Airborne Laser Scanning (ALS) sensors, providing height/structure information, are commonly used to produce digital surface models (DSMs) and digital terrain models (DTMs).

The objective of the EUFAR Joint Research Activity HYLIGHT is to combine the two different airborne remote sensing technologies (HSI and ALS) to improve the processing and analysis of both types of acquired data.

HYLIGHT TOOLS UNDER DEVELOPMENT:

>> Combined analyses of ALS and HSI

PML	**ALS/HSI target matching tool :** matches near neighbours of ALS to HSI points and vice-versa
TU Vienna	**opalsRadioCal :** uses Full Waveform information to compute reflectance for laser scanning points of extended targets, enhanced by atmospheric correction
TAU	**LWIR radiance Planck fit and Temperature extraction :** Planck curve fitting with temperature extraction and ALS shadow modelling

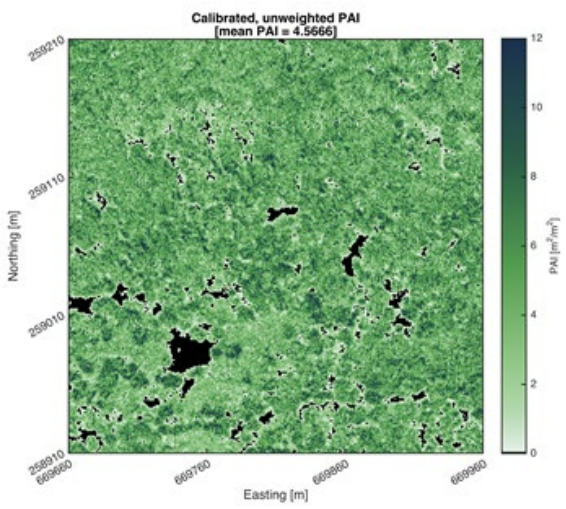
>> HSI to improve ALS

PML, ONERA	**ALS classification tool :** improves classification of ALS using the HSI classifications. If data are collected at the same time then also classifies cloud & haze
Czech Globe	**BiomassMapper tool :** estimates tree biomass

>> ALS to improve HSI

INTA	**SLP_ASP_calculator :** improves the calculation of slope and aspect maps using ALS data and actual characteristics of HSI imagery
VITO	**DSM creator :** creates a DSM from ALS data
ONERA	**ICARE-HS tool :** atmospheric correction of urban HSI images using ALS-derived 3D information
UZH	**AtmoCorr3D :** shadow correction for HSI images using 3D canopy structure parameters derived from ALS and a radiative transfer model
DLR	**LAVA - LAS Variability tool :** calculates error margins of the DSM/ DTM and DSM/ DTM related errors for atmospheric correction steps
UZH	**Irradiance fraction tool :** estimates direct and diffuse irradiance fraction for each HSI pixel using a radiative transfer modelling approach
VITO	**Shadow fraction tool :** shadow fraction with LAS processing and put in the same grid cell
UZH	**PAI estimation tool :** estimates voxel based plant area index (PAI) for the parameterisation of the radiative transfer model DART
VITO	**Tree species classification tool :** classifies tree species using ALS-derived vegetation percentage height values (PHV) as additional layer

Example of output of the PAI tool for the Laegern test site (credits UZH)



Extraction of PAI allows the parameterisation of the DART model for the analysis of the 3D radiative budget to quantify the amount of irradiance for each HSI pixel to be used to compensate shadowed pixels

HYLIGHT working group photo

For more information, contact Ils.Reusen@vito.be or visit www.eufar.net/tools