



REACHING INTO SPACE
TOGETHER

Services de suivi forestier par observation de la Terre

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VIERVES-SUR-VIROIN | 06-06-2024

COMMERCIAL

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- c. Results

SPACEBEL, A SAFE VALUE IN THE SPACE INDUSTRY

SPACEBEL is a systems and software engineering company operating in the Space and Earth observation applications sectors.

OUR SKILLS

- DESIGN, DEVELOPMENT AND VALIDATION OF IT SPACE SYSTEMS
- DESIGN AND DEVELOPMENT OF GEOSPATIAL INFORMATION SYSTEMS AND GIS SERVICES
- MISSION DEFINITION OF SMALL SATELLITES FOR EARTH OBSERVATION



500 m² clean rooms

YOUR HIGH-TECH PARTNER OF CHOICE

We deliver our services and products to :

- SPACE AGENCIES
- MAJOR EUROPEAN AEROSPACE COMPANIES
- EUROPEAN COMMISSION AND GOVERNMENTAL BODIES
- INDUSTRY

OUR CORE-BUSINESS IN A NUTSHELL

Mission critical solutions, when performance, safety and reliability are a must

- **SPACE SYSTEMS & SOFTWARE ENGINEERING:**
 - Launcher flight programme software
 - Spacecraft on-board software
 - Satellite simulators & processor emulators
 - Spacecraft control centres
 - Mission centres
 - Remote sensing data management
- **SPACE SYSTEM CONTROL, INCLUDING CONTROL DESIGN, TECHNIQUES AND VERIFICATION**
- **TELECOMMAND AND TELEMETRY SUBSYSTEMS AND TOOLS**
- **SPACE WEATHER IT INFRASTRUCTURE**
- **SYSTEM DESIGN & VERIFICATION, INCLUDING SYSTEM ANALYSIS AND SIMULATION**
- **MISSION OPERATION AND GROUND DATA SYSTEMS**
- **EARTH OBSERVATION APPLICATIONS**

1. EO-APPS team

EO-APPS offers **Earth observation products** and services for **vegetation, forestry, agriculture** and **natural resources management** and contributes to help decision makers and private owners world-wide in knowing their land, while protecting and improving people's livelihood



1. EO Applications

• OUR SERVICES

FOCUS OF TODAY

Forestry



Agriculture

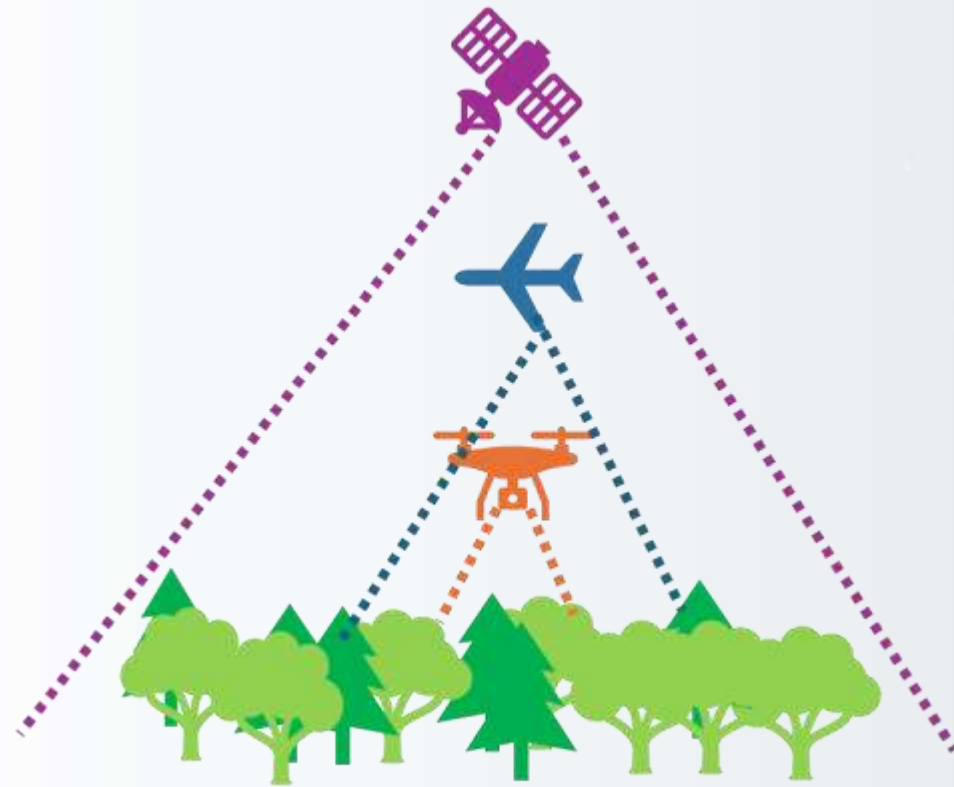


**Disaster
Monitoring**



2. SPACEBEL UTILIZES MULTI-SCALE APPROACHES

Forestry services provided through a
balanced mix of data and technologies



Spatial resolution

Spatial coverage

Satellite data (commercial and public)

Airborne data

Drone data

Expert knowledge and field data from end-user

SPACEBEL'S OFFERED SERVICES



LARGE AREA COVERAGE

False-colour cloudless composites

True-colour cloudless composites

Spectral indices

Change detection

Forest, non-forest masks

Species identification



SMALL AREA COVERAGE

Single tree-vitality status

High-resolution species identification

Invasive species detection

Single-tree detection

Tree height and diameter

Tree density map



EFFICIENT SATELLITE-BASED SCOUTING



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Douglas-fir tussock moth

© USDA Forest service



Data used:

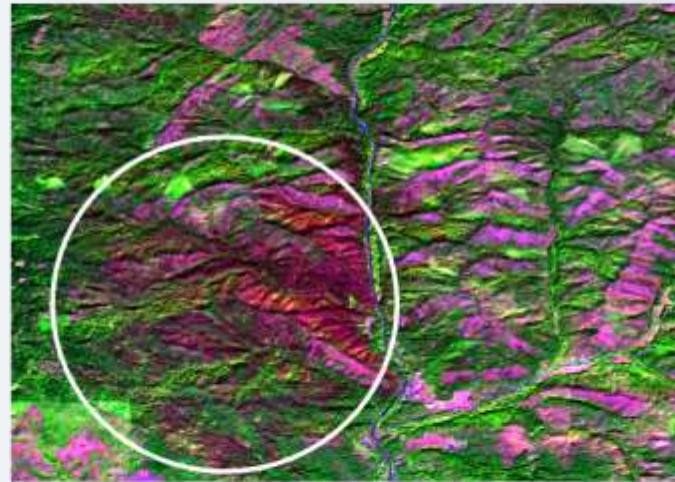
*10m resolution
VNIR-SWIR images*

Defoliation resulting from the moth outbreak in 2019 can be easily inspected. Improvements in the affected area are observable in 2021.



Washington state, USA

Real Colour Satellite Image



August 2019



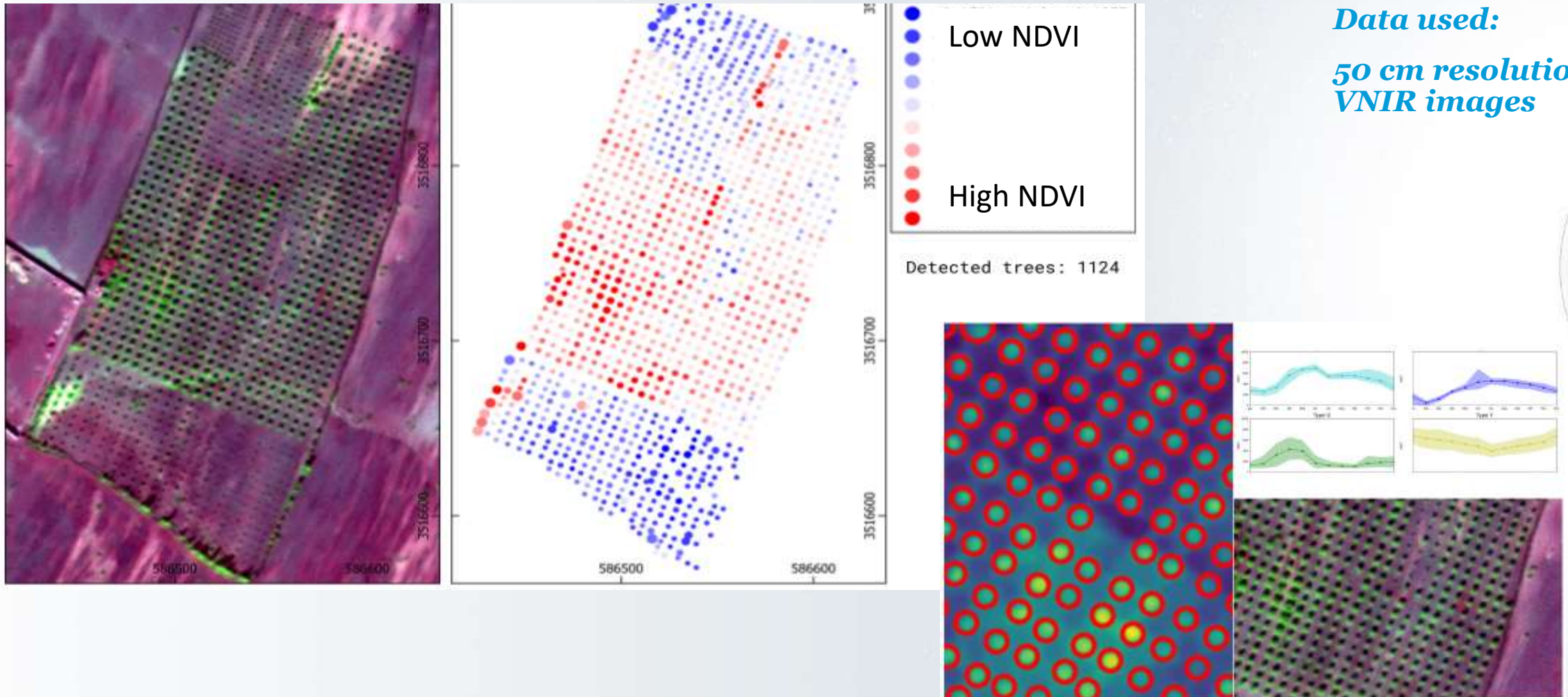
August 2021

False Colour Satellite Images

TREE DETECTION AND HEALTH INDEX

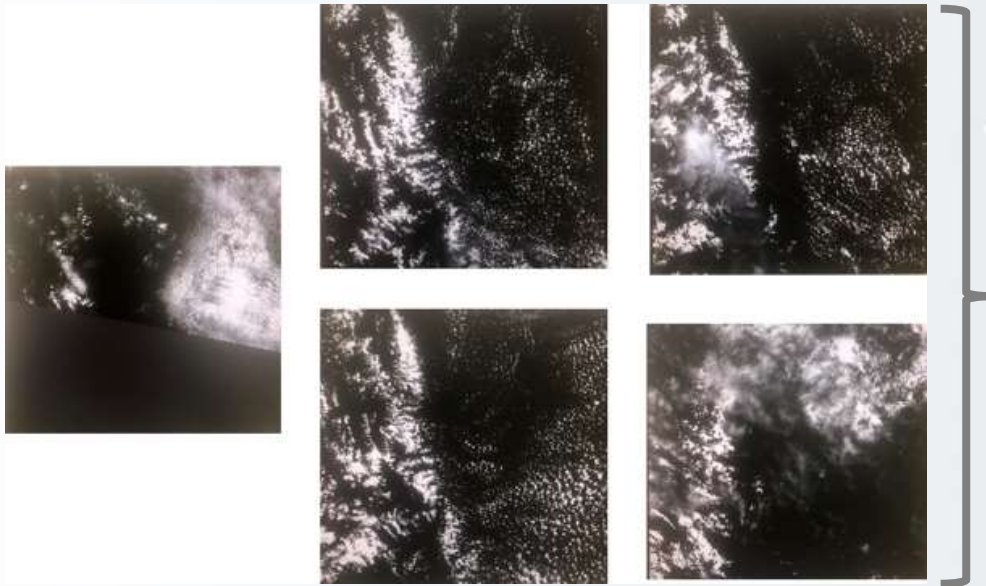


Olive trees in Morocco : Mapping and vitality monitoring



INCREASED IMAGING OPPORTUNITIES

Forests in Peru: developing cloudless mosaics and mapping forests and changes



Data used:
10 resolution
VNIR-SWIR images



DATA ENABLES DETAILED MAPPING AND TREE HEIGHT



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Urban canopy mapping in Brussels

Data used:

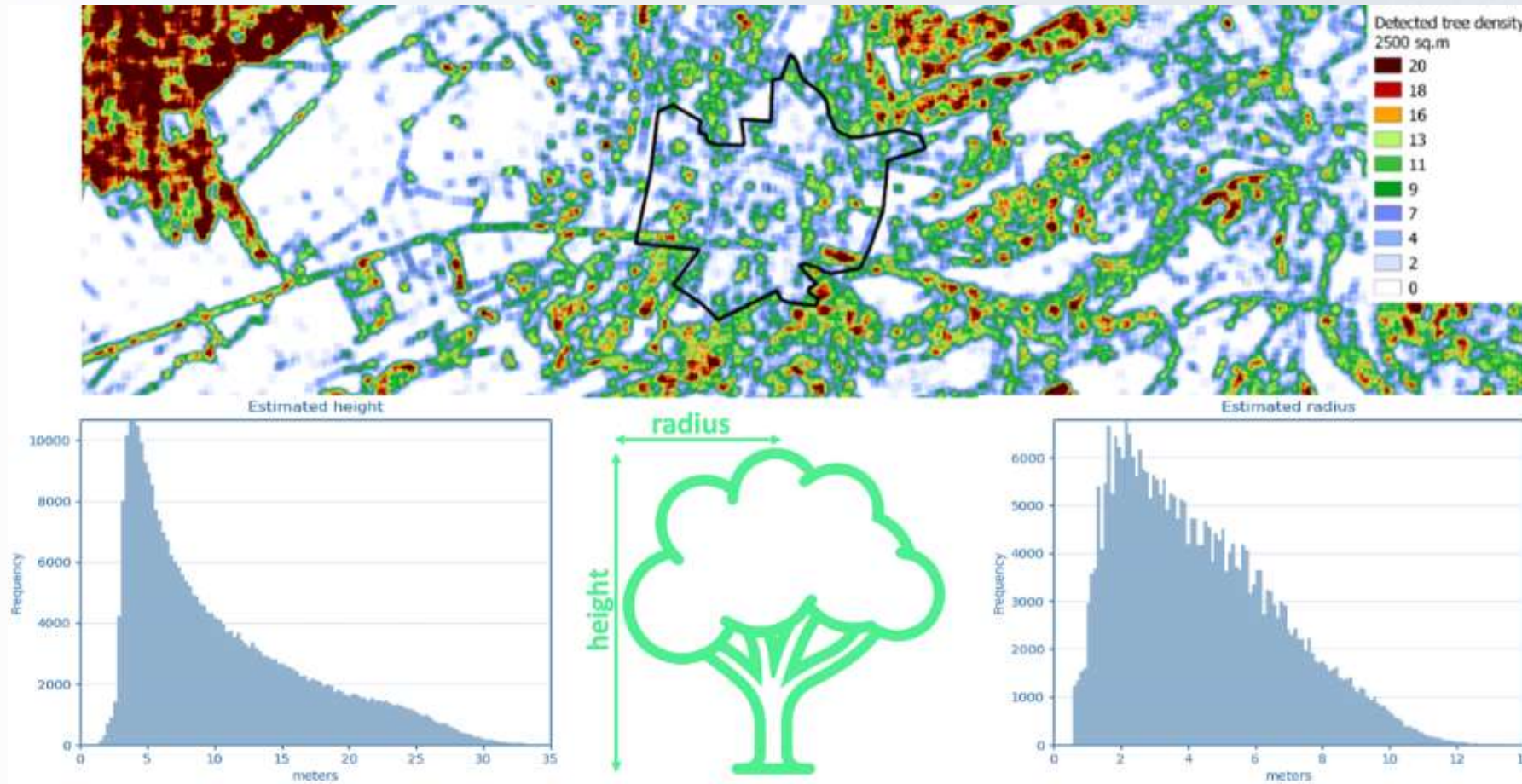
*50 cm resolution digital surface
and terrain models*



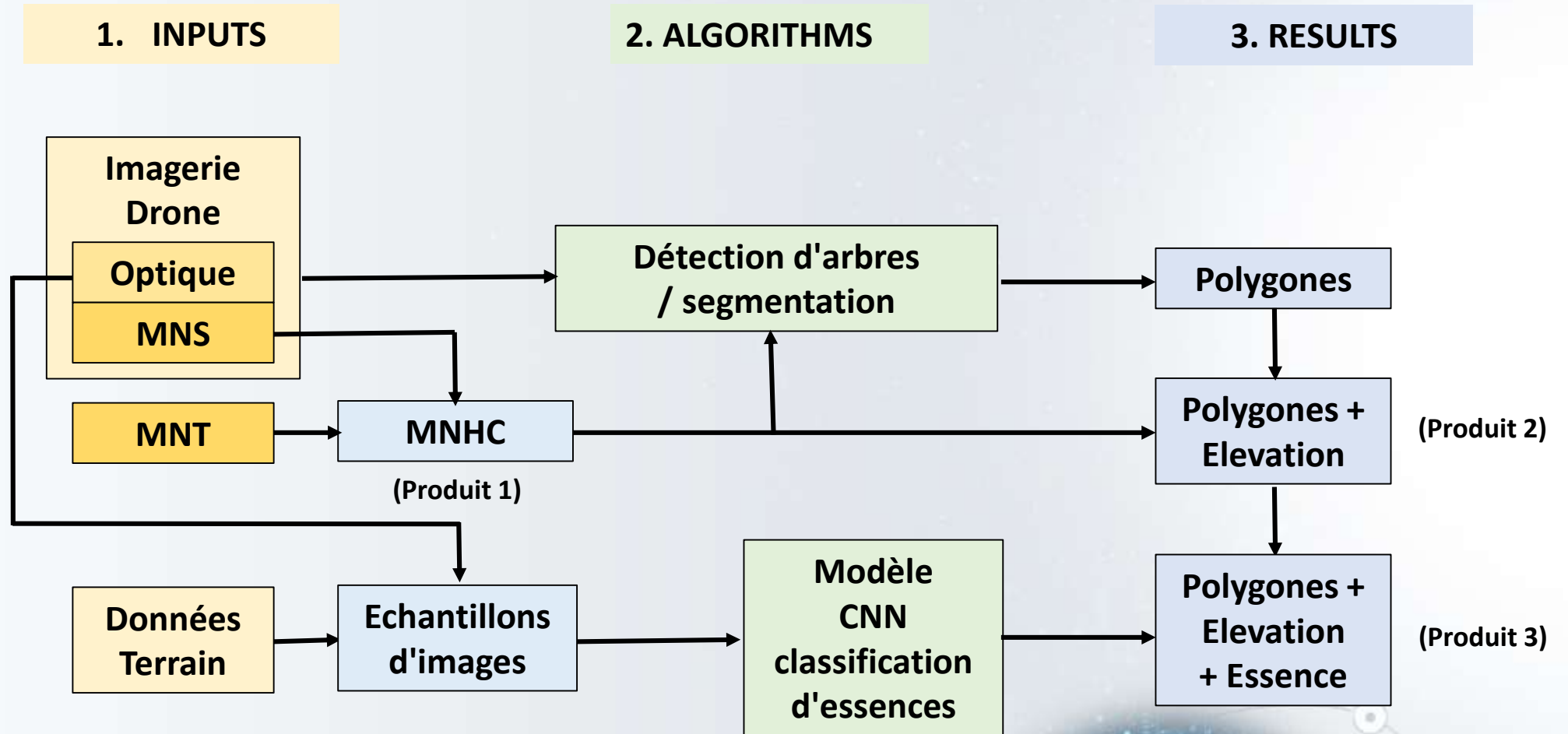
Detailed mapping and tree density



Data used:
20 cm resolution
RGB imagery



3. DRONE BASED SOLUTIONS

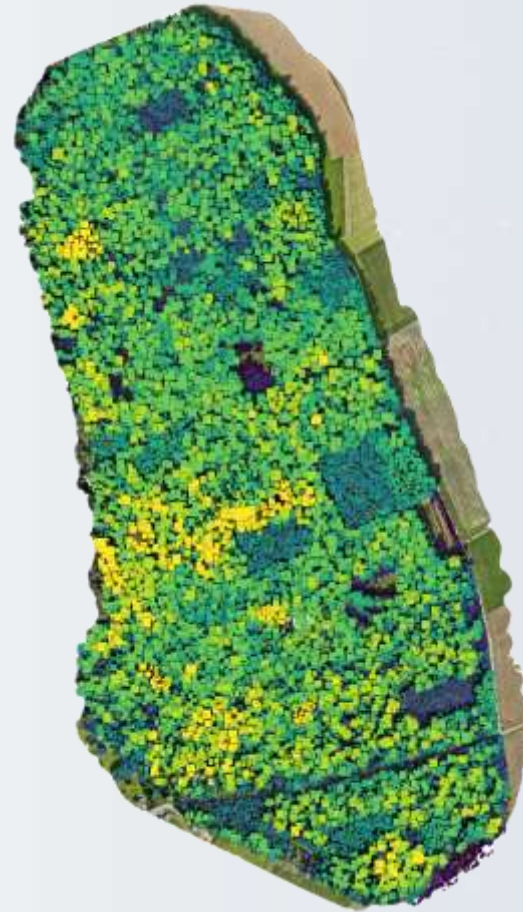


DRONE BASED PRODUCTS

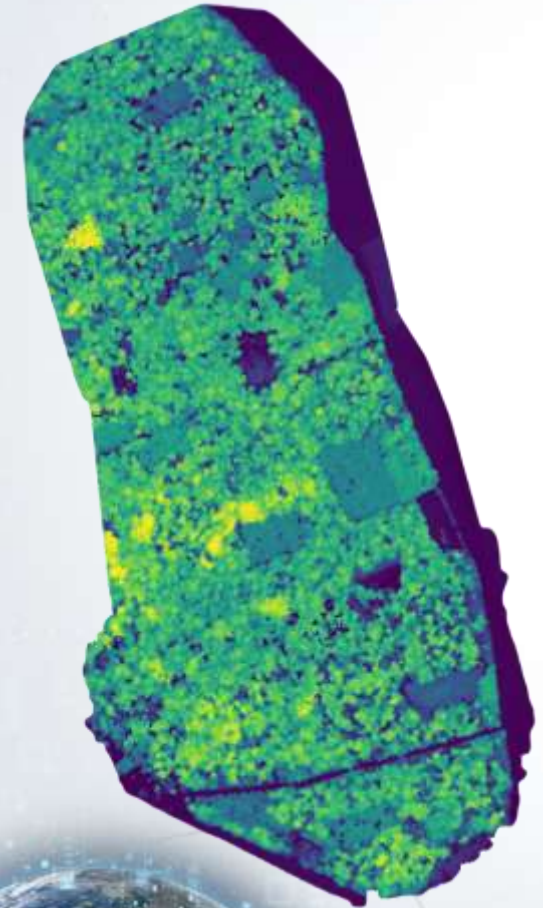
TREE SPECIES CLASSIFICATION



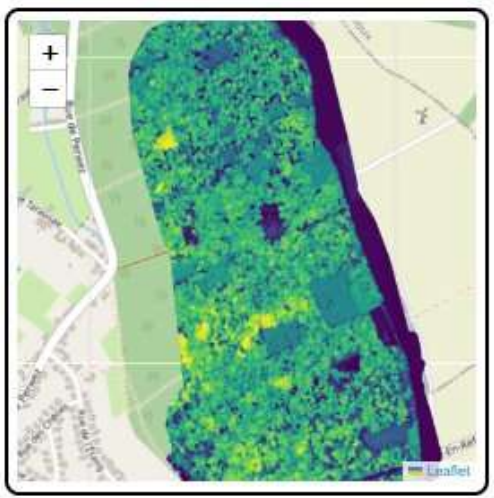
TREE CROWN SEGMENTATION + CANOPY HEIGHT MODEL



CANOPY HEIGHT MODEL



Results for drone-based solutions

	Produit 1: MNS & Ortho (VHR)	Produit 2: Segmentation des couronnes d'arbres et estimation des hauteurs		Produit 3: Classifications des essences
Prérequis	- Autorisation vols drone - Préparation vols & temps clément	Récupérer (ou générer) le MNT de hauteurs d'arbre		Set d'entrainement constituant les essences présentes (à bonne saison)
Presentation des produits Voir vidéo				
Techniques	Traitement photogrammétrique (Metashape/ODM): RGB + MNS Resolution: 5 cm	Segmentation (très rapide) Performance: - Precision = 0.66 - Recall = 0.68 - F1 score = 0.67	AI-based + finetuning + inférence Performance: - Precision = 0.80 - Recall = 0.78 - F1 score = 0.79	Campagne terrain + preparation du set d'entrainement (Verification points GPS+ interpretation visuelle) Faster-CNN classification performance: - Precision = 0.88 - Recall = 0.80 - F1 score = 0.83

CONTACT

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Avec le support de:

