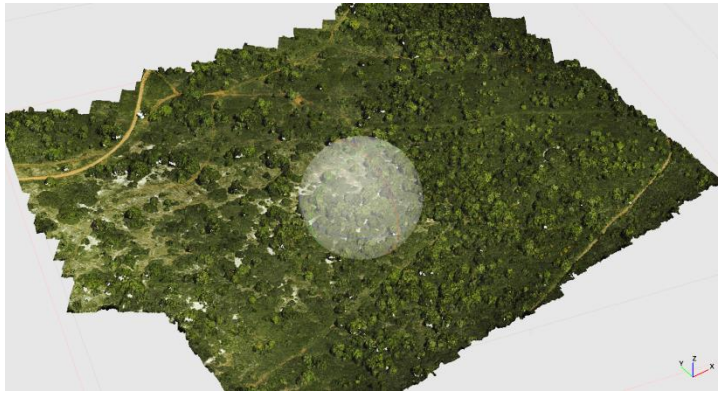
Apéro OSU-OREME – 28 mai 2018

Photogrammétrie de photographies issues de drones pour l'étude des milieux méditerranéens



S. Alleaume, M. Lang

IRSTEA - UMR Tetis

Contexte

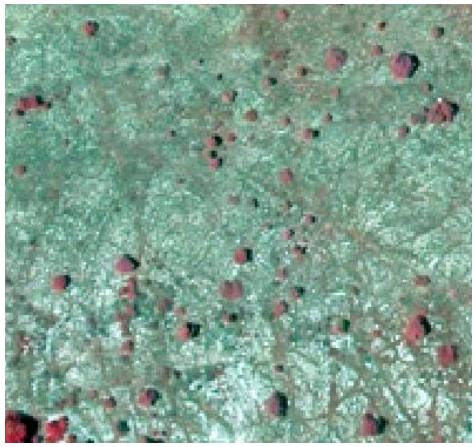
- La préservation de la biodiversité est une préoccupation majeure :
  - Au niveau international (Convention on biological Diversity)
  - Au niveau Européen (Natura 2000)
  - Au niveau National (Stratégie national pour la biodiversité)
- Structure des habitats est un aspect important lié à la biodiversité
  - GEO-BON dans le cadre des EBV's
  - Natura 2000 pour l'évaluation de la qualité des habitats
- Besoin d'outils de caractérisation et de suivi

Objectif Général

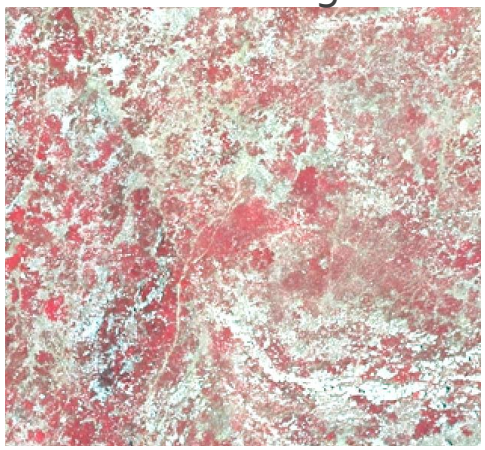
- Explorer le potentiel de la télédétection pour la mise au point de méthodes d'analyse et de suivi de la **structure** des habitats naturels et semi-naturels

Ecosystème méditerranéens = mosaïque de paysages à la structure complexe

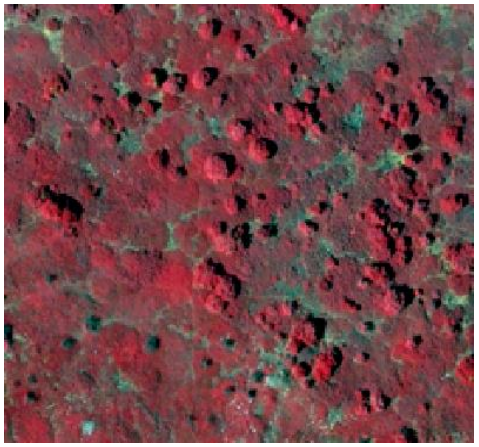
Pelouse



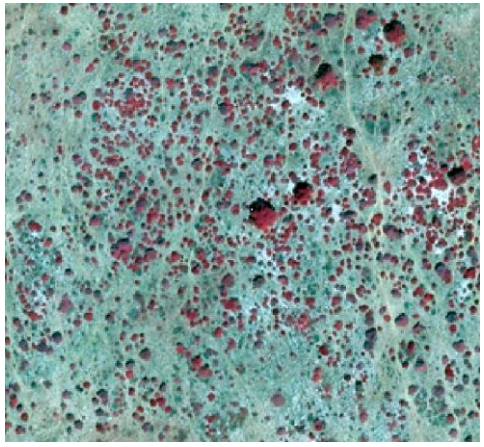
Pelouse très dégradée



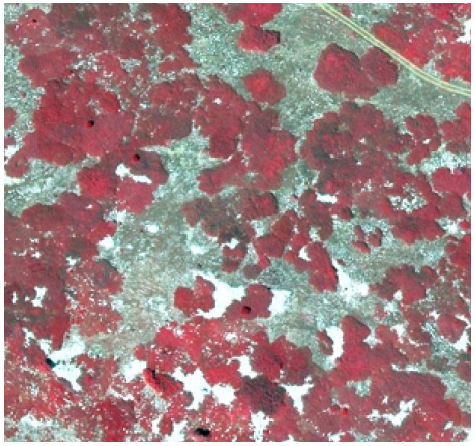
Matorral arbustif



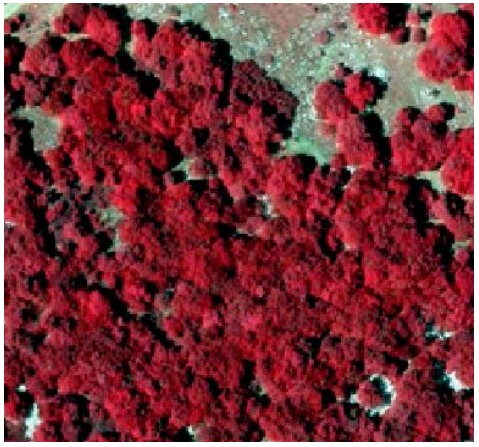
Garrigue à genévrier



Garrigue à chêne kermès



Forêt chêne vert



la structure des milieux : une porte d'entrée vers la multifonctionnalité des paysages

Conservation

Pastoralisme

Gestion des risques d'incendie

Patrimoine culturel

Objectif

- Caractériser **l'organisation spatiale** des différentes strates de végétation
  - Recouvrement
  - Organisation : distribution, connectivité

- Quatre strates d'intérêt

Sol nu

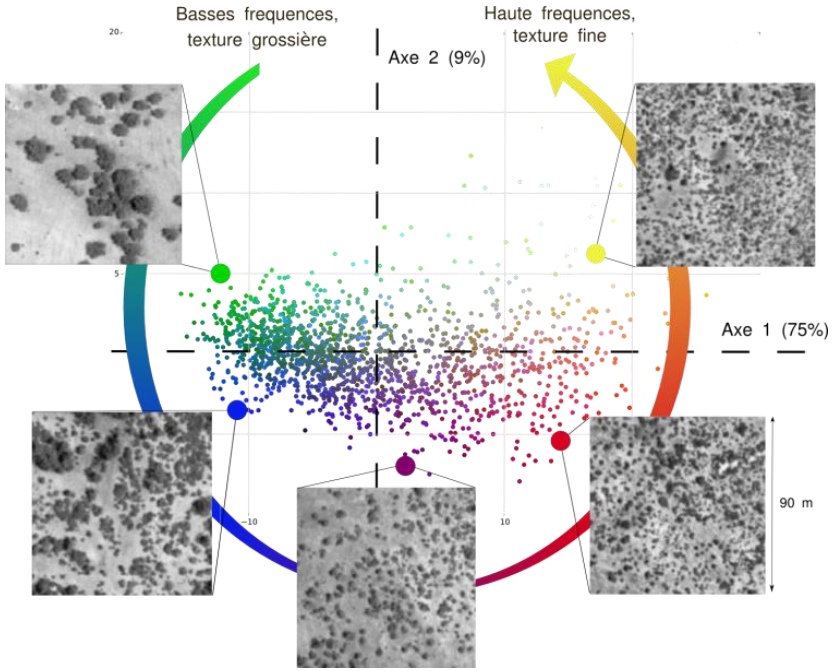
herbacées

Ligneux bas

Ligneux hauts

Stratégie

➢Méthode FOTO contenu fréquentiel

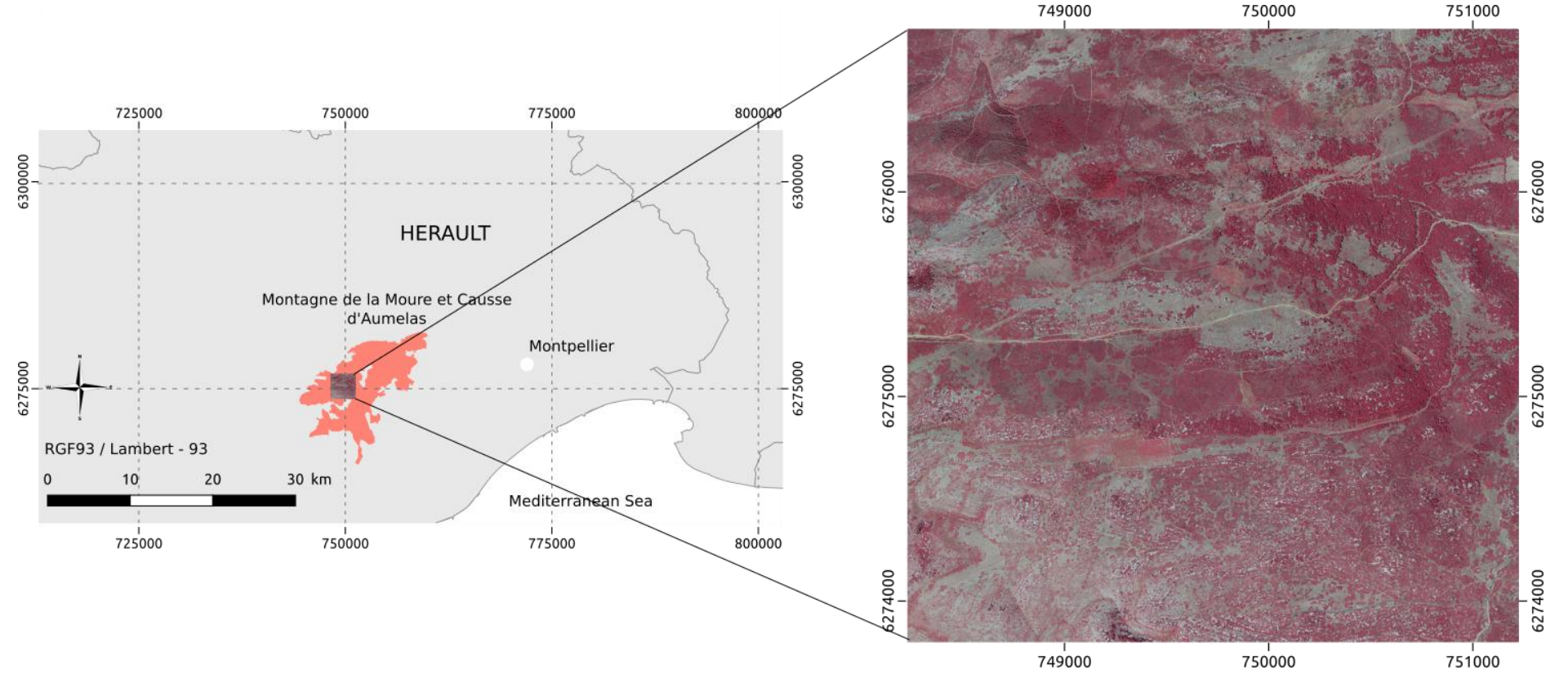


?

- Taux de recouvrement
- Densité
- Compacité

➢ Besoin d'une base de données de référence

Site d'étude : Causse d'Aumelas

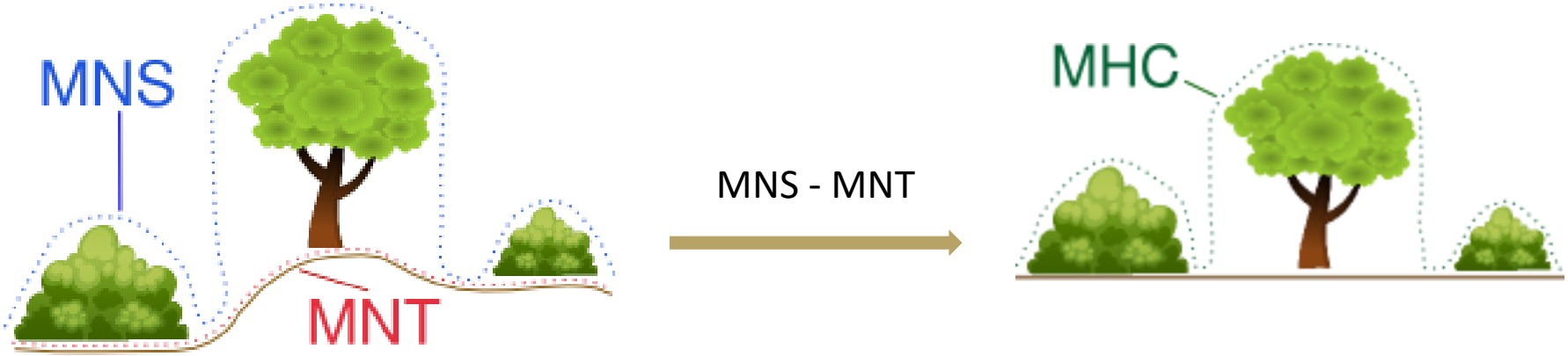


Principe : utilisation de la hauteur

- Rappel : quatre classes d'intérêt

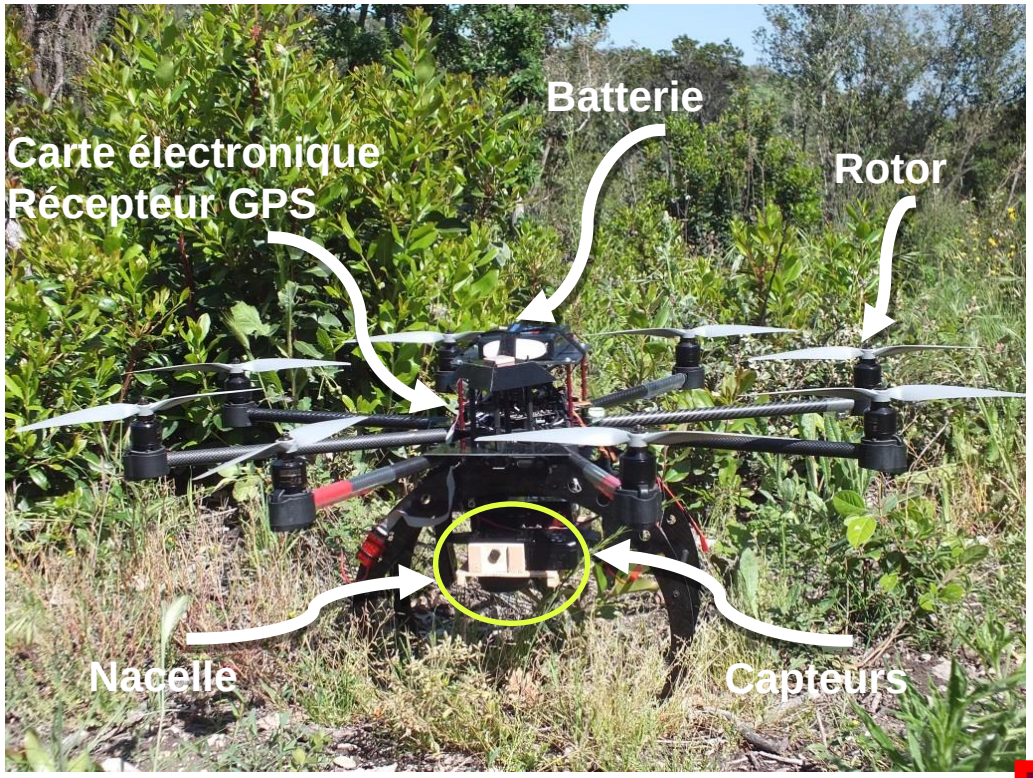
Sol nu | herbacées | Ligneux bas | Ligneux hauts

- Elaboration d'un Modèle de Hauteur de Canopée (MHC)



Aquisitions

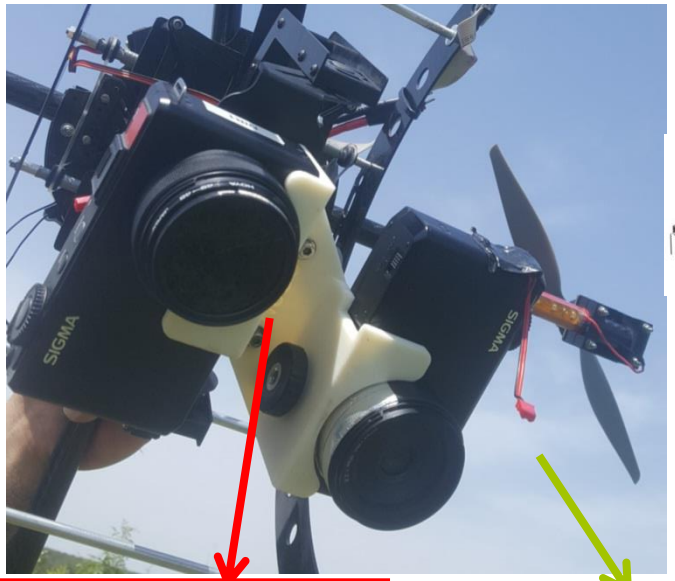
Aquisitions

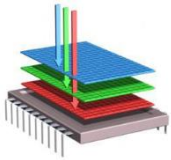


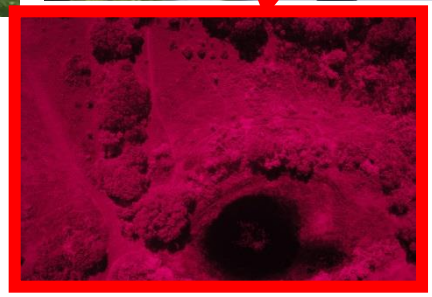
Drones à 6 ou 8 rotors

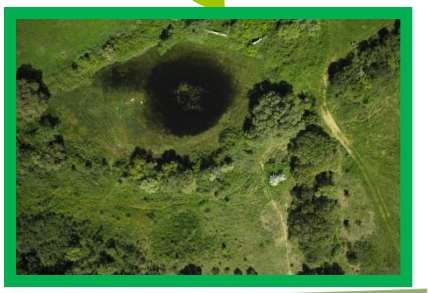
→ 2 appareils photo Sigma

→ 1 caméra Go Pro







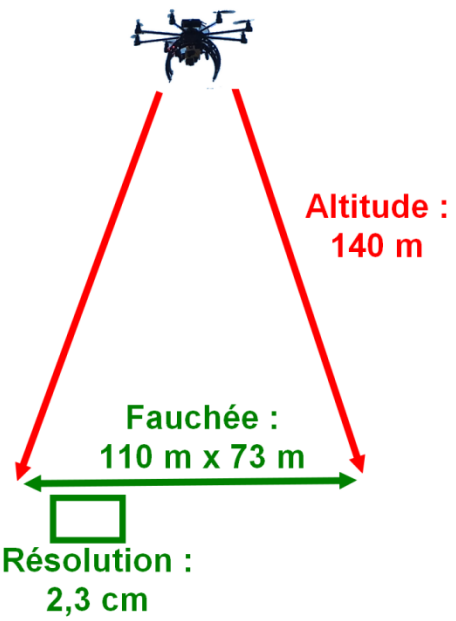


Vecteurs & capteurs

Aquisitions

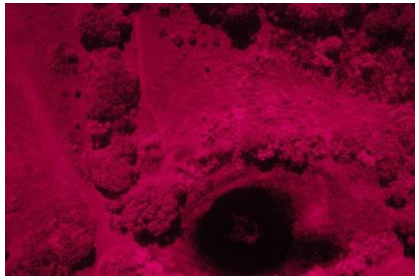
Recouvrement
80% avant
60% latéral

Clichés toutes les 7s



Traitements

Appariement PIR/VIS → Fusion des bandes → Photogramétrie + Géoréférencement → MNT, MNS / Mosaïquage



PIR

Recherche de points homologues

RVB

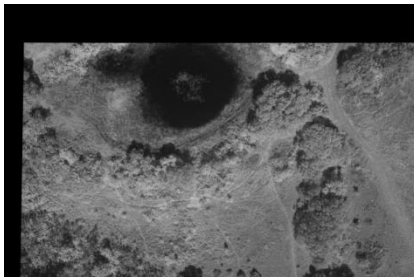


Image PIR redressée

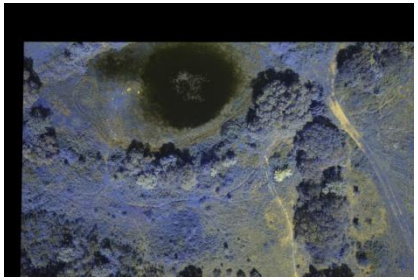
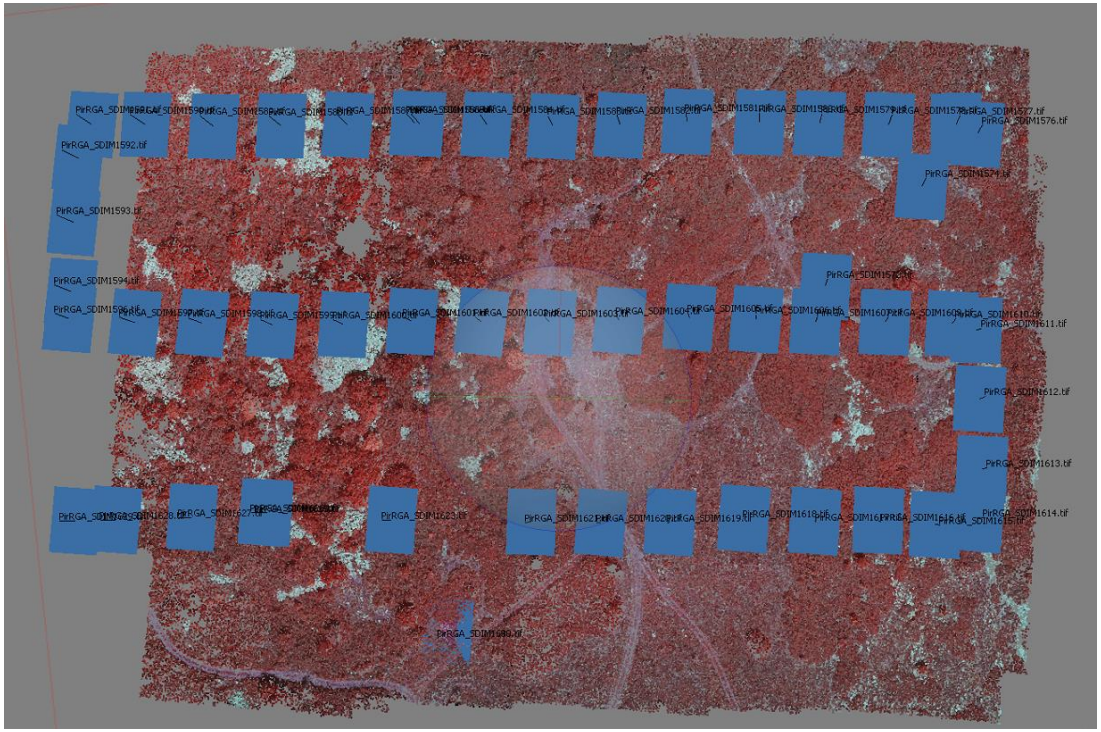
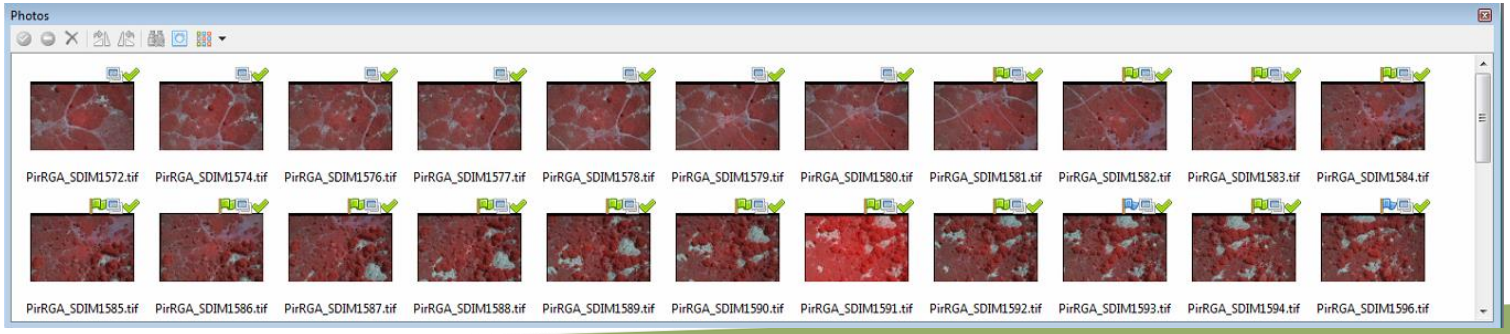


Image VRPIR

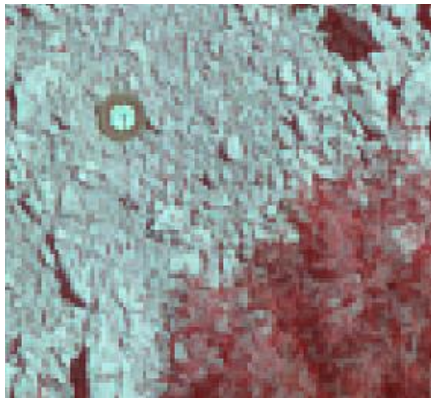
Alignement des photos



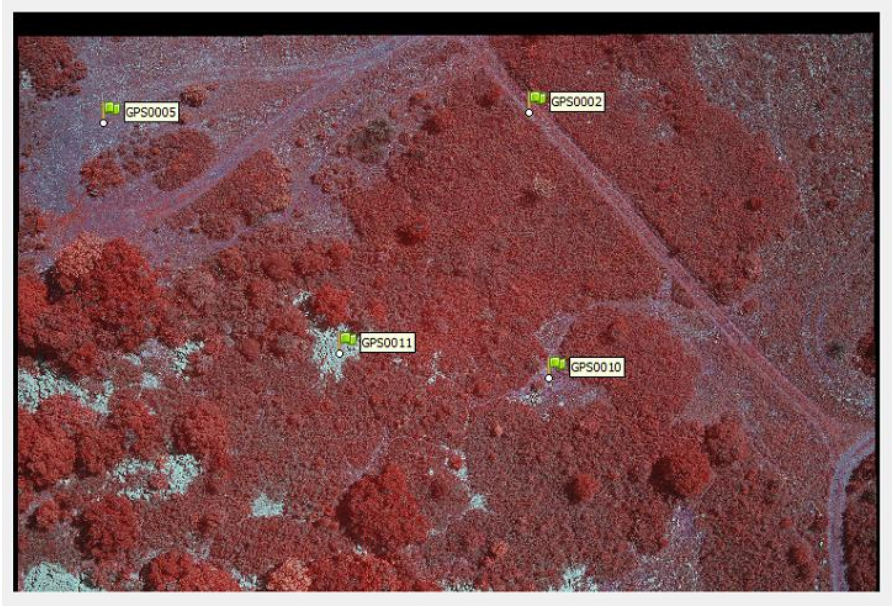


Placer des marqueurs

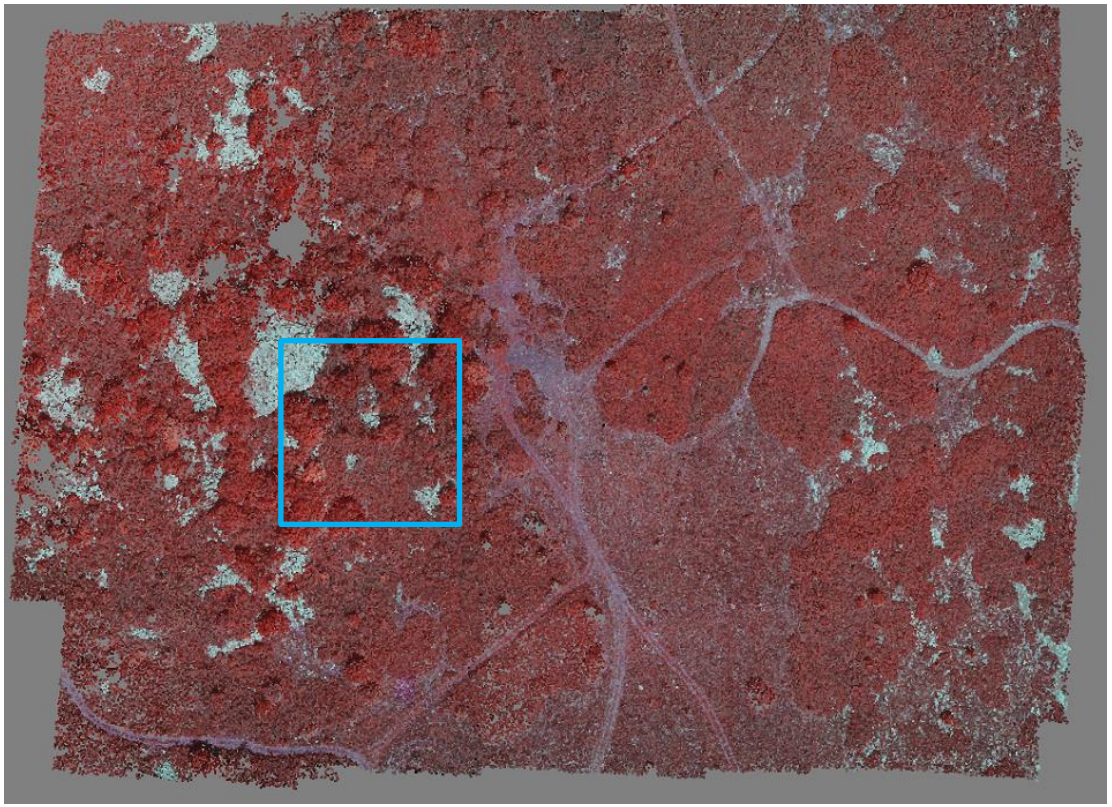
= Des points cibles DGPS acquis sur le terrain sont positionnés

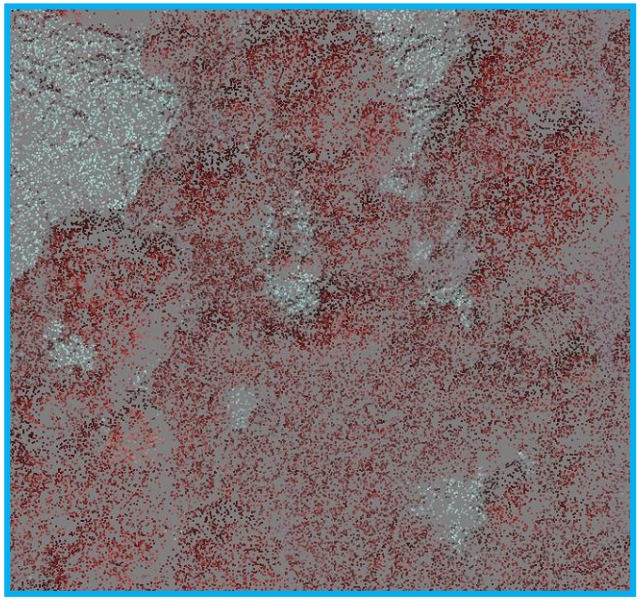


Markers	Easting (m)	Northing (m)	Altitude (m)	Accuracy (m)	Error (m)	Projections	Error (pix)
GPS0002	751052.891000	6274502.684200	293.835500	**0.0037/0.0054**	0.008655	9	0.183
GPS0005	751054.089400	6274561.174800	291.394900	**0.004/0.0059**	0.027985	16	0.285
GPS0006	751016.246700	6274579.725900	290.589200	**0.0052/0.0078**	0.016662	11	0.275
GPS0007	750986.454700	6274563.734800	292.834600	**0.005/0.0073**	0.011839	17	0.169
GPS0008	750962.602400	6274544.519900	291.861800	**0.004/0.006**	0.002612	15	0.313
GPS0010	751016.407900	6274501.895200	292.664700	**0.0036/0.0052**	0.054920	9	0.406
GPS0011	751020.955800	6274529.920500	292.428100	**0.0035/0.0052**	0.014325	10	0.138
Total Error							
Control points					0.010333		0.219
Check points					0.036864		0.317

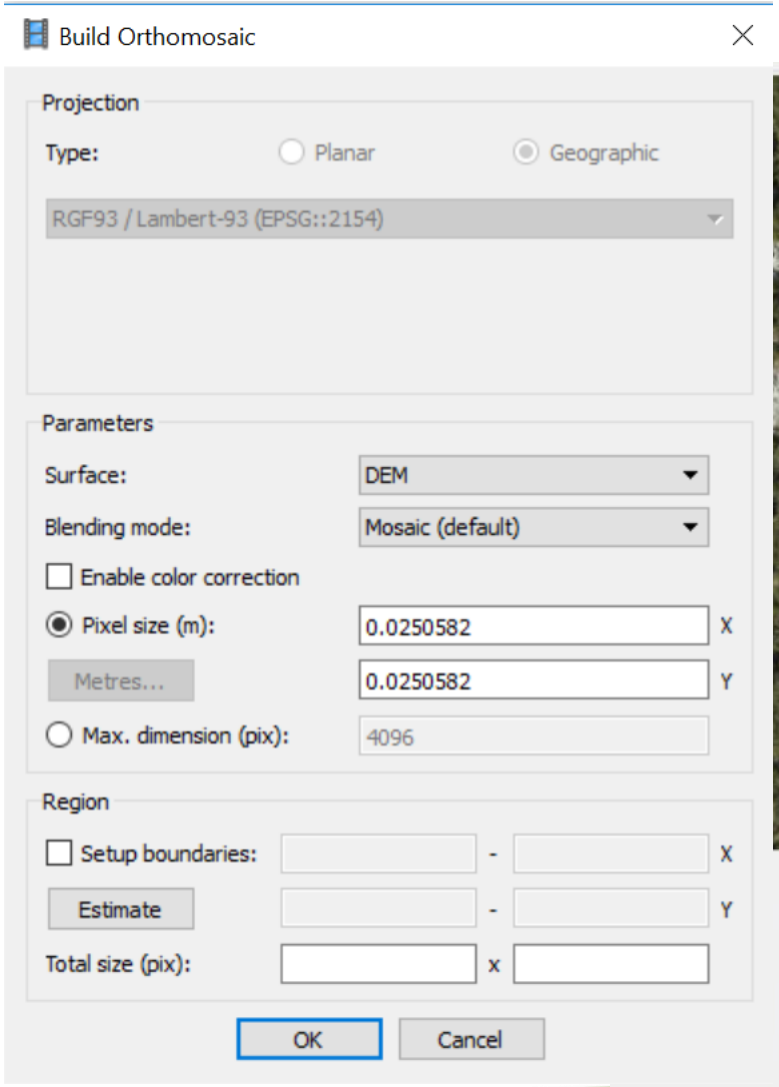


Nuage de points denses

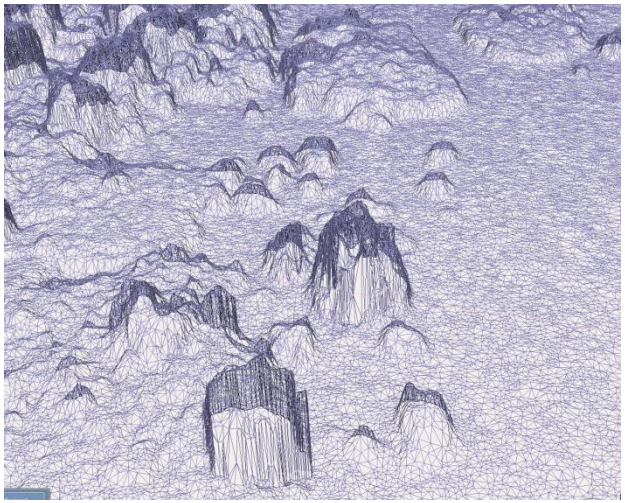


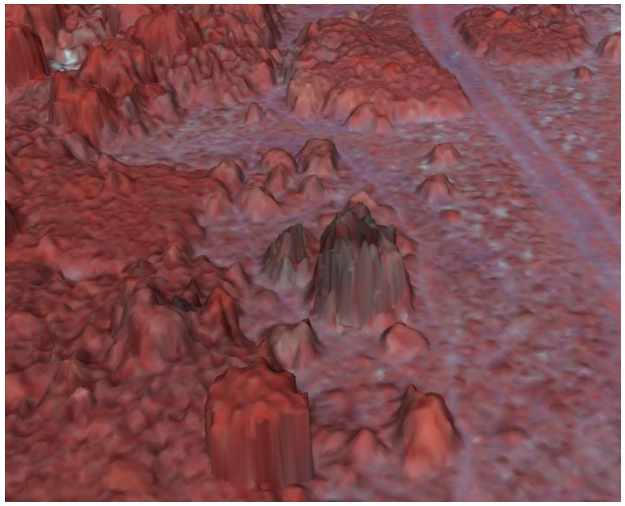


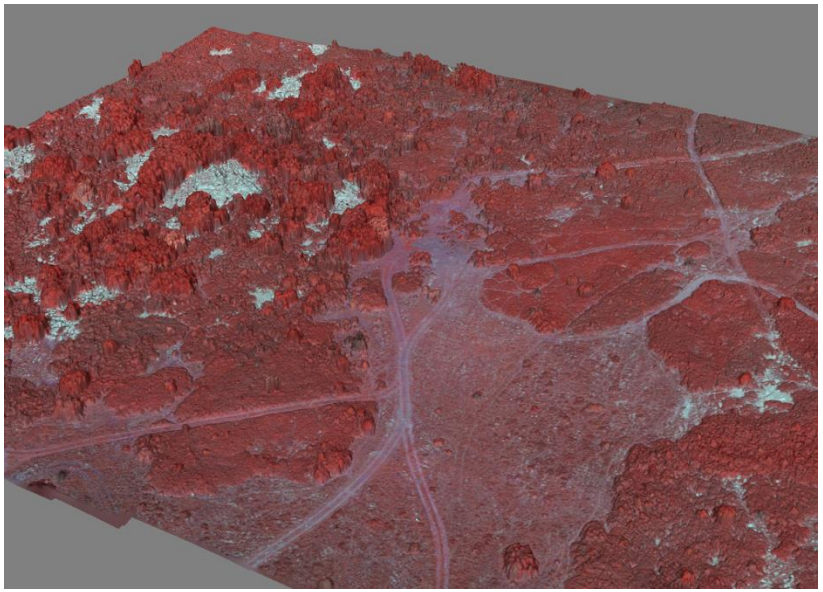
Construction de l'orthomosaique



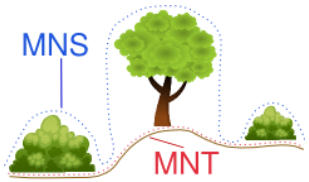
Modèle 3 D

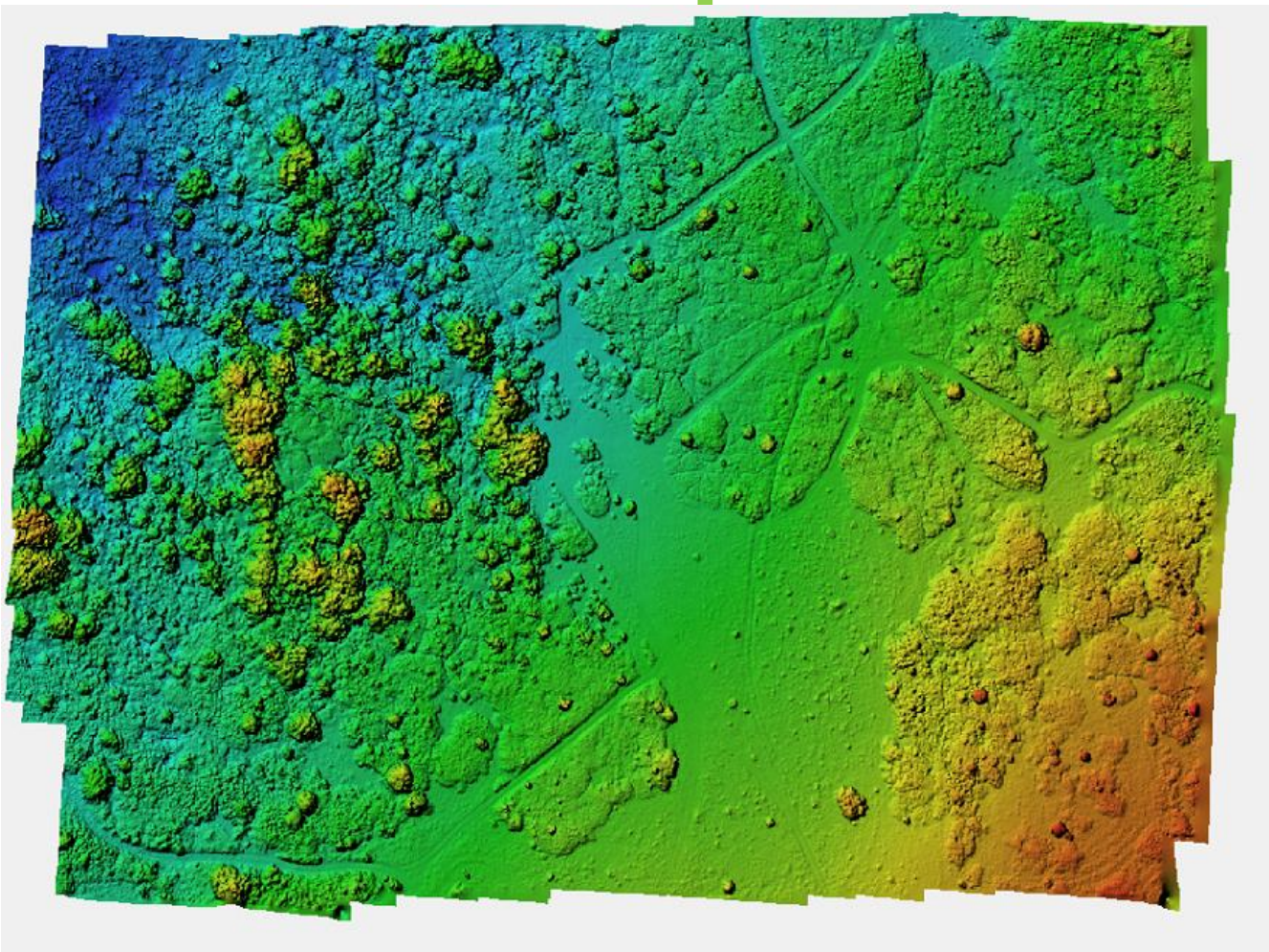




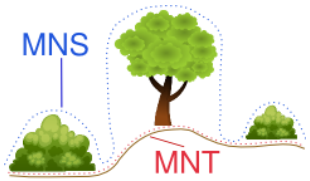


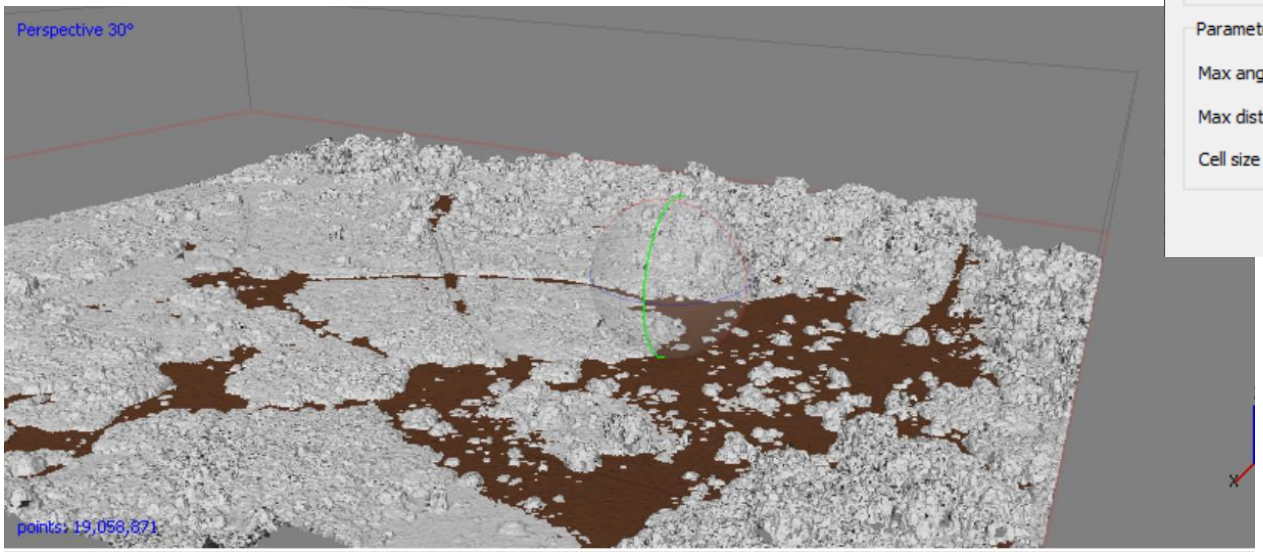
MNS
Modèle Numérique de Surface

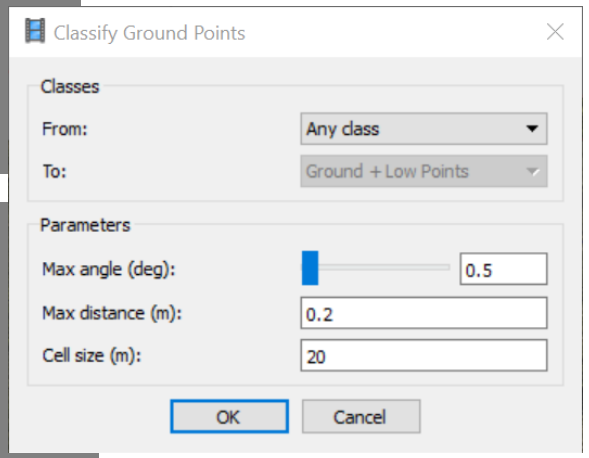




MNT
Modèle Numérique de Terrain

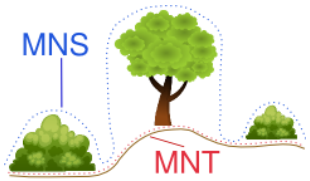




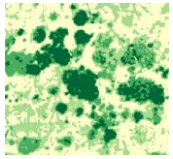


Classification
des points sols

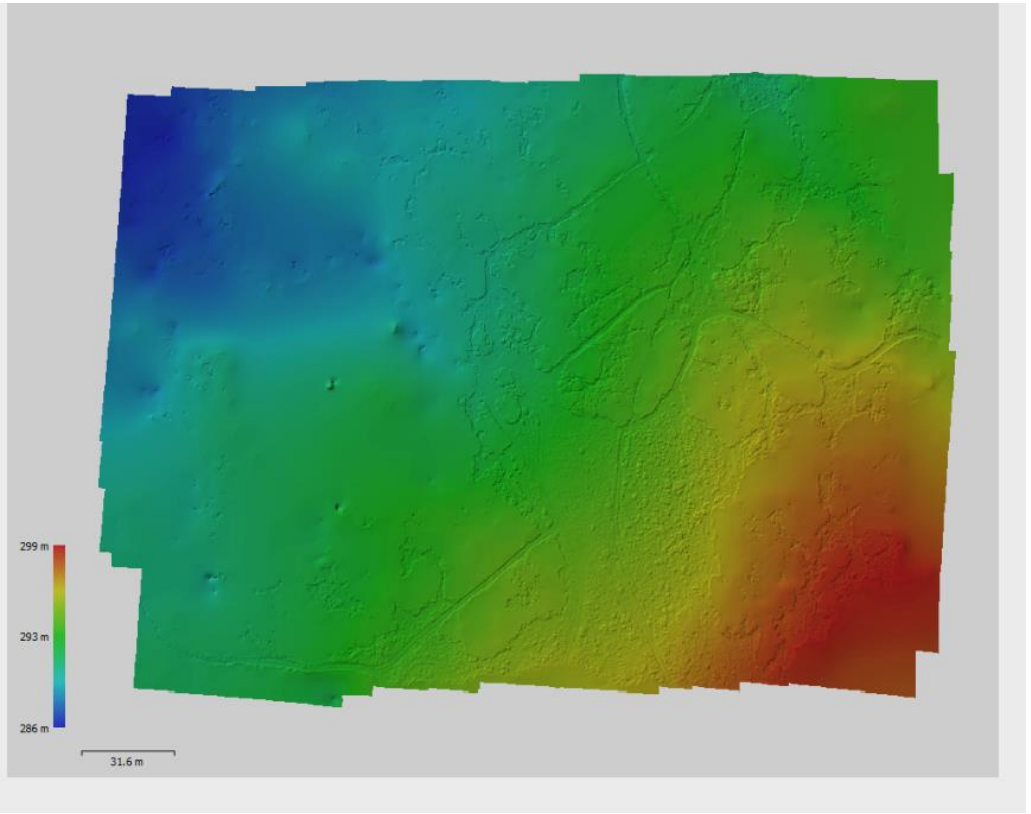
Calcul du MNT



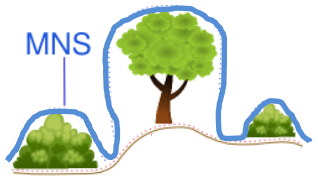
Seuillage

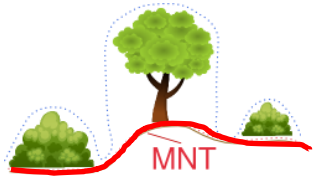


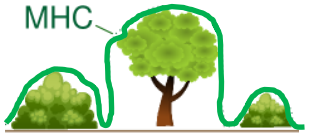
Métriques

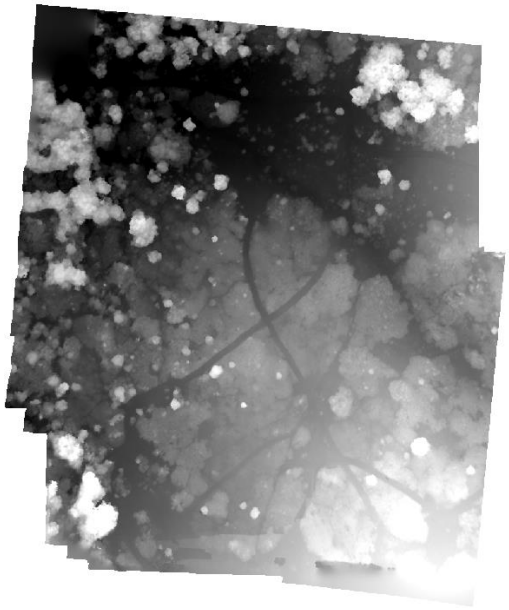


Construction du MHC









MNS

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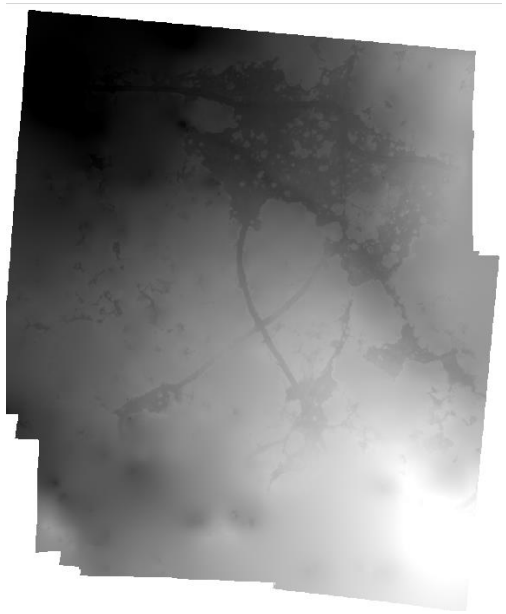

MNT

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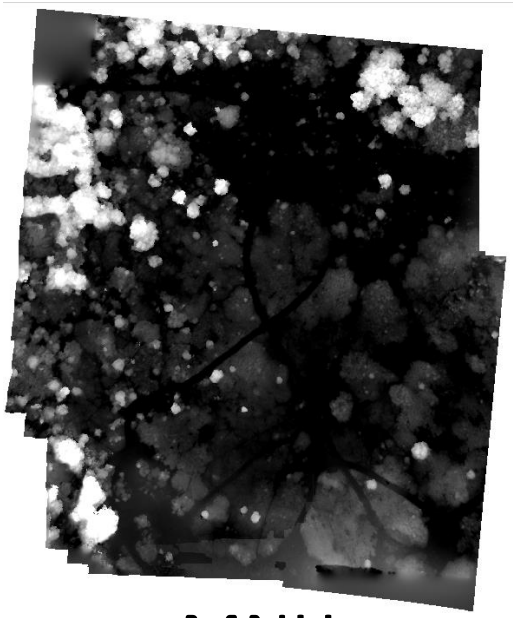
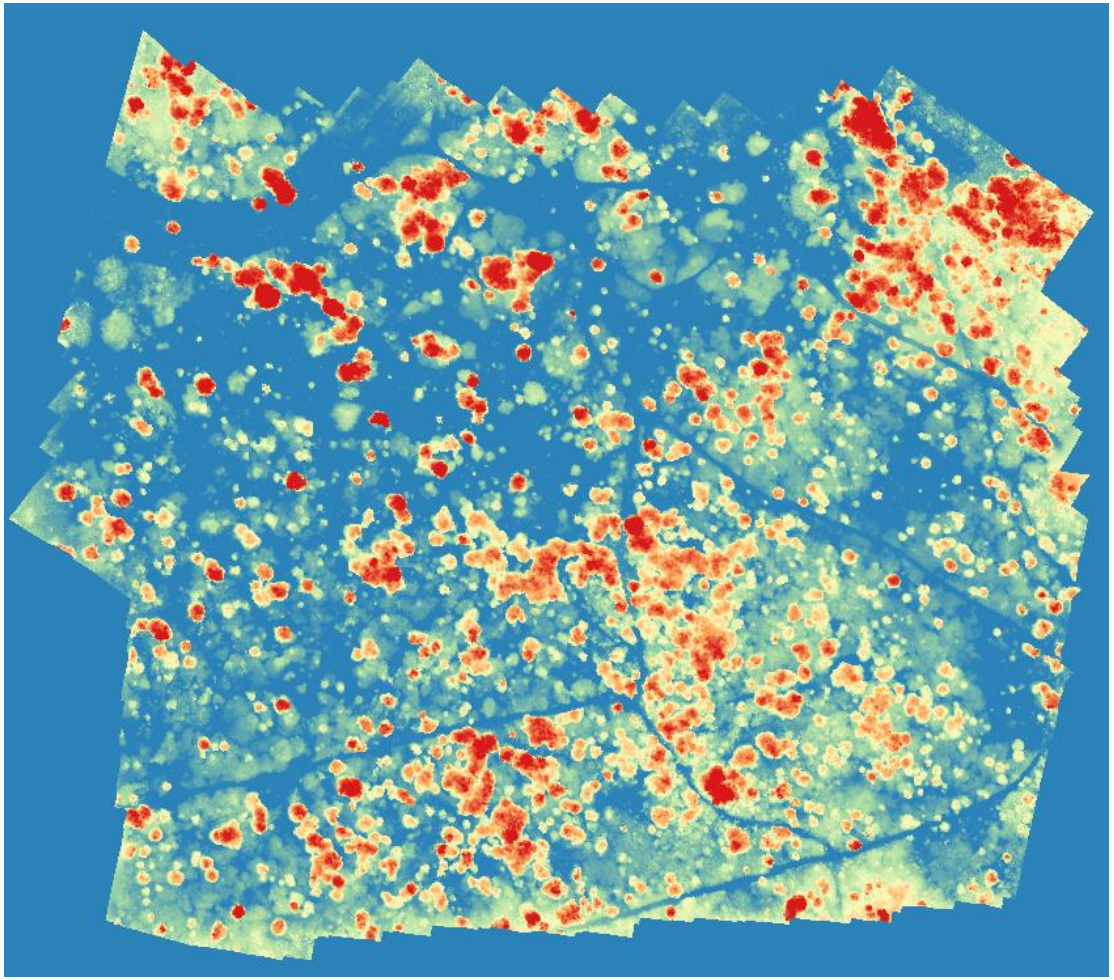


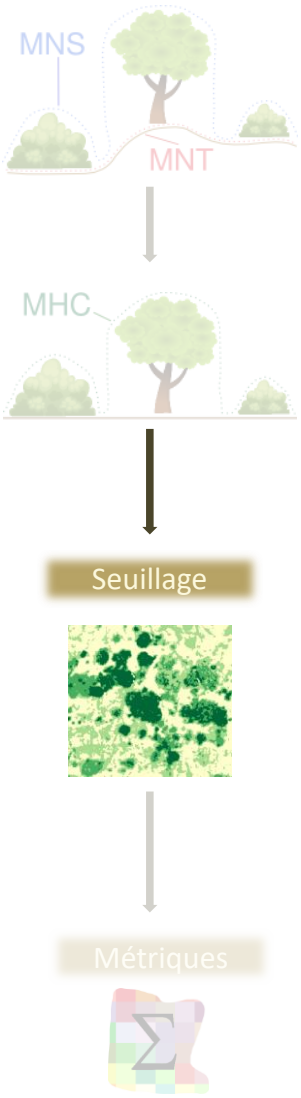
MNH

Construction du MHC

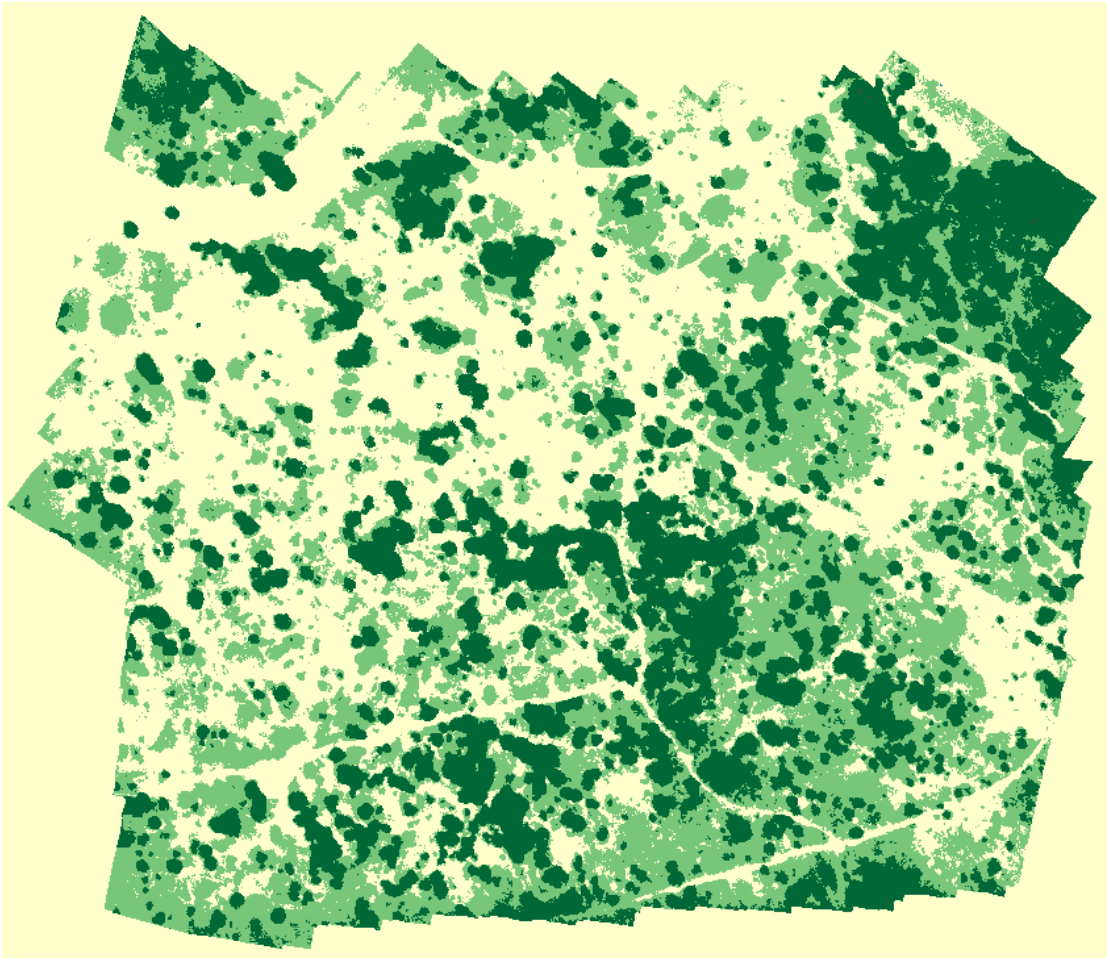
- MNS – MNT :



Classification du MHC



- Opération de seuillage (GDAL)

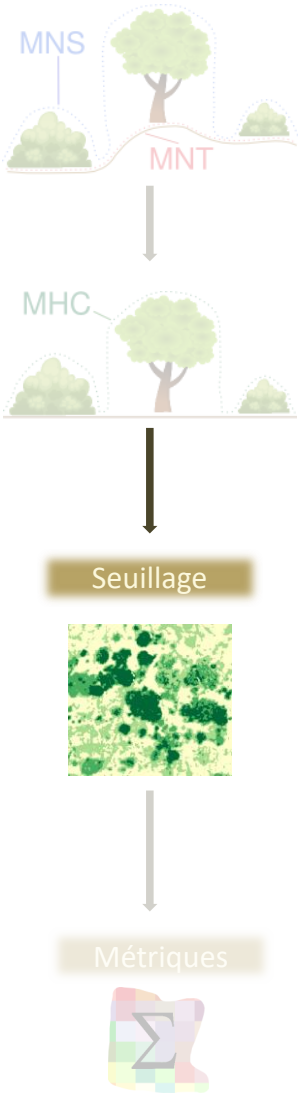


Sol nu / Herbes

Ligneux bas

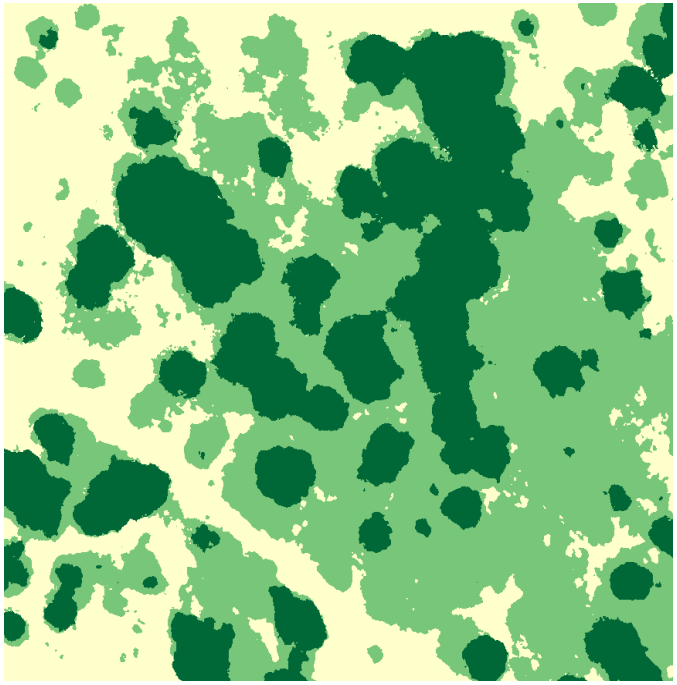
Ligneux hauts

Comparaison visuelle



➢ Drone avec capteur optique :

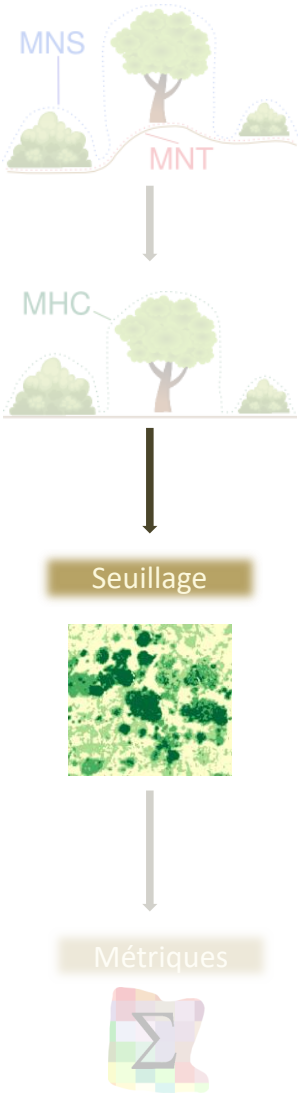
75 m



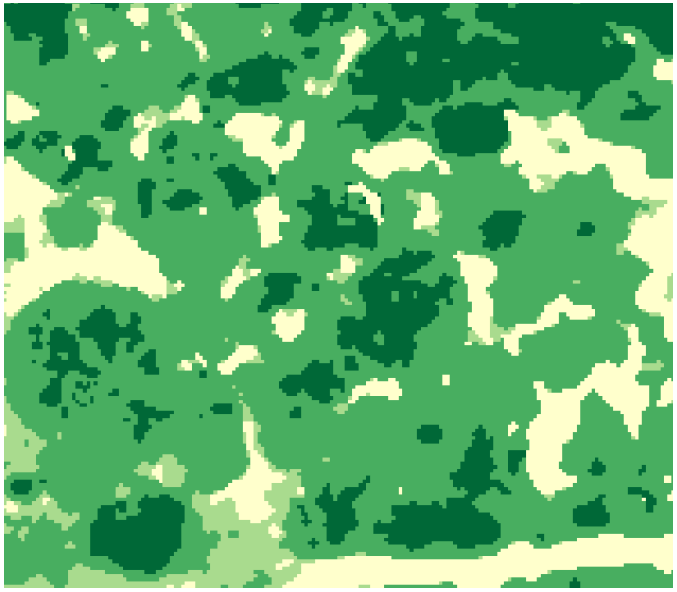
Sol nu / Herbes Ligneux bas Ligneux hauts

- Bonne distinction des couronnes et des différentes strates

Comparaison visuelle



- Photo interprétation et seuillage de NDVI :

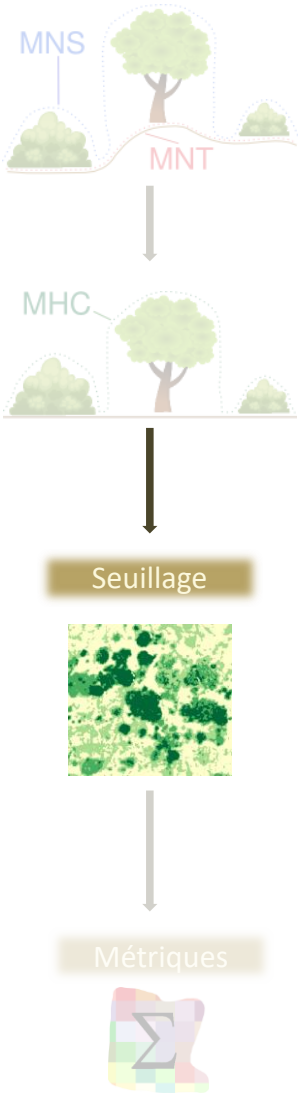


90 m

Sol nu | Herbes | Ligneux bas | Ligneux hauts

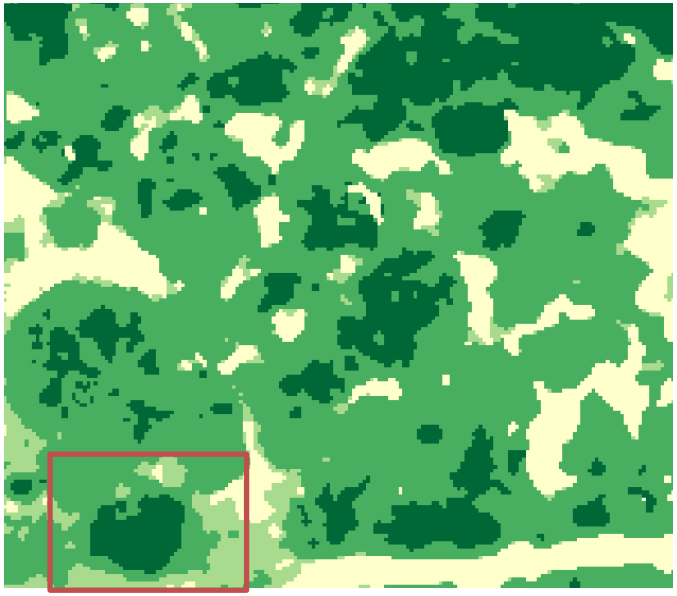
- Confusions entre ligneux bas et hauts
- Forme des couronnes mal déterminée
- Temps de traitements plus rapides, sur une plus grande surface

Comparaison visuelle



- Photo interprétation et seuillage de NDVI :

90 m



Sol nu | Herbes | Ligneux bas | Ligneux hauts

- Confusions entre ligneux bas et hauts
- Forme des couronnes mal déterminée
- Temps de traitements plus rapides, sur une plus grande surface

Merci de votre attention