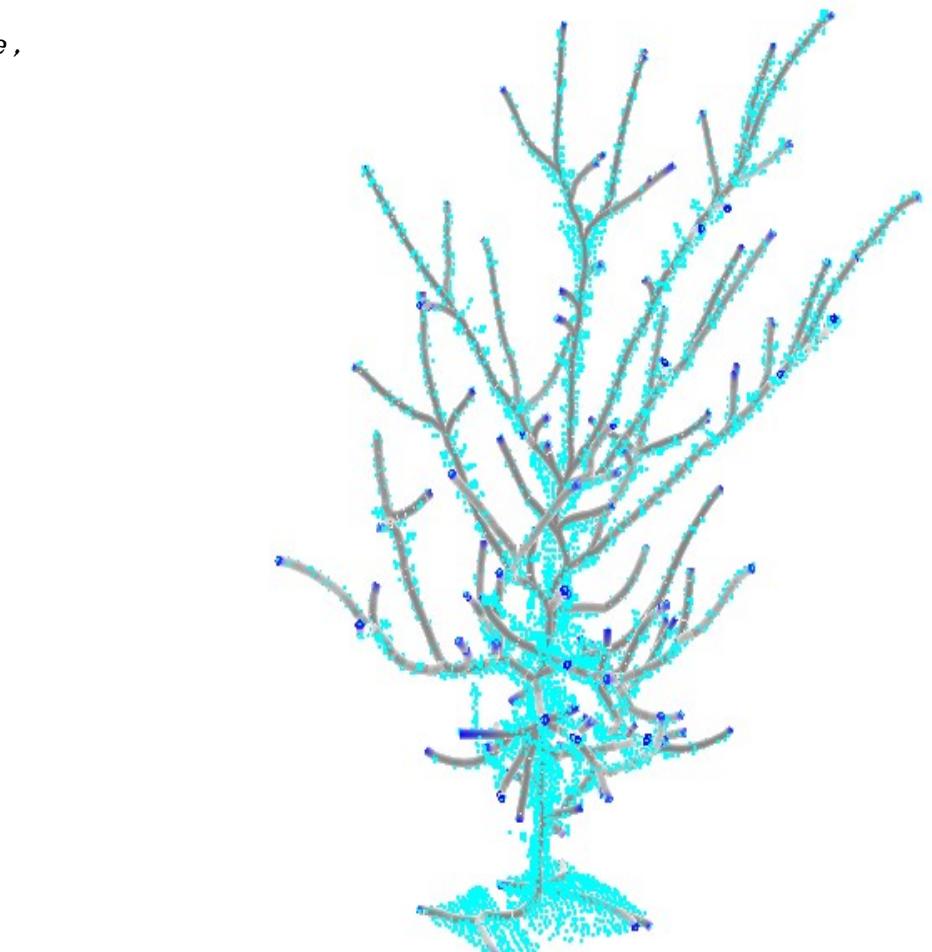
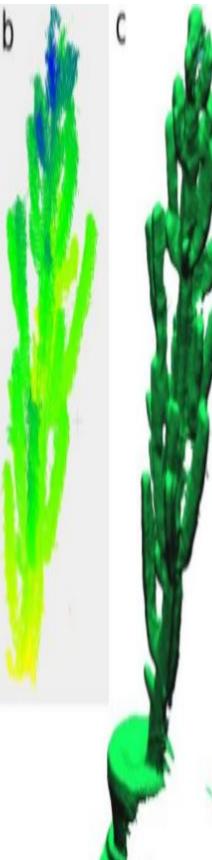


Digitisation de l'architecture : pourquoi et comment

File View Point Cloud Model Reconstruction Help

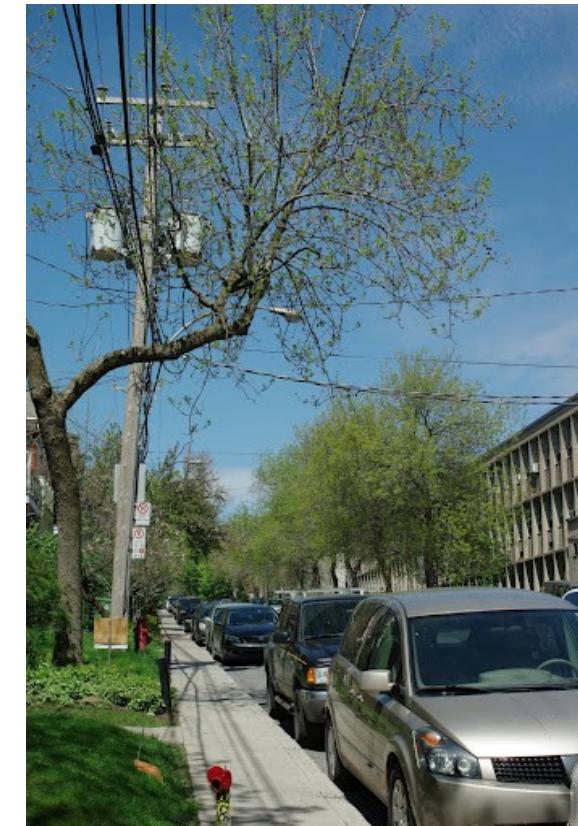
Taugourdeau, Desagrange,
Lecigne, Nock, Rechon,
Messier ...



POURQUOI?

www.arbresurbains.uqam.ca

Chaire de recherche
CRSNG/Hydro-Québec sur le contrôle de la croissance des arbres



AXE 1: Croissance de l'arbre et de sa cime

Comprendre la dynamique de la croissance de l'arbre et de sa cime en relation avec sa physiologie, sa morphologie, son architecture et son environnement.

AXE 2: Stabilité biomécanique

Étudier la dynamique de la stabilité biomécanique des arbres en fonction des conditions structurales et biophysiques.

AXE 3: Modélisation de la croissance

Développer des modèles et algorithmes pour permettre le suivi et la prédiction de la croissance des arbres en fonction des conditions biophysiques retrouvées sur l'ensemble du Québec.

COMMENT ?

Acquisition du nuage de points : Z+F



B



Figure 1. Experimental design with the study tree in the center and scaffolding towers to elevate the sprinkler system (A) and progressive change in tree architecture with increasing ice accretion (B).

Acquisition du nuage de points / Mesh : Kinect



\$149.99

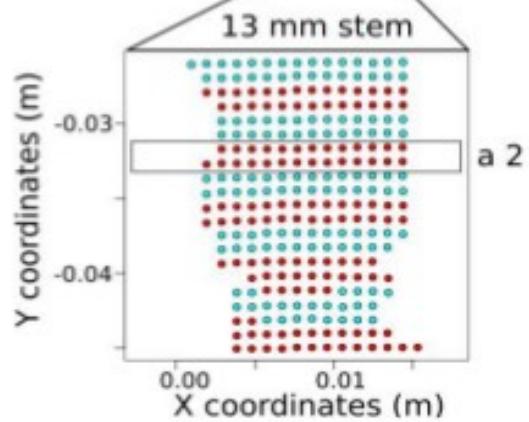
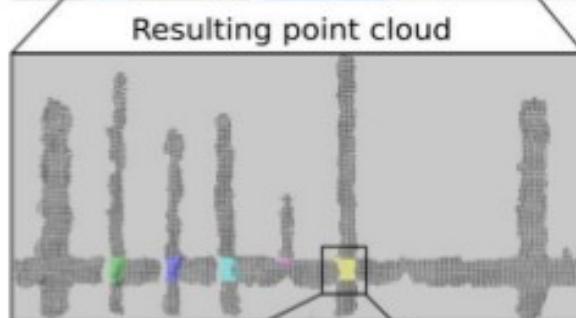
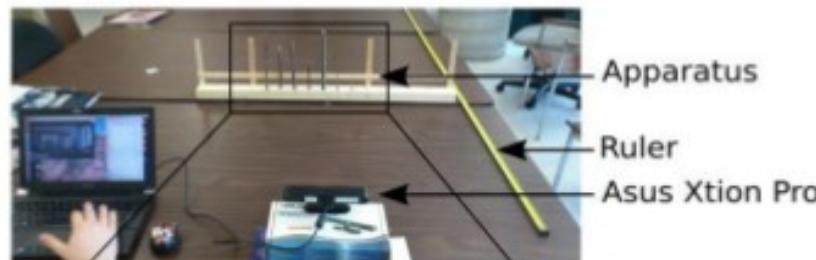
Scanner 3D à lumière structurée

Xbox Kinect—record for “fastest selling consumer electronics device”.

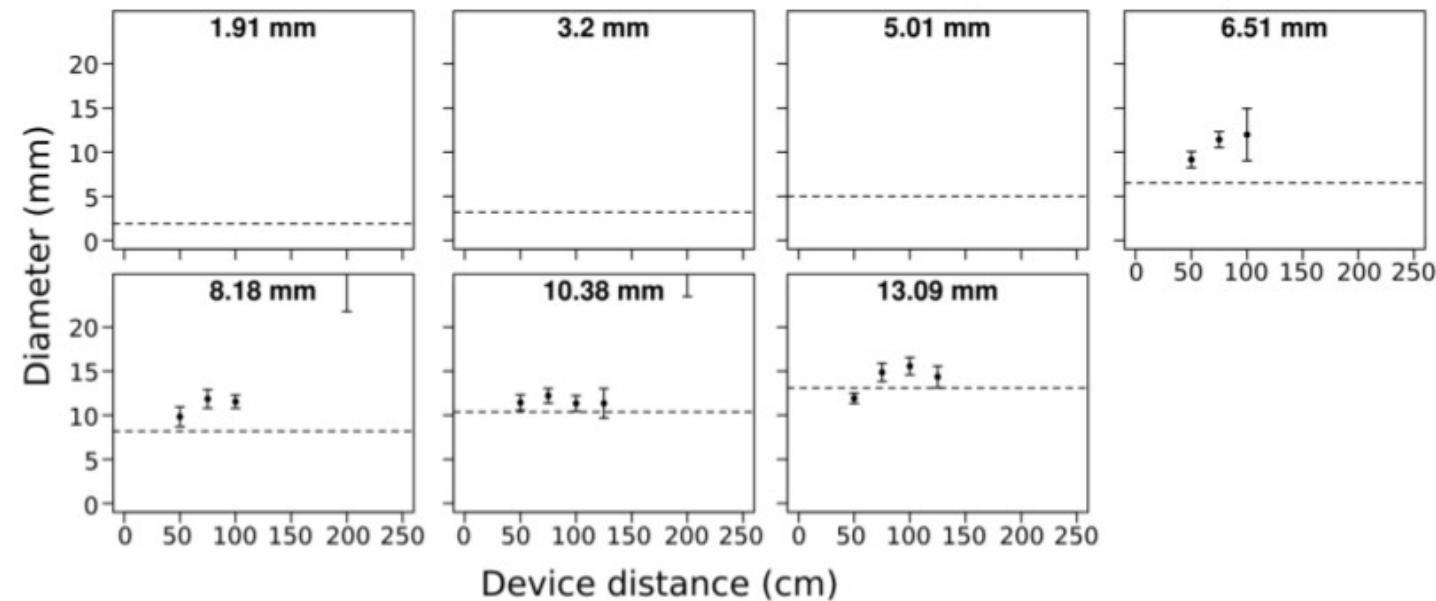
Génère un nuage de point coloré en 3D (RGB+D)

Acquisition du nuage de points / Mesh : Kinect

Acquisition set-up
and stem diameter estimation



Diameter estimation and 95% confident interval (based on 10 repetitions)



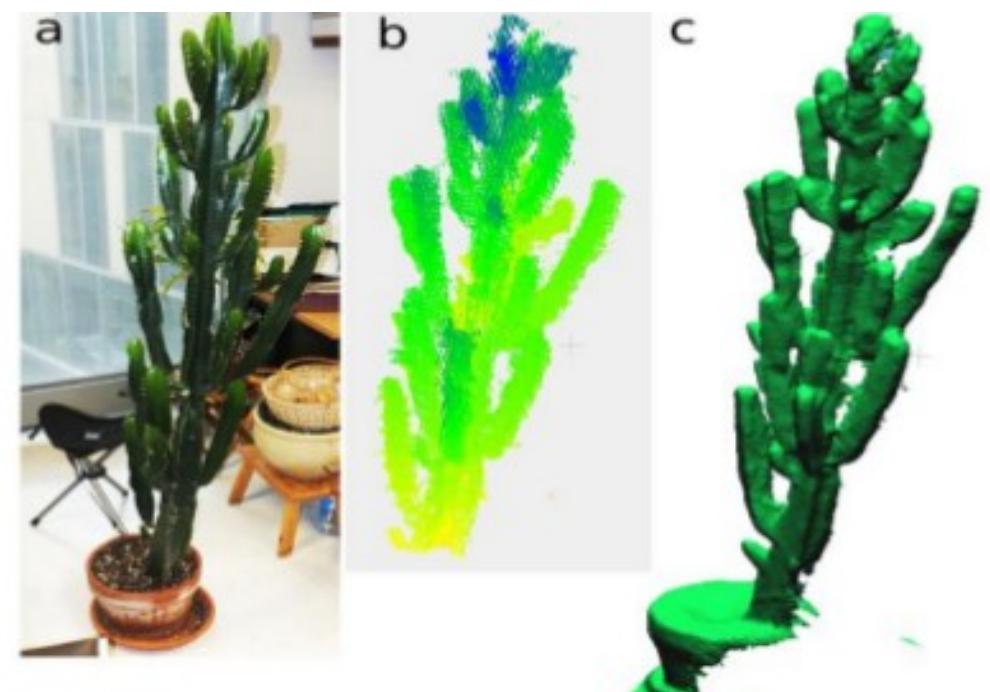
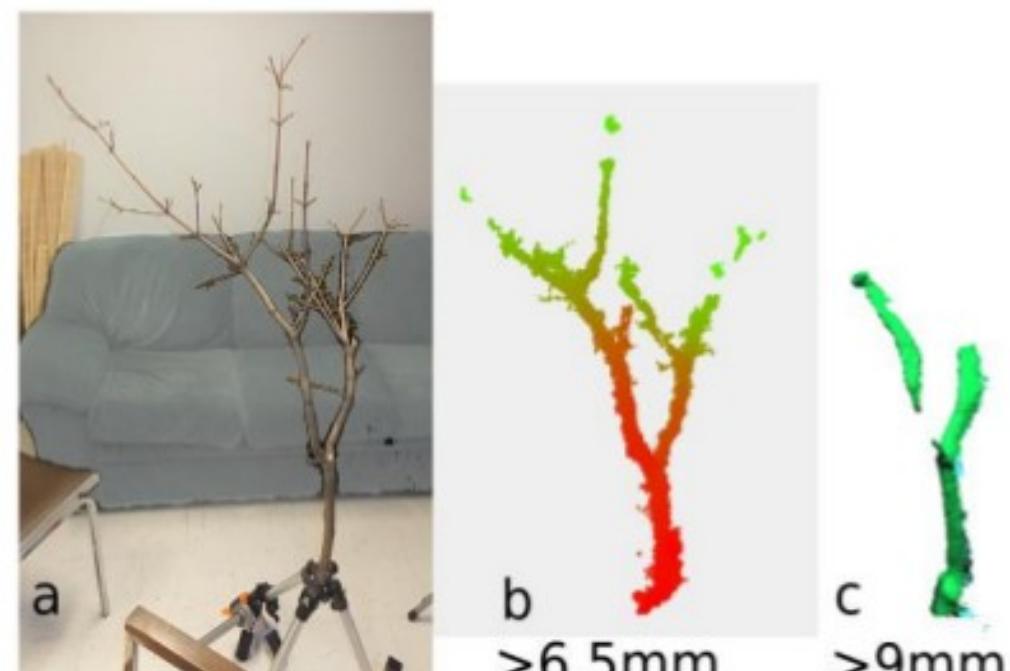
\$149.99

Scanner 3D à lumière structurée

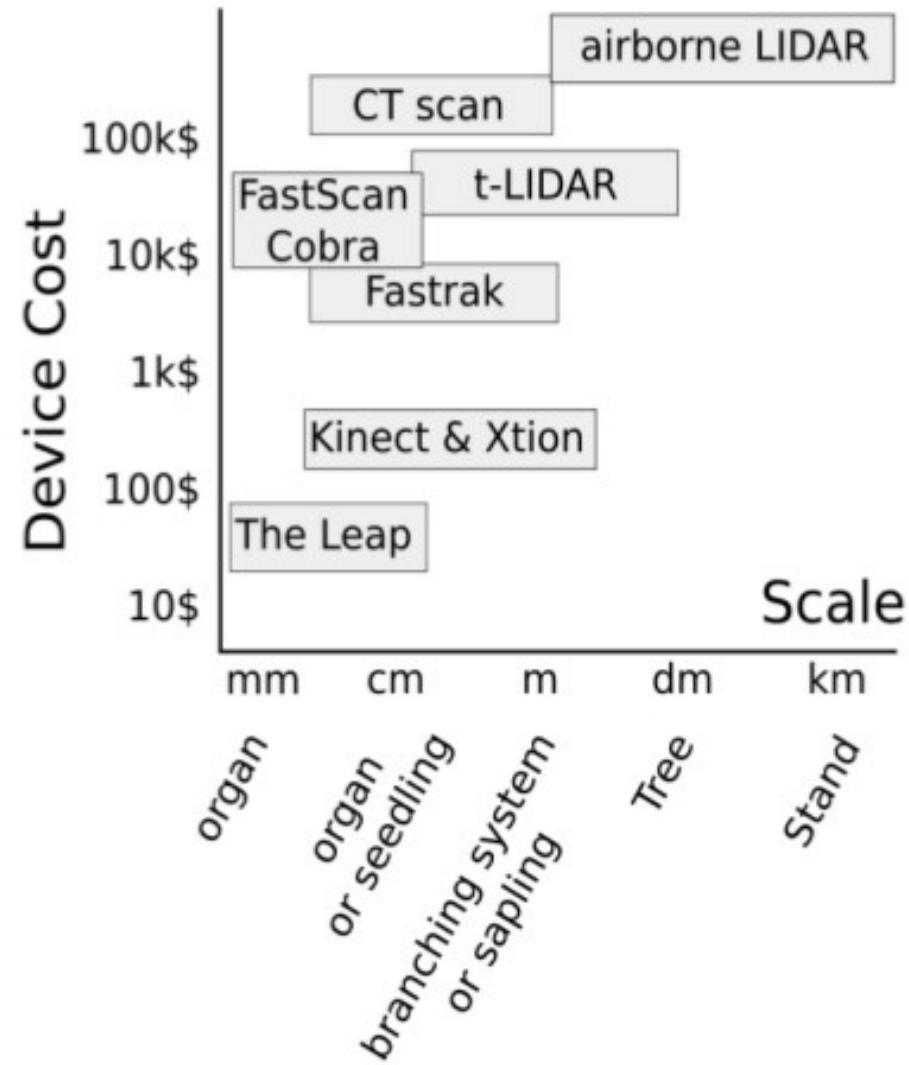
Xbox Kinect—record for “fastest selling consumer electronics device”.

Génère un nuage de point coloré en 3D (RGB+D)

Acquisition du nuage de points / Mesh : Kinect



Demo Cloud Compare



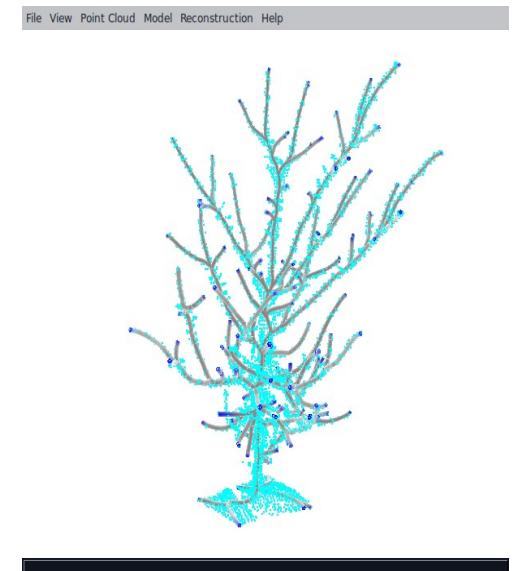
Analyse des données : reconstruction topologique

La reconstruction: « PypeTree » + VTK

C. Jauvin, S. Delagrange, P. Rochon

Basée sur l'algorithme de Verroust et Lazarus (INRIA)

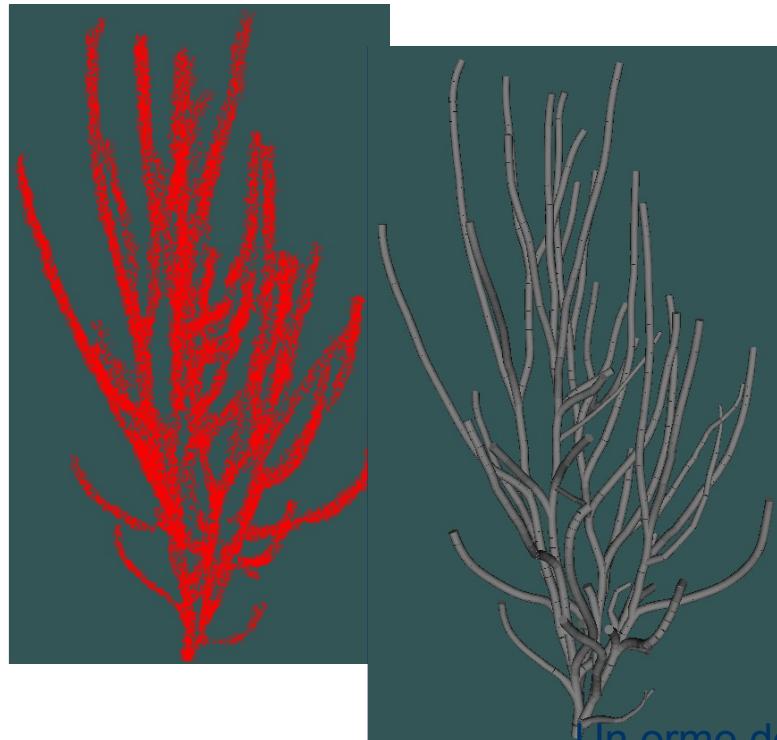
Le graph des plus proches voisins,
Le graph géodésique ,
La segmentation par la distance
La construction du squelette



Quelques exemples récents

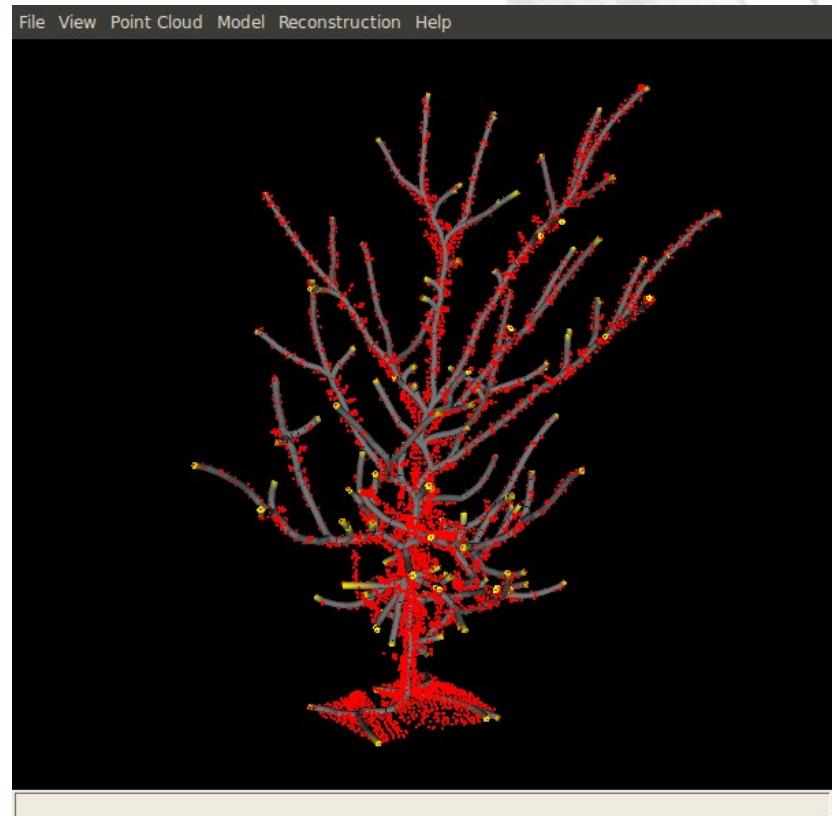
Des bouleaux jaunes de 1.5 m

Détection complète des axes longs, 60% des rameaux courts



Un orme de 4 m.

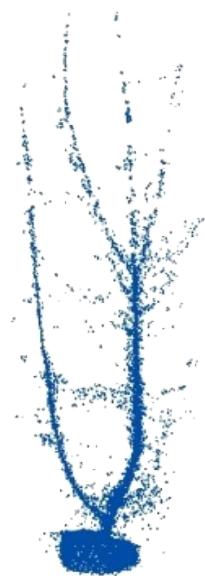
construction assistée par l'utilisateur on peut aller reconstruire la plupart des axes courts.
Détection moyenne (90% des axes longs trouvés, seulement 50% des rameaux courts trouvés)



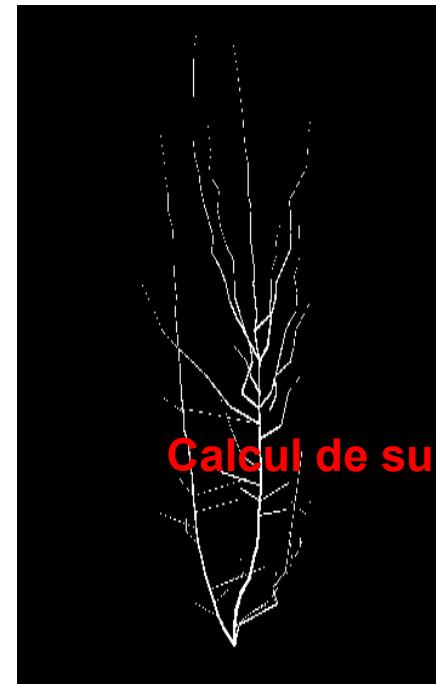
Reconstruction du feuillage grâce à des règles allométriques

Un peuplier hybride

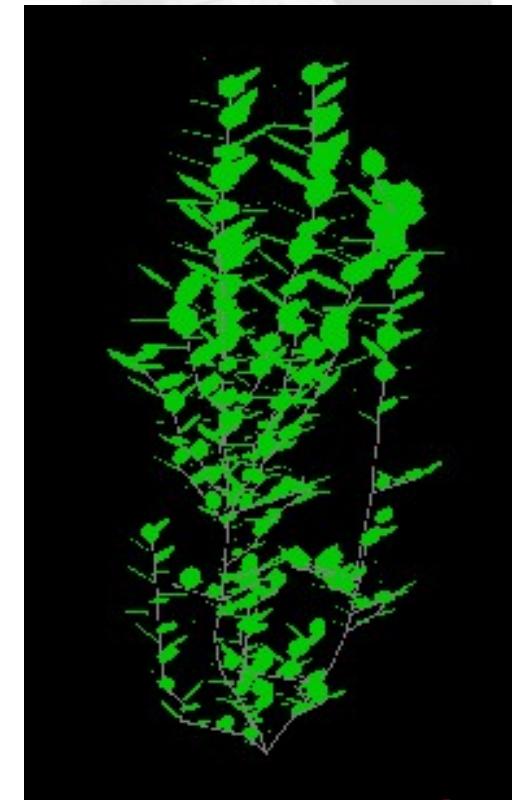
3 scans (sans feuilles)



Alignement de la scène



Squelettisation du nuage de point

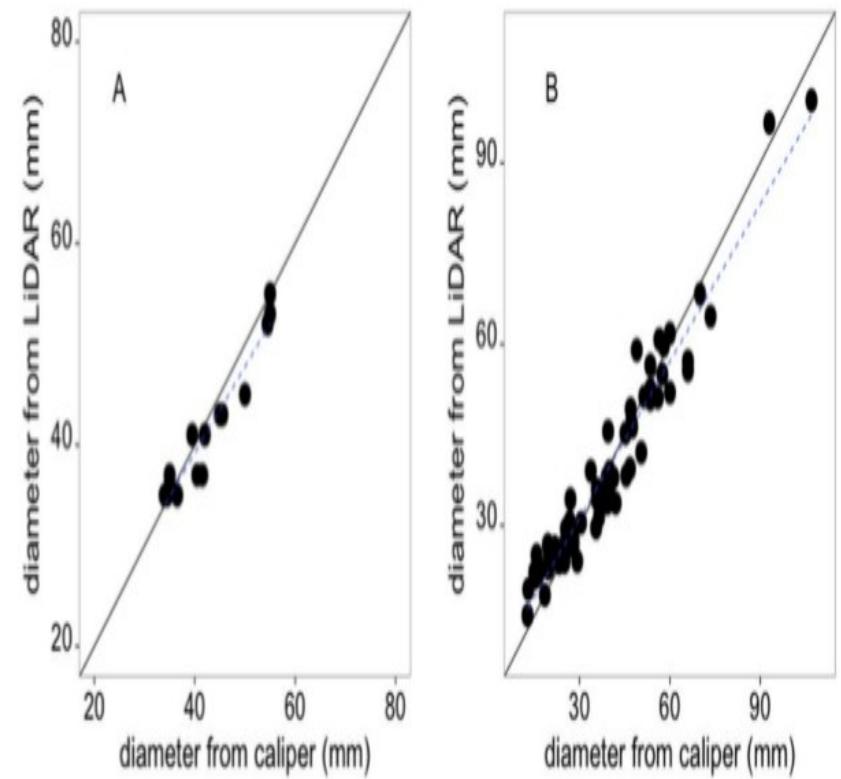


Analyse des données : reconstruction topologique

Mesures de diamètres

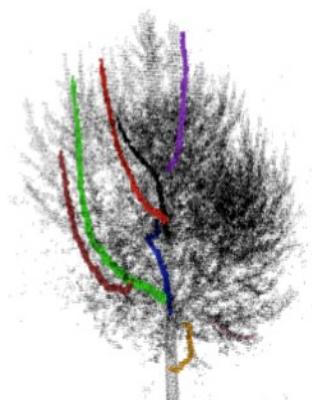
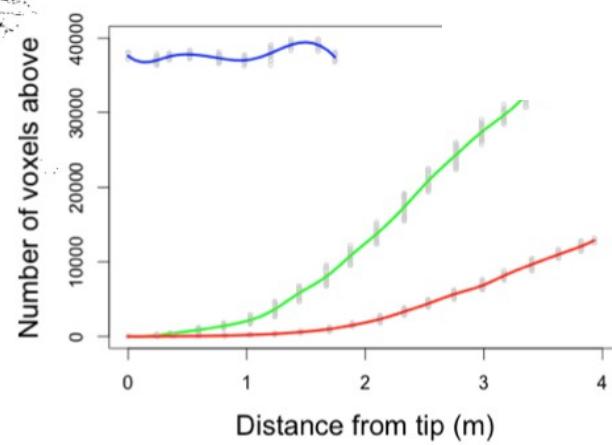
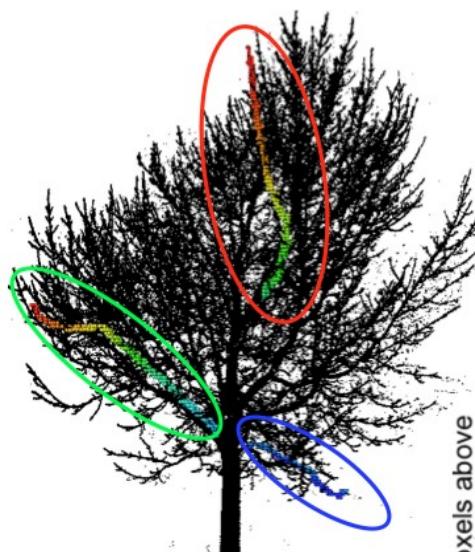


Figure 9. Illustration of the method for measuring diameter.

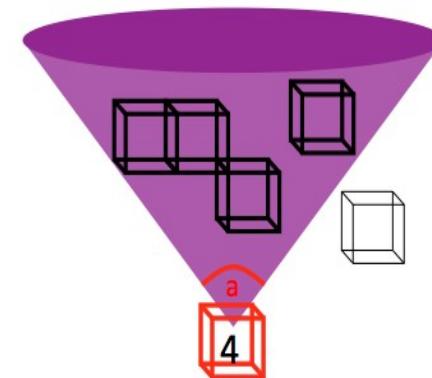


Analysse des données : voxélisation

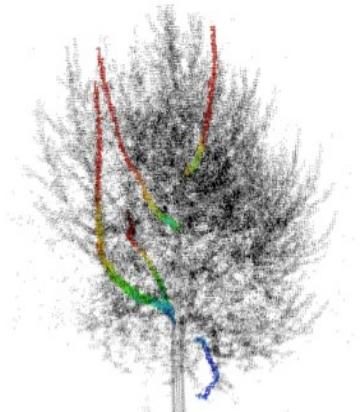
Can we use voxels to relate canopy structure to ice thickness (load)?



R function: vox above



Wamer colour =
less voxels above

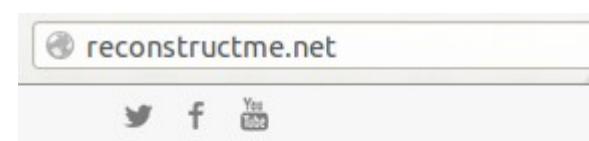
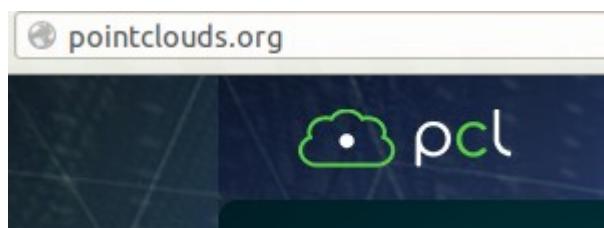


Nock CA, Greene D, Delagrange S, Follett M, Fournier R, Messier C. 2013. *In Situ Quantification of Experimental Ice Accretion on Tree Crowns Using Terrestrial Laser Scanning.* PLoS ONE 8: e64865.

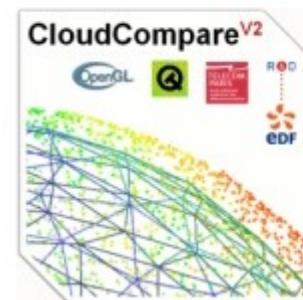
Nock C, Taugourdeau O, Delagrange S, Messier C. 2013. *Assessing the Potential of Low-Cost 3D Cameras for the Rapid Measurement of Plant Woody Structure.* Sensors 13: 16216–16233.

+1 article soumis

+2 articles en cours de rédaction



ReconstructMe



CloudCompare

**3D point cloud and mesh processing software
Open Source Project**