

Development of methods to estimate tree structural attributes using lidar on an Unmanned Aerial Vehicle

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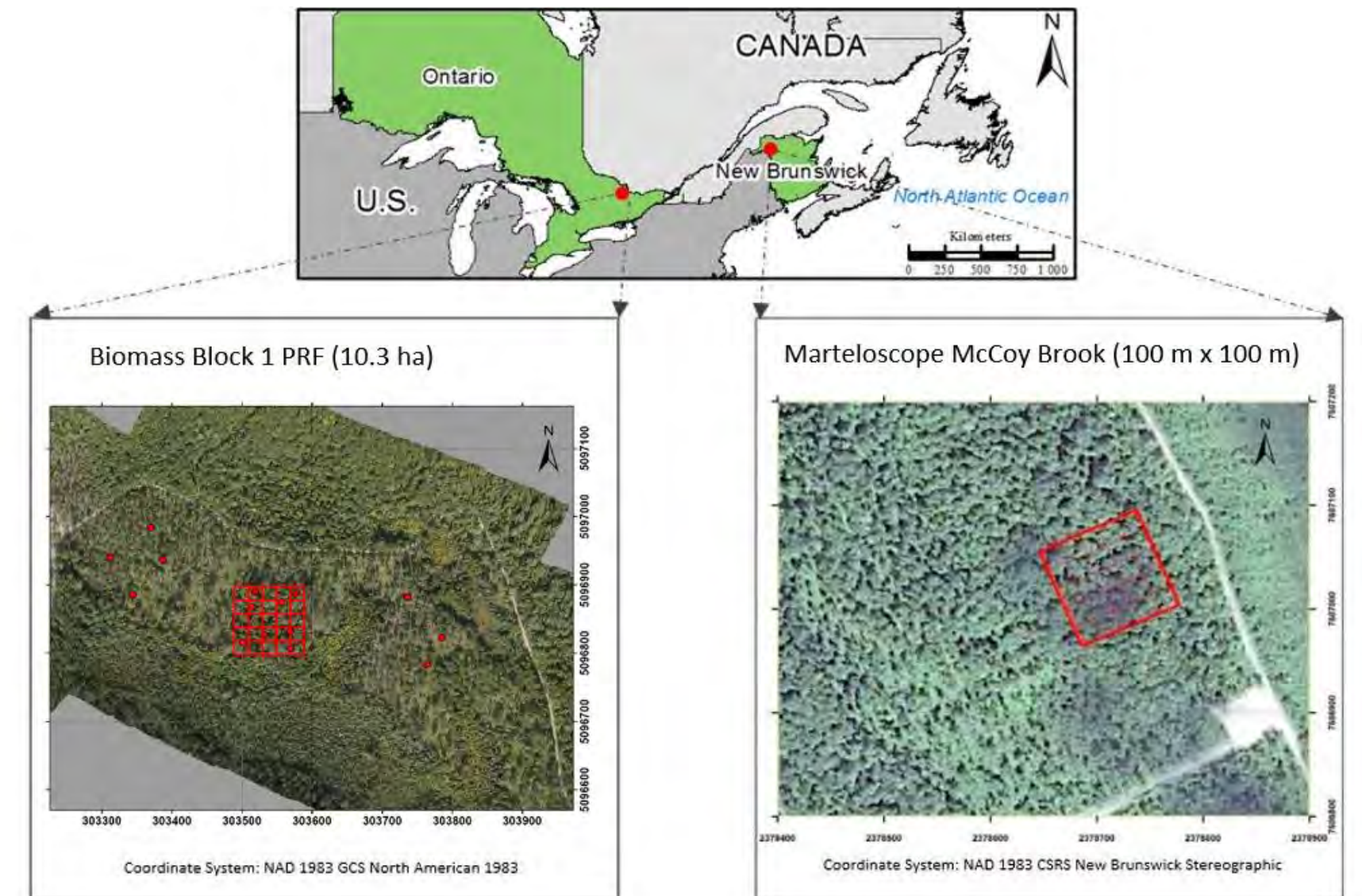
1. Context & Objectives

CONTEXT: Enhanced Forest Inventories derived from Airborne Laser Scanning (ALS) or stereo Image Point Clouds have been extensively used to produce **area-based estimates** of growing stock (basal area, volume) and average tree size (diameter, height, volume) on large area.

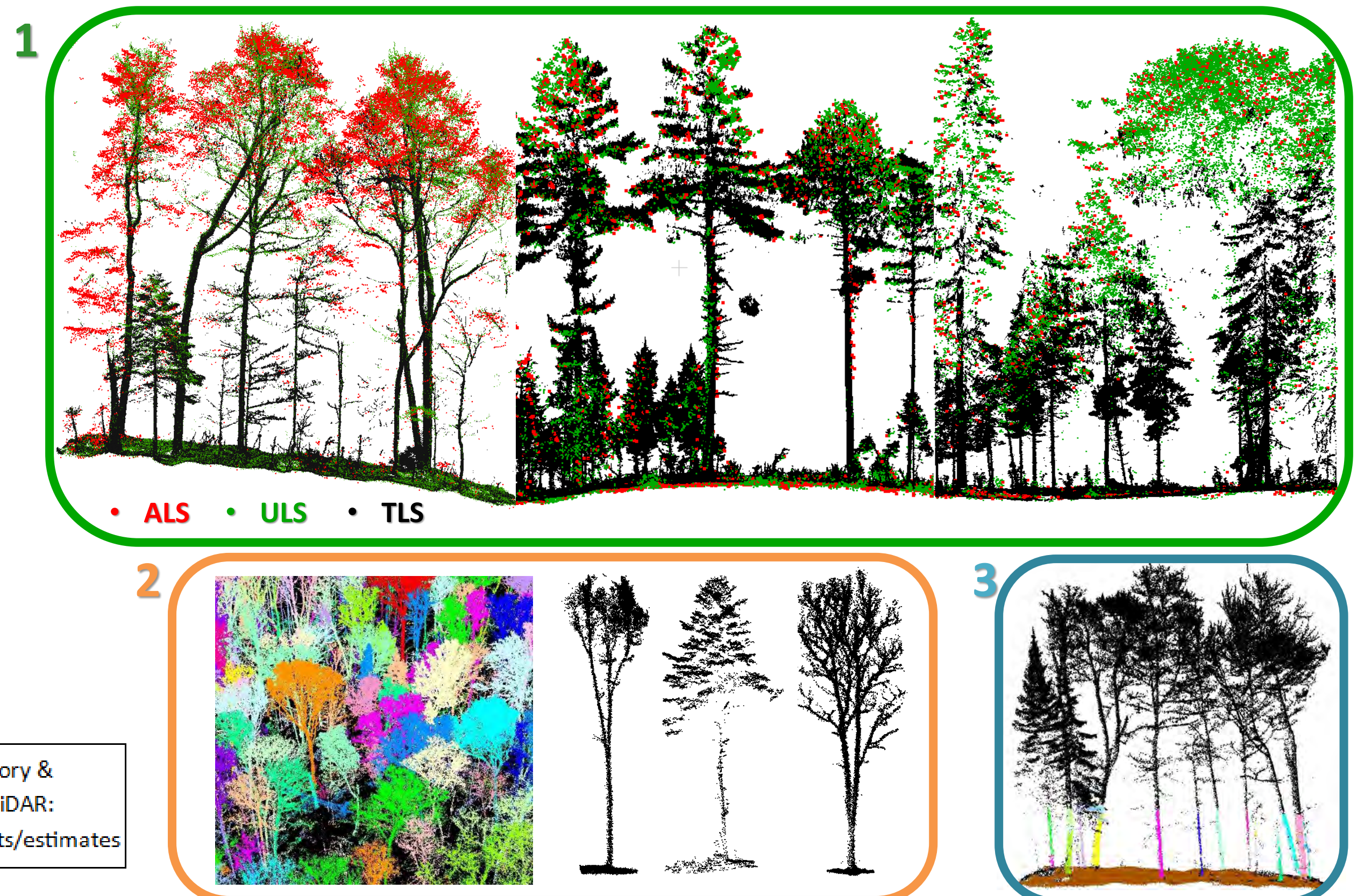
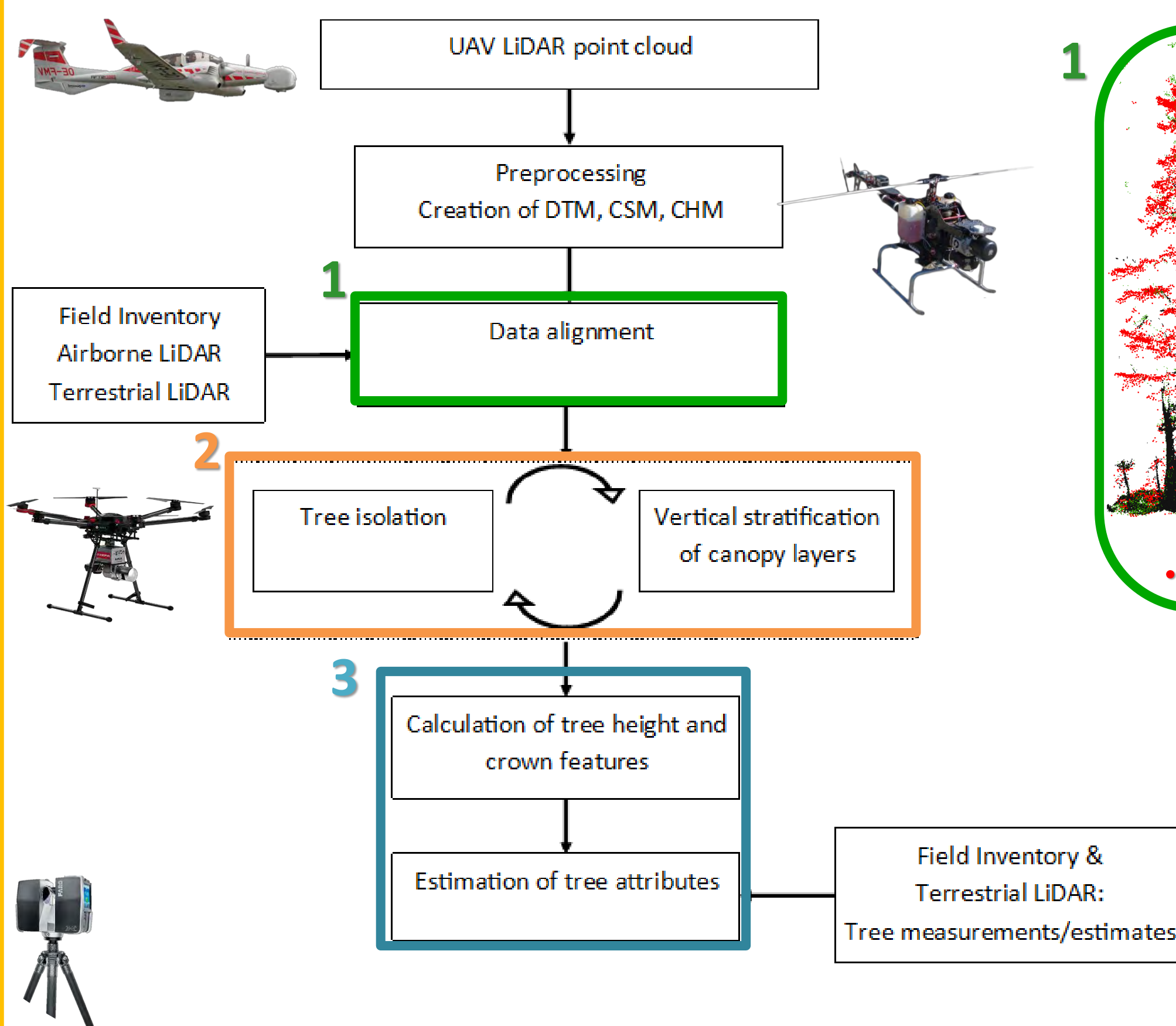
There is a growing interest in adding information on **wood attributes** at the **tree level** for supporting **Operational-level Forest Inventory**. UAV Laser Scanning (ULS) has the ability to provide high density data on a fine scale with great operational flexibility with a high spatial / temporal resolution and can potentially support OFI.

MAIN OBJECTIVE: Develop new methods adapted to **UAV Laser Scanning (ULS)** point clouds to assess several **tree structural attributes**, namely tree location, total tree height, crown dimension, DBH, stem taper and subsequently stem volume.

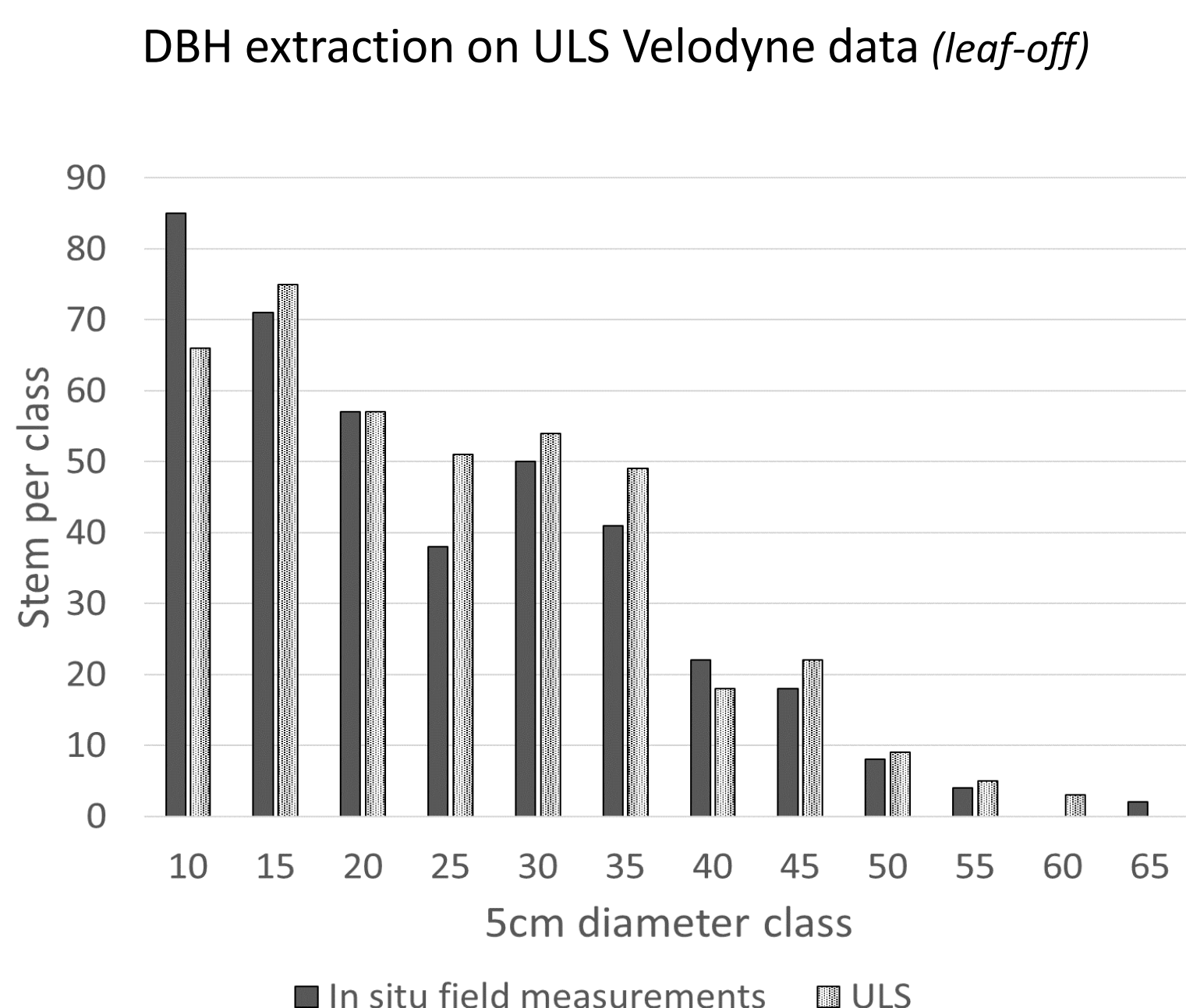
2. Study Sites



3. Materials & Methods



4. Preliminary Results



5. Discussion & Perspectives

DISCUSSION:

- In leaf-off condition, ULS point clouds make possible **direct estimation** of structural attributes (i.e. DBH);
- More attributes on the **stem form** (straight, crooked, etc.) could be exploited for saw log purposes;
- Preliminary **results match closely in situ** field measurements.

NEXT STEPS:

- Improve individual tree crown and **canopy layers segmentation**;
- Extract and identify the most relevant **ULS metrics** and identify the added value of ULS when compare to ALS data;
- Adapt the methodology for **managed and unmanaged forest** environments for the extraction of forest structural attributes.

Acknowledgments

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