The arrival of mini-UAV (Unmanned Aerial Vehicle), these small autonomous aircrafts, has opened the doors to a new environmental data acquisition’s approach. In forestry, low-altitude imagery from UAV can be used to characterize forest ecosystem structure through a Canopy Height Model (CHM). The greatest asset of these images, compare to traditional remote sensing techniques such as photogrammetry (high altitude flights with metric camera) or Lidar based survey, stay its high spatial and temporal resolutions [Watts et al., 2012].

In this research, authors developed a new workflow for acquiring low-altitude aerial images with a mini-UAV and used them for the construction of a high resolution Canopy Height Model.

**Photogrammetric Workflow**

1. **Data Collection**: Using the mini-UAV Gatewing X100 and a GRIII (10 Mpixels, 6 mm fixed focal length) camera, 612 aerial images covering the entire study area were collected in one single flight. The flight altitude was 250 m height, providing 9 cm Ground Sample Distance (pixel resolution) and 80% side and front overlaps.

2. **Data Processing**: For digital photogrammetry processing, authors compare two software solutions. The first one is MicMac (http://www.gatewing.com) and the second one is APERO [A.PER.s.O.M.A.R. - Advanced Photogrammetry Research Lab, University of Liège - Gembloux Agro-Bio Tech. Unit of Forest and Nature Management]. According to authors, these residuals have four origins; they must be improved before being able to provide very accurate Digital Elevation Models of forest canopies.

   - **UAV-photogrammetry is promising approach that may obtain satisfying results**

3. **Results**

Even if the accuracy of the resulting UAV-photo DEM is not good enough for measuring single tree height with this method, valuable characteristics at the stand level could now be quickly available with such a workflow. Indeed, stand level information such as recruitment status, maturity level (e.g. mean height, dominant height, etc.), and horizontal and vertical structure variability could be analyzed from such CHMs. [Vega et al., 2009, 2008, Miller et al., 2000, Nadjet et al., 2012, Itaya et al., 2004].

This research highlights the fact that UAV photogrammetry which is using consumer-grade digital camera and Structure from Motion software must be improved before being able to provide very accurate Digital Elevation Model of forest canopy. Indeed, measurement of tree height movement based on multi-temporal UAV flights, for example, is not conceivable with a CHM precision of less than one meter. Nevertheless, UAV-photogrammetry is promising approach that may obtain satisfying results for a bunch of environmental research. This is just the dawn of drone ecology [Koh & Wier, 2012].

**References**