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**TITLE:** Canopy Biomass Lidar (CBL) Acquisitions at NEON and TERN Forest Sites

**AUTHORS (FIRST NAME, LAST NAME):** Crystal Schaaf[1], Ian Paynter[1], Edward Saenz[1], Francesco Peri[1], Zhuosen Wang[1], Angela Erb[1], Xiaoyuan Yang[1], Alan H Strahler[2], Zhan Li[2], Jan A van Aardt[3], David Kelbe[3], Paul Romanczyk[3], Kerry Cawse-Nicholson[3], Keith Krause[4], Nathan Leisso[4], Thomas U Kampe[4], Courtney L Meier[4], Cory Ritz[4], Supriya Chakrabarti[5], Timothy Cook[5], Glenn Howe[5], Jason Martel[5], Kuravi Hewawasam[5], Ewan S Douglas[2], Glenn Newnham[6], Michael Schaefer[6], John Armston[7, 8], Jasmine Muir[7, 8], Dan Tindall[7], Stuart R Phinn[8]

**INSTITUTIONS (ALL):** 1. School for the Environment, University of Massachusetts Boston, Boston, MA, United States.
2. Boston University, Boston, MA, United States.
3. Rochester Institute of Technology, Rochester, NY, United States.
4. National Ecological Observatory Network (NEON), Boulder, CO, United States.
5. University of Massachusetts Lowell, Lowell, MA, United States.
6. Commonwealth Scientific and Industrial Research Organisation (CSIRO), Canberra/Melbourne, ACT, Australia.
7. Queensland Dept. of Science, Information Technology, Innovation and the Arts , Brisbane, QLD, Australia.
8. University of Queensland, Brisbane, QLD, Australia.

**ABSTRACT BODY:** Terrestrial Laser Scanning (TLS) offers the ability to capture complex forest structure through 3D reconstruction of multiple laser return point clouds. These reconstructions provide detailed information on understory, mid-story and canopy structure and allow quantification of important ecosystem factors such as biomass, vegetation productivity, forest health and response to disturbance. Used in conjunction with airborne lidar and satellite imaging, TLS is a powerful calibration/validation tool for improved regional scale ecological surveying and modeling. Repeated deployments facilitate the estimation of growth rates, nutrient fluxes, and other essential parameters in global scale climate and biogeochemic modeling. Routine TLS acquisitions at long-term research sites provide an opportunity to capture temporal variations due to natural and anthropogenic effects. While discrete return and full waveform TLS instruments (such as the Dual Wavelength Echidna Lidar (DWEL)) are increasingly being deployed, there is also a need for high speed, low-cost, highly portable TLS instruments to augment these more powerful, high resolution lidars.
The Canopy Biomass Lidar (CBL) is a light, fast-scanning, time-of-flight, 905nm, TLS instrument, conceived by the Katholieke Universiteit Leuven (KUL) and refined by the Rochester Institute of Technology (RIT). Two CBLs, constructed by the University of Massachusetts Boston, were deployed alongside the full waveform DWEL (developed by Boston University, University of Massachusetts Lowell, University of Massachusetts Boston, and the Commonwealth Scientific and Industrial Research Organisation (CSIRO)) during the June 2013 NEON Airborne Observation Platform (AOP) campaign in the Sierra National Forest, CA. Three sites were characterized by both the CBLs and the DWEL in the Soaproot and Teakettle regions (where relocatable NEON towers will be situated). Up to 5 multiple scans were acquired by the DWEL, with an additional 8-12 scans obtained with the CBLs, to generate coincident 3D point clouds. Additional NEON sites in the Soaproot region were also scanned by the RIT CBL, while field teams collected forestry measures and LAI estimates. NEON full waveform airborne LiDAR and hyperspectral imagery were captured concurrently.
In July 2013, the UMB CBL scanners were again deployed alongside the DWEL at three long term

forest monitoring locations in Queensland, Australia as part of a TLS field activity, sponsored by the Terrestrial Laser Scanning International Interest Group (TLSiig), the Terrestrial Ecosystem Research Network (TERN) and CSIRO, Australia. The sites were located at Karawatha Forest Park, a TERN Supersite location and in the Brisbane Forest Park portion of D'Aguilar National Park. Again multiple scans were acquired over each 50x50m site (13 lower range CBL scans interposed at and between the DWEL scans) to generate multiple point clouds and detailed 3D reconstructions. These and further efforts this fall in the vicinity of the NEON tower site at Harvard Forest, MA, recognize the substantial value TLS offers to ongoing data collection at globally-recognized long-term field sites such as NEON and TERN. Highly-portable TLS such as the CBL allow efficient, frequent, expansive, and rapid response sampling to augment the more detailed information possible from instruments like the DWEL.

**KEYWORDS:** 0439 BIOGEOSCIENCES Ecosystems, structure and dynamics , 0480 BIOGEOSCIENCES Remote sensing.

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**Additional Details**

**Previously Presented Material:**

**Contact Details**

**CONTACT (NAME ONLY):** Crystal Schaaf

**CONTACT (E-MAIL ONLY):** crystal.schaaf@umb.edu

**TITLE OF TEAM:**