Looking Above the Terrain--Lidar for Vegetation Assessment

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The participants are expected to have a basic understanding of remote sensing techniques and image processing. The overall goal of this half-day workshop is to introduce participants to lidar concepts, processing techniques, and applications for deriving information on forest vegetation resources and canopy parameters. More specific objectives are to:
(1) Familiarize participants with basic lidar and laser ranging concepts;
(2) Introduce types of lidar sensors for forest resources assessment – ground-based, airborne, and satellite sensors;
(3) The LAS lidar data format;
(4) Review algorithms for deriving information on terrain elevation and analyzing forest structure;
(5) Review processing techniques for generating canopy height models and "multi-band" lidar height bins using ground-based and airborne lidar,
(6) Review methods for deriving vegetation information at individual tree, plot, and stand level;
(7) Introduce participants to TreeVaW, a lidar processing software for identifying and measuring individual trees on lidar-derived canopy height models, and
(8) Compare forest structure metrics obtained by processing ICESat waveform data and spatially coincident discrete-return airborne lidar and ground-based laser scanner data over varied terrain conditions covered by forest vegetation.

Workshop content can be summarized as follows:

I. Types of Lidar Sensors. Why Use Lasers for Range Finding?
II. The LAS Lidar Data Exchange Format
III. Full Waveform vs. Discrete-returns, Small Footprint vs. Large Footprint Lidar; Scientific Visualization of Lidar Data
IV. Online resources of lidar data
V. Approaches to Lidar Processing for Deriving Terrain Elevation and Assessing Forest Vegetation: Lidar Discrete Points or Interpolated Surfaces?
VI. Seeing the Trees in the Forest: Direct Lidar Measurements at Individual Tree Level – Tree Height, Crown Diameter, Crown Base Height, and Stand Density
VII. TreeVaW: An Automated Software Application using Adaptive Filtering to Locate and Measure Individual Trees in Complex Canopy Structures; Other software resources.
VIII. Lidar-Derived Biophysical Parameters: Volume, Biomass, Percent Canopy Cover, Leaf Area Index, and Forest Fuel Models; Assessing Risk of Insect Damage; Lidar-multispectral Fused Imagery

About the Instructor:

Sorin C. Popescu is Associate Professor, Spatial Sciences Laboratory, Department of Ecosystem Science and Management, at Texas A&M University where he teaches Remote Sensing courses in renewable natural resources and aerial photo interpretation. Popescu received a diploma degree as a Forest Engineer from "Transylvania" University of Brasov, Romania in June 1992. For the next five years he was an assistant lecturer at Transilvania University, then moved on to Virginia Tech University in 1997 as a Graduate Research and Teaching Assistant in the Department of Forestry. He received a PhD in Forestry from Virginia Tech in 2002, after which he spent a year there as a postdoctoral research associate. In 2003, Popescu moved to Texas A&M University where he assumed a position as Assistant Professor, then became Associate Professor in 2009. He is the author of several technical papers and served on NASA Review Panels for proposal funding. A member of ASPRS since 1997, Popescu is Vice President of the ASPRS Mid-South Region and has served as a workshop instructor at ASPRS conferences for several years. His awards include the ASPRS 2002 LH Systems Internship Award; NASA Earth System Science Fellowship (September 1999-2002); First Honorable Mention, ASPRS Talbert Abrams Award (2005), NASA New Investigator (2008-2011) and, 2008 Graduate Teacher of the Year, Department of Ecosystem Science and Management, Texas A&M.