*The Western New York chapter of the IEEE Geoscience and Remote Sensing Society presents a technical seminar*

# Advancing waveform lidar sensing through improved understanding of complex signals for ecological applications such as structural unmixing, species classification, and biomass estimation

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Monday, November 8, 2010
Pizza and soda provided at 5:30 pm
Meeting and Presentation at 6 pm

Carlson Learning Center (Room 1275)
Chester F. Carlson Center for Imaging Science (Building 76)
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***Abstract***

Much effort has been expended towards assessment of vegetation structure, specifically for forest inventory and carbon sequestration purposes. Although structure can be quantified remotely using both passive and active sensing, characterization of *detailed* structure, important to conservation of structural biodiversity, remains elusive. However, remote sensing modalities such as imaging spectroscopy and waveform light detection and ranging (lidar) have emerged as candidates for addressing these needs. A waveform research group within RIT's Chester F. Carlson Center for Imaging Science evaluated whether species-specific assessment of woody and foliar biomass, crown structure, and woody cover can be mapped at various scales using these remote sensing technologies. Data from the Carnegie Airborne Observatory were collected for a land use gradient that spans degraded-to-conserved areas in the savannas in and around the Kruger National Park, South Africa. The first step included development of a robust processing approach for waveform lidar data, which included smoothing, deconvolution, and angle correction for off-nadir pulses. A data fusion approach to species classification and waveform-based quantification of woody biomass and structure at the tree- to landscape scales followed next. Classification results (53-74% overall accuracies) varied by species and were influenced by phenological and within-species variation, while structural quantification was driven by the management regime of a particular land use. The group was able to develop tree-, landuse-, and landscape-level models that describe the structural variation in the system. These efforts will contribute to addressing the challenge of how to best quantify structural diversity, its variation across landscapes, and its change due to management and climate impacts.

***Biography***

Dr. Jan van Aardt obtained a BSc Forestry degree (biometry and silviculture specialization) from the University of Stellenbosch, South Africa. This was followed by a Hons. Forestry degree with a remote sensing and Geographical Information Systems (GIS) specialization, also from the University of Stellenbosch. Dr. van Aardt then completed MS and PhD Forestry degrees at Virginia Polytechnic Institute and State University, Blacksburg, Virginia - these degrees respectively focused on hyperspectral and light detection and ranging (lidar) applications in forestry. Hyperspectral, lidar, and multi-temporal sensing form the core of his efforts, with various ecosystem and forestry projects, e.g., land quality and global change (multi-temporal), forest and savanna structural assessment using discrete and waveform lidar systems, and estimation of foliar chemistry and vegetation state (hyperspectral) projects. He currently is an Associate Professor in the Chester F. Carlson Center for Imaging Science at the Rochester Institute of Technology, following stints at the Katholieke Universiteit Leuven as post-doc and the Council for Scientific and Industrial Research, South Africa, as research group leader.

*This meeting is free and open to the public. No reservations required.*