Geophysical Research Abstracts
Vol. 13, EGU2011-8685, 2011
EGU General Assembly 2011

Active hyperspectral LiDAR for the study of vegetation

Sanna Kaasalainen, Teemu Hakala, Juha Suomalainen, and Eetu Puttonen
FInnish Geodetic Institute, Remote Sensing and Photogrammetry, Masala, Finland (sanna.kaasalainen@fgi.fi)

We have investigated the concept and practical aspects of active hyperspectral LiDAR and studied its potential applications in the remote sensing of vegetation. The concept is based on the supercontinuum laser technology, which has recently become commercially available. The supercontinuum laser source provides a continuous spectrum, which is used in our application for combined multispectral or hyperspectral laser intensity and range measurement. The advantage of an active measurement is that there is no need for an external illumination, as in traditional hyperspectral remote sensing. We present results from two different experiments: a prototype multispectral range finder and fusion of active hyperspectral and range (laser scanner) data. Applications for the study of vegetation, such as tree species classification, can also be demonstrated with the newest prototype version with a 16 element avalanche photodiode array, and a digitizer with eight 1 GS/s channels. Combined with the supercontinuum laser source, this will allow us to choose and measure the most nteresting wavelength bands for a given application with good spatial resolution. The preliminary results point out the potential of active hyperspectral methods in laser-based remote sensing of vegetation. One-shot topographic and spectral information, such as the normalized difference vegetation index (NDVI) and spectral correlation mapper techniques can be used efficiently in, e.g., automatic target identification and classification, to retrieve qualitative information on a single LIDAR point level. The first results also indicate the efficiency of the new method: classification is possible even with a small number of features.