SEMI-AUTOMATED LIFE FORM CLASSIFICATIOMN TOOL FOR PHOTOGRAMMETRICALLY-DERIVED POINT CLOUDS – A CASE STUDY IN THE NATIONAL PETROLEUM RESERVE-ALASKA

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ABSTRACT:

The National Petroleum Reserve-Alaska (NPR-A) is a 26 million acre track of roadless federal land in northern Alaska poised for vast energy development. A monitoring program is being established to describe pre-and post-development ecological status and trend. In order to monitor such a vast landscape with a fairly short field season, BLM intends to deploy UAS to collect "field-like" data from very large scale stereo imagery to supplement/bolster direct field observations to help offset costs with traditional monitoring.

The first year of the project occurred between July 31 and Aug 7, 2012, along a 30-mile wide N-S transect in the eastern NPR-A. This field effort focused on a helicopter-based deployment of two field crews performing "field visits" and "remote visits" with one goal being to evaluate methods for core indicator, plot-level data collection using imagery. To facilitate extraction of life form (trees, shrubs, bare ground, water, litter, rock, forbs/herbs, etc.) cover data from the stereo imagery, we proposed a Support Vector Machine (SVM) point cloud classifier.

LiDAR has long been used to improve classification results from optical imagery. Typically the integration of these technologies occurs within a raster environment. However, there are problems with the integration such as time difference on data acquisition and distinct geometry differences (3D verses planar) that tend to limit classification accuracies especially when working with very high resolution data where even slight misregistrations can have dramatic impact on results. Due to the vast computation improvements, photogrammetric-based methods can now deliver dense point clouds similar to what can be collected with LiDAR. Photogrammetrically-derived point clouds provide not only elevation data, but also color and photo normal data that provide additional variables for classification. We tested our approach using point clouds derived from 1cm stereo imagery for plots within NPR-A and compared the results to field observations.