

## **Digital monoplottting to extract vector data from oblique angle terrestrial photographs**

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Across western North America, grasslands and open canopy forests have been lost to encroachment and densification of forests due to disruption of historical natural disturbance dynamics. This disruption is primarily driven by modern European settlement, which has included fire exclusion policies and massive land use change. The entire region has been affected causing grasslands, meadows, and savannahs to be lost, and the composition of the expanding forest cover to be altered. Implementing effective strategies to manage these changes requires accurate information regarding the extent and magnitude of these changes to establish ecological baselines. Most field based research programs (examining tree rings, reconstructing past forest stands, pollen analysis) are labour intensive, and therefore limited in spatial extent. Remote sensing is a field of study that permits large areas to be analyzed, but aerial photography in the southern Alberta Rocky Mountains is limited to 1949. This does not give a very clear picture of the pre-settlement landscape.

A series of photographs does exist, however, that permits us to see the landscape at the turn of the 20<sup>th</sup> century: The Mountain Legacy Project. This is the world's largest land-based oblique repeat photograph collection (1890-2010). Quantitative assessments of land-based oblique angle photographs is a new challenge: previous studies of these photographs have been limited to qualitative description, or detailed analysis of only very small areas (10's of km<sup>2</sup>). New techniques are emerging, and one of these is digital monoplottting, which enables the accurate extraction of vector data from oblique landscape photographs for spatial analysis. In addition to the photographs to be analyzed, data inputs required for digital monoplottting are orthophotos of the area in question and an accurate digital elevation model. With these three elements (oblique images, ortho images, DEM), digital monoplottting is incredibly accurate: initial assessments have shown the accuracy of georeferencing objects to be within 3m of their real world location.

This presentation will describe a) the technique of digital monoplottting, and b) how using digital monoplottting with the Mountain Legacy Project photograph collection permits quantitative assessment of changes in historical vegetation across large landscapes to determine the degree of change that has occurred since modern European settlement of the region.