**Description (1000chars)**

Very High Resolution Mapping of Carbon Stocks in Subtropical Thicket

The Subtropical Thicket biome is found in the Eastern Cape and Little Karoo in South Africa. Poorly managed livestock browsing, particularly by goats, has degraded this habitat throughout much of its range. Once Subtropical Thicket has been degraded, it is not able to recover spontaneously, but requires active restoration.   
  
Currently the most promising means for restoring degraded thicket is through the planting of Spekboom, a hardy succulent tree. Spekboom acts as a nurse plant, creating a favourable environment for the establishment of other species. It is unusually effective at sequestering carbon dioxide for an arid region plant. Much restoration work has been completed and there is considerable interest in expanding these efforts. Very high resolution (VHR) carbon stock maps are needed to assist in the planning and monitoring of thicket restoration. Manual allometric techniques for measuring carbon stocks are costly and time consuming. The impracticality of allometry for large areas is confounded in the Subtropical Thicket biome due to its density, heterogeneous nature and complex growth forms.

This research aims to develop an automated remote sensing technique for mapping above ground carbon stocks in Subtropical Thicket. A field sampling exercise is currently underway to gather carbon stock ground truth in the Baviaanskloof, Eastern Cape. Using this ground truth, we aim to develop a regression model for estimating carbon stocks from multi-spectral satellite imagery. Preliminary results using the ground truth acquired to date, and freely available aerial imagery, are encouraging. The usefulness of the aerial imagery is however limited by radiometric variations, poor spectral resolution and long revisit times. We hope to extend and improve on these preliminary results using a DigitalGlobe WorldView-3 ortho-ready image of the study area.

**Research Benefits (200chars)**

Re-establishment of Spekboom in degraded areas will help improve soil fertility, prevent erosion, reduce flood severity and provide an important source of food for many herbivores. From an employment perspective, restoration can potentially create thousands of jobs in impoverished areas. Restoration also contributes to climate change mitigation efforts due to the carbon sequestration properties of Spekboom. Carbon captured through thicket restoration can be traded as credits on the international carbon market and used to offset restoration costs.

**Publication Plan**

31 Dec 2018 – Finalise the carbon stock mapping technique.

28 Feb 2019 – Complete a paper on the carbon stock mapping technique, to be published in a peer-reviewed journal.