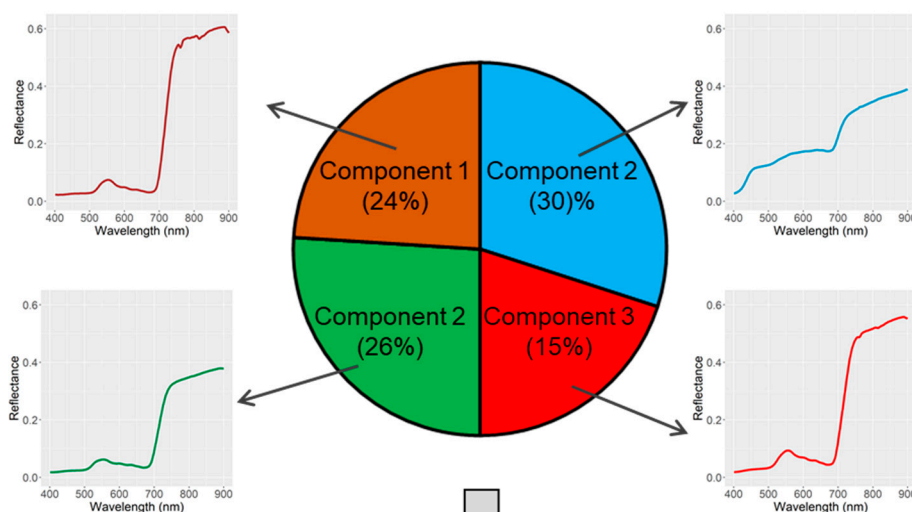


Supplementary Materials

Spectrum and fractional cover of different components:



Linear spectral mixing:

$$R_{mix}(\lambda) = \sum_{i=1}^n f_i \times R_i(\lambda)$$

Simulated footprint spectrum:

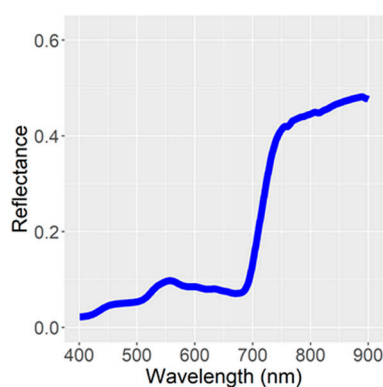


Figure S1. Illustration of linear spectral simulation for validation of *Osprey* spectral reflectance data. Spectrum of each component was acquired from the *in-situ* measurements using a Spectra Vista Corporation (SVC) HR-1024i spectrometer. Fractional cover of each component was from the image classification of RGB and TIR. The linear spectral mixing assumes that the spectrum of a footprint (i.e. the entire 'pie') is a linear mixture of its containing components.

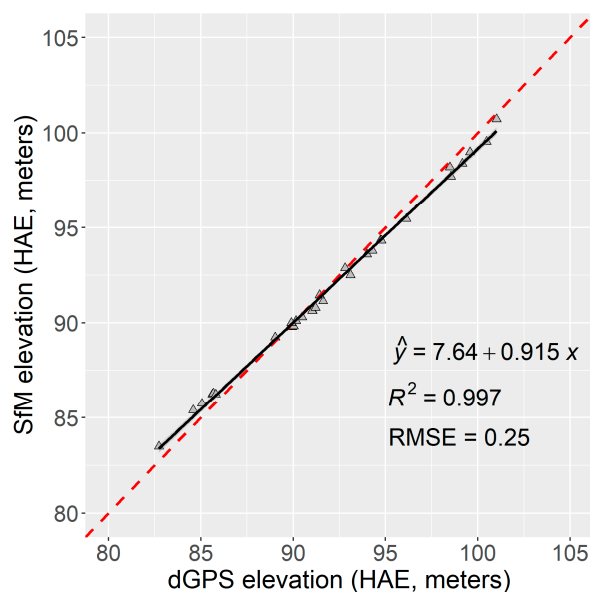


Figure S2. Comparison between Structure-from-Motion (SfM) derived DEM and those from dGPS measurements at Kougarok Hillslope case flight. The elevation was measured in height above ellipsoid (HAE). A R^2 of 0.997 and RMSE of 0.25 m was achieved, indicating a high quality of the derived DEM.

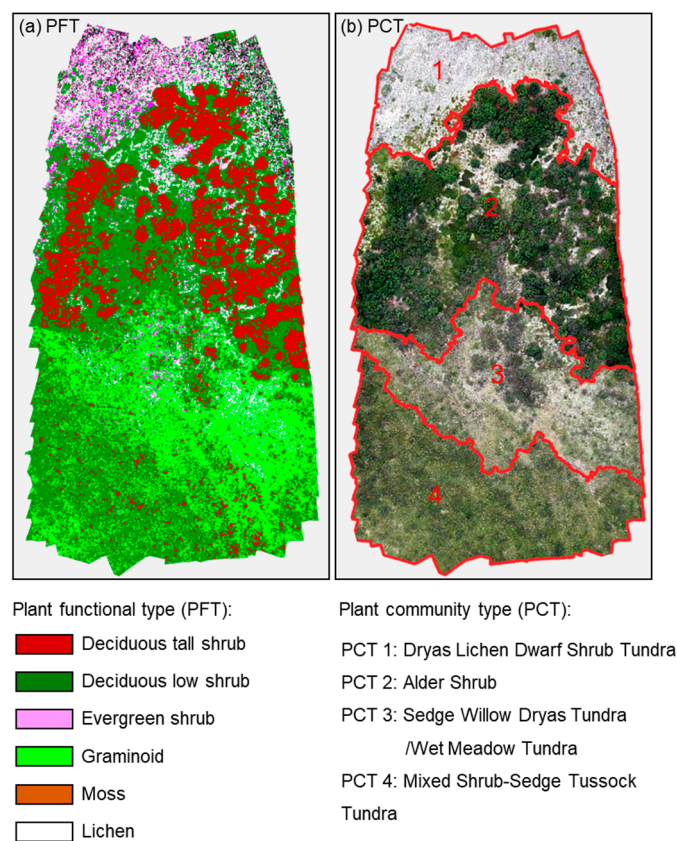


Figure S3. (a) Plant functional type (PFT) map merged from the raw image classification (i.e. Figure 5); (b) Representative plant community types (PCTs) identified in the case flight region.

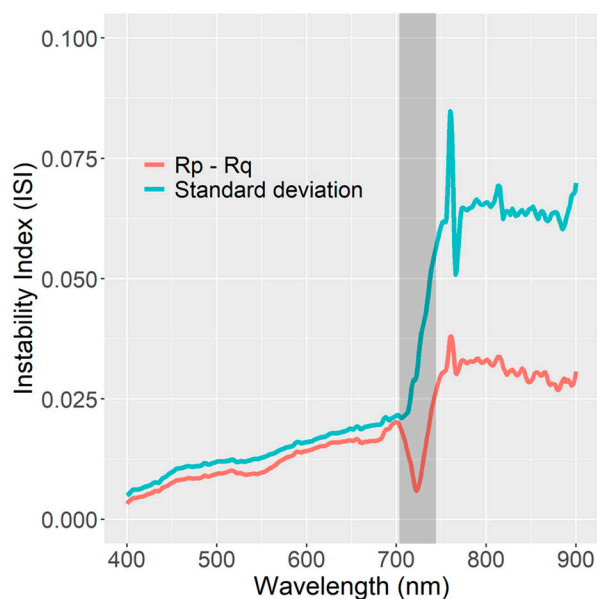


Figure S4. The intra-group standard deviation (δ) and inter-group difference ($R_p - R_q$) terms in the instability index. Though higher inter-group differences are seen in near infrared range compared with visible to red edge, much higher intra-group variations are also seen in the near infrared range, leading to the relatively lower spectral separability (as shown in Figure 9c).

Table S1. Confusion matrix for PFT-level classification accuracy assessment. The diagonal cells (highlighted by bold text) correspond to reference samples that were correctly classified.

<i>Reference samples</i>							
	Deciduous low to tall shrub	Deciduous low shrub	Evergreen shrub	Graminoid	Lichen	Non- vegetaion	Total
<i>Classified results</i>							
Deciduous low to tall shrub	170	45	0	3	0	2	220
Deciduous low shrub	6	404	81	5	3	17	516
Evergreen shrub	0	0	310	0	0	7	317
Graminoid	0	7	0	169	0	0	176
Lichen	2	0	4	0	281	4	291
Non-vegetation	6	18	11	0	8	259	302
Total	184	474	406	177	292	289	1822
Producer's accuracy	92.4	85.2	76.4	95.5	96.2	89.6	

Note: overall accuracy: 87.43%; Kappa coefficient: 0.85.



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