Supplementary Materials

Estimating Community-Level Plant Functional Traits in a Species-Rich Alpine Meadow Using UAV Image Spectroscopy

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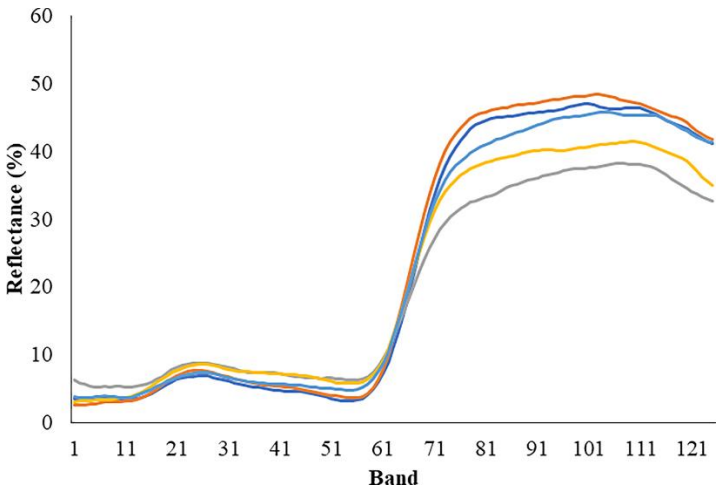

Figure S1. Examples of corrected spectra of alpine meadow from five different flight sites.

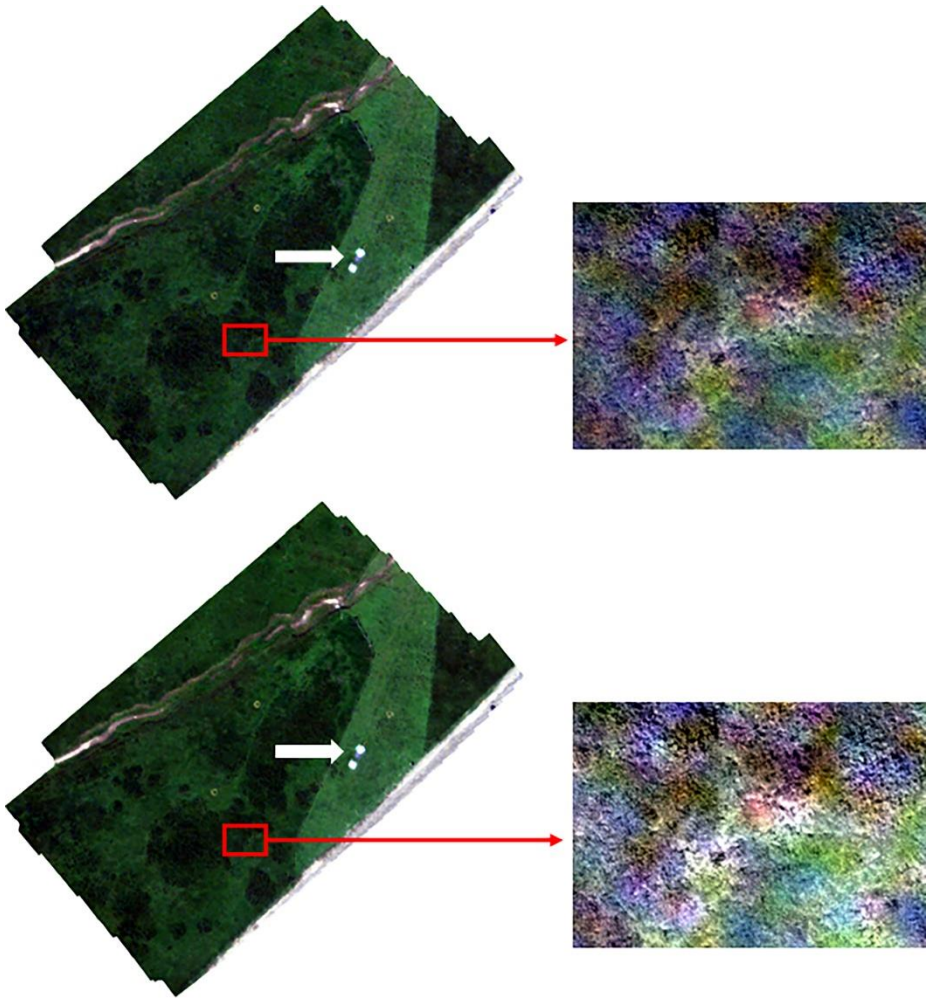

Figure S2. The UAV hyperspectral image used for mapping plant community traits. The upper one is the raw image and the lower one is the corrected image shown in true colour composites. This image covers plot 32, plot 33, and plot 34 in Figure 2. The white arrows indicate the location of the three reference panels.

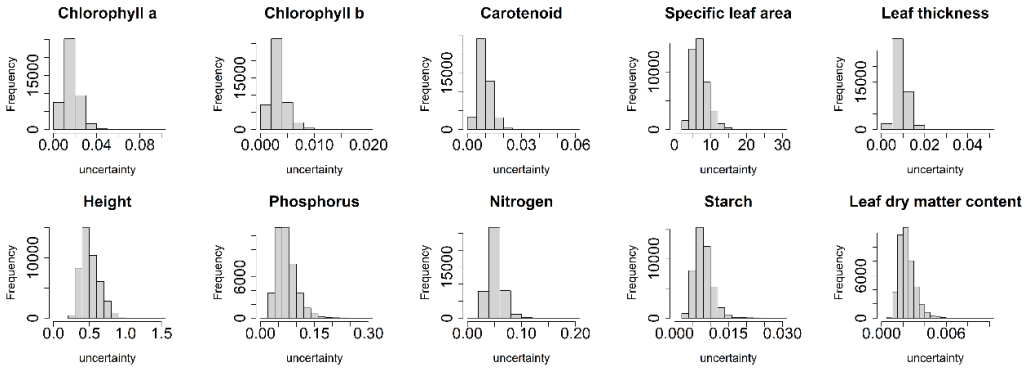

Figure S3. Frequency distribution of relative uncertainty of the ten plant community trait maps produced by the GA_PLSR model.

Table S1. Summary statistics of the ten plant functional traits for sampled plots (*n* = 40).

Traits		unit	mean	SD
Biochemical traits	chlorophyll *a*	mg/cm^2	6.31×10^{-3}	2.10×10^{-3}
	chlorophyll *b*	mg/cm^2	2.31×10^{-3}	7.13×10^{-4}
	carotenoid	mg/g	0.16	0.05
	phosphorus content	mg/g	1.65	0.36
	nitrogen content	mg/cm^2	0.18	4.79×10^{-2}
	starch content	mg/g	0.37	0.12
Structural traits	specific leaf area	cm^2/g	113.94	25.15
	leaf thickness	mm	0.16	0.04
	plant height	cm	10.85	6.85
	leaf dry matter content	%	33.37	0.04

Table S2. An overview of optimal hyper-parameters of two machine-learning models for ten plant community traits.

Trait	RF		XGB		
	ntree	*mtry*	*eta*	*max_depth*	*nrounds*
chlorophyll *a*	100	33	0.3	2	61
chlorophyll *b*	100	125	0.7	3	8
carotenoids	100	95	0.1	5	99
specific leaf area	200	40	0.3	2	30
leaf thickness	100	91	0.8	1	6
plant height	200	70	0.3	3	2
phosphorus content	100	122	0.1	4	31
nitrogen content	100	77	0.9	3	3
starch content	800	1	0.4	1	86
leaf dry matter content	100	1	0.8	3	86