Supplement

The following supplementary materials are available for this article: Chen, T., Lee, Y.-N., Lin, P.-Y., Wu, K.-S., Zelený, D. 2024 Vegetation of *Chamaecyparis* montane cloud forest in Lalashan Forest Dynamics Plot. Taiwania 69(3): 399-411. doi: *10.6165/tai.2024.69.399*

Extended Materials and Methods: Lalashan Saddle weather station

The standard Lalashan Saddle weather station is located in a small deforested saddle between Lalashan and Tamanshan mountains at 1730 m a.s.l. (24°43'20.9"N 121°26'31.1"E). Here, we report long-term air temperature measurements, precipitation, wind speed and direction, and visibility, measured from January 1, 2021, till December 31, 2021. Air temperature and relative humidity were measured by ATMOS 14 4-in-1 sensor housed in a sunshield (Meter, Germany). Rainfall was measured by RS-102N rain gauge (Aneos, Japan), and wind speed and direction by Young 05103 WS/WD meter (R. M. Young Company, USA). Visibility was measured by a visibility sensor MiniOFS Sensor (Optical Sensors, Sweden), using laser beam backscatter method; it quantifies the distance (in meters) to which it is possible to see an object and is used as a proxy for fog intensity. The climatic data were computed and saved in the CR300-Series Datalogger (Campbell Scientific, USA) every 10 minutes.

For the microclimatic data analysis and visualization, we applied a window-averaging algorithm with a two-hour time interval on all temperature and relative air humidity measurements. The air temperature and the precipitation were aggregated to draw a climatic diagram. The wind speed and direction were aggregated to draw a wind rose chart. The visibility was used to calculate fogginess intensity and the length of foggy time. The fogginess was classified into three categories: heavy, medium, and light, with visibility of less than 100 m, 100–500 m, and 500–1000 m, respectively. The foggy time was calculated as a percentage proportion of visibility measurements falling into the relevant category of fogginess out of all measurements done within a given month.

Table S1. Diagnostic species of the three vegetation types. Values are the relative percentage frequency (Freq.), and species are sorted by decreasing fidelity (Φ). The green colour indicates diagnostic species with a fidelity ≥ 35%.

Vegetation type	**R**		**E**		**V**	
No. of plots	74		20		6	
	Freq.	Φ.	Freq.	Φ	Freq.	Φ
Daphniphyllum himalayense subsp. *macropodum*	62	38.1	30	33	17	-
Rhododendron formosanum	93	37.9	95	-	17	-
Pourthiaea villosa var. *parvifolia*	7	-	75	75.8		-
Eurya glaberrima	61	-	95	60.9		-
Viburnum luzonicum	11	-	50	52.3		-
Quercus stenophylloides		-	35	51.4		-
Microtropis fokienensis	12	-	50	51.1		-
Osmanthus heterophyllus	32	-	70	43.8	17	-
Tetradium ruticarpum		-	25	42.6		-
Ilex sugerokii var. *brevipedunculata*	4	-	30	41.6		-
Itea parviflora	3	-	25	38.5		-
Litsea elongata var. *mushaensis*	38	-	90	37.3	67	-
Skimmia japonica subsp. *distincte-venulosa*	4	-	25	36.6		-
Hydrangea angustipetala	3	-		-	33	46.4
Eurya loquaiana	7	-	10	-		-
Chamaecyparis obtusa var. *formosana*	85	-	90	-	33	-
Tsuga chinensis var. *formosana*	3	-		-		-
Neolitsea acuminatissima	88	-	95	-	67	-
Trochodendron aralioides	95	34.2	75	-	50	-
Cleyera japonica	81	-	75	-	67	-
Ilex lonicerifolia	12	-	30	20.5	17	-
Pourthiaea beauverdiana var. *notabilis*		-	5	-		-
Euonymus spraguei		-	5	-		-
Dendropanax dentiger	62	-	70	-	50	-
Prunus transarisanensis	38	-	55	-		-
Schima superba	1	-		-		-
Acer morrisonense	1	-		-		-
Michelia compressa	3	-	5	-		-
Litsea acuminata	8	-	5	-	17	-
Lindera erythrocarpa	11	-	10	-		-

Vegetation type	R		E		V	
No. of plots	74		20		6	
	Freq.	Φ.	Freq.	Φ	Freq.	Φ
Photinia niitakayamensis	8	-		-		-
Acer kawakamii	8	-	10	-		-
Quercus sessilifolia	72	-	90	-	83	-
Sycopsis sinensis	5	-	5	-	17	-
Rhamnus crenata	8	-	5	-		-
Neolitsea aciculata	9	-	5	-		-
Styrax formosanus	14	-	10	-		-
Machilus thunbergii	3	-		-		-
Acer palmatum var. *pubescens*	35	-	50	-	33	-
Ilex tugitakayamensis	30	-	35	-		-
Symplocos macrostroma	72	-	100	22.9	100	-
Carpinus rankanensis	4	-	30	24.7	17	-
Symplocos formosana	16	-	60	25.7	50	-
Ligustrum liukiuense	53	-	80	20.3	67	-
Eurya crenatifolia	73	-	100	22.2	100	-
Ilex suzukii		-	10	26.3		-
Viburnum foetidum var. *rectangulatum*		-	15	32.4		-
Sorbus randaiensis	3	-	20	33.2		-
Barthea barthei	3	-	20	33.2		-
Viburnum urceolatum		-	10	26.3		-
Ilex hayatana	31	-	55	30.9	17	-
Camellia brevistyla	39	-	85	31.4	67	-
Rhododendron leptosanthum	1	-		-		-
Tetradium glabrifolium	1	-		-		-
Viburnum sympodiale	27	-	40	-	17	-
Quercus longinux	26	-	45	-		-
Vaccinium bracteatum	1	-		-		-
Rhododendron pseudochrysanthum	1	-		-		-
Prunus phaeosticta	23	-	35	-	67	-
Berberis hayatana		-	5	-		-
Symplocos migoi		-		-	17	-
Callicarpa randaiensis	5	-	30	11.9	33	-
Pieris taiwanensis	1	-		-		-
Benthamidia japonica var. *chinensis*	1	-		-		-
Chamaecyparis formosensis	1	-	10	-		-

Table S2. The multiple regression between each environmental variable and the first two DCA axes. No. subplots = in how many subplots the variable was measured; DCA1 and DCA2 = directional cosines of each variable, r^2 = coefficient of determination; *P*-value = significance (calculated by Monte Carlo permutation test with toroidal shift; *** = P < 0.001; ** = P < 0.01; * = P < 0.05; . = P < 0.1); No. perm. = number of permutations in the test.

Variable	No. subplots	DCA1	DCA2	r^2	*P*-value		No. perm.
elevation	100	0.904	-0.427	0.436	0.0025	**	399
convexity	100	-0.124	-0.992	0.225	0.0025	**	399
slope	100	-0.720	0.694	0.186	0.0250	*	399
northeasterness	100	-0.893	-0.451	0.060	0.3425		399
windwardness	100	-0.958	-0.288	0.199	0.0150	*	399
soil_depth	100	-0.973	0.231	0.005	0.8475		399
rockiness	100	-0.404	0.915	0.097	0.0425	*	399
pH	100	-0.886	0.463	0.164	0.0025	**	399
sand	25	0.300	0.954	0.184	0.1300		99
silt	25	-0.525	-0.851	0.208	0.1300		99
clay	25	0.203	-0.979	0.084	0.3500		99
C	25	0.996	0.090	0.023	0.7800		99
tN	25	0.820	0.573	0.016	0.8600		99
CN_ratio	25	0.891	-0.454	0.075	0.3900		99
eN	25	0.634	-0.774	0.026	0.8100		99
P	25	0.842	-0.539	0.166	0.1000	.	99
K	25	0.919	-0.394	0.023	0.8100		99
Ca	25	0.992	-0.125	0.038	0.7600		99
Mg	25	0.662	-0.750	0.148	0.2100		99
Fe	25	0.913	-0.407	0.056	0.5600		99
Mn	25	-0.919	0.395	0.238	0.0700	.	99
Cu	25	-0.761	0.648	0.273	0.0200	*	99
Zn	25	0.929	-0.369	0.145	0.1700		99

Table S3. Checklist of all woody species recorded within Lalashan Forest Dynamics Plot, including Latin species name with authors, Chinese species name (Chinese), family, and species abbreviation (Abbrev.). Abbreviations were created from 4 letters of genus and 4 letters of the the name on the lowest taxonomic level (species, subspecies or variety), with exception of *Chamacyparis formosensis* and *C. obtusa* var. *formosana*, which were abbreviated as Chamform and Chamobtu, respectively.

Latin species name	Chinese	Family	Abbrev.
Acer kawakamii Koidz.	尖葉槭	Aceraceae	Acerkawa
Acer morrisonense Hayata	臺灣紅榨槭	Aceraceae	Acermorr
Acer palmatum var. *pubescens* Li	臺灣掌葉槭	Aceraceae	Acerpube
Barthea barthei (Hance ex Benth.) Krasser	深山野牡丹	Melastomataceae	Bartbart
Cornus kousa subsp. *chinensis* (Osborn) Q.Y.Xiang	四照花	Cornaceae	Bentchin
Berberis hayatana Mizush.	早田氏小檗	Berberidaceae	Berbhaya
Callicarpa randaiensis Hayata	巒大紫珠	Verbenaceae	Callrand
Camellia brevistyla (Hayata) Cohen-Stuart	短柱山茶	Theaceae	Camebrev
Carpinus rankanensis Hayata	蘭邯千金榆	Betulaceae	Carprank
Chamaecyparis formosensis Matsum.	紅檜	Cupressaceae	Chamform
Chamaecyparis obtusa var. *formosana* (Hayata) Hayata	臺灣扁柏	Cupressaceae	Chamobtu
Cleyera japonica Thunb.	紅淡比	Theaceae	Cleyjapo
Daphniphyllum himalaense (Benth.) Müll.Arg. subsp. *macropodum* (Miq.) T.C.Huang	薄葉虎皮楠	Daphniphyllaceae	Daphmacr
Dendropanax dentiger (Harms) Merr.	臺灣樹參	Araliaceae	Denddent
Euonymus spraguei Hayata	刺果衛矛	Celastraceae	Euonspra
Eurya crenatifolia (Yamam.) Kobuski	假柃木	Theaceae	Eurycren
Eurya glaberrima Hayata	厚葉柃木	Theaceae	Euryglab
Eurya loquaiana Dunn	細枝柃木	Theaceae	Euryloqu
Hydrangea angustipetala Hayata	狹瓣八仙花	Saxifragaceae	Hydrangu
Ilex hayatana Loes.	早田氏冬青	Aquifoliaceae	Ilexhaya
Ilex lonicerifolia Hayata	忍冬葉冬青	Aquifoliaceae	Ilexloni
Ilex sugerokii var. *brevipedunculata* (Maxim.) S.Y. Hu	太平山冬青	Aquifoliaceae	Ilexbrev
Ilex suzukii S.Y. Hu	鈴木冬青	Aquifoliaceae	Ilexsuzu
Ilex tugitakayamensis Sasaki	雪山冬青	Aquifoliaceae	Ilextugi
Itea parviflora Hemsl.	小花鼠刺	Saxifragaceae	Iteaparv
Ligustrum liukiuense Koidz.	日本女貞	Oleaceae	Liguliuk
Lindera erythrocarpa Makino	鐵釘樹	Lauraceae	Linderyt
Litsea acuminata (Blume) Kurata	長葉木薑子	Lauraceae	Litsacum
Litsea elongata var. *mushaensis* (Hayata) J.C. Liao	霧社木薑子	Lauraceae	Litsmush
Machilus thunbergii Siebold & Zucc.	紅楠	Lauraceae	Machthun
Michelia compressa (Maxim.) Sarg.	烏心石	Magnoliaceae	Michcomp
Microtropis fokienensis Dunn	福建賽衛矛	Celastraceae	Micrfoki
Neolitsea aciculata (Blume) Koidz.	銳葉新木薑子	Lauraceae	Neolacic
Neolitsea acuminatissima (Hayata) Kaneh. & Sasaki	高山新木薑子	Lauraceae	Neolacum
Osmanthus heterophyllus (G. Don) P.S. Green	異葉木犀	Oleaceae	Osmahete
Photinia niitakayamensis Hayata	玉山假沙梨	Rosaceae	Photniit
Pieris taiwanensis Hayata	臺灣馬醉木	Ericaceae	Piertaiw
Pourthiaea beauverdiana var. *notabilis* (C.K. Schneid.) Hatus.	臺灣老葉兒樹	Rosaceae	Pournota
Pourthiaea villosa var. *parvifolia* (E. Pritz.) H. Iketani & H. Ohashi	小葉石楠	Rosaceae	Pourparv
Prunus phaeosticta (Hance) Maxim.	墨點櫻桃	Rosaceae	Prunphae
Prunus transarisanensis Hayata	阿里山櫻花	Rosaceae	Pruntran
Quercus longinux Hayata	錐果櫟	Fagaceae	Querlong
Quercus sessilifolia Blume	毽子櫟	Fagaceae	Quersess
Quercus stenophylloides Hayata	狹葉櫟	Fagaceae	Quersten
Rhamnus crenata Siebold & Zucc.	鈍齒鼠李	Rhamnaceae	Rhamcren
Rhododendron formosanum Hemsl.	臺灣杜鵑	Ericaceae	Rhodform
Rhododendron leptosanthum Hayata	西施花	Ericaceae	Rhodlept
Rhododendron pseudochrysanthum Hayata	玉山杜鵑	Ericaceae	Rhodpseu
Schima superba Gard. & Champ.	木荷	Theaceae	Schisupe
Skimmia japonica Thunb. subsp. distincte-venulosa (Hayata) T.C.Ho	臺灣茵芋	Rutaceae	Skimvenu
Sorbus randaiensis (Hayata) Koidz.	巒大花楸	Rosaceae	Sorbrand
Styrax formosanus Matsum.	烏皮九芎	Styracaceae	Styrform
Sycopsis sinensis Oliv.	水絲梨	Hamamelidaceae	Sycosine
Symplocos formosana Brand	臺灣灰木	Symplocaceae	Sympform

Latin species name	Chinese	Family	Abbrev.
Symplocos macrostroma Hayata	大花灰木	Symplocaceae	Sympmacr
Symplocos migoi Nagarn.	擬日本灰木	Symplocaceae	Sympmigo
Tetradium glabrifolium (Champ. ex Benth.) T.G. Hartley	賊仔樹	Rutaceae	Tetrglab
Tetradium ruticarpum (A. Juss.) T.G. Hartley	吳茱萸	Rutaceae	Tetrruti
Trochodendron aralioides Siebold & Zucc.	昆欄樹	Trochodendraceae	Trocaral
Tsuga chinensis var. *formosana* (Hayata) H.L. Li & H. Keng	臺灣鐵杉	Pinaceae	Tsugform
Vaccinium bracteatum Thunb.	米飯花	Ericaceae	Vaccbrac
Viburnum foetidum var. *rectangulatum* Rehder	狹葉莢蒾	Caprifoliaceae	Viburect
Viburnum luzonicum Rolfe	呂宋莢蒾	Caprifoliaceae	Vibuluzo
Viburnum sympodiale Graebn.	假繡球	Caprifoliaceae	Vibusymp
Viburnum urceolatum Siebold & Zucc.	壺花莢蒾	Caprifoliaceae	Vibuurce

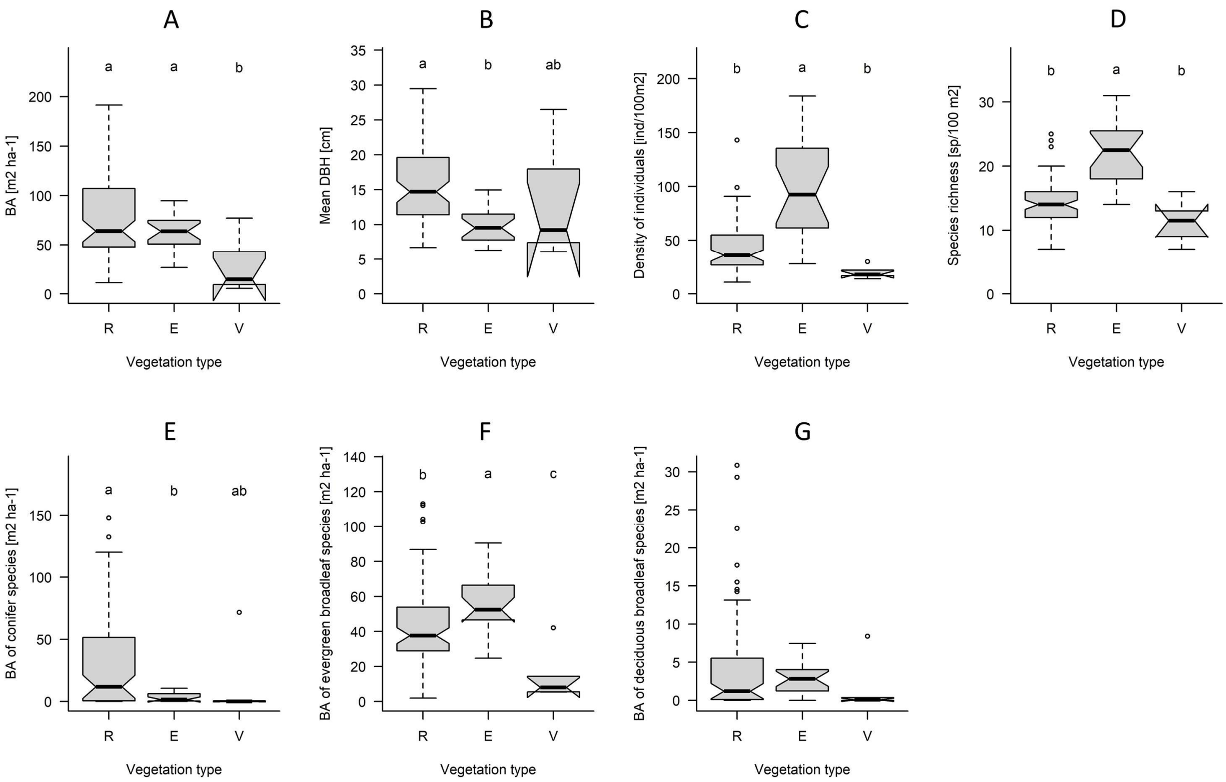

Fig. S1. Boxplots showing the subplot-based differences in vegetation structure between the three vegetation types; **A.** total BA, **B.** mean DBH, **C.** individual density, **D.** species richness, **E.** BA of conifer species, **F.** BA of evergreen broadleaf species, **G.** BA of deciduous broadleaf species. All differences between vegetation types, except for **G.**, are significant (P < 0.05) through the ANOVA test. R: ridge type, E: east-facing slope type, V: valley type.

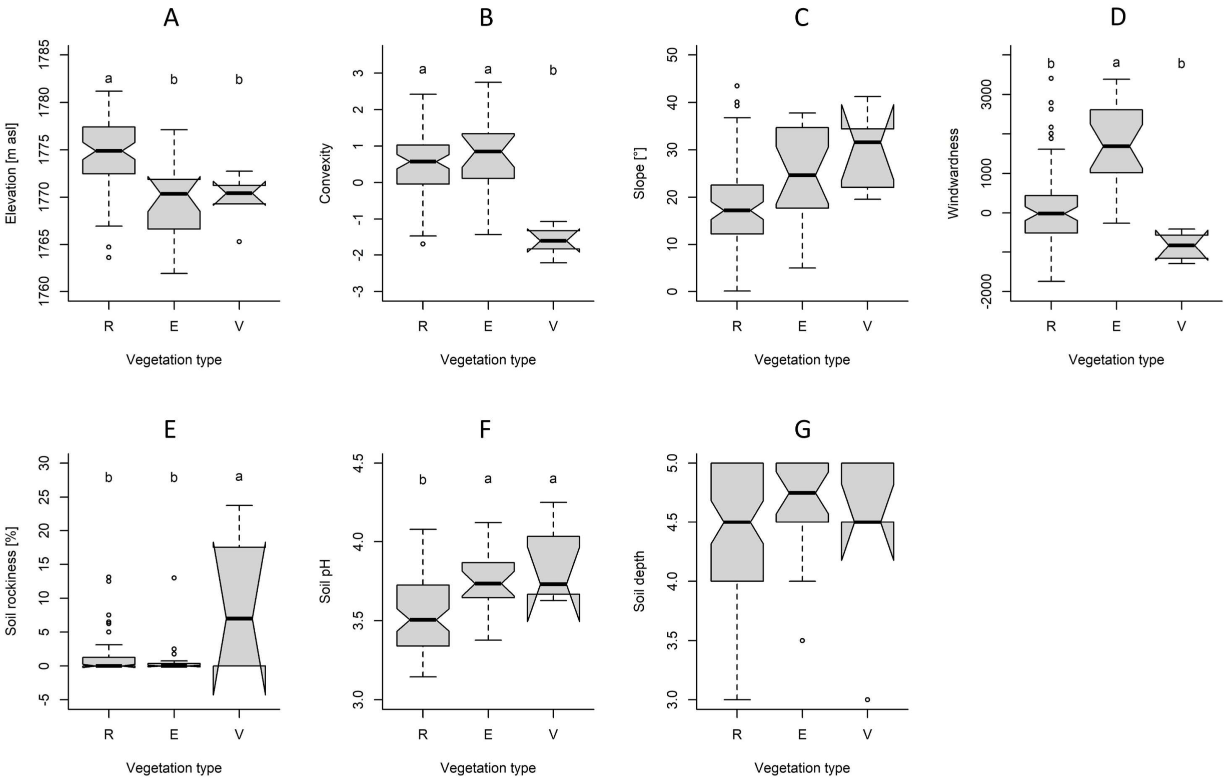

Fig. S2. Boxplots showing the differences of different environmental factors (containing 100 subplots data) between the three vegetation types; **A.** elevation, **B.** convexity, **C.** slope, **D.** windwardness, **E.** soil rockiness, **F.** soil pH, **G.** soil depth. All differences between the vegetation types, except for **G.**, are significant through ANOVA test. R: ridge type, E: east-facing slope type, V: valley type.

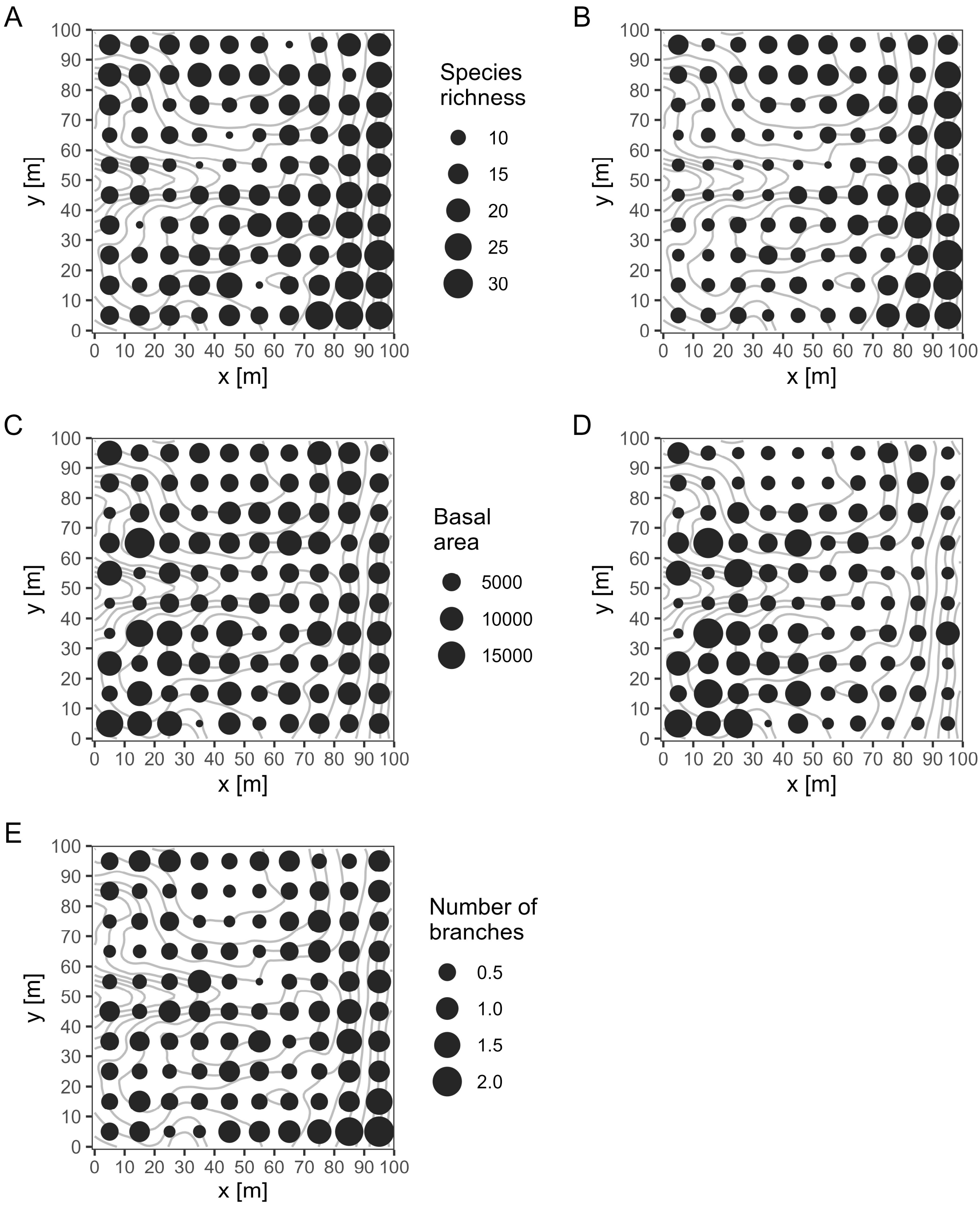

Fig. S3. Spatial distribution of **A.** species richness, **B.** number of individuals per subplot, **C.** basal area of all individuals within the subplot, **D.** maximal basal area of the largest individual within the subplot, and **E.** average number of branches per individual within subplot. The size of the circle is proportional to value of the variable in given subplot.

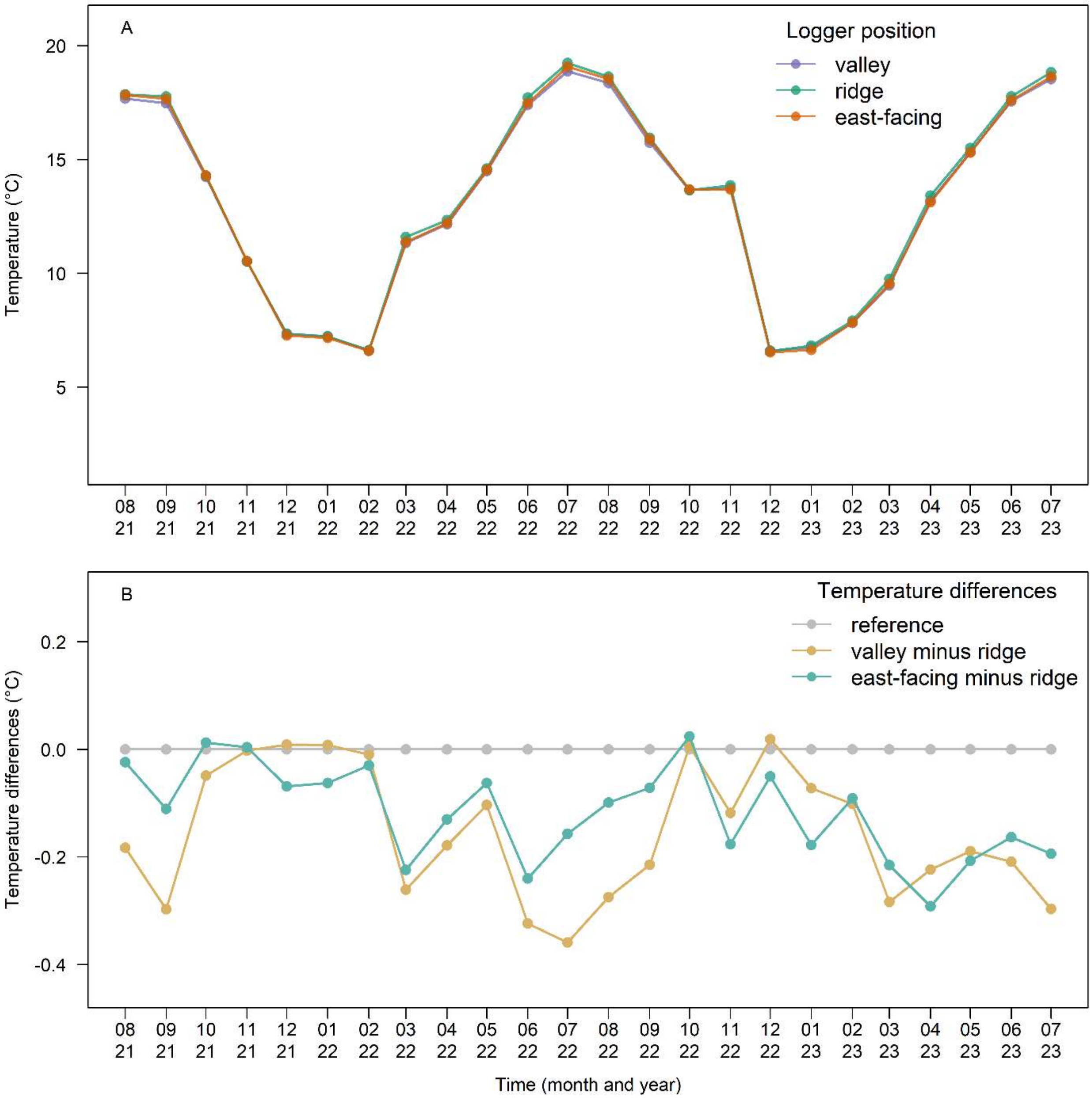

Fig. S4. The pattern of **A.** mean monthly temperature by the three loggers within LFDP, and **B.** mean monthly temperature differences between valley and ridge (green) and east-facing and ridge (blue). Reference represents the ridge logger. Data from temperature measurements between August 1, 2021, and July 31, 2023. The time x-axis is coded as month (upper number) and year (lower number).

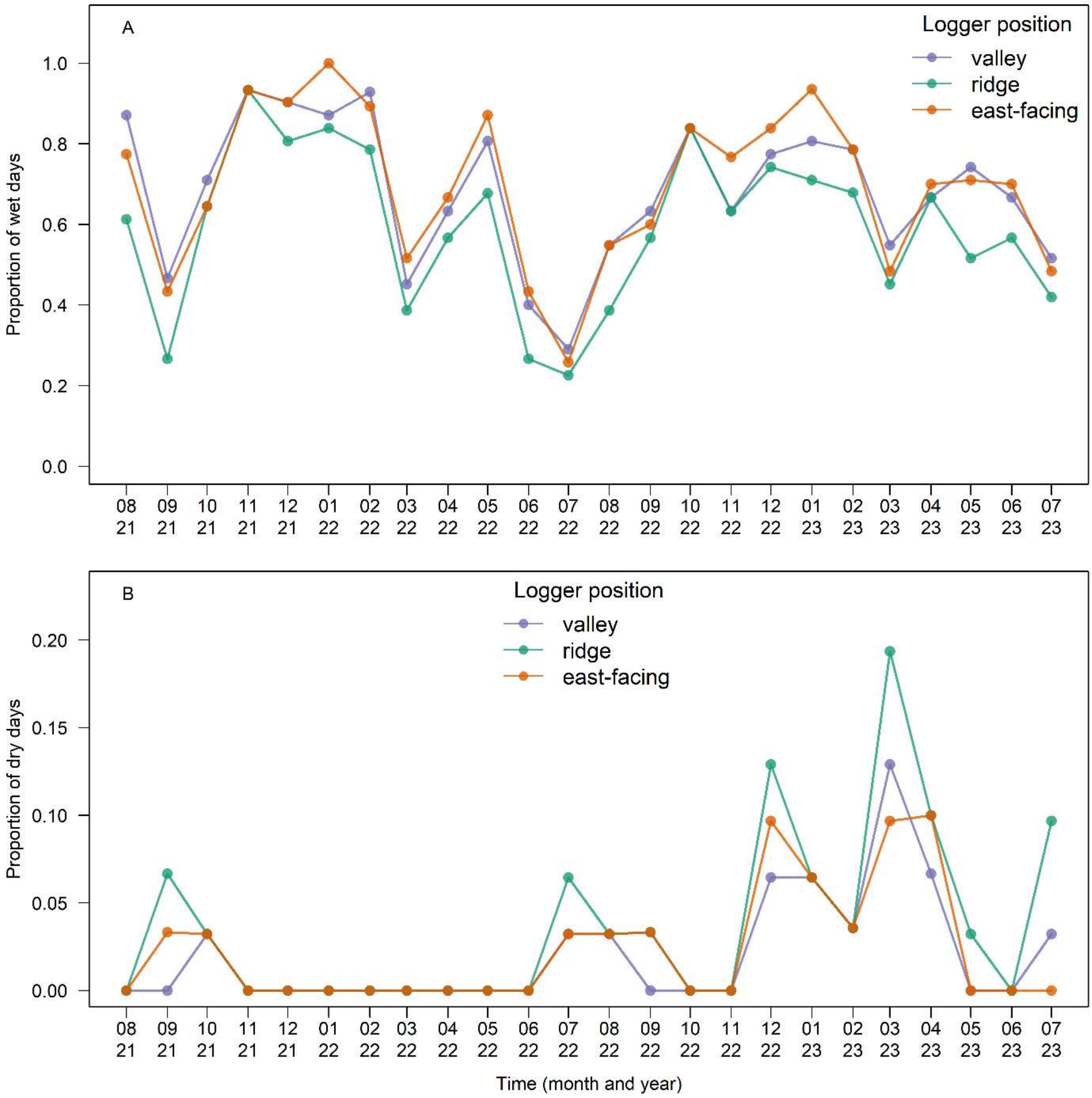

Fig. S5. Monthly proportions of **A.** wet days and **B.** dry days recorded by RH loggers located in different parts of LFDP, from August 1, 2021, to July 31, 2023. Wet days are defined as days with a mean RH ≥ 99%, while dry days with a mean RH ≤ 75%. The time x-axis is coded as month (upper number) and year (lower number).

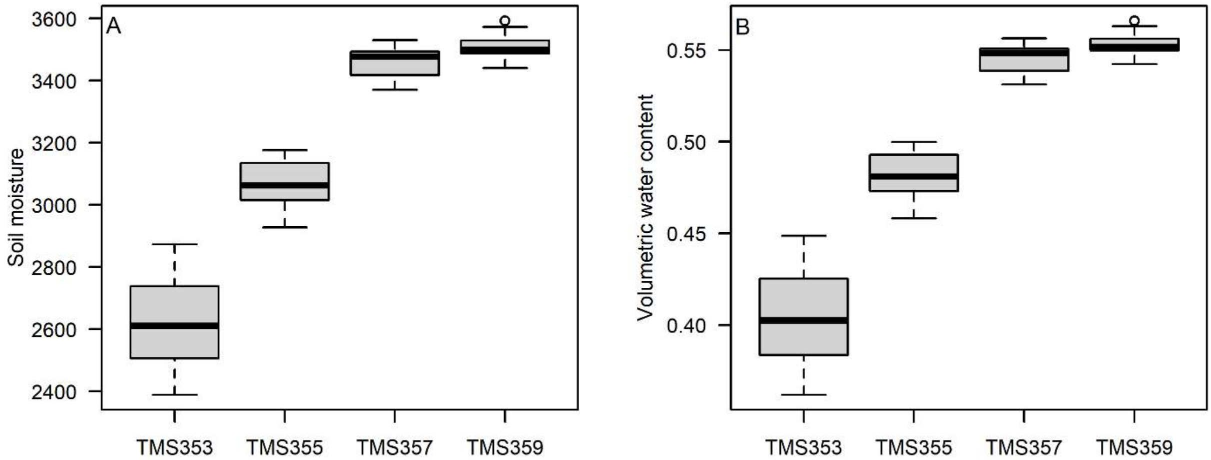

Fig. S6. Differences in **A.** soil moisture and **B.** volumetric water content along the topographical gradient from the convex ridge (TMS353) to the concave valley (TMS359), measured by TOMST TMS-4 loggers close to the centre of the plot from April 17, 2022, till May 28, 2022.

Fig. S7. Photographs of the three vegetation types in LFDP; **A.** - ridge type, **B.**- east-facing slope type, **C.** - valley type. Photo credit by Ting Chen.