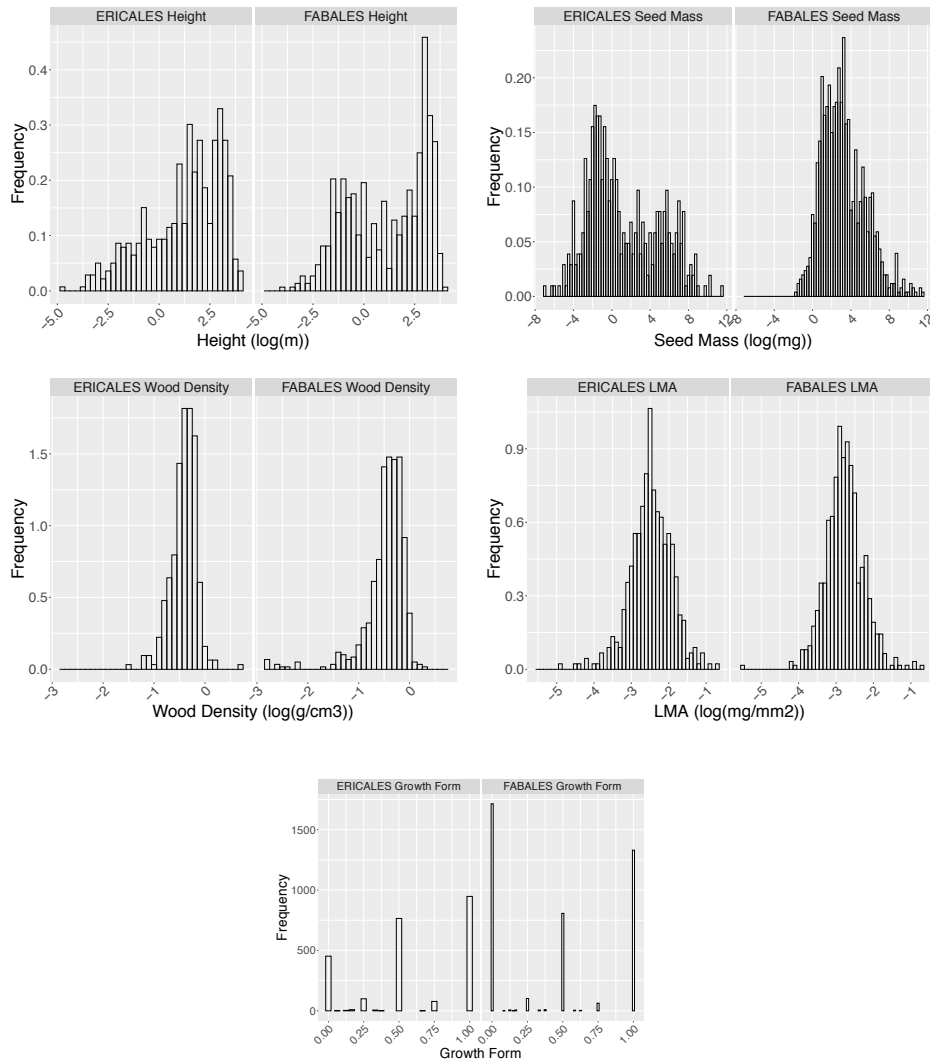# SUPPORTING INFORMATION

Figure S1. Comparison of Ericales and Fabales trait distributions. In general, the overall distribution of trait values across each plant order is similar, indicating that differences between groups at similar latitudes (Figure 1 main text) are not generally caused by average differences in trait values achieved between the two clades. Growth form is a categorical trait treated differently from the others. The three spikes for growth form indicate herbs (0), shrubs (0.5), and trees (1; see Methods), with bars at intermediate values indicating multiple growth forms listed for a given species. For two traits, significant clade-wide differences exist between Ericales and Fabales: (1) Fabales produce larger seeds on average than Ericales. This is due both to a lack of very small seeds among Fabales, and a greater proportion of small seeds produced by Ericales; (2) A greater overall proportion of Fabales are herbaceous, whereas a greater proportion of Ericales are trees.

Table S1. InfoMap bioregions parameters.

	Cell size (deg.)	Number of species per cell
Max	2	100
Min	0.5	5

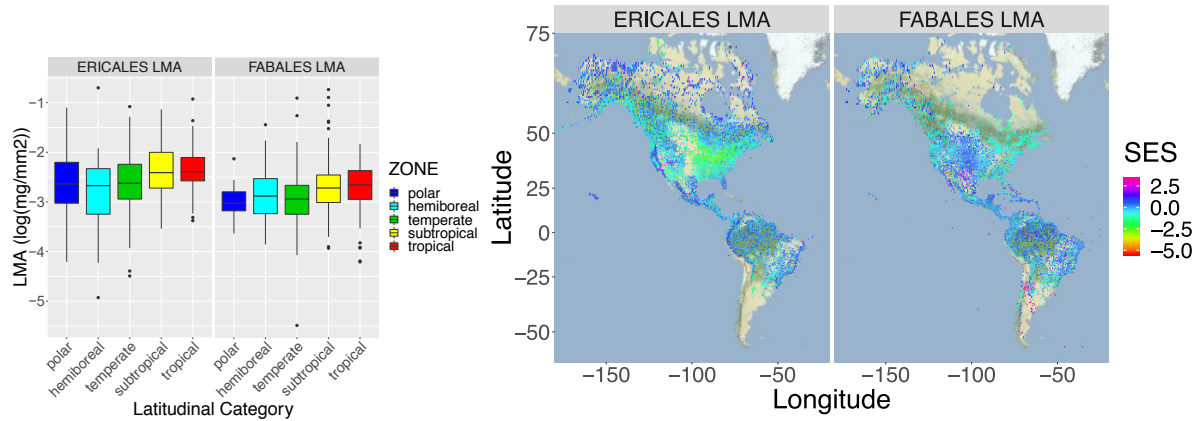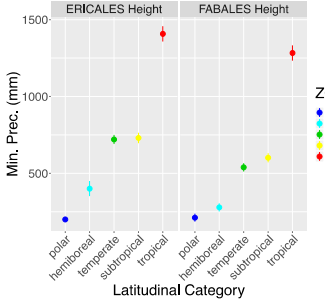Clustering cost was left at the default value of 1. Number of clustering iterations: 10.

Figure S2. Geographic results for LMA for both Ericales (*left panels*) and Fabales (*right panels*). Boxplots are as in Figure 1 in the main text. Although there is some trend of tropical taxa having higher median LMA values than polar ones, the trend is quite slight and not significant. Maps are as in Figure 2 of the main text. For both Ericales and Fabales, regardless of latitude, most grid cells have average values that are close to the overall LMA average. Fabales taxa do show some notable hotspots of particularly low LMA values—near the southwestern United States and northwestern/ central Mexico, which coincide with arid desert climates.
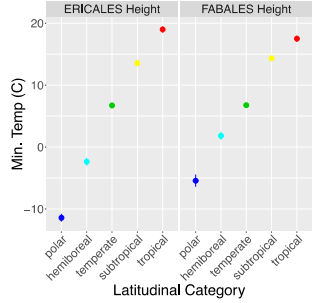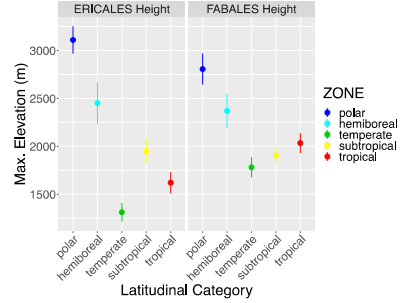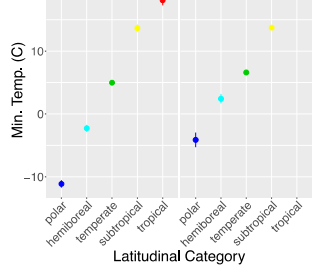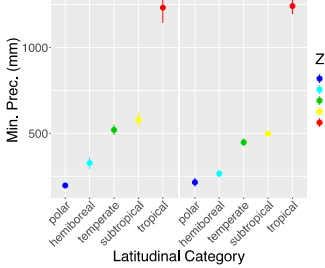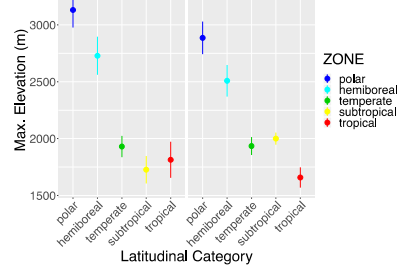
Min. Avg. Temp (C) Min. Avg. Prec. (mm) Maximum Elevation (m)
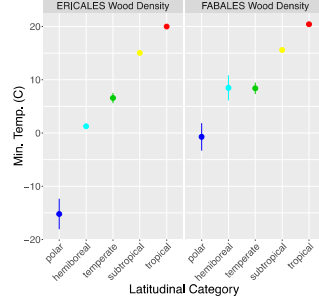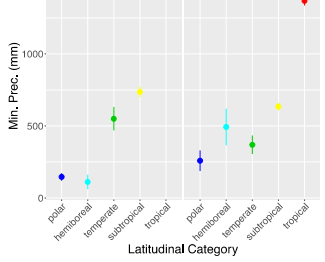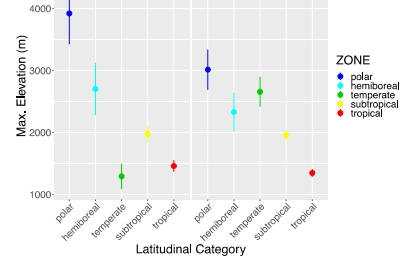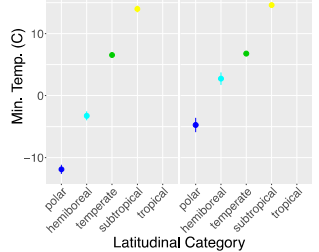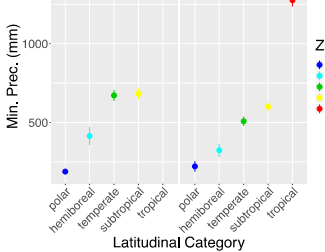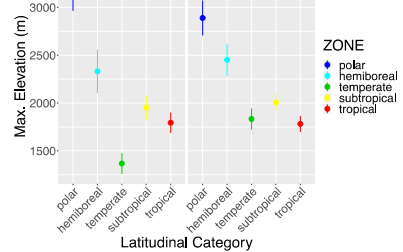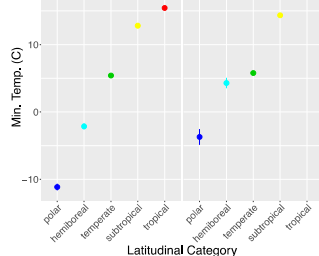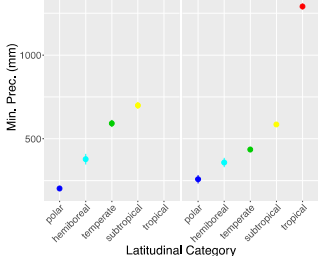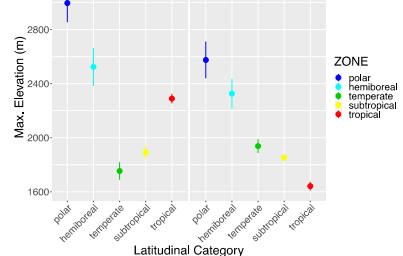
Figure S3. *Left Column:* minimum average temperature experienced by each clade (Ericales, *left panels*; Fabales, *right panels*; dots represent mean values, bars, standard deviation) among species categorized based on latitudinal extrema (colors as in Figure 1 of main text). As different species have different data availability for each trait (see Methods), we include a panel for each (*rows:* height, seed mass, wood density, leaf mass per area (LMA), and growth form), in order to illustrate any differences arising from differences in the extent of sampling. *Middle Column*: same as first column but showing minimum average precipitation. *Right Column*: same as other column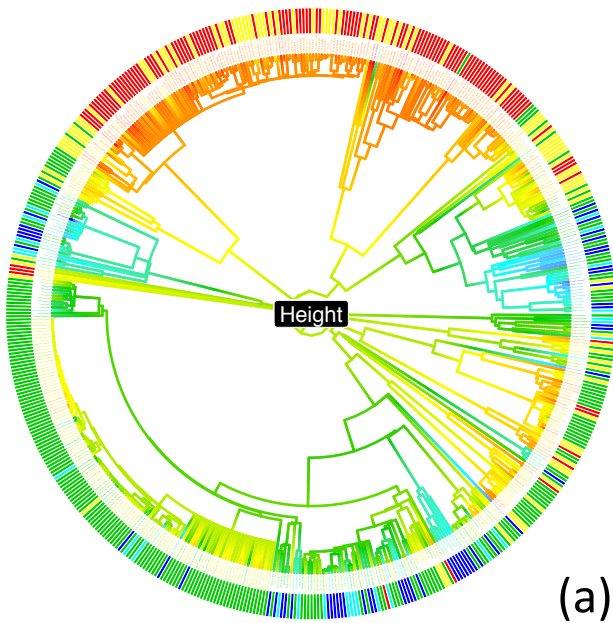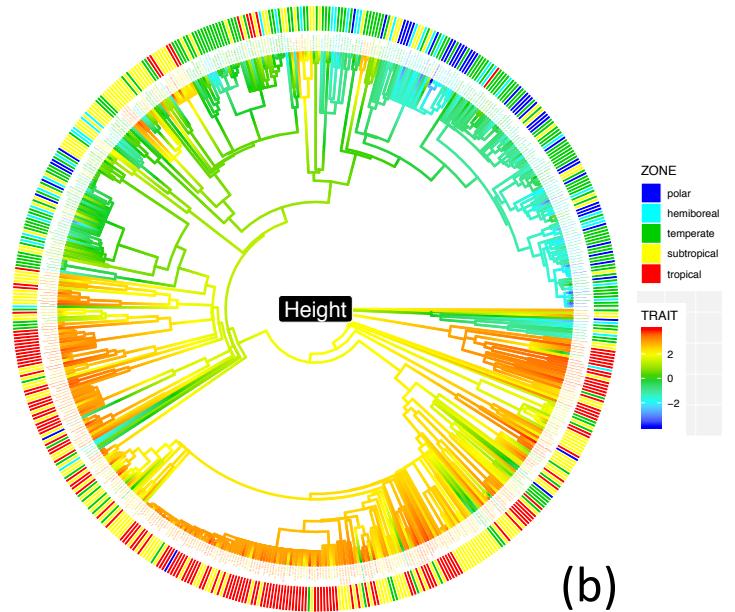s but showing maximum elevation. Overall, at polar latitudes, Ericales occupy sites characterized by lower average temperatures and higher elevation than Fabales (compare blue dots between panels in first and third columns), which might explain some differences in the manifestation of trait syndromes between the two clades—for example, why at polar latitudes Fabales are significantly taller than Ericales (Figure 1 main text and Discussion). At temperate latitudes, Ericales tend to occupy sites with lower elevation and higher precipitation (compare green dots between panels in second and third columns) than Fabales, which might explain, for example why temperate Ericales are significantly taller than temperate Fabales (Figure 1 main text and Discussion).
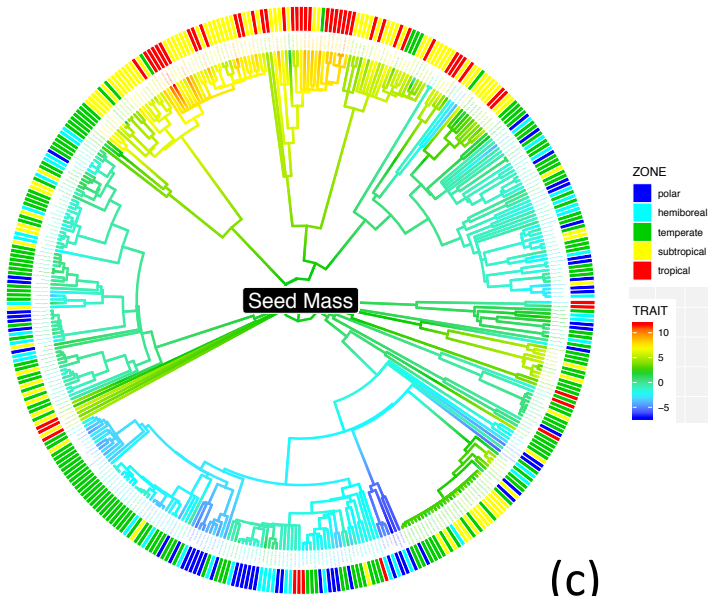
ERICALES   FABALES

(a) Height — ZONE: polar, hemiboreal, temperate, subtropical, tropical; TRAIT

(b) Height — ZONE: polar, hemiboreal, temperate, subtropical, tropical; TRAIT

(c) Seed Mass — ZONE: polar, hemiboreal, temperate, subtropical, tropical; TRAIT

(d) Seed Mass — ZONE: polar, hemiboreal, temperate, subtropical, tropical; TRAIT

(e) Wood Density — ZONE: polar, hemiboreal, temperate, subtropical, tropical; TRAIT

(f) Wood Density — ZONE: polar, hemiboreal, temperate, subtropical, tropical; TRAIT

ERICALES

FABALES

ZONE
- polar
- hemiboreal
- temperate
- subtropical
- tropical

TRAIT
-1
-2
-3
-4

LMA

(g)

ZONE
- polar
- hemiboreal
- temperate
- subtropical
- tropical

TRAIT
-1
-2
-3
-5

LMA

(h)

ZONE
- polar
- hemiboreal
- temperate
- subtropical
- tropical

TRAIT
1.00
0.75
0.50
0.25
0.00

Growth Form

(i)

ZONE
- polar
- hemiboreal
- temperate
- subtropical
- tropical

TRAIT
1.00
0.75
0.50
0.25
0.00

Growth Form
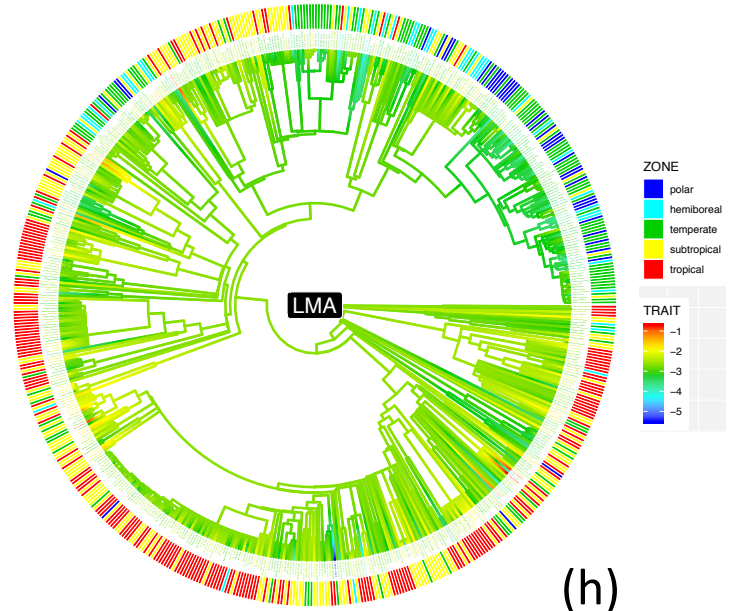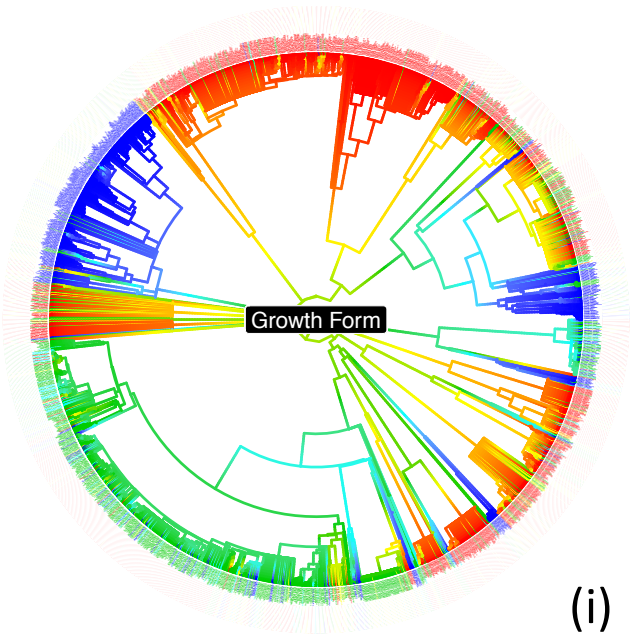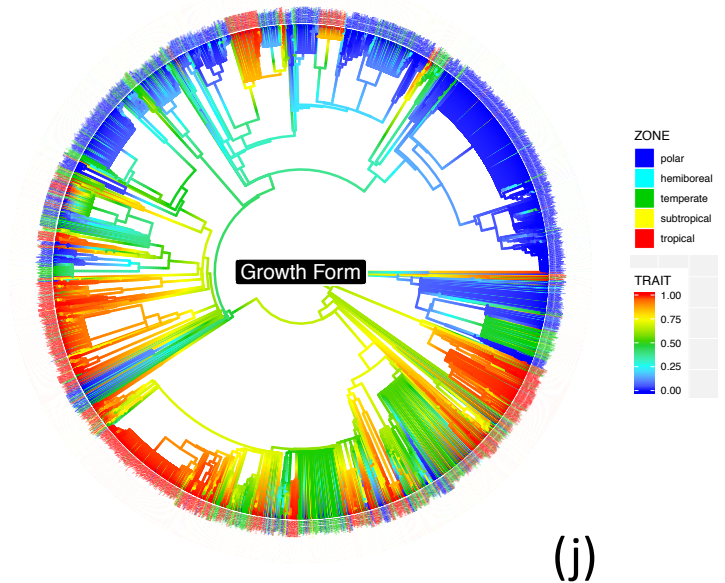
(j)

Figure S4. Phylogenetic conservation of functional trait values and latitudinal extrema for Ericales (*left column*) and Fabales (*right column*). The only change to the phylogenies from Figure 3 in the main text is that here we include all taxa, whereas Figure 3 shows only a random sample of up to 500 species for traits with a large amount of data (which made it difficult to maintain readability of species names for some trait/ taxa combinations).
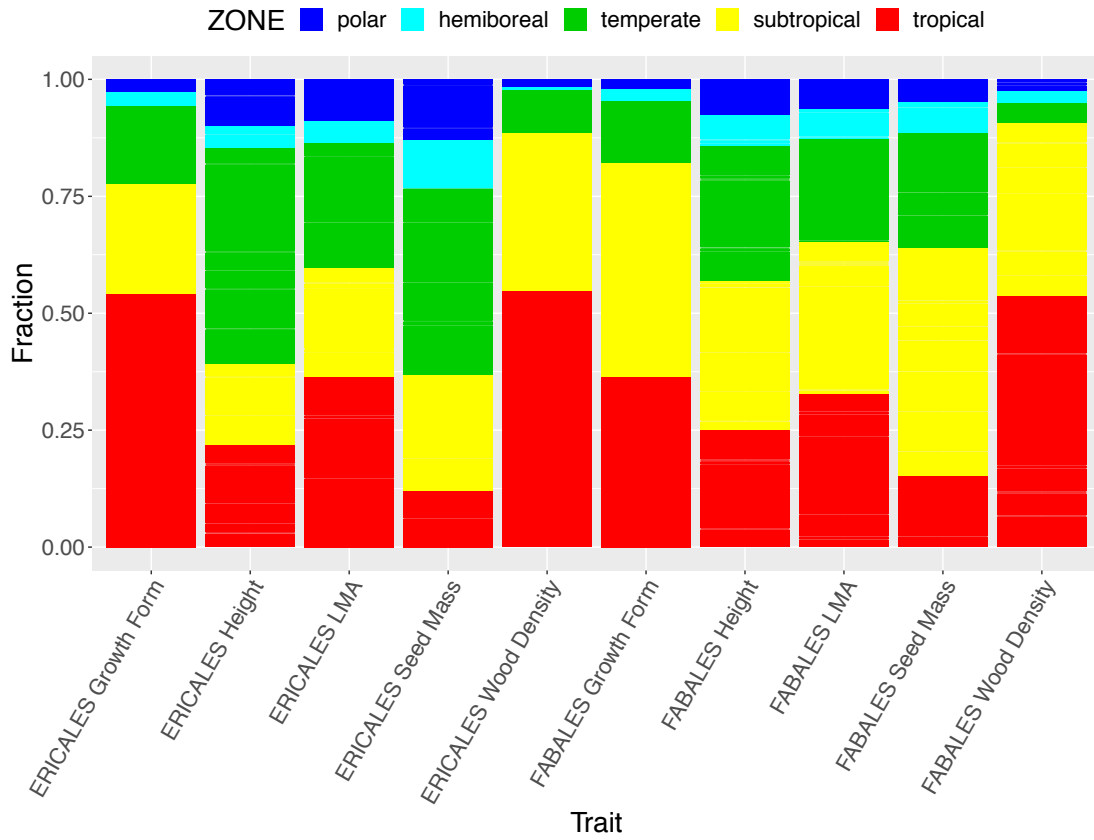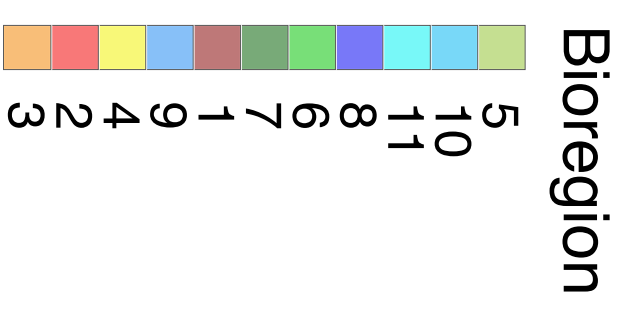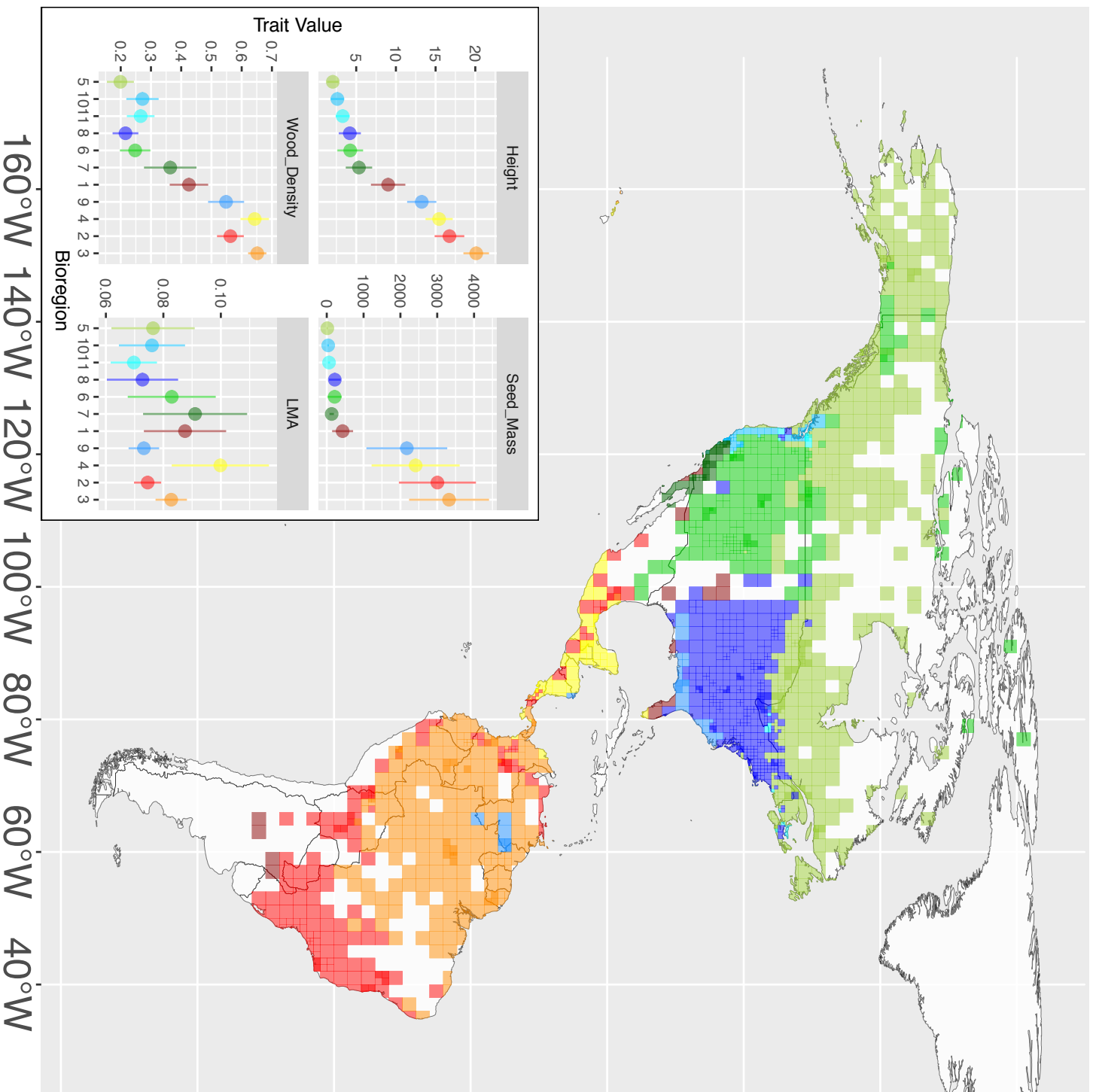
Figure S5. Stacked bar plot showing the fraction of species in each latitudinal category for each trait among Ericales and Fabales taxa. When looking at the same trait, both groups showed similar fractions of species in each latitudinal category, despite there being more data for Fabales overall (see Methods).
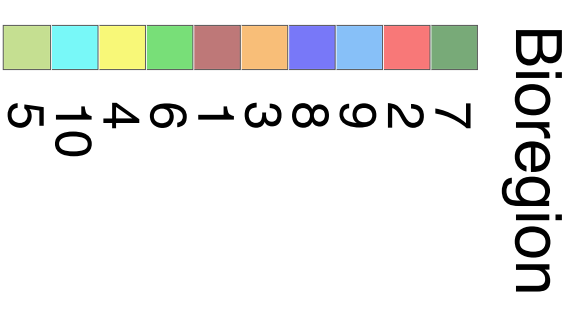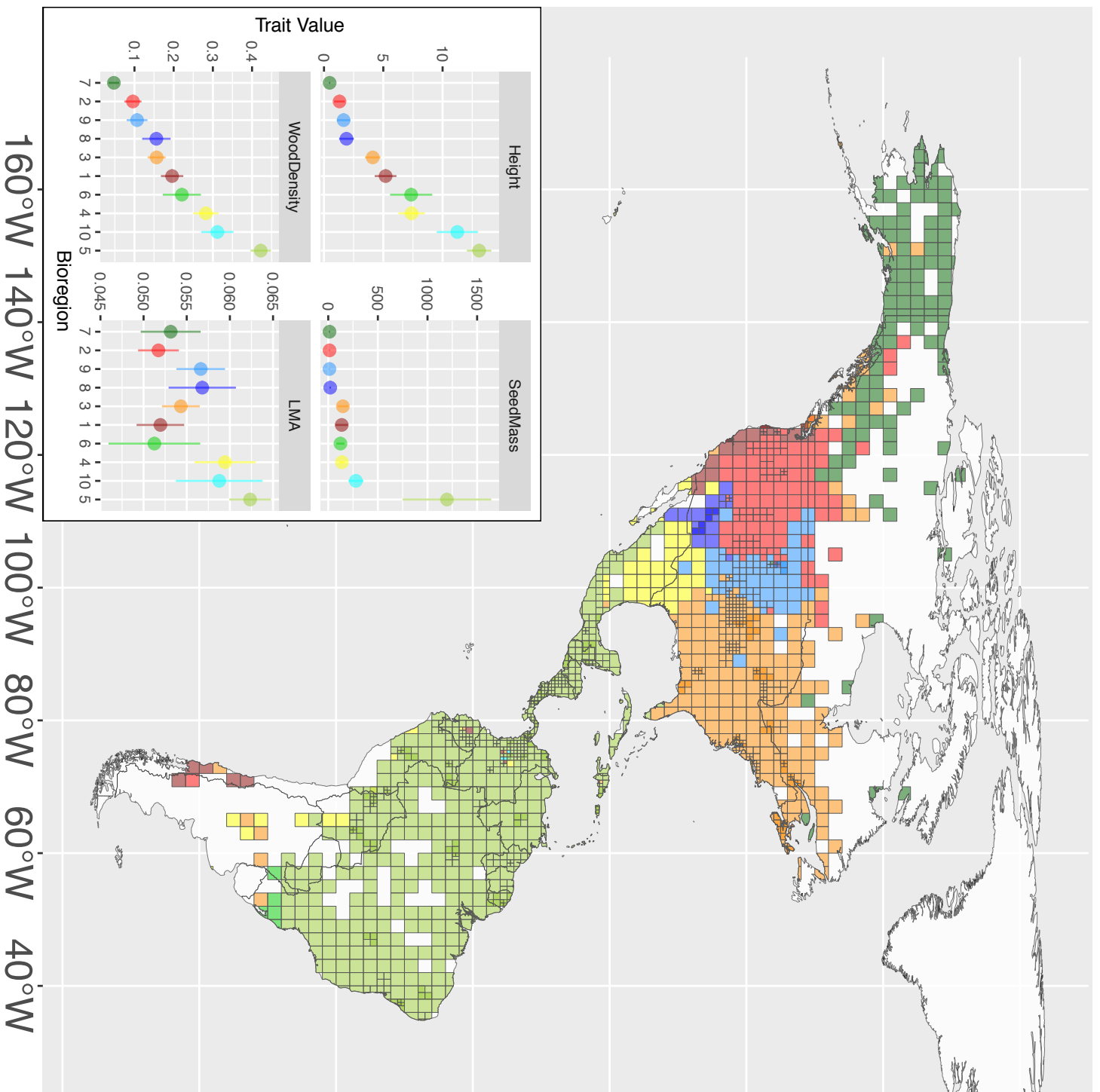
ERICALES

FABALES

Figure S6. Biogeographic clusters (bioregions) identified with the Infomap Bioregions algorithm (see Methods) for both Ericales (86 sp.) and Fabales (220 sp.) taxa with complete trait information. Bioregion colors and numbering were chosen arbitrarily by the algorithm for each plot; however, bioregions have been ordered in the legend and inset plots by increasing average height within that cluster. This generally corresponds also with increasing average seed mass and wood density, but not leaf mass per area (LMA). Inset plots show average (+/ SE) trait values within each cluster for each functional trait, as indicated. Both Ericales and Fabales show similar numbers of bioregions, and these also generally map to similar geographic areas. Bioregions tend to show consistent trait patterns, although there is a sharp discontinuity within both clades for seed mass, with tropical (extra-tropical) clusters showing much greater (lower) seed mass. Clade-specific differences in trait values associated with bioregions are also observed. Notably, Fabales taxa group primarily into a single tropical cluster, whereas Ericales do not.