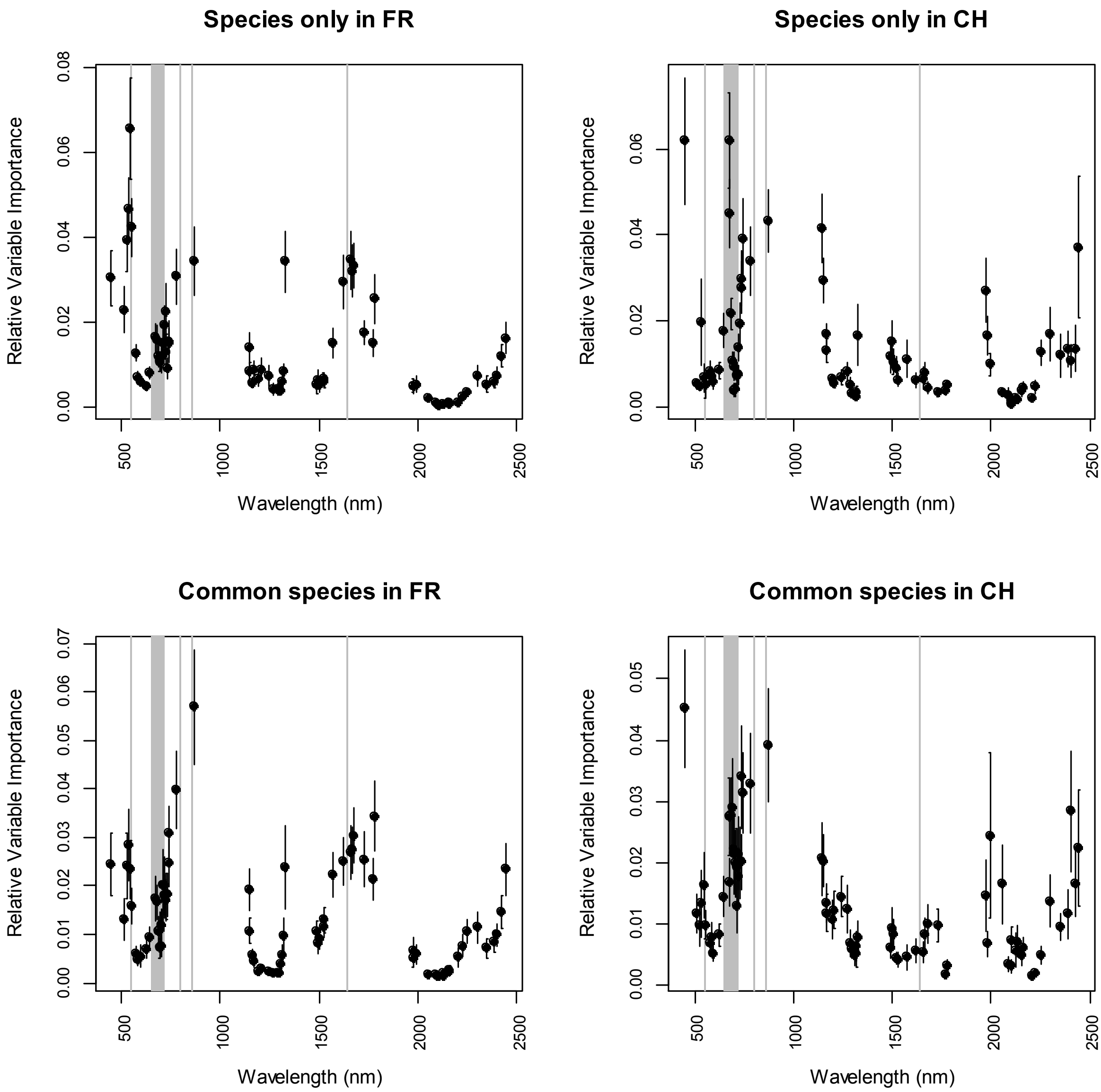
Electronic Supplementary Material 2:

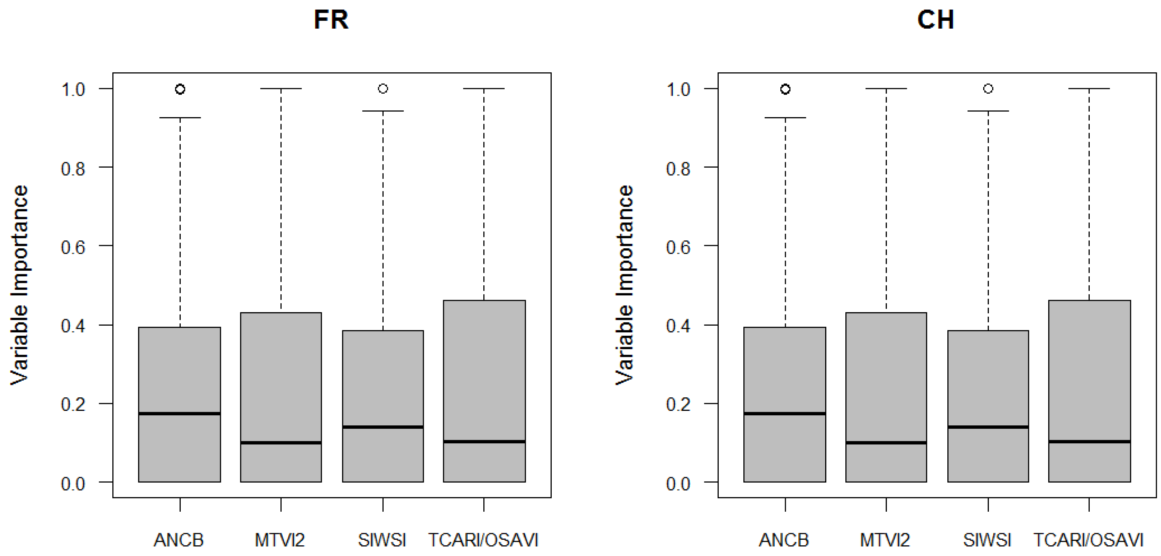
Complementary results.

1) **Relative importance of reflectance intensity in spectral bands for predicting the distribution of species recorded only in one of the two sites or recorded in both sites.**



ESM2 Fig 1: Relative importance of reflectance intensity in spectral bands for predicting the distribution of species recorded only in the French site (FR), only in the Swiss site (CH), recorded in both sites but modeled in the French site and recorded in both sites but modeled in the Swiss site. Gray areas represent bands used for the calculation of the vegetation indices.

2) Variable importance of vegetation indices for the French site (FR) and the Swiss site (CH).



ESM2 Fig 2: Variable importance of the RS-retrieved vegetation indices for modeling species distribution. FR for the French site and CH for the Swiss site. Details on the calculation of indices can be found in ESM1.

3) Detailed prediction accuracy of species distribution models.

ESM 2 Table 1: Summary table of prediction accuracy of species distribution models assessed with the area under the curve of a receiver-operating characteristic plot: AUC. Topo indicates models based on topographic predictors only, BS models based on reflectance selected spectral bands. VI indicates models based on vegetation indices only. Topo+BS and Topo+VI indicate respectively models based on topographic predictors and reflectance or vegetation indices as predictors. Species are listed in alphabetic order according to their occurrence in the two sites. Green highlighting indicates species that showed at least 10% improvement of model accuracy when adding the AIS-predictors to topographic based models in at least one of the two sites. AUC values above 0.7 can be considered as models with good prediction accuracy.

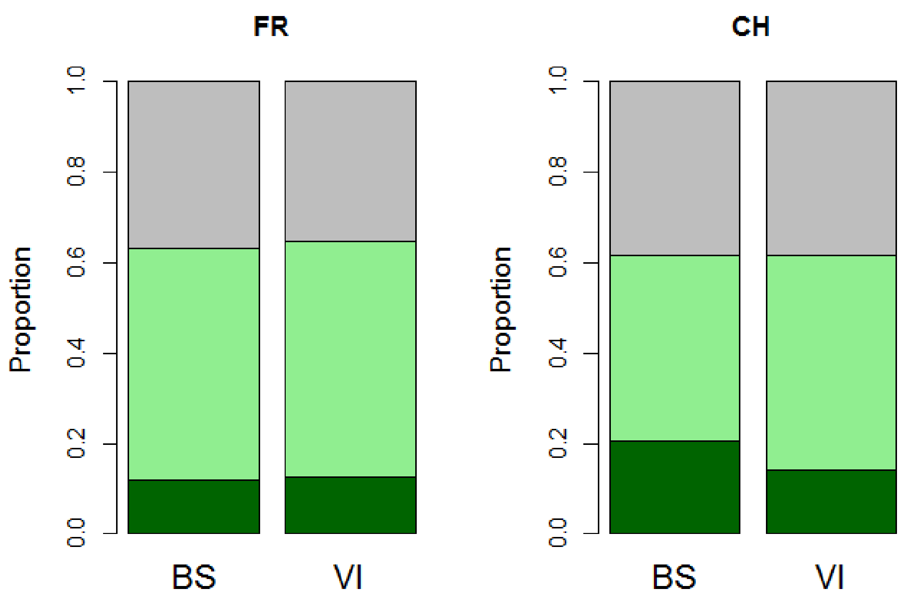
	Topo		BS		Topo+BS		VI		Topo+VI	
	FR	CH	FR	CH	FR	CH	FR	CH	FR	CH
Achillea millefolium	0.686	-	0.807	-	0.811	-	0.8	-	0.827	-
Achillea nana	0.8	-	0.703	-	0.783	-	0.737	-	0.746	-
Alchemilla coriacea sl.	0.735	-	0.707	-	0.717	-	0.721	-	0.732	-
Alchemilla pentaphyllea	0.893	-	0.763	-	0.897	-	0.817	-	0.884	-
Alchemilla splendens	0.695	-	0.682	-	0.728	-	0.664	-	0.727	-
Alopecurus alpinus	0.742	-	0.607	-	0.704	-	0.668	-	0.733	-
Androsace adfinis subsp. *brigantiaca*	0.703	-	0.65	-	0.713	-	0.719	-	0.763	-

Androsace vitaliana	0.666	-	0.785	-	0.786	-	0.786	-	0.76	-
Antennaria carpatica	0.776	-	0.757	-	0.823	-	0.743	-	0.787	-
Antennaria dioica	0.783	-	0.675	-	0.783	-	0.639	-	0.737	-
Aster alpinus	0.703	-	0.689	-	0.664	-	0.662	-	0.711	-
Biscutella laevigata	0.795	-	0.631	-	0.722	-	0.627	-	0.755	-
Botrychium lunaria	0.681	-	0.704	-	0.679	-	0.722	-	0.711	-
Carduus defloratus sl.	0.852	-	0.796	-	0.817	-	0.751	-	0.836	-
Carex curvula subsp. *rosae*	0.789	-	0.803	-	0.827	-	0.82	-	0.764	-
Carex foetida	0.78	-	0.655	-	0.721	-	0.67	-	0.763	-
Centaurea uniflora	0.781	-	0.8	-	0.864	-	0.779	-	0.837	-
Cerastium arvense sl.	0.677	-	0.581	-	0.663	-	0.592	-	0.689	-
Deschampsia flexuosa	0.658	-	0.653	-	0.597	-	0.729	-	0.657	-
Empetrum nigrum subsp. *hermaphroditum*	0.943	-	0.843	-	0.933	-	0.897	-	0.931	-
Erigeron uniflorus	0.656	-	0.664	-	0.66	-	0.672	-	0.673	-
Euphorbia cyparissias	0.832	-	0.785	-	0.842	-	0.755	-	0.852	-
Festuca laevigata	0.846	-	0.681	-	0.859	-	0.702	-	0.87	-
Festuca nigrescens	0.607	-	0.705	-	0.658	-	0.686	-	0.62	-
Festuca paniculata	0.741	-	0.746	-	0.782	-	0.783	-	0.839	-
Galium lucidum	0.776	-	0.66	-	0.746	-	0.613	-	0.765	-
Galium mollugo subsp. *erectum*	0.87	-	0.756	-	0.848	-	0.73	-	0.874	-
Gentiana brachyphylla	0.882	-	0.664	-	0.859	-	0.736	-	0.903	-
Gentiana lutea	0.949	-	0.801	-	0.942	-	0.737	-	0.943	-
Gentiana punctata	0.709	-	0.706	-	0.708	-	0.692	-	0.71	-
Gentianella campestris	0.719	-	0.656	-	0.676	-	0.686	-	0.708	-
Geranium sylvaticum	0.775	-	0.796	-	0.801	-	0.82	-	0.821	-
Helianthemum grandiflorum	0.775	-	0.642	-	0.74	-	0.62	-	0.752	-
Helictotrichon sedenense	0.64	-	0.858	-	0.839	-	0.849	-	0.837	-
Hieracium armerioides	0.633	-	0.692	-	0.666	-	0.72	-	0.645	-
Hieracium peleterianum	0.645	-	0.692	-	0.635	-	0.673	-	0.648	-
Hieracium villosum	0.616	-	0.608	-	0.645	-	0.613	-	0.597	-
Kobresia myosuroides	0.68	-	0.695	-	0.732	-	0.738	-	0.73	-
Laserpitium halleri	0.73	-	0.803	-	0.771	-	0.718	-	0.701	-
Laserpitium latifolium	0.864	-	0.852	-	0.908	-	0.82	-	0.87	-
Leucanthemopsis alpina	0.734	-	0.822	-	0.861	-	0.829	-	0.858	-
Lilium martagon	0.819	-	0.806	-	0.789	-	0.783	-	0.839	-
Lotus alpinus	0.626	-	0.624	-	0.628	-	0.602	-	0.615	-
Luzula lutea	0.725	-	0.762	-	0.762	-	0.753	-	0.754	-
Luzula nutans	0.623	-	0.657	-	0.669	-	0.631	-	0.633	-
Meum athamanticum	0.829	-	0.919	-	0.931	-	0.881	-	0.888	-
Minuartia sedoides	0.783	-	0.77	-	0.806	-	0.779	-	0.767	-
Minuartia verna	0.753	-	0.824	-	0.817	-	0.821	-	0.896	-
Myosotis arvensis	0.85	-	0.859	-	0.876	-	0.822	-	0.847	-
Narcissus poeticus	0.935	-	0.875	-	0.951	-	0.886	-	0.942	-
Nigritella corneliana	0.615	-	0.592	-	0.622	-	0.631	-	0.621	-
Oxytropis lapponica	0.645	-	0.733	-	0.662	-	0.632	-	0.641	-

Pachypleurum mutellinoides	0.828	-	0.831	-	0.841	-	0.797	-	0.845	-
Pedicularis rostratospicata	0.64	-	0.592	-	0.647	-	0.624	-	0.642	-
Pedicularis tuberosa	0.748	-	0.758	-	0.786	-	0.686	-	0.765	-
Phyteuma michelii	0.75	-	0.686	-	0.752	-	0.66	-	0.727	-
Potentilla grandiflora	0.801	-	0.768	-	0.809	-	0.735	-	0.785	-
Pulmonaria angustifolia	0.781	-	0.781	-	0.801	-	0.779	-	0.837	-
Pulsatilla alpina sl.	0.566	-	0.601	-	0.574	-	0.594	-	0.584	-
Ranunculus kuepferi	0.727	-	0.612	-	0.693	-	0.6	-	0.698	-
Rhinanthus alectorolophus	0.864	-	0.869	-	0.932	-	0.847	-	0.926	-
Rumex nebroides	0.673	-	0.726	-	0.719	-	0.746	-	0.713	-
Saxifraga paniculata	0.665	-	0.843	-	0.853	-	0.861	-	0.846	-
Scutellaria alpina	0.864	-	0.777	-	0.894	-	0.777	-	0.879	-
Sedum anacampseros	0.691	-	0.643	-	0.676	-	0.705	-	0.693	-
Sempervivum arachnoideum	0.707	-	0.75	-	0.774	-	0.798	-	0.816	-
Sempervivum montanum	0.752	-	0.719	-	0.754	-	0.736	-	0.795	-
Sempervivum tectorum	0.745	-	0.645	-	0.756	-	0.623	-	0.776	-
Senecio doronicum	0.841	-	0.779	-	0.826	-	0.778	-	0.83	-
Senecio incanus	0.683	-	0.699	-	0.662	-	0.704	-	0.667	-
Sibbaldia procumbens	0.836	-	0.721	-	0.841	-	0.858	-	0.877	-
Silene acaulis	0.774	-	0.832	-	0.834	-	0.848	-	0.849	-
Silene nutans	0.683	-	0.678	-	0.669	-	0.642	-	0.633	-
Silene vulgaris sl.	0.736	-	0.813	-	0.777	-	0.711	-	0.761	-
Stachys pradica	0.764	-	0.669	-	0.743	-	0.672	-	0.74	-
Taraxacum alpinum	0.64	-	0.631	-	0.613	-	0.644	-	0.661	-
Trifolium alpestre	0.874	-	0.88	-	0.916	-	0.856	-	0.942	-
Trifolium alpinum	0.606	-	0.69	-	0.661	-	0.655	-	0.651	-
Trifolium montanum	0.824	-	0.833	-	0.92	-	0.836	-	0.915	-
Trisetum flavescens	0.888	-	0.871	-	0.925	-	0.886	-	0.932	-
Vaccinium uliginosum subsp. *microphyllum*	0.841	-	0.798	-	0.86	-	0.811	-	0.841	-
Veronica allionii	0.708	-	0.619	-	0.689	-	0.665	-	0.697	-
Alchemilla xanthochlora aggr	0.629	0.601	0.612	0.603	0.608	0.588	0.59	0.636	0.617	0.631
Anthoxanthum odoratum aggr	0.591	0.704	0.624	0.641	0.628	0.671	0.618	0.638	0.629	0.68
Anthyllis vulneraria sl.	0.681	0.75	0.624	0.66	0.666	0.727	0.616	0.65	0.662	0.75
Arnica montana	0.828	0.617	0.802	0.66	0.83	0.659	0.758	0.71	0.822	0.645
Bartsia alpina	0.699	0.629	0.657	0.705	0.769	0.658	0.641	0.643	0.71	0.645
Campanula scheuchzeri	0.641	0.643	0.685	0.709	0.685	0.681	0.698	0.651	0.661	0.629
Carex sempervirens	0.628	0.76	0.608	0.648	0.598	0.755	0.605	0.655	0.596	0.709
Carlina acaulis subsp. *caulescens*	0.81	0.723	0.786	0.744	0.823	0.771	0.791	0.691	0.853	0.783
Cirsium spinosissimum	0.681	0.671	0.629	0.681	0.7	0.71	0.688	0.686	0.742	0.735
Dryas octopetala	0.769	0.694	0.812	0.71	0.847	0.733	0.816	0.685	0.881	0.697
Festuca rubra aggr.	0.681	0.658	0.706	0.76	0.711	0.79	0.709	0.716	0.693	0.706
Festuca violacea aggr.	0.609	0.634	0.608	0.608	0.586	0.599	0.595	0.63	0.62	0.642
Gentiana acaulis	0.729	0.72	0.709	0.68	0.758	0.72	0.645	0.693	0.737	0.738
Geum montanum	0.645	0.603	0.593	0.709	0.607	0.68	0.579	0.758	0.638	0.687
Homogyne alpina	0.896	0.615	0.799	0.625	0.878	0.656	0.81	0.605	0.901	0.623

Leontodon helveticus	0.59	0.677	0.666	0.746	0.642	0.772	0.663	0.71	0.615	0.715
Leontodon hispidus sl.	0.802	0.659	0.8	0.645	0.818	0.699	0.735	0.61	0.859	0.665
Lotus corniculatus aggr.	0.862	0.616	0.71	0.608	0.859	0.608	0.713	0.601	0.901	0.61
Myosotis alpestris	0.672	0.729	0.713	0.639	0.735	0.664	0.735	0.608	0.753	0.693
Nardus stricta	0.654	0.613	0.624	0.659	0.644	0.655	0.625	0.667	0.641	0.647
Phleum rhaeticum	0.68	0.683	0.75	0.576	0.724	0.682	0.718	0.653	0.692	0.701
Phyteuma orbiculare	0.631	0.66	0.614	0.62	0.603	0.626	0.625	0.614	0.578	0.638
Plantago alpina	0.619	0.618	0.621	0.621	0.619	0.631	0.671	0.59	0.635	0.588
Poa alpina	0.788	0.647	0.619	0.633	0.795	0.655	0.625	0.627	0.764	0.64
Polygonum viviparum	0.718	0.652	0.653	0.685	0.698	0.691	0.722	0.615	0.743	0.655
Potentilla aurea	0.625	0.612	0.669	0.746	0.659	0.75	0.571	0.745	0.596	0.725
Ranunculus acris sl.	0.664	0.68	0.748	0.665	0.748	0.662	0.803	0.731	0.799	0.681
Ranunculus montanus aggr.	0.684	0.599	0.745	0.652	0.744	0.642	0.727	0.714	0.781	0.677
Salix herbacea	0.741	0.655	0.781	0.686	0.818	0.639	0.791	0.62	0.811	0.669
Sesleria caerulea	0.666	0.655	0.752	0.705	0.737	0.718	0.797	0.671	0.783	0.713
Thesium alpinum	0.71	0.66	0.793	0.781	0.791	0.747	0.84	0.718	0.788	0.678
Thymus praecox subsp. *polytrichus*	0.771	0.649	0.694	0.748	0.803	0.717	0.655	0.757	0.756	0.649
Trifolium pratense sl.	0.759	0.592	0.66	0.75	0.72	0.731	0.67	0.697	0.732	0.678
Trifolium repens sstr.	0.651	0.747	0.609	0.691	0.611	0.746	0.639	0.786	0.673	0.749
Trifolium thalii	0.623	0.606	0.66	0.612	0.612	0.607	0.635	0.606	0.634	0.616
Vaccinium myrtillus	0.882	0.647	0.801	0.671	0.858	0.623	0.779	0.643	0.848	0.659
Viola calcarata	0.627	0.68	0.613	0.614	0.624	0.616	0.624	0.737	0.622	0.628
Agrostis capillaris	-	0.66	-	0.771	-	0.774	-	0.793	-	0.852
Agrostis rupestris	-	0.685	-	0.762	-	0.721	-	0.598	-	0.666
Alchemilla conjuncta aggr.	-	0.599	-	0.684	-	0.697	-	0.669	-	0.629
Alchemilla glabra aggr.	-	0.671	-	0.736	-	0.705	-	0.619	-	0.66
Alchemilla vulgaris aggr.	-	0.74	-	0.634	-	0.65	-	0.655	-	0.674
Androsace chamaejasme	-	0.658	-	0.602	-	0.643	-	0.61	-	0.646
Aposeris foetida	-	0.788	-	0.714	-	0.818	-	0.692	-	0.838
Aster bellidiastrum	-	0.705	-	0.646	-	0.741	-	0.657	-	0.758
Campanula barbata	-	0.703	-	0.789	-	0.745	-	0.787	-	0.72
Carex ornithopoda	-	0.707	-	0.638	-	0.68	-	0.612	-	0.677
Cerastium fontanum sl.	-	0.682	-	0.684	-	0.706	-	0.683	-	0.685
Crepis aurea	-	0.634	-	0.716	-	0.639	-	0.636	-	0.597
Crocus albiflorus	-	0.744	-	0.733	-	0.769	-	0.727	-	0.781
Deschampsia cespitosa	-	0.683	-	0.715	-	0.726	-	0.773	-	0.754
Euphrasia minima	-	0.585	-	0.66	-	0.624	-	0.6	-	0.606
Festuca quadriflora	-	0.634	-	0.767	-	0.737	-	0.679	-	0.647
Galium anisophyllon	-	0.767	-	0.609	-	0.753	-	0.713	-	0.771
Gentiana campestris sstr.	-	0.705	-	0.597	-	0.665	-	0.65	-	0.673
Gentiana purpurea	-	0.62	-	0.81	-	0.797	-	0.788	-	0.746
Gentiana verna	-	0.682	-	0.681	-	0.663	-	0.674	-	0.646
Helianthemum nummularium sl.	-	0.631	-	0.631	-	0.627	-	0.638	-	0.624
Helictotrichon versicolor	-	0.627	-	0.607	-	0.615	-	0.597	-	0.605
Hieracium lactucella	-	0.648	-	0.755	-	0.761	-	0.771	-	0.748

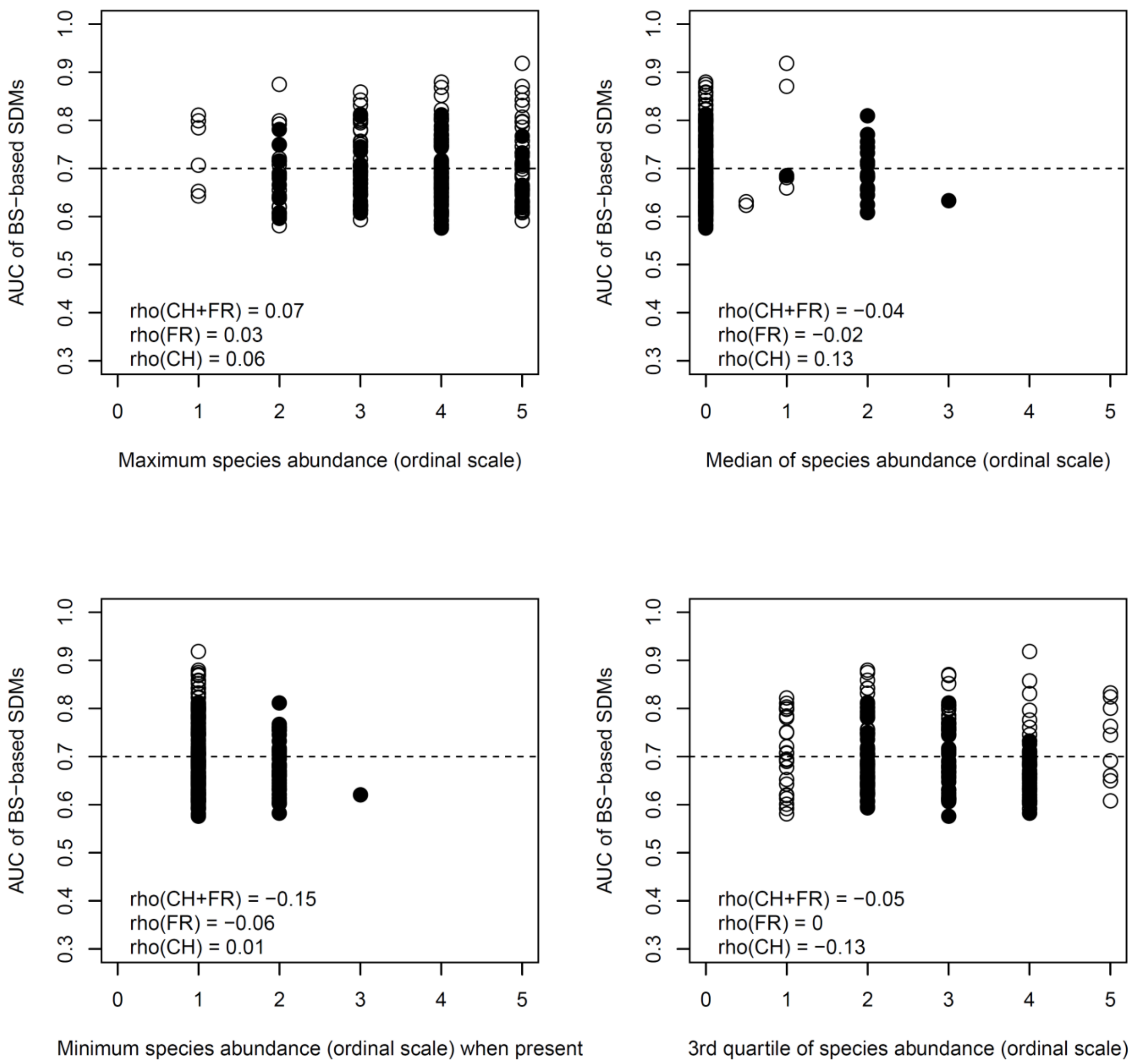
Leucanthemum vulgare aggr.	-	0.864	-	0.756	-	0.888	-	0.707	-	0.911
Ligusticum mutellina	-	0.624	-	0.677	-	0.671	-	0.741	-	0.698
Loiseleuria procumbens	-	0.66	-	0.639	-	0.601	-	0.635	-	0.624
Luzula alpinopilosa	-	0.671	-	0.69	-	0.681	-	0.711	-	0.688
Luzula multiflora	-	0.715	-	0.582	-	0.643	-	0.608	-	0.684
Pedicularis verticillata	-	0.682	-	0.657	-	0.693	-	0.627	-	0.681
Plantago atrata sstr.	-	0.6	-	0.614	-	0.607	-	0.605	-	0.593
Polygala alpestris	-	0.633	-	0.643	-	0.637	-	0.702	-	0.615
Potentilla crantzii	-	0.639	-	0.67	-	0.635	-	0.657	-	0.625
Prunella vulgaris	-	0.683	-	0.622	-	0.661	-	0.63	-	0.634
Salix retusa	-	0.68	-	0.688	-	0.764	-	0.661	-	0.748
Scabiosa lucida	-	0.647	-	0.678	-	0.727	-	0.607	-	0.633
Soldanella alpina	-	0.642	-	0.717	-	0.717	-	0.683	-	0.677
Taraxacum officinale aggr.	-	0.757	-	0.627	-	0.685	-	0.761	-	0.681
Trifolium badium	-	0.689	-	0.696	-	0.666	-	0.695	-	0.66
Trollius europaeus	-	0.667	-	0.812	-	0.8	-	0.715	-	0.75
Vaccinium gaultherioides	-	0.633	-	0.648	-	0.641	-	0.624	-	0.647
Vaccinium vitis-idaea	-	0.705	-	0.666	-	0.674	-	0.644	-	0.723



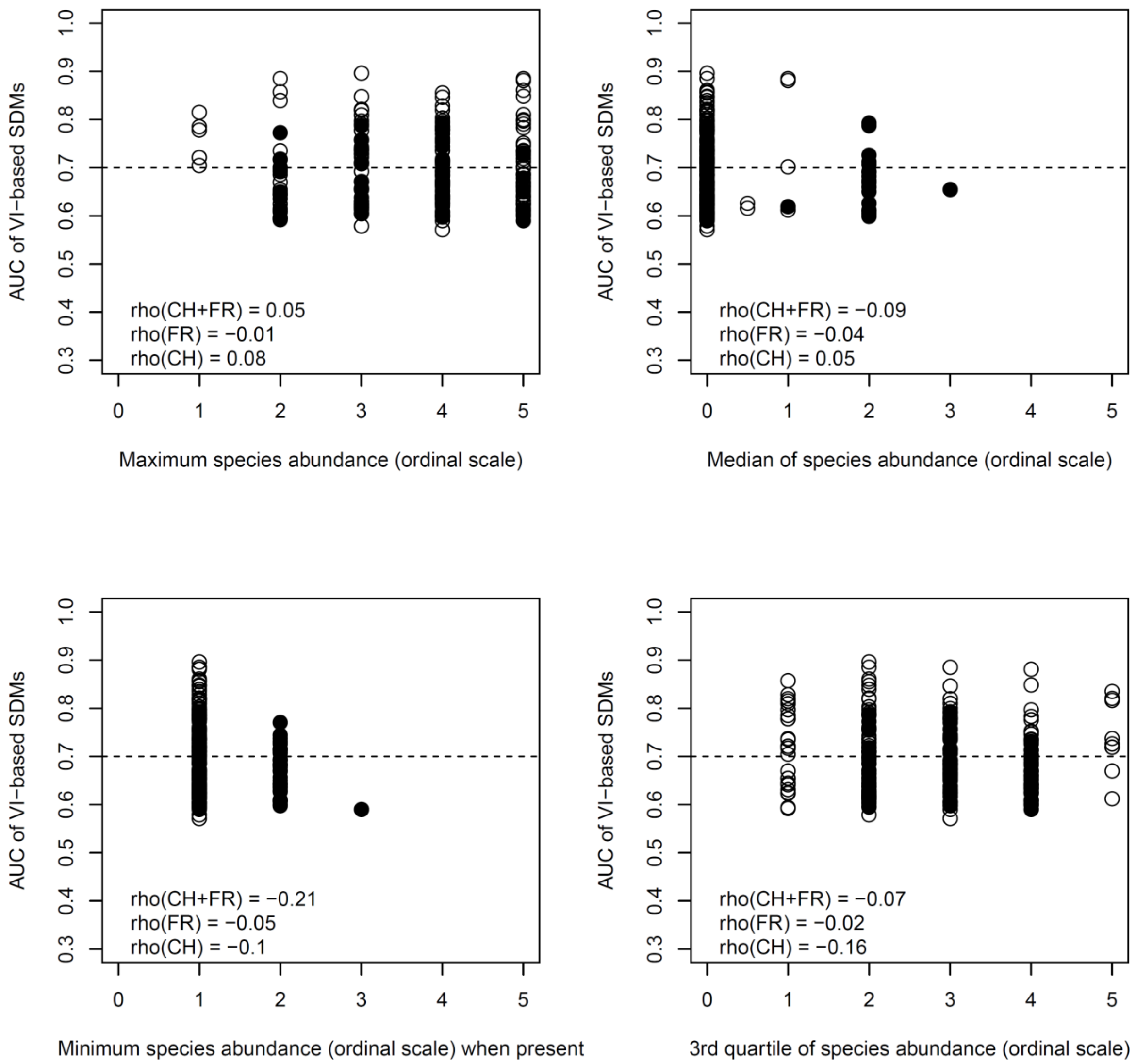
ESM2 Fig 3: Proportions of species distribution models for which accuracy was improved by 10% (dark green areas) or between 0 and 10% (light green areas) or was declined (gray areas) when adding the AIS-predictors to topographic based models. FR for the French site and CH for the Swiss site. BS indicates reflectance records in spectral bands as predictors and VI indicates vegetation indices as predictors. See ESM2 Table 1 for identity of the species that showed best model improvement.

Weak or no improvement of species distribution models, when including AIS-predictors, suggests that the ecological information represented by AIS-data was redundant to already included topography indicators. Increasing the dimensionality of the set of predictors without additional informational content may flaw the fitted statistical relationships and ultimately decrease model accuracy as we observed for many species at both sites.

4) **The effect of species abundance patterns on the prediction accuracy of remote sensing–based species distribution models.**



ESM2 Fig 4: Relationships between four predictors of species abundance patterns and the accuracy of species distribution models based on the reflectance records in spectral bands (BS). White points for species from the French site (FR) and black points for species from the Swiss site (CH).



ESM2 Fig 5: Relationships between four predictors of species abundance patterns and the accuracy of species distribution models based on the vegetation indices. White points for species from the French site (FR) and black points for species from the Swiss site (CH).

5) **Testing the phylogenetic and functional dependency of model features between the species.**

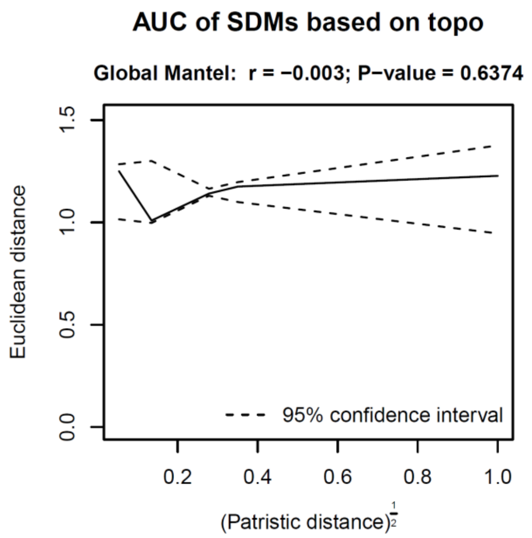
We implemented a similar procedure as for the test of phylogenetic signal of species traits, except were considered the AUC values and AIS-predictor importance as traits and we sought for both phylogenetic and functional signals. Specifically, we implemented two complementary analyses following recommendations of Hardy and Pavoine 2012 [1]. In the first, we computed a global Mantel test contrasting dissimilarity of species distribution models (Euclidean distance between AUC values or AIS-variable importance) and phylogenetic or functional dissimilarity between the species. The randomisation procedure consisted of random reallocation of AUC values or variable importance between the species (999 permutations). In the second, we computed distograms where species model dissimilarities (again as Euclidean distance between AUC values or AIS-variable importance) are plotted against classes of phylogenetic or functional distance between the species. This indicates how species models differ for functionally/phylogenetically closely related species and for dissimilar species.

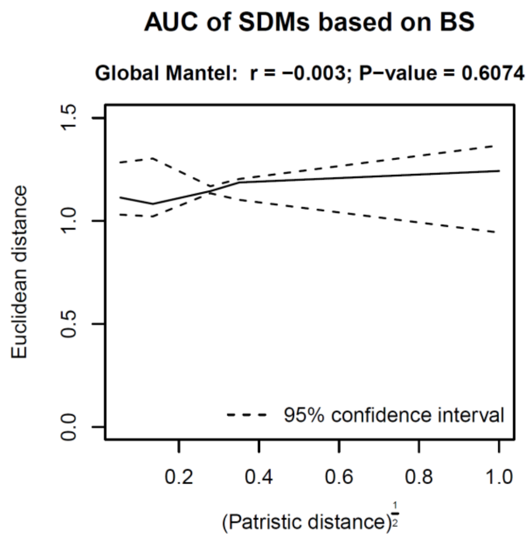
Phylogenic information for the French site was extracted from the complete phylogeny for the Alpine flora at the genus level published in Thuiller et al. 2014 [2]. Finally, we randomly resolved terminal polytomies by applying a birth-death (Yule) bifurcation process within each genus [3]. Phylogenetic information for the Swiss site was extracted from the phylogeny for the 231 most frequent species of the Western Swiss Alps of the Canton of Vaud (a 700 km² region surrounding the Swiss site Anzeindaz). This phylogeny is based on DNA sequences extracted from collected vegetal material and built by alignment of chloroplastic DNA sequences (*rbcl* and *matK*) with GTR + gamma models of evolution under a Bayesian inference framework. Details are available in Ndiribe et al. 2013 [4].
All the species of the French site (i.e. 119) were included in phylogenetic tests while 69 species of the Swiss site (on 78) could be accounted for.
The phylogenetic distance between the species was quantified using the Abouheif proximity measure for Mantel tests and the square-root of patristic distance for distograms [1].

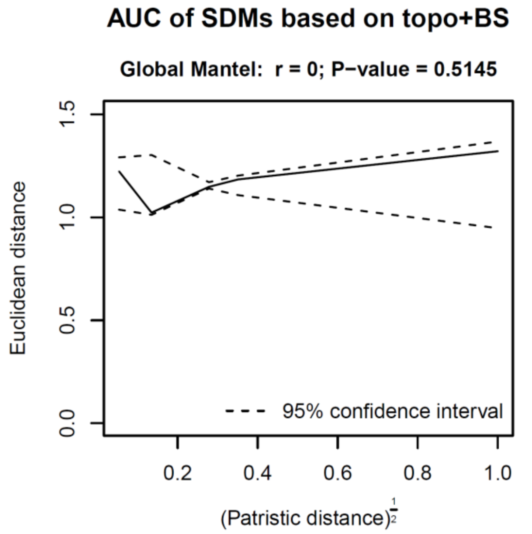
Traits information included morphological and physiological traits that are acknowledged to indicate plant fitness, community dynamics and ecosystem processes. Some of them are also recognized to be related to the reflectance pattern of vegetation stands [5,6]. We considered: 1) specific leaf area (SLA; $m^2.kg^{-1}$), 2) leaf dry matter content (LDMC, $mg.g^{-1}$), 3) vegetation height (mm), 4) plant growth form discriminating species as graminoid, forb, legume or shrub, 5) Leaf distribution along the stem discriminating species with leaves growing regularly along the stem, rosette or tufted species and semi rosette species, and 6) branching, a binary trait describing species ability to fill lateral space. SLA, LDMC and vegetation height were measured for most species in the field within each of the two sites (89 out 119 for FR and 71 out of 78 for CH). Leaf distribution, growth form, and branching were retrieved from the LEDA database [7]. Since trait data covered continuous and categorical variables, the functional dissimilarity between species was quantified using the Gower distance metric [8] for both Mantel tests and distogram computation.

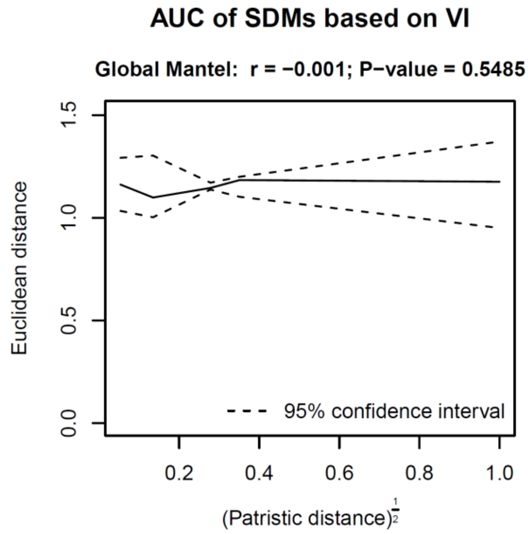
Tests for phylogenetic and functional dependency of the importance of AIS-variables considered only the species that showed distribution models with fair to good prediction accuracy (i.e. AUC > 0.7) in order to exclude spurious estimates of variable importance from inaccurate models. This led to analyses with reduced list of species as follows:

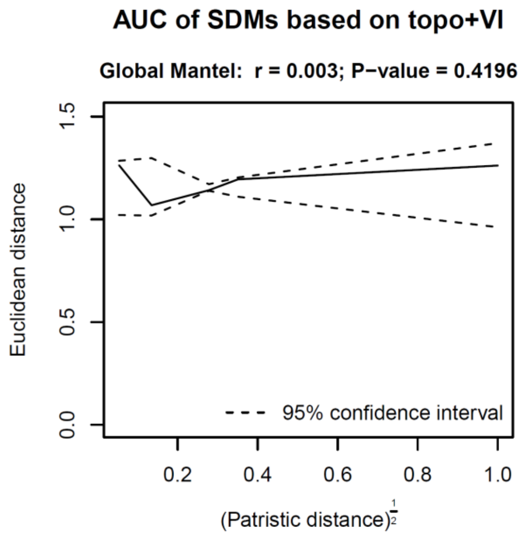
Number of species included in the analyses	FR		CH	
	Phylogenetic (119/119sp)	Functional (89/119sp)	Phylogenetic (69/78sp)	Functional (71/78sp)
Reflectance in spectral bands	64	47	25	25
Vegetation indices	68	50	19	20



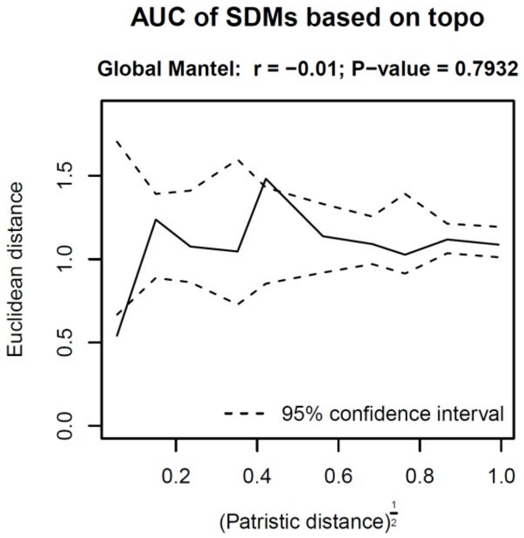


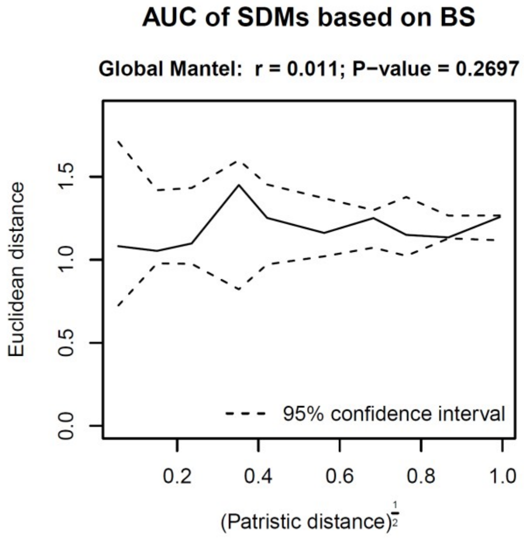


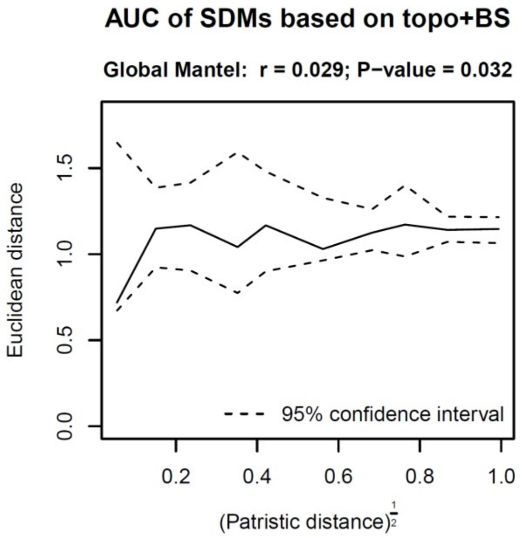


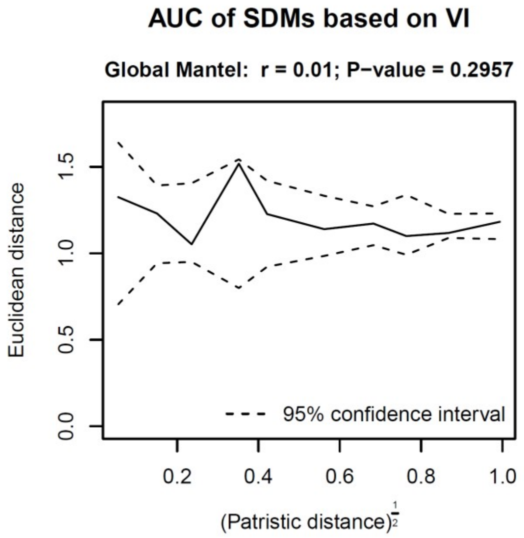


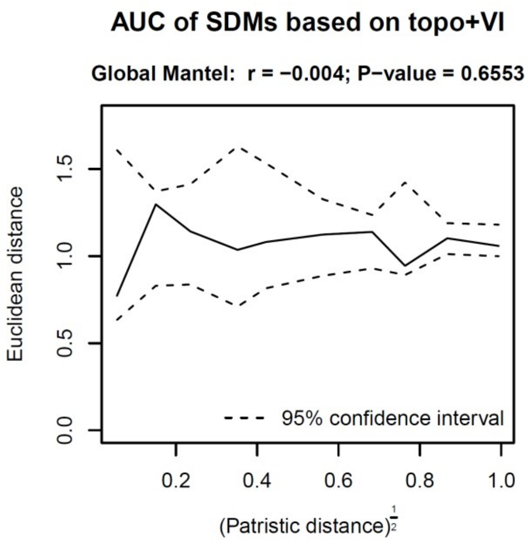
ESM2 Fig 6: **Phylogenetic dependency of model accuracy** (AUC: the area under the curve of a receiver-operating characteristic plot) between the species for the **French site (FR)**. The x-axis represents the phylogenetic distance between the species and the y-axis differences in AUC. Topo indicates models based on topographic predictors only, BS models based on reflectance recorded in the spectral bands. VI indicates models based on vegetation indices only. Topo+BS and Topo+VI indicate respectively models based on topographic predictors and reflectance records in spectral bands or vegetation indices as predictors. Confidence intervals were computed with random re-allocation of AUC values between the species (9999 permutations)



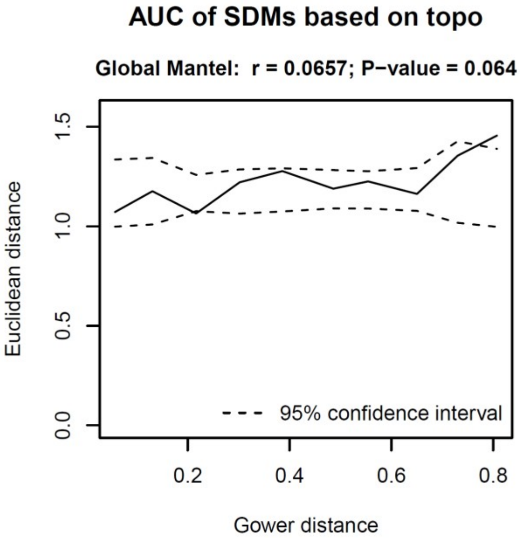


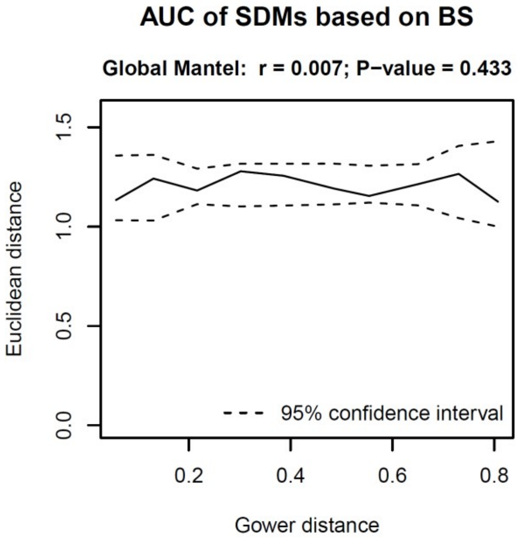


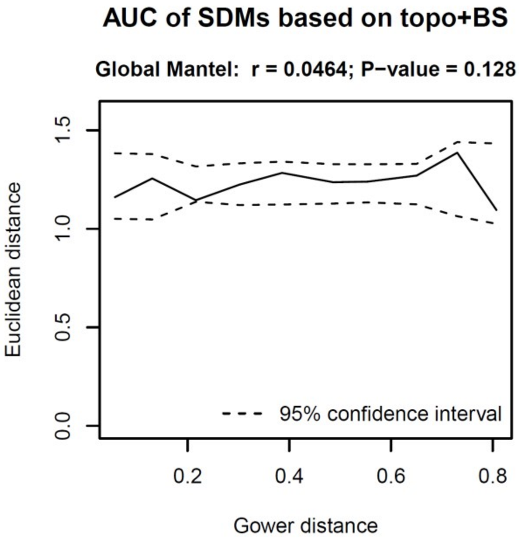


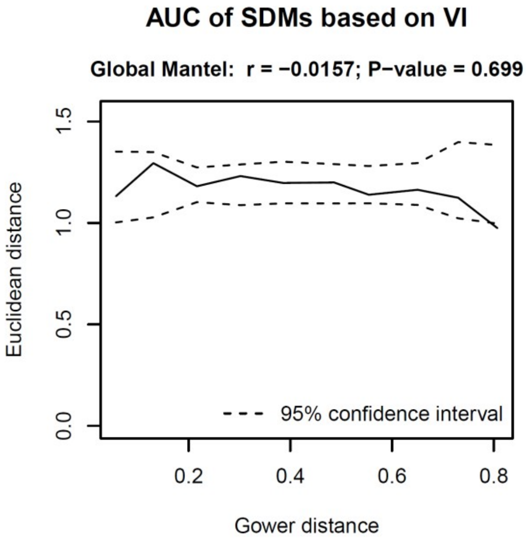


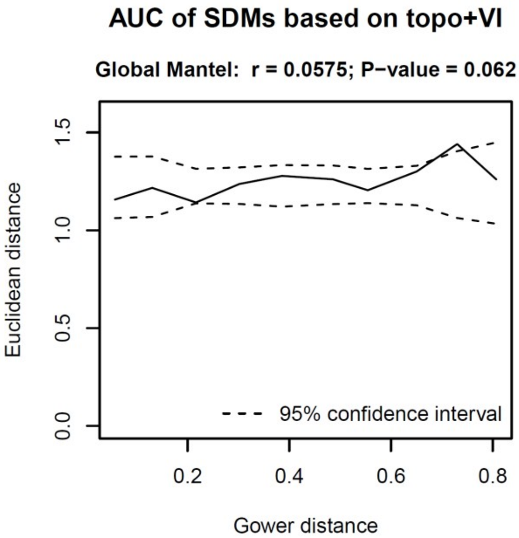
ESM2 Fig 7: **Phylogenetic dependency of model accuracy** (AUC: the area under the curve of a receiver-operating characteristic plot) between the species for the **Swiss site (CH)**. The x-axis represents the phylogenetic distance between the species and the y-axis differences in AUC. Topo indicates models based on topographic predictors only, BS models based on reflectance recorded in the spectral bands. VI indicates models based on vegetation indices only. Topo+BS and Topo+VI indicate respectively models based on topographic predictors and reflectance records in spectral bands or vegetation indices as predictors. Confidence intervals were computed with random re-allocation of AUC values between the species (9999 permutations)



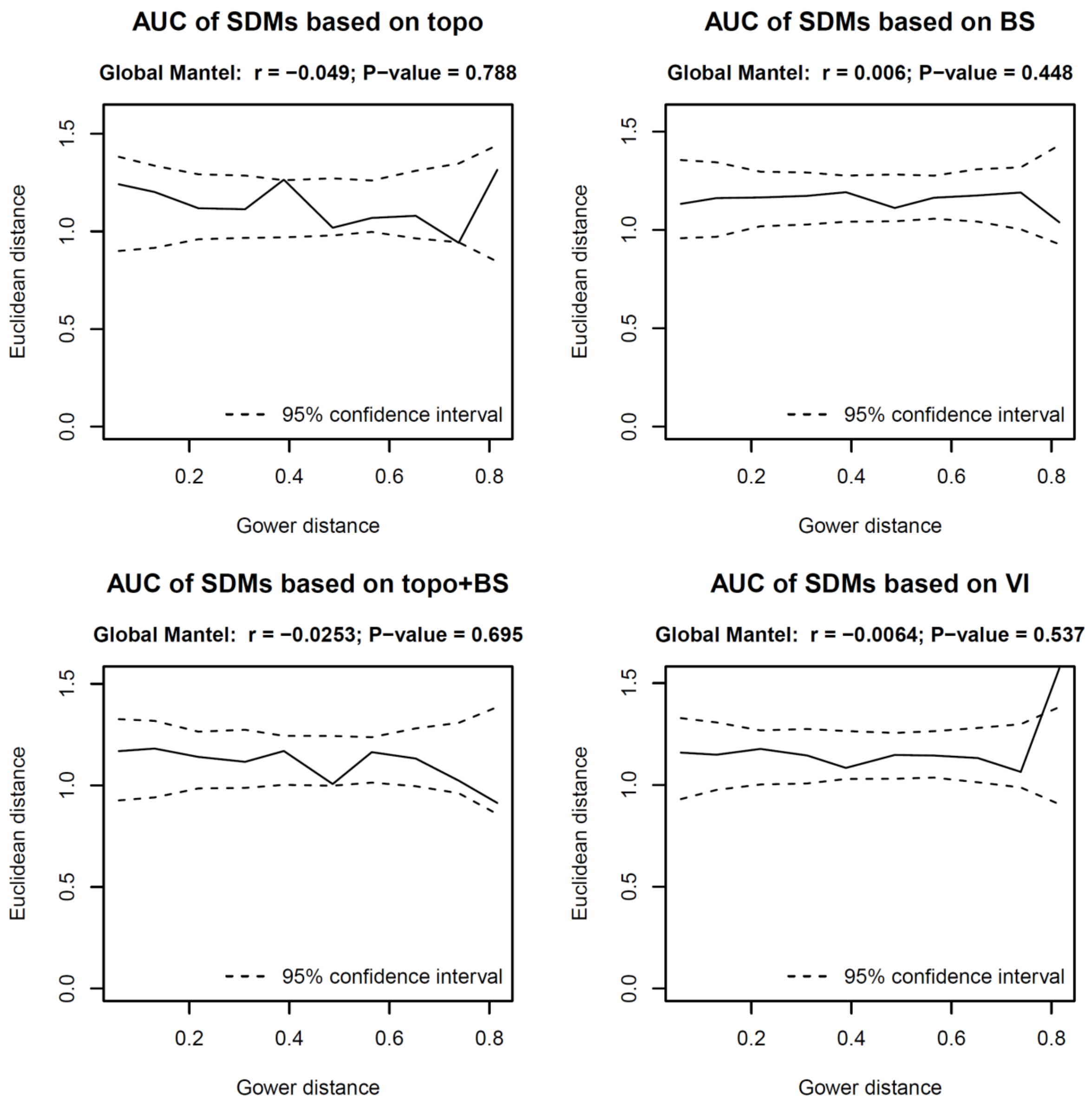


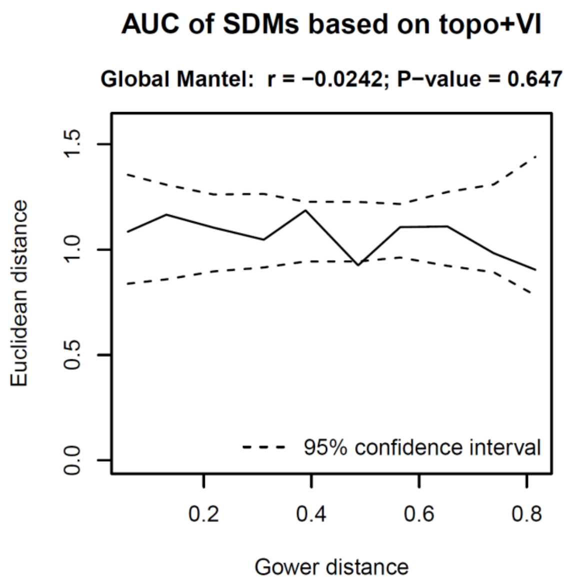




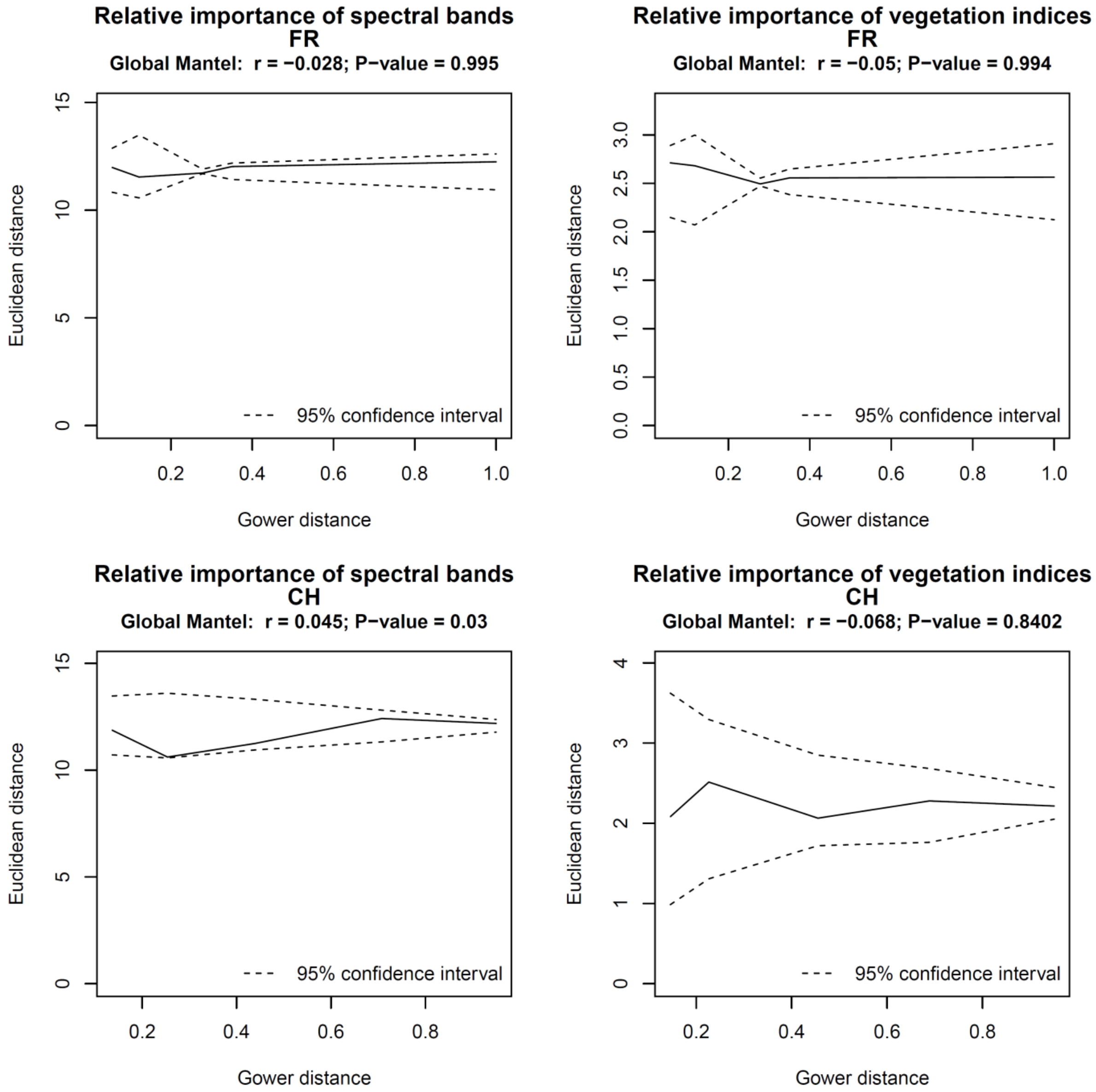


ESM2 Fig 8: **Functional dependency of model accuracy** (AUC: the area under the curve of a receiver-operating characteristic plot) between the species for the **French site (FR)**. The x-axis represents the functional distance between the species and the y-axis differences in AUC. Topo indicates models based on topographic predictors only, BS models based on reflectance recorded in the spectral bands. VI indicates models based on vegetation indices only. Topo+BS and Topo+VI indicate respectively models based on topographic predictors and reflectance records in spectral bands or vegetation indices as predictors. Confidence intervals were computed with random re-allocation of AUC values between the species (9999 permutations)

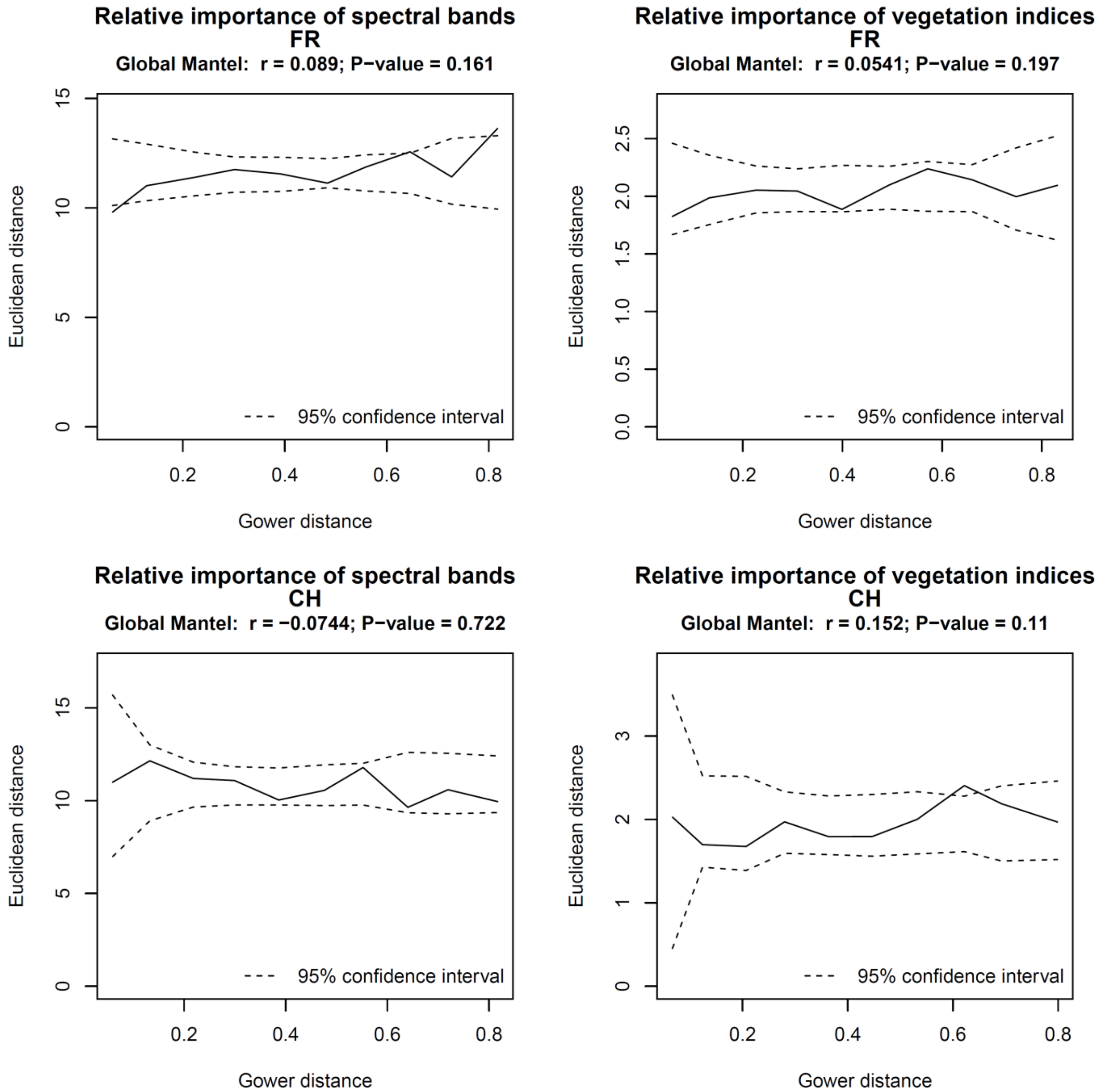




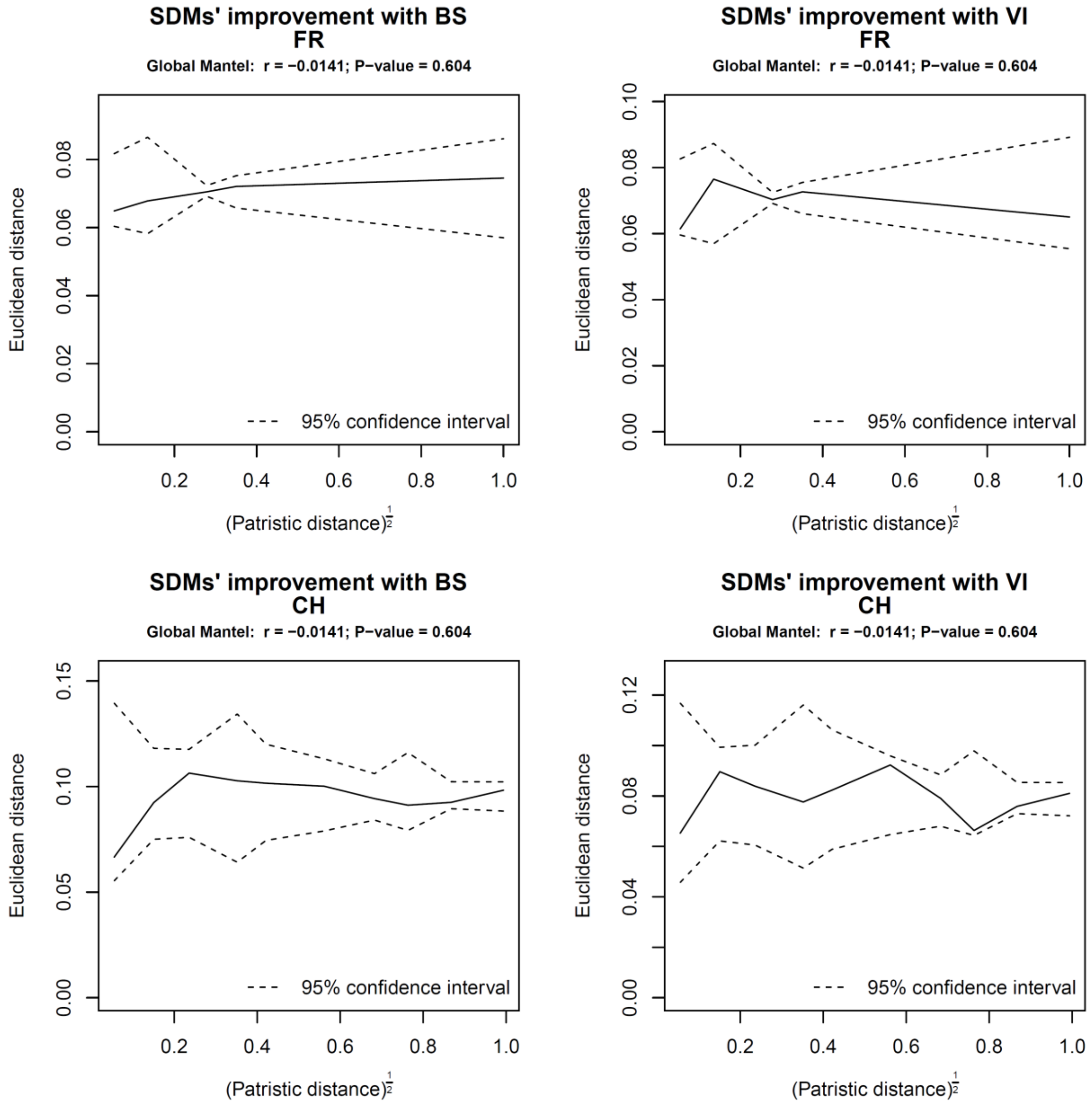
ESM2 Fig 9: **Functional dependency of model accuracy** (AUC: the area under the curve of a receiver-operating characteristic plot) between the species for the **Swiss site (CH)**. The x-axis represents the functional distance between the species and the y-axis differences in AUC. Topo indicates models based on topographic predictors only, BS models based on reflectance recorded in the spectral bands. VI indicates models based on vegetation indices only. Topo+BS and Topo+VI indicate respectively models based on topographic predictors and reflectance records in spectral bands or vegetation indices as predictors. Confidence intervals were computed with random re-allocation of AUC values between the species (9999 permutations)



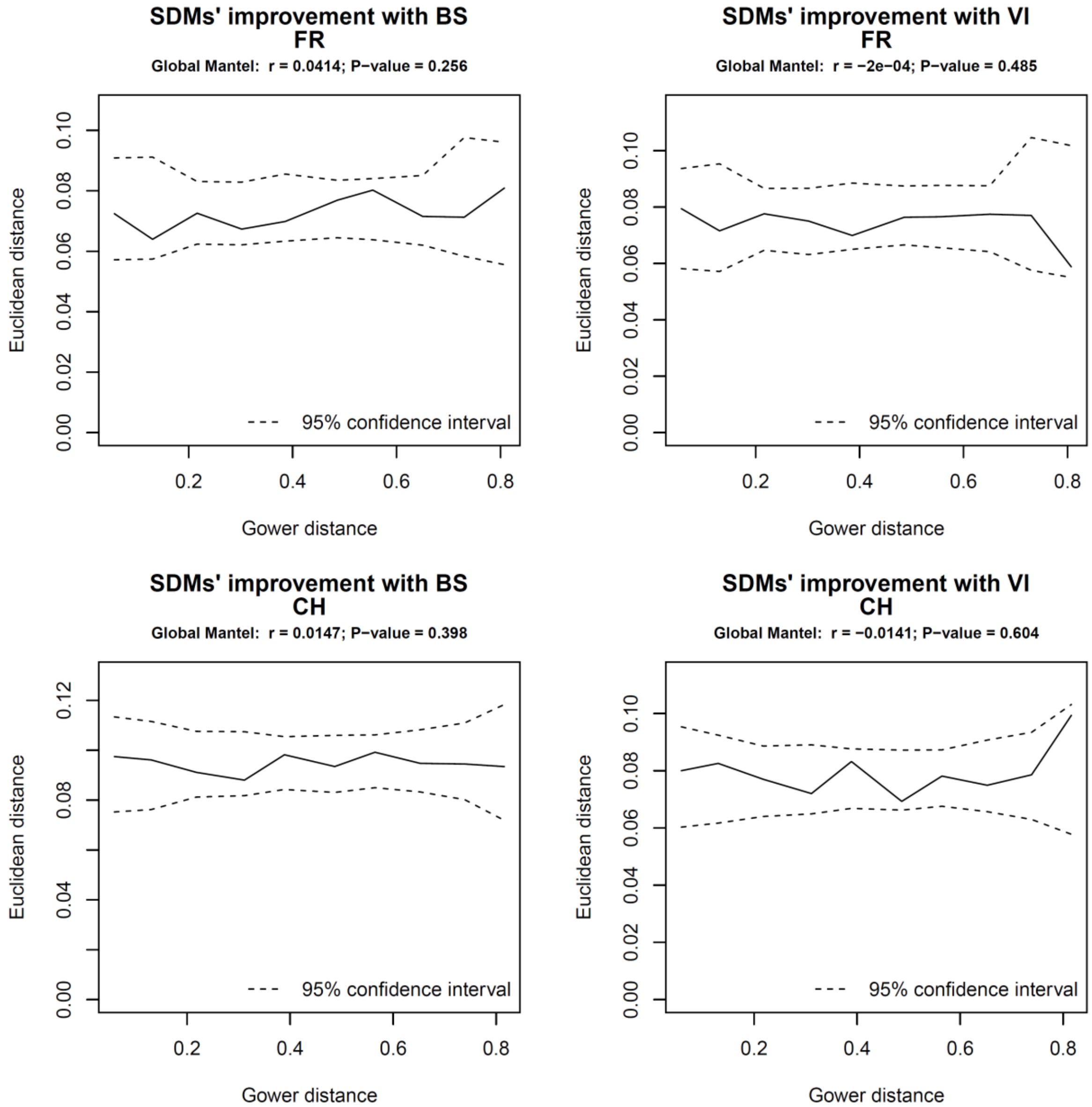
ESM2 Fig 10: **Phylogenetic dependency of relative importance of AIS-predictors** between the species for both the French site (FR) and the Swiss site (CH). The x-axis represents the phylogenetic distance between the species and the y-axis differences in RS-predictors (either reflectance recorded in the spectral bands or vegetation indices). Only species with distribution models showing fair to good prediction accuracy (AUC>0.7) were considered. Confidence intervals were computed with random re-allocation of predictor importance between the species (9999 permutations)



ESM2 Fig 11: **Functional dependency of relative importance of RS-predictors** between the species for both the French site (FR) and the Swiss site (CH). The x-axis represents the functional distance between the species and the y-axis differences in AIS-predictors (either reflectance recorded in the spectral bands or vegetation indices). Only species with distribution models showing fair to good prediction accuracy (AUC>0.7) were considered. Confidence intervals were computed with random re-allocation of predictor importance between the species (9999 permutations)



ESM2 Fig 12: **Phylogenetic dependency of model improvement among species with addition of AIS-predictors** for the French site (FR) and the Swiss site (CH). The x-axis represents the phylogenetic distance between the species and the y-axis differences in model improvement when adding AIS-predictors (either reflectance recorded in the spectral bands (BS) or vegetation indices (VI)) to topographic predictors. Confidence intervals were computed with random re-allocation of AUC values between the species (9999 permutations)



ESM2 Fig 13: **Functional dependency of model improvement among species with addition of AIS-predictors** for the French site (FR) and the Swiss site (CH). The x-axis represents the functional distance between the species and the y-axis differences in model improvement when adding AIS-predictors (either reflectance recorded in the spectral bands (BS) or vegetation indices (VI)) to topographic predictors. Confidence intervals were computed with random re-allocation of AUC values between the species (9999 permutations)

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