Supplementary Information: A climate suitability index for ecological habitats applied to terrestrial arthropods in the Mediterranean Region

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1   Considerations of Climate Indices

Additional variables to the ones presented in Table 2 were considered. These are listed in Table S1 below. Most of these were not considered due to the strong relationship with other variables such as prsum and tasmean. The wind extreme variable, fg6bft was omitted as too many observation points were returning a 0-value. The relationship between the final selected climate indices is shown in Figure S1 (full image on github), and the correlation coefficients, are summarised in Table S2.

Table S1: The eight climate indices used in this study to describe the climatological component of an ecological niche

Short Name	Long Name	Units
r10mm	Annual mean of heavy precipitation days	days
r20mm	Annual mean of very heavy precipitation days	days
rx5day	Maximum 5-day precipitation in time period	mm/5-days
nrx5day	Annual mean of number of 5-day precipitation periods	days
tx10p	Percentage of very cold days wrt 10th percentile	%
tx90p	Percentage of very warm days wrt 90th percentile	%
tasp10	10th percentile of Near-Surface Air Temperature	°C
tasp90	90th percentile of Near-Surface Air Temperature	°C
fg6bft	Annual mean of days with wind speed >/= 6Bft (10.8 m/s)	days

Table S2: Correlation coefficients from the matrix of scatter-plots shown in Figure S1.

	rx1day	prsum	tasmean	cwfi	hwfi	windmean	orog
cdd	0.091839	0.366449	0.474165	0.106336	0.001705	0.010041	0.002390
rx1day	-	0.075989	0.008508	1.88×10^{-9}	0.082247	0.116917	0.035843
prsum		-	0.367381	0.043809	0.026970	0.010039	0.001709
tasmean			-	0.018775	0.006116	0.024940	0.349485
cwfi				-	0.20428	0.014931	0.020600
hwfi					-	0.24554	0.004873
windmean						-	0.086998
orog							-
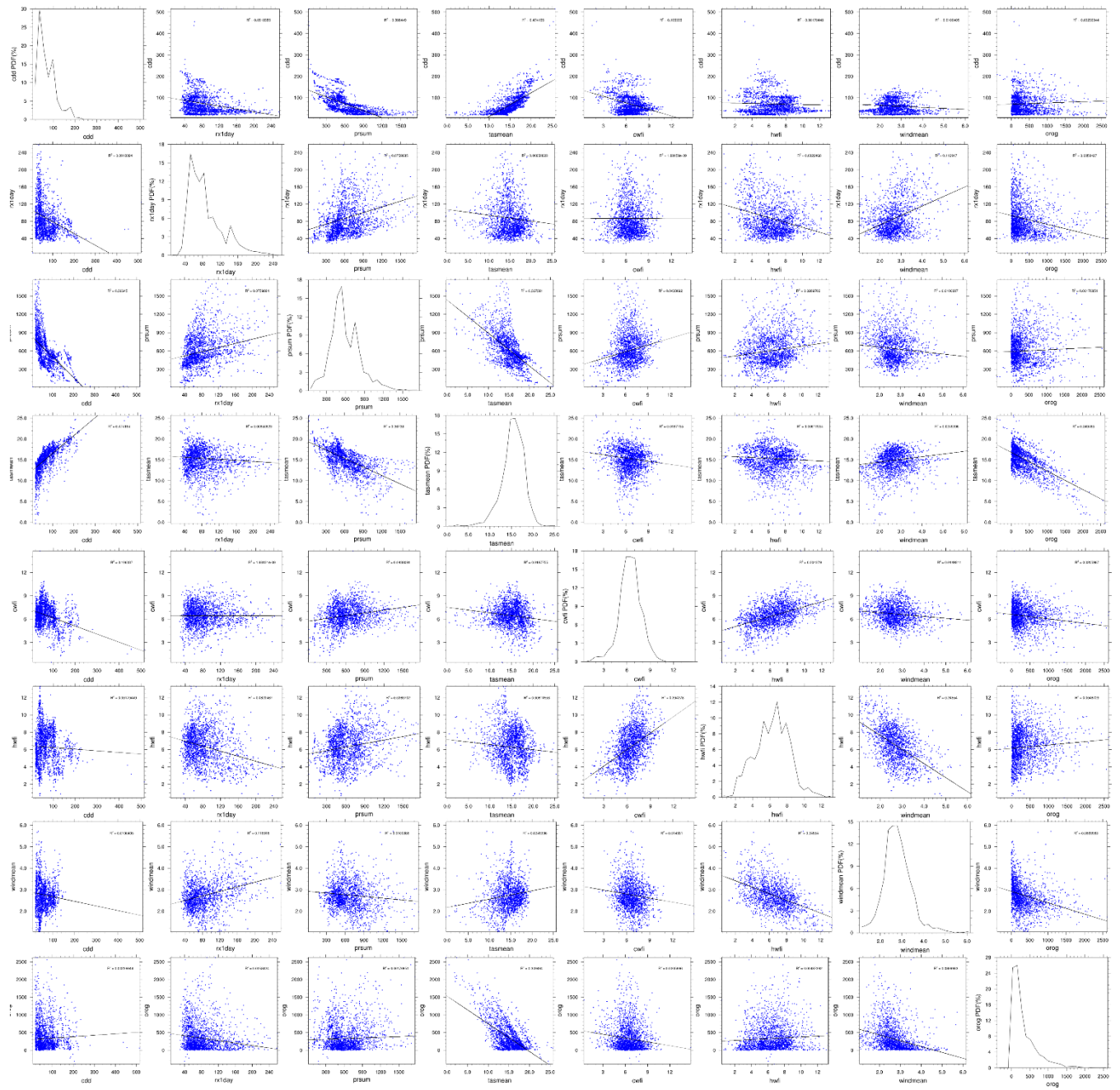
Figure S1: A matrix of scatter-plots for the eight climate indices (derived from the 1980-2010 E-OBS dataset) extracted from the grid-cells that correspond to the coordinates where *Spilostethus pandurus* was observed (from the iNaturalist dataset). The plots include the regression line and R2 of each pair, as well as the PDF for each index.

2   *EIₛ* assessment

30   The paper makes use of 8 different species to explore the effectiveness of the EI_s metric under different conditions. The complete output associated with this metric for all PSIs (except *Spilostethus pandurus*), and analogous to Figure 4 is given in Figures S2-S24. The EI_s products obtained from the E-OBS, Ens6, and WMD03 data-sets are shown in Figures S2-S8, S9-S16, S17-S24 respectively. Note in Figure S4, that *Brachytrupes megacephalus* does not produce a spatial EI_s map as none of the observation points could be used with the E-OBS data-set.

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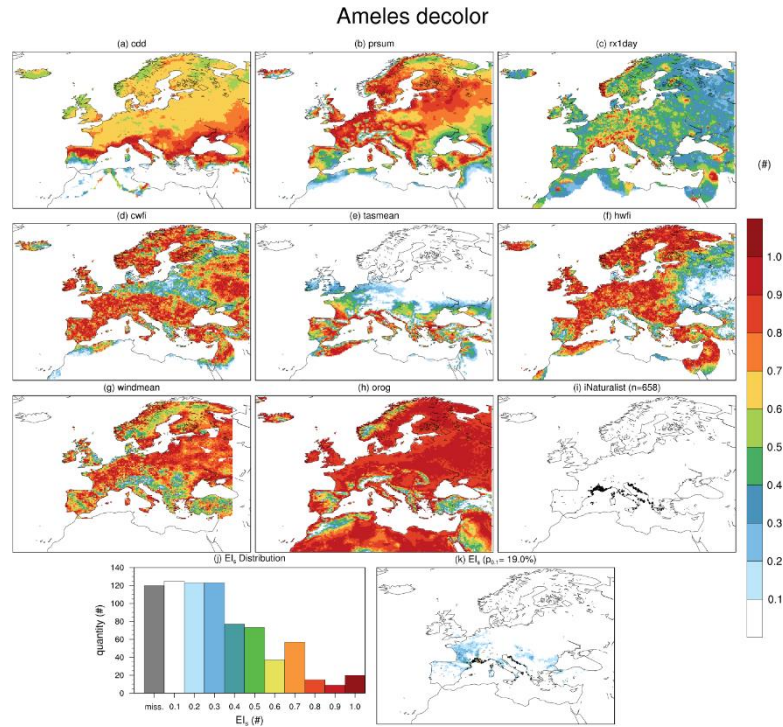
Figure S2. The *EIₛ* products using E-OBS, analogous to Figure 4 for *Ameles decolor*.
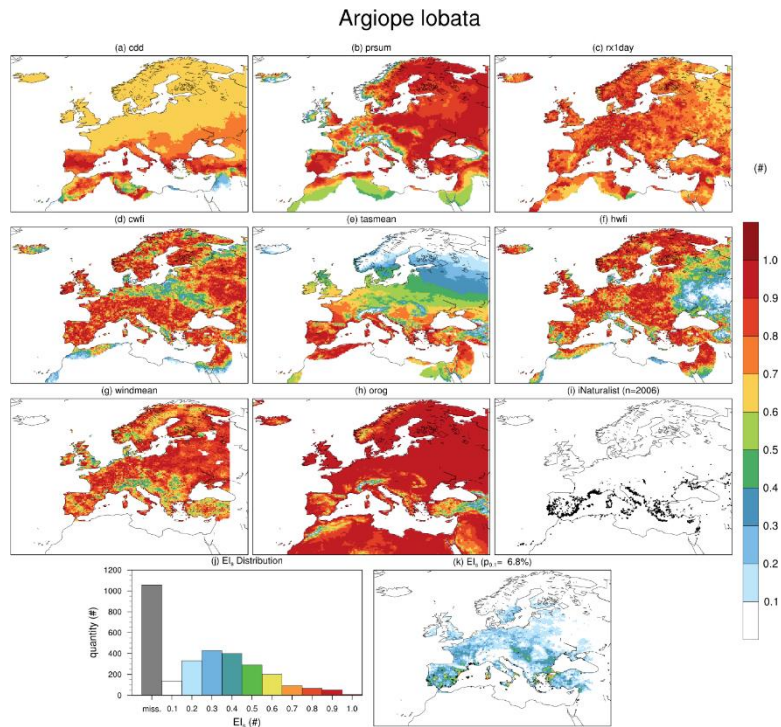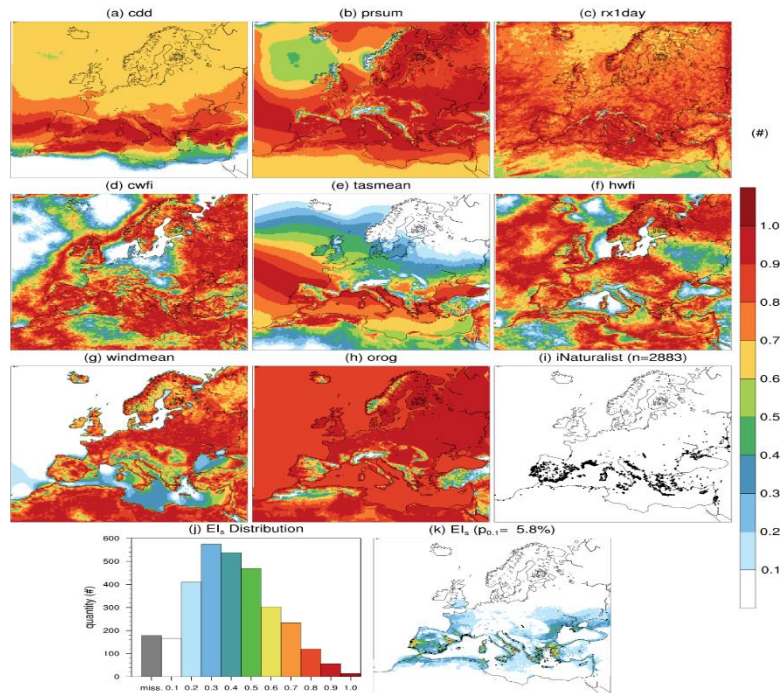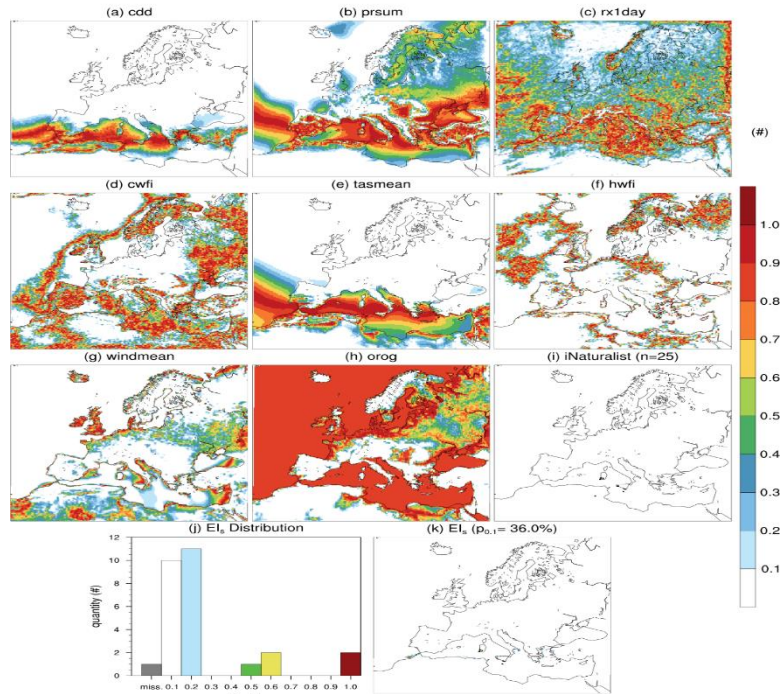
Argiope lobata

Figure S3. The *EI_s* products using E-OBS, analogous to Figure 4 for *Argiope lobata*.

Brachytrupes megacephalus

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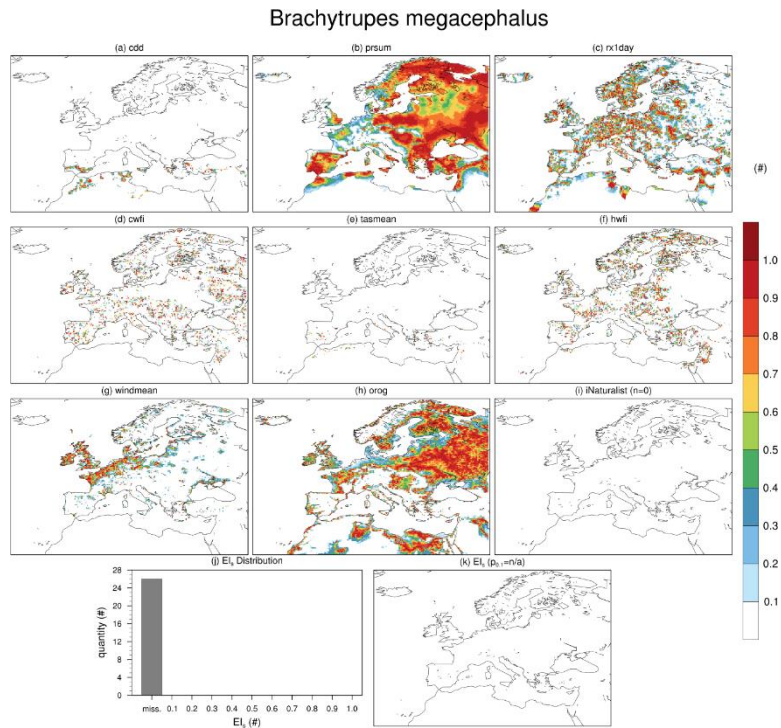
Figure S4. The *EI_s* products using E-OBS, analogous to Figure 4 for *Brachytrupes megacephalus*.
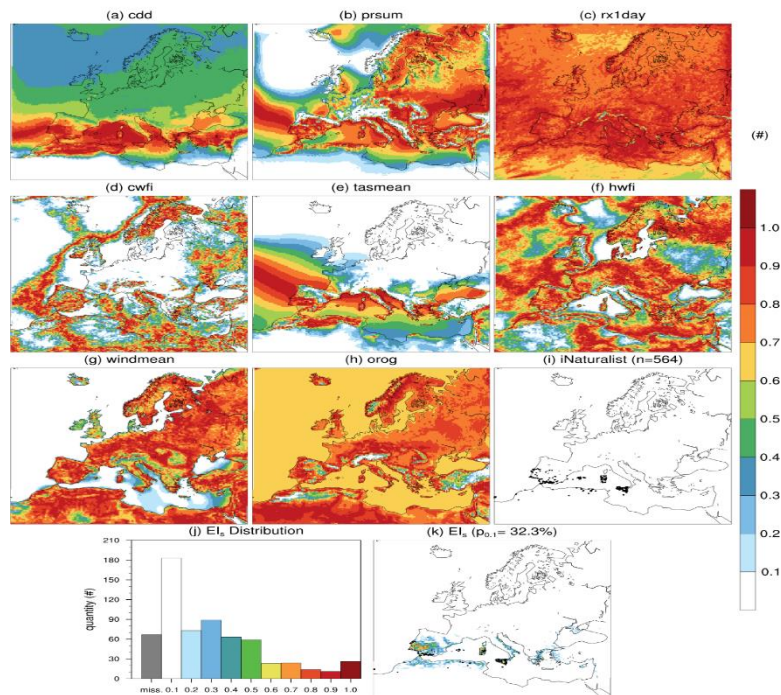
Polyommatus celina
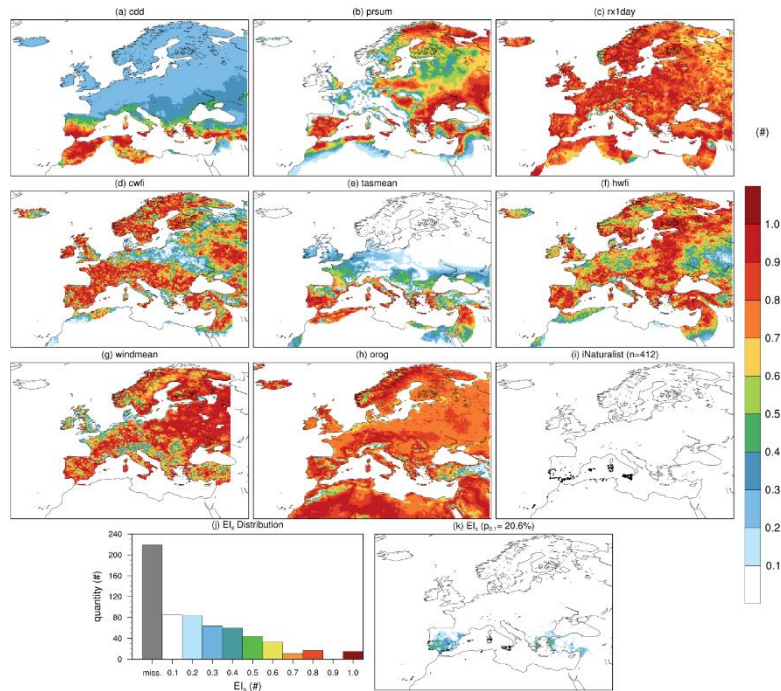
Figure S5. The *EI_s* products using E-OBS, analogous to Figure 4 for *Polyommatus celina*.
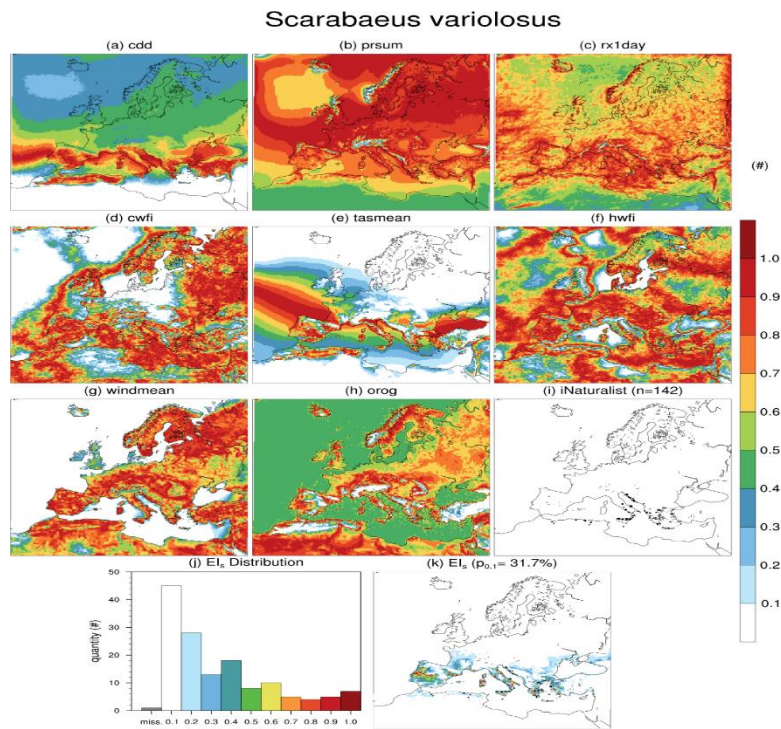
Scarabaeus variolosus
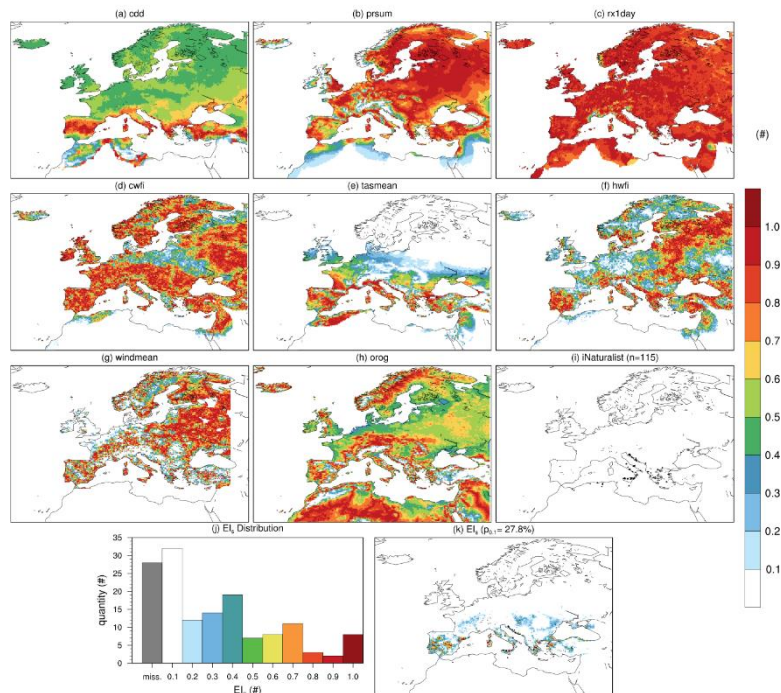
45   **Figure S6. The *EI_s* products using E-OBS, analogous to Figure 4 for *Scarabaeus variolosus*.**
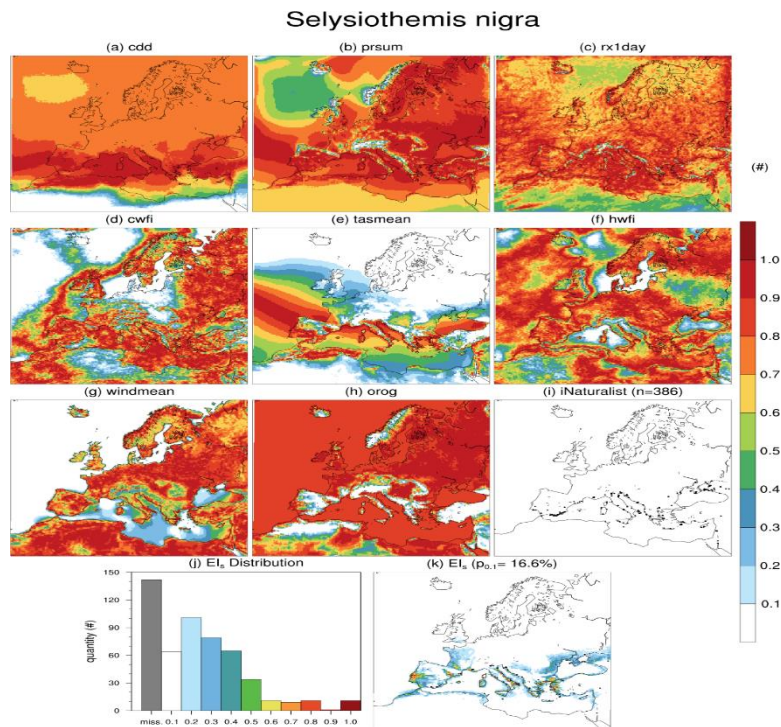
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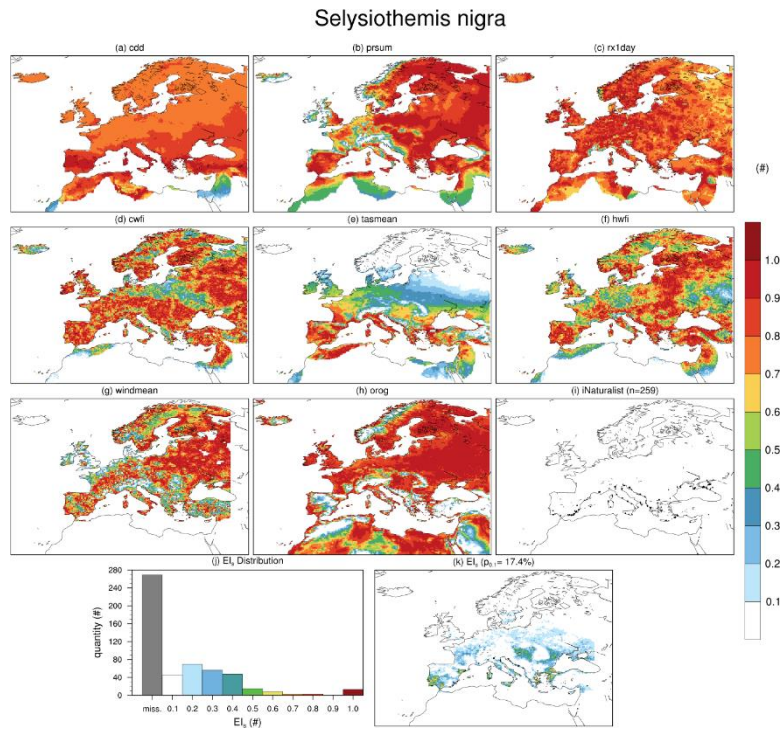
Figure S7. The *EI$_s$* products using E-OBS, analogous to Figure 4 for *Selysiothemis nigra*.
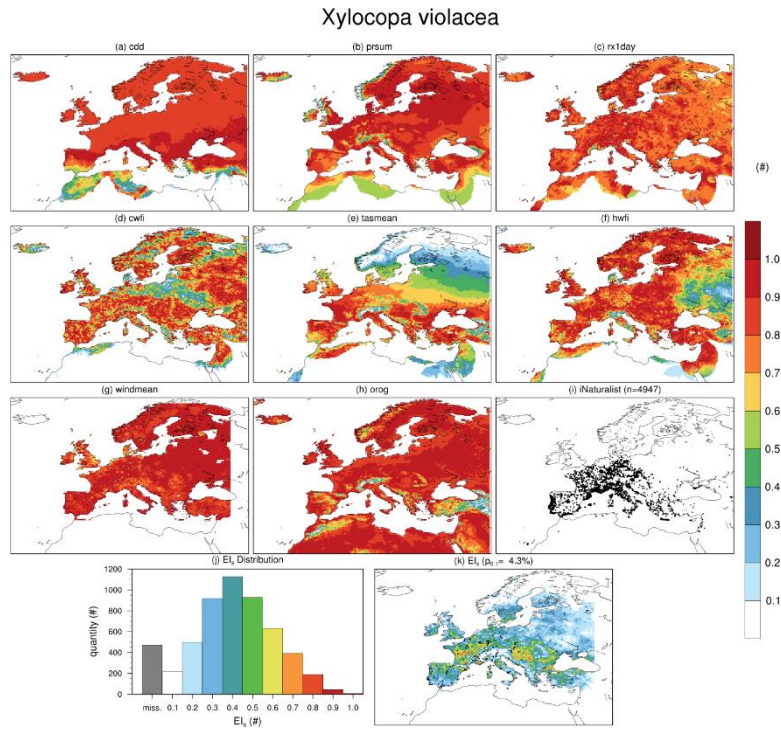
Figure S8. The *EI$_s$* products using E-OBS, analogous to Figure 4 for *Xylocopa violacea*.

Ameles decolor
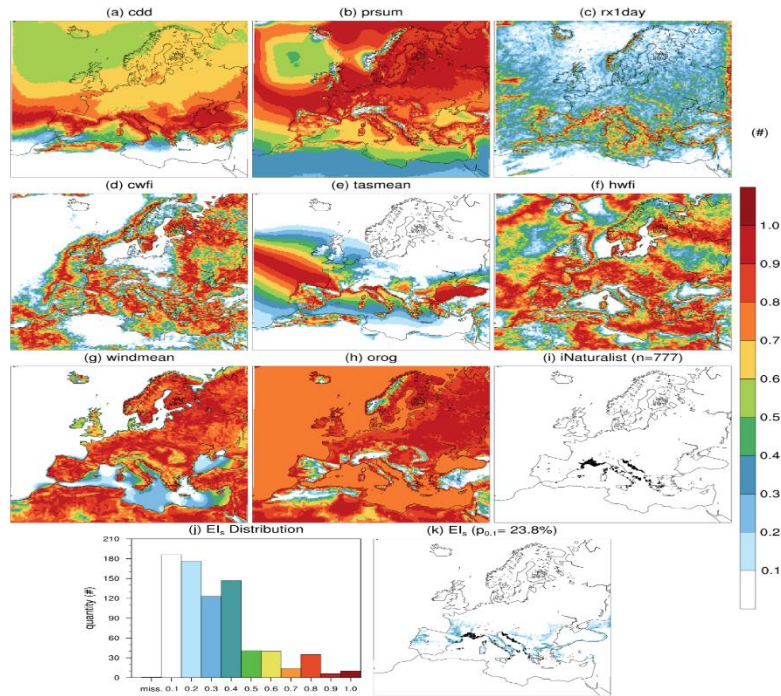
Figure S9. The *EI_s* products using Ens6, analogous to Figure 4 for *Ameles decolor*.
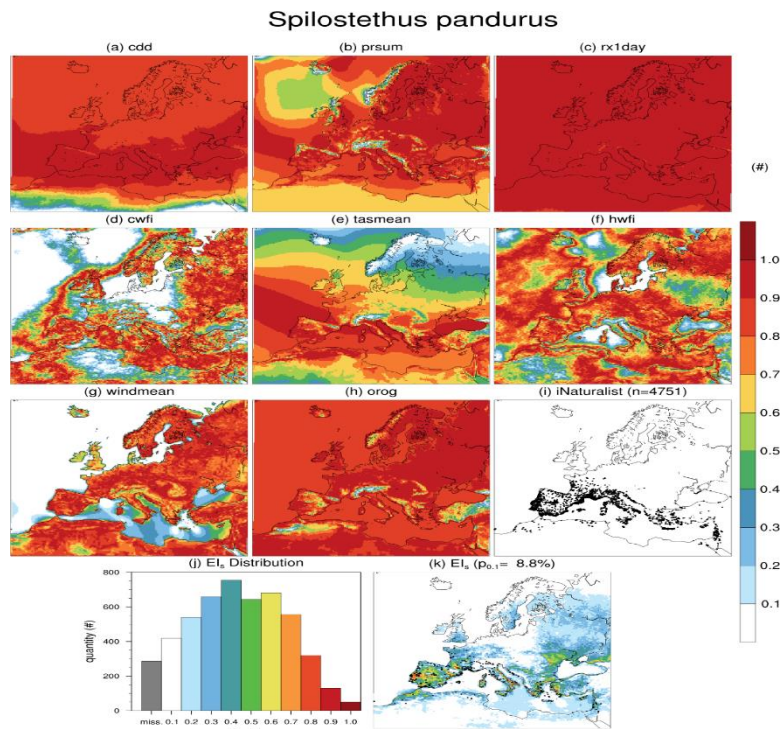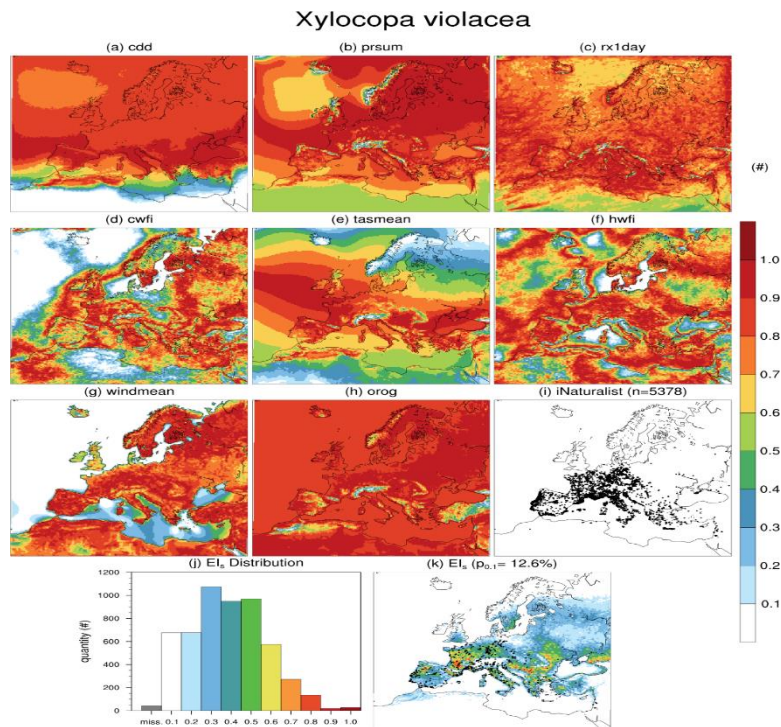
Argiope lobata

Figure S10. The *EI_s* products using Ens6, analogous to Figure 4 for *Argiope lobata*.

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Brachytrupes megacephalus

Figure S11. The *EI$_s$* products using Ens6, analogous to Figure 4 for *Brachytrupes megacephalus*.

Polyommatus celina

Figure S12. The *EI$_s$* products using Ens6, analogous to Figure 4 for *Polyommatus celina*.

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Scarabaeus variolosus

Figure S13. The *EI$_s$* products using Ens6, analogous to Figure 4 for *Scarabaeus variolosus*.

Selysiothemis nigra

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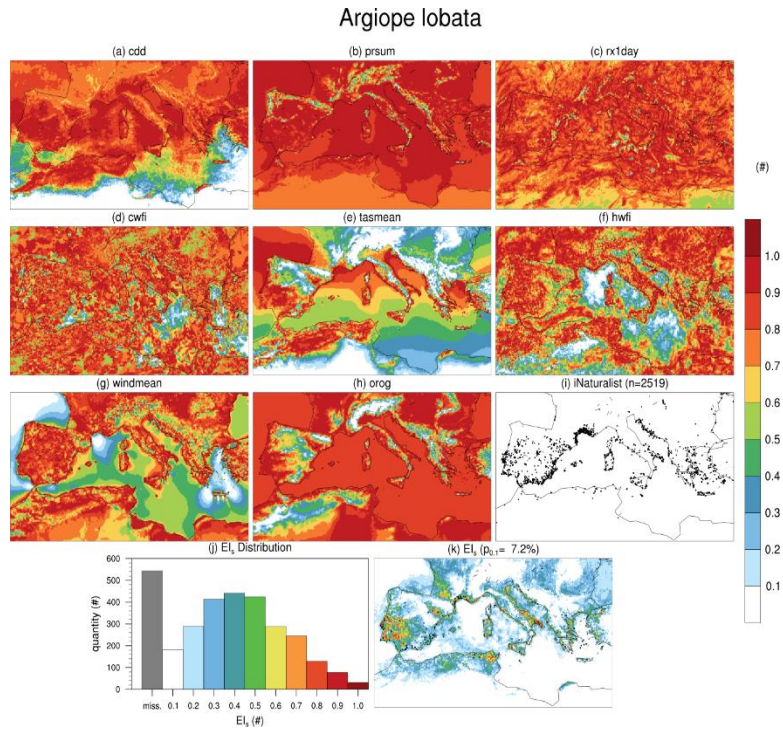**Figure S14. The *EI$_s$* products using Ens6, analogous to Figure 4 for *Selysiothemis nigra*.**

Spilostethus pandurus

Figure S15. The *EIₛ* products using Ens6, analogous to Figure 4 for *Spilostethus pandurus*.

Xylocopa violacea

65   **Figure S16. The *EIₛ* products using Ens6, analogous to Figure 4 for *Xylocopa violacea*.**
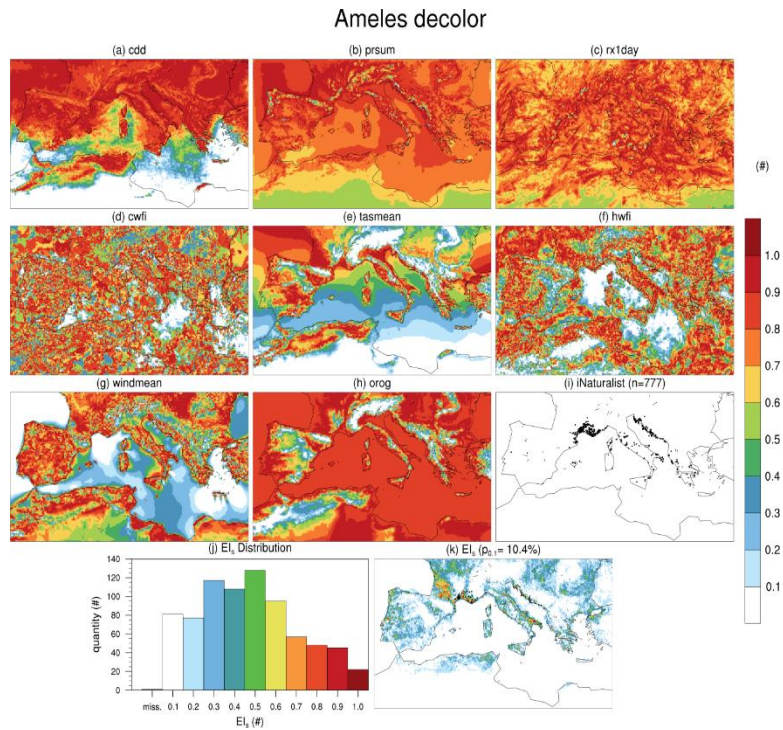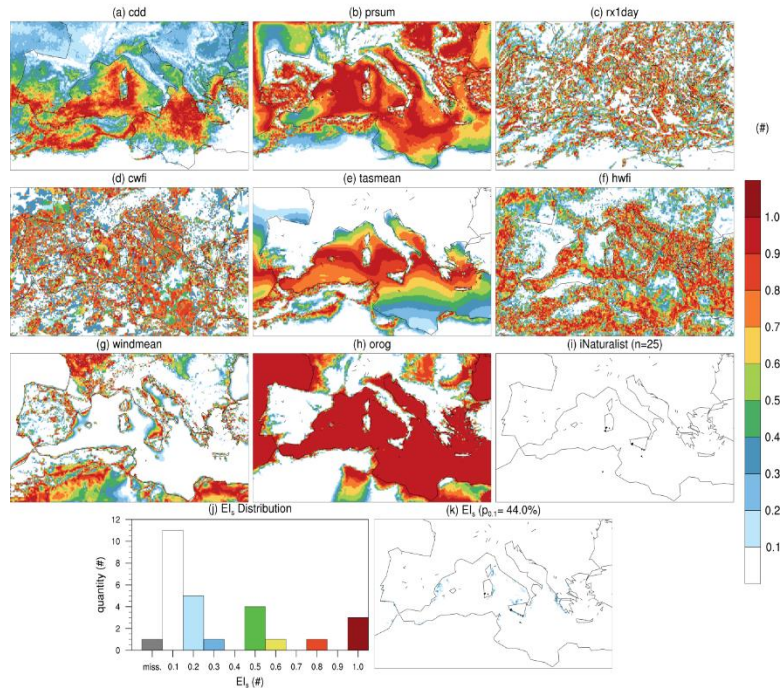
Figure S17. The *EI$_s$* products using WMD03, analogous to Figure 4 for *Ameles decolor*.

Figure S18. The *EI$_s$* products using WMD03, analogous to Figure 4 for *Argiope lobata*.

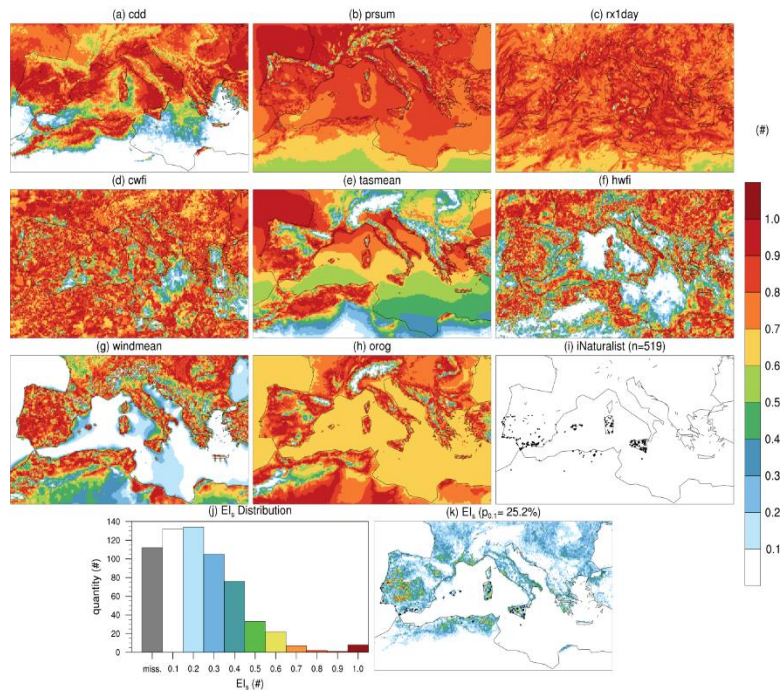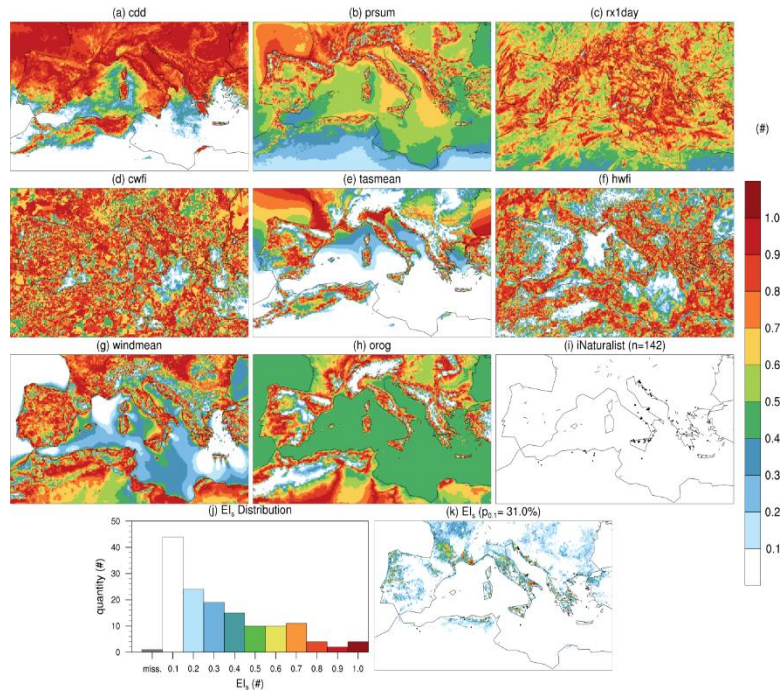**Figure S19. The *EI_s* products using WMD03, analogous to Figure 4 for *Brachytrupes megacephalus*.**

Figure S20. The *EI_s* products using WMD03, analogous to Figure 4 for *Polyommatus celina*.

Scarabaeus variolosus

Figure S21. The *EIₛ* products using WMD03, analogous to Figure 4 for *Scarabaeus variolosus*.

Selysiothemis nigra

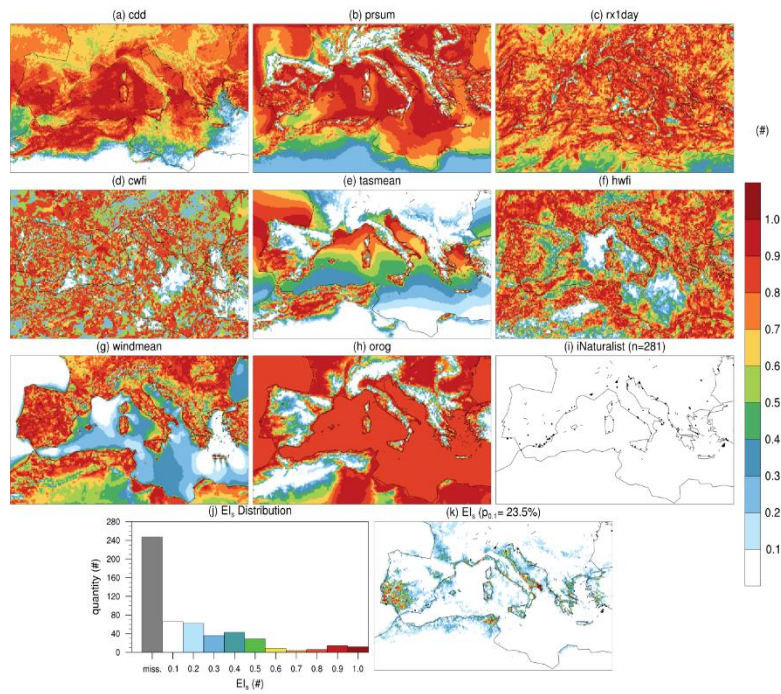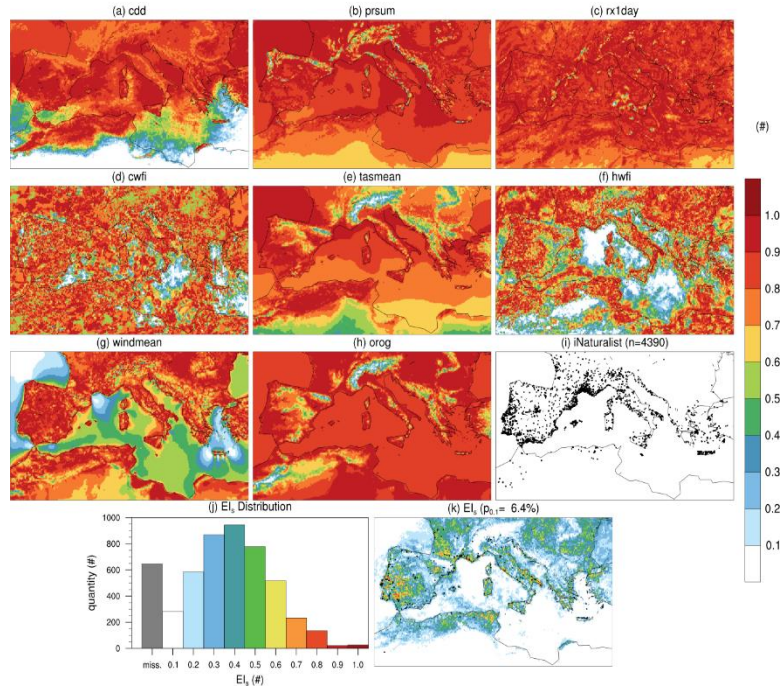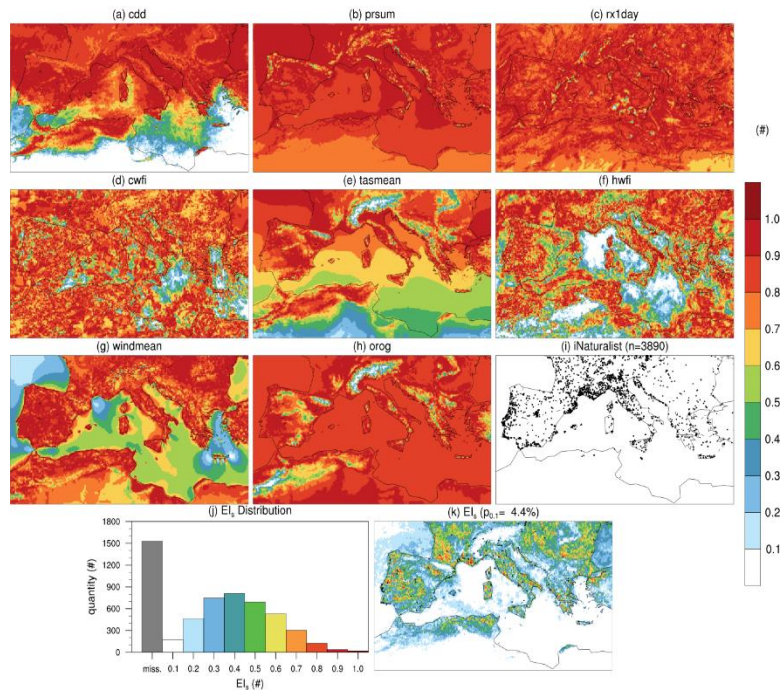Figure S22. The *EIₛ* products using WMD03, analogous to Figure 4 for *Selysiothemis nigra*.

Figure S23. The *EI$_s$* products using WMD03, analogous to Figure 4 for *Spilostethus pandurus*.

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Figure S24. The *EI$_s$* products using WMD03, analogous to Figure 4 for *Xylocopa violacea*.