

Zerynthia rumina (LINNAEUS, 1767) – Spanish Festoon



© Kars Veling

		Full dispersal	No dispersal
2050	SEDG	-802 (-22.91%)	-1847 (-52.77%)
	BAMBU	-1378 (-39.37%)	-1932 (-55.2%)
	GRAS	-1187 (-33.91%)	-2196 (-62.74%)
2080	SEDG	-1574 (-44.97%)	-2617 (-74.77%)
	BAMBU	-2119 (-60.54%)	-3078 (-87.94%)
	GRAS	-1967 (-56.2%)	-3405 (-97.29%)

Changes in climatic niche distribution
(in 10'x10' grid cells; present niche space: 3500 cells)

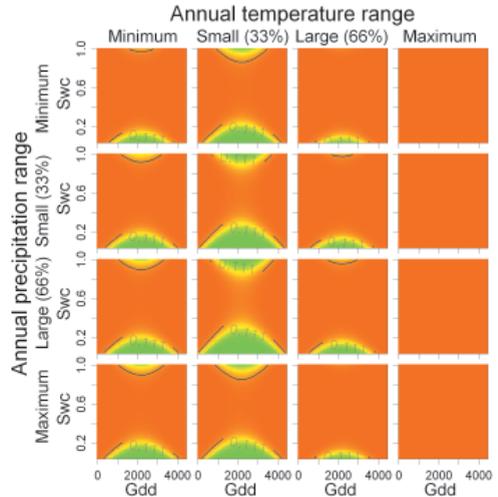
The Spanish Festoon can be found on scrub and dry, grassy vegetation. The butterflies are often found in rocky areas, where they can be seen, wings widespread, basking on stones, warming themselves in the sun. The female lays her eggs singly or in small groups on birthworts (*Aristolochia* spp.), such as *A. longa*, *A. rotunda*, and *A. pistolochia*. The caterpillars feed on these poisonous plants, pupating for the winter. It can sometimes take two to three years before the butterfly emerges from the pupa. Apart from a few sites in southern Spain the species is single brooded.

Present distribution can be well explained by climatic variables (AUC = 0.91).

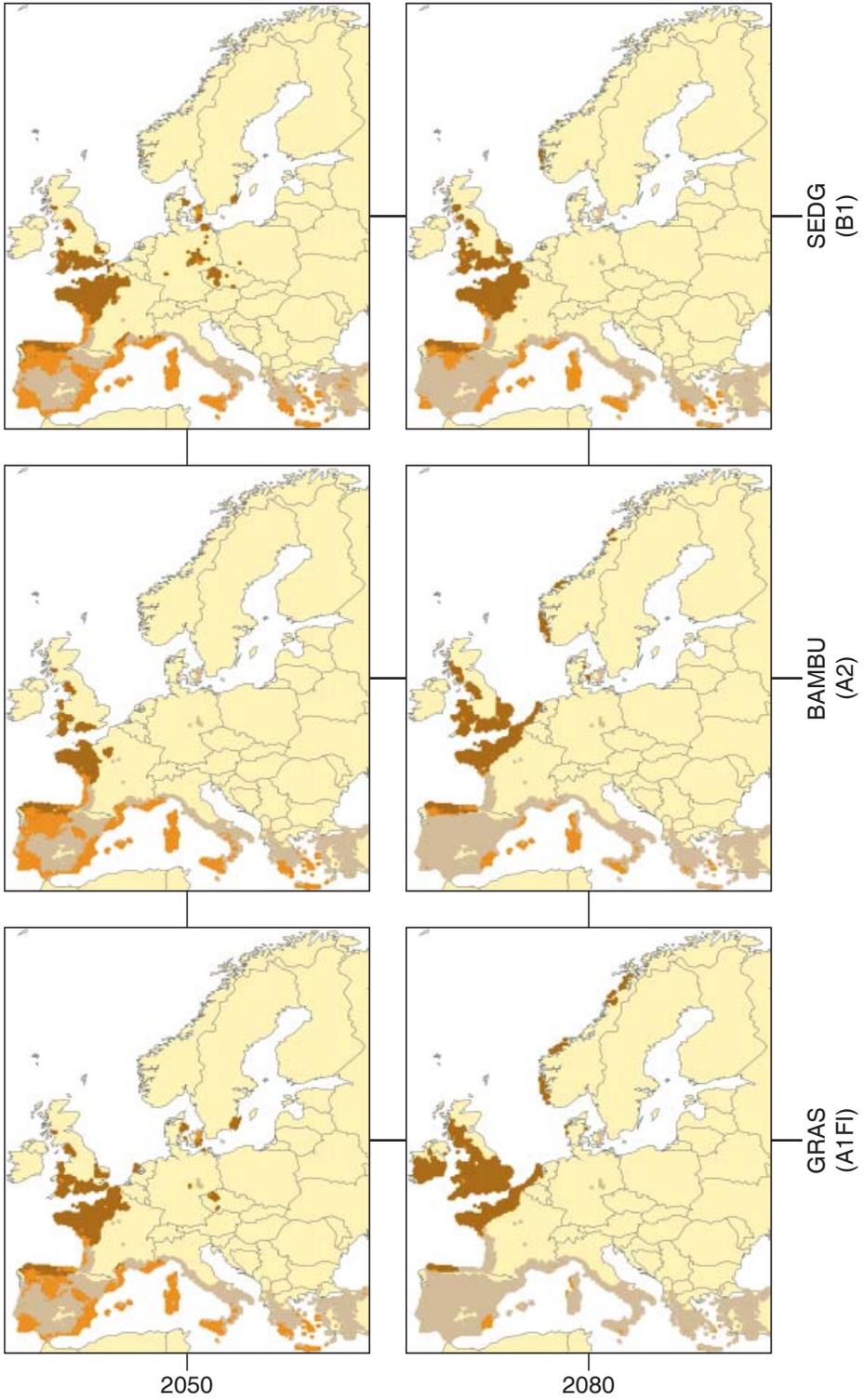
Climate risk category: HHRH



Observed species distribution (50 x 50 km² UTM grid; black circles) and modelled actual distribution of climatic niche (orange areas)



Multidimensional climatic niche. Occurrence probability defined by accumulated growing degree days until August (Gdd) and soil water content (Swc) for combinations of minimum, lower tercile, upper tercile and maximum values of annual temperature range and annual precipitation range. Climatic conditions: orange – unsuitable; green – hostile; black line – modelled threshold



Zerynthia polyxena ([SCHIFFERMÜLLER], 1775) – Southern Festoon



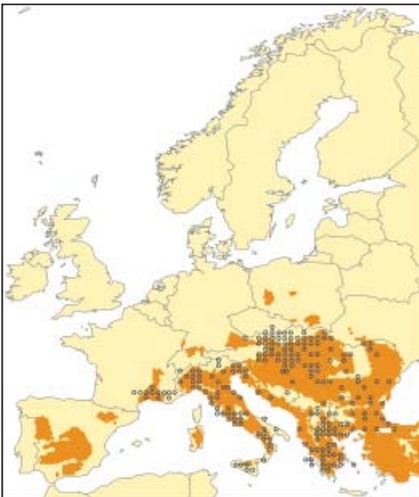
© Albert Vliegenthart

		Full dispersal	No dispersal
2050	SEDG	3753 (76.61%)	-722 (-14.74%)
	BAMBU	3218 (65.69%)	-1107 (-22.6%)
	GRAS	3098 (63.24%)	-1499 (-30.6%)
2080	SEDG	4158 (84.87%)	-1612 (-32.9%)
	BAMBU	3432 (70.06%)	-3156 (-64.42%)
	GRAS	4141 (84.53%)	-3917 (-79.96%)

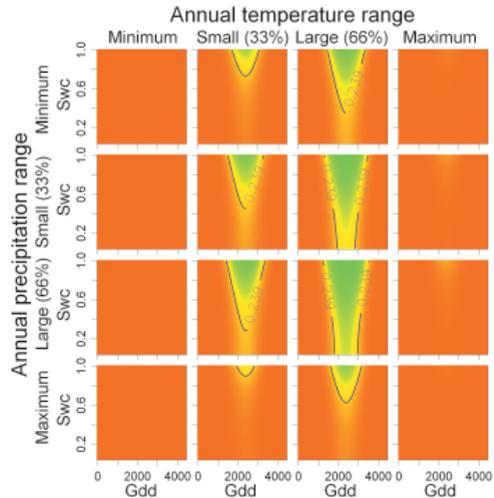
Changes in climatic niche distribution
(in 10'x10' grid cells; present niche space: 4899 cells)

The caterpillars of the Southern Festoon live on various birthworts, such as *Aristolochia clematitis*, *A. rotunda*, *A. pallida*, and *A. pistolochia*. Because their foodplants grow in different habitats, and because the caterpillars also have different foodplants in different areas, this spring butterfly can be found in quite different habitats. The eggs are laid singly or in small groups on the underside of the leaves, where the caterpillars are usually also found. The caterpillars have a striking appearance. Otherwise beige with black spots, it has some orange tubercles on each segment, each ending in a black, spiny tuft. The Southern Festoon is single-brooded and hibernates as pupa. This species is listed in Annex IV of the Habitats' Directive.

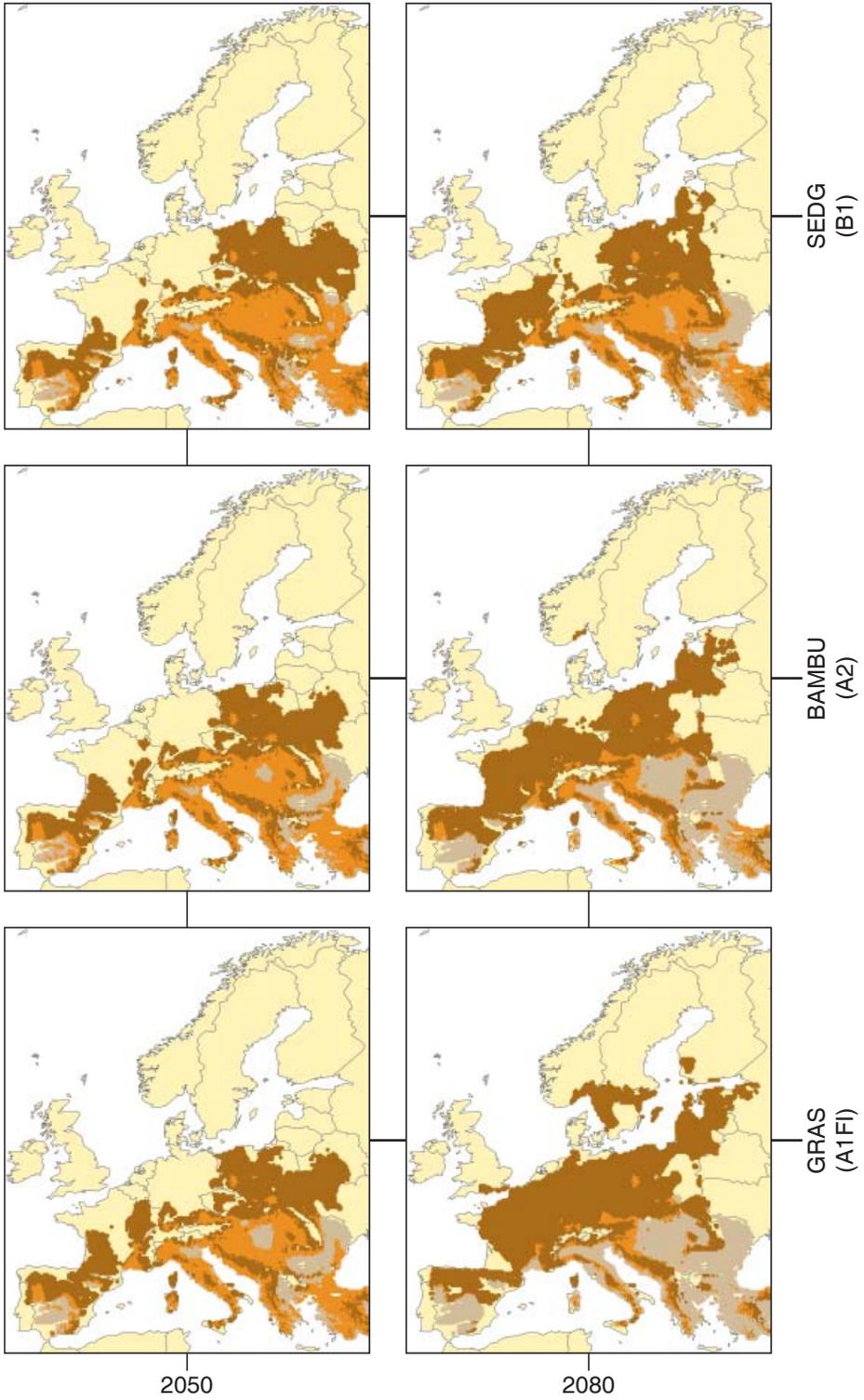
Present distribution can be explained by climatic variables to a moderate extent (AUC = 0.85). Climate risk category: HR.



Observed species distribution (50 x 50 km² UTM grid; black circles) and modelled actual distribution of climatic niche (orange areas)



Multidimensional climatic niche. Occurrence probability defined by accumulated growing degree days until August (Gdd) and soil water content (Swc) for combinations of minimum, lower tercile, upper tercile and maximum values of annual temperature range and annual precipitation range. Climatic conditions: orange – unsuitable; green – hostile; black line – modelled threshold



Zerynthia cerisyi (GODART, 1822) – Eastern Festoon



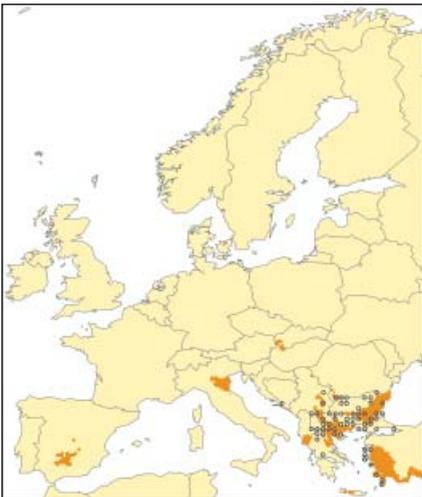
© Albert Vliegenthart

		Full dispersal	No dispersal
2050	SEDG	1685 (291.02%)	-11 (-1.9%)
	BAMBU	2079 (359.07%)	-10 (-1.73%)
	GRAS	2080 (359.24%)	-23 (-3.97%)
2080	SEDG	2970 (512.95%)	-35 (-6.04%)
	BAMBU	3022 (521.93%)	-73 (-12.61%)
	GRAS	4073 (703.45%)	-71 (-12.26%)

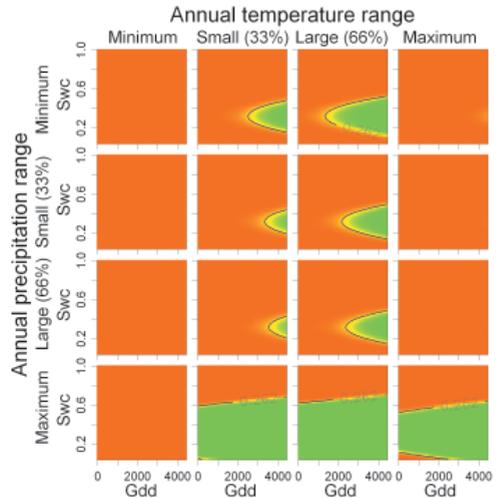
Changes in climatic niche distribution
(in 10⁴ × 10⁴ grid cells; present niche space: 579 cells)

The Eastern Festoon occurs in warm, usually dry, places such as in dry grassland with scattered bushes, in scrub, near hedges, on agricultural land, vineyards and olive groves. It is also found in river valleys. Choosing plants growing near bushes or trees, the female lays her eggs mostly on Birthwort (*Aristolochia clematitis*), but also on other birthworts. The Eastern Festoon has one generation a year and passes the winter in the pupal stage.

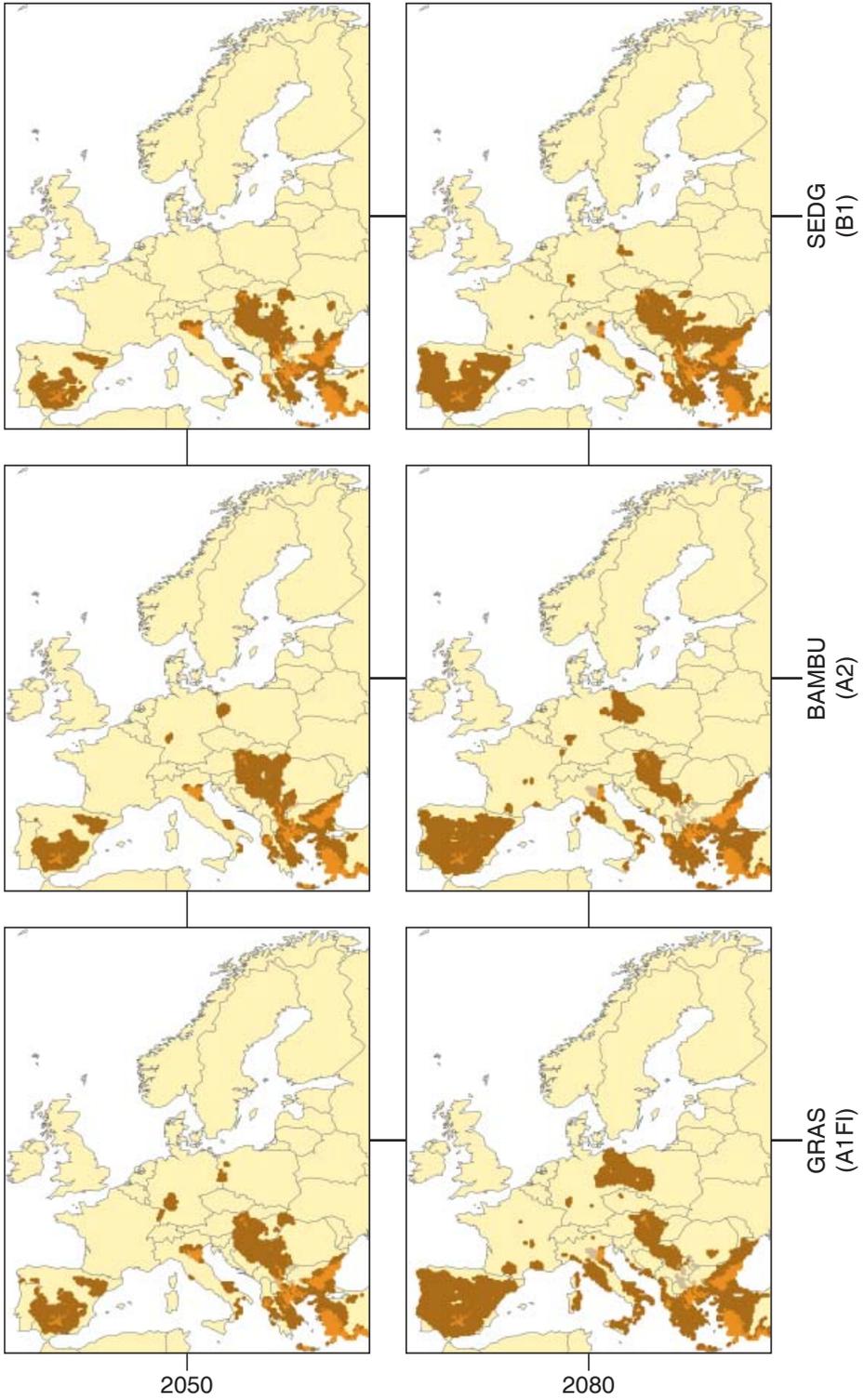
Present distribution can be well explained by climatic variables (AUC = 0.91).
Climate risk category: LR.



Observed species distribution (50 × 50 km² UTM grid; black circles) and modelled actual distribution of climatic niche (orange areas)



Multidimensional climatic niche. Occurrence probability defined by accumulated growing degree days until August (Gdd) and soil water content (Swc) for combinations of minimum, lower tercile, upper tercile and maximum values of annual temperature range and annual precipitation range. Climatic conditions: orange – unsuitable; green – hostile; black line – modelled threshold



Parnassius mnemosyne (LINNAEUS, 1758) – Clouded Apollo



© Kars Veling

		Full dispersal	No dispersal
2050	SEDG	-465 (-5.1%)	-2308 (-25.34%)
	BAMBU	-1793 (-19.68%)	-2980 (-32.71%)
	GRAS	-1983 (-21.77%)	-3222 (-35.37%)
2080	SEDG	-175 (-1.92%)	-4413 (-48.45%)
	BAMBU	-2536 (-27.84%)	-6269 (-68.82%)
	GRAS	-2163 (-23.75%)	-7025 (-77.12%)

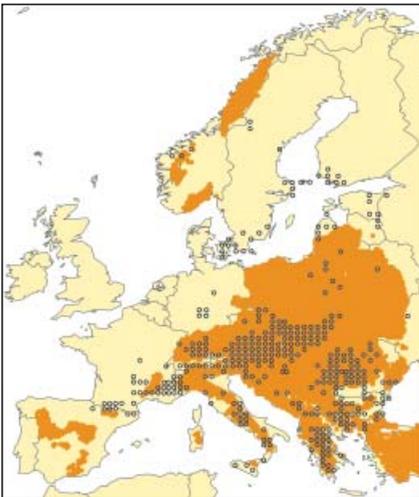
Changes in climatic niche distribution
(in 10'x10' grid cells; present niche space: 9109 cells)

The Clouded Apollo occurs in mountainous regions on damp to moderately dry grassland, usually with woodland or scrub in the neighbourhood. The butterflies can often be seen visiting red or purple flowers for the nectar they need. The foodplant is *Corydalis*, that at the time of egg laying is not yet above ground. The eggs are laid on its dried stems, on grass blades, or on other plants not too far from the foodplants. The egg hibernates. In the spring, as soon as it has released itself from the egg, the small caterpillar starts its search for a suitable foodplant. When fully-grown, it pupates in a closely spun cocoon of fine threads, situated above the ground in the leaves of the foodplant. The Clouded Apollo has one generation a year.

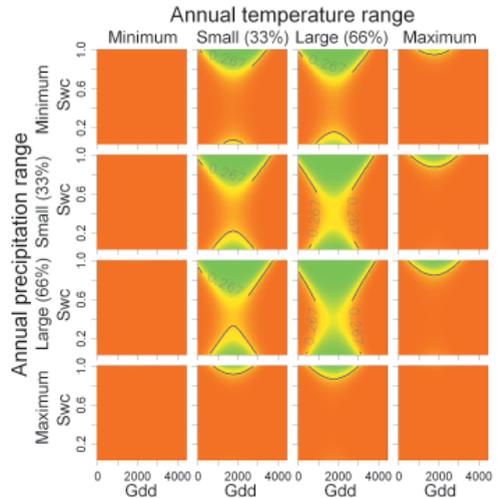
This species is listed in Annex IV of the Habitats' Directive.

Present distribution can be explained by climatic variables to a moderate extent (AUC = 0.77).

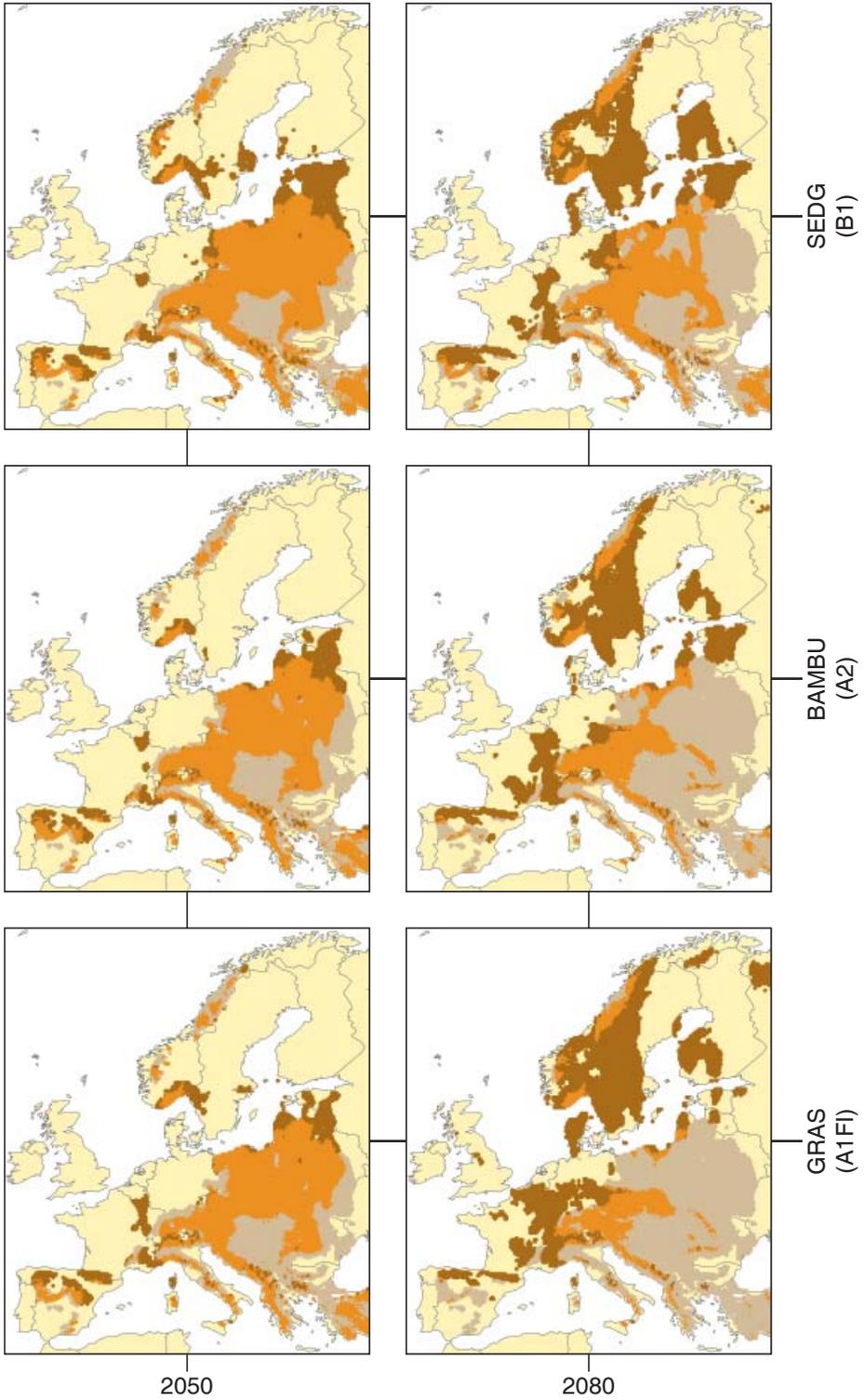
Climate risk category: HR.



Observed species distribution (50 x 50 km² UTM grid; black circles) and modelled actual distribution of climatic niche (orange areas)



Multidimensional climatic niche. Occurrence probability defined by accumulated growing degree days until August (Gdd) and soil water content (Swc) for combinations of minimum, lower tercile, upper tercile and maximum values of annual temperature range and annual precipitation range. Climatic conditions: orange – unsuitable; green – hostile; black line – modelled threshold



Parnassius phoebus (FABRICIUS, 1793) – Small Apollo



© Jostein Engdal

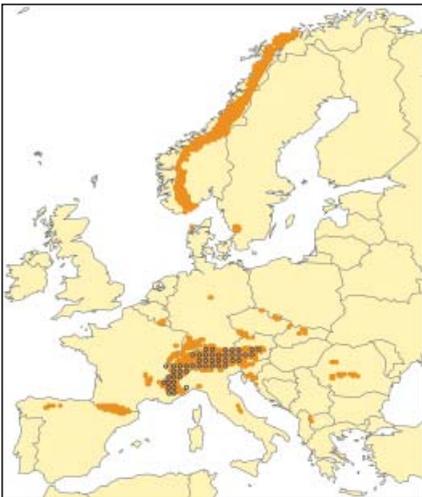
		Full dispersal	No dispersal
2050	SEDG	-275 (-24.71%)	-455 (-40.88%)
	BAMBU	-198 (-17.79%)	-388 (-34.86%)
	GRAS	-314 (-28.21%)	-488 (-43.85%)
2080	SEDG	-526 (-47.26%)	-755 (-67.83%)
	BAMBU	-364 (-32.7%)	-645 (-57.95%)
	GRAS	-574 (-51.57%)	-804 (-72.24%)

Changes in climatic niche distribution
(in 10'x10' grid cells; present niche space: 1113 cells)

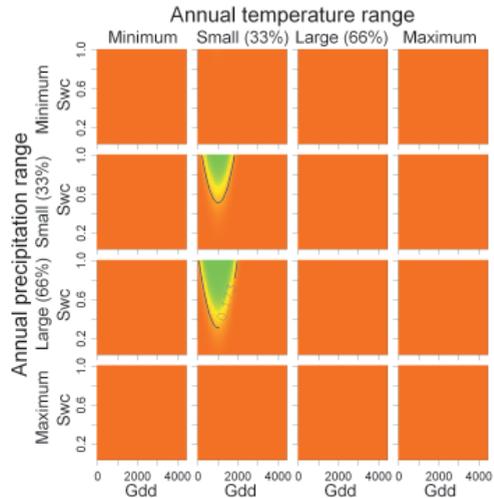
The Small Apollo occurs in the mountains, especially in damp places, such as beside streams and where it gets flooded from time to time. Such spots are the habitat of the larval food plant Yellow Mountain Saxifrage (*Saxifraga aizoides*). However, in the Mercantour in the south-west of the Alps, the foodplant is Roseroot (*Rhodiola roseum*). Although the eggs are sometimes laid on the foodplant, they are also often laid not far from it. The very small caterpillar sometimes passes the winter in the egg, sometimes outside it. The fully-grown caterpillars are black with a row of orange-red or yellow spots along each side. At the beginning of the summer, they spin a flimsy cocoon in which to pupate, either low down on the larval plant, or on the ground. The Small Apollo is single-brooded.

Present distribution can be very well explained by climatic variables (AUC = 0.99).

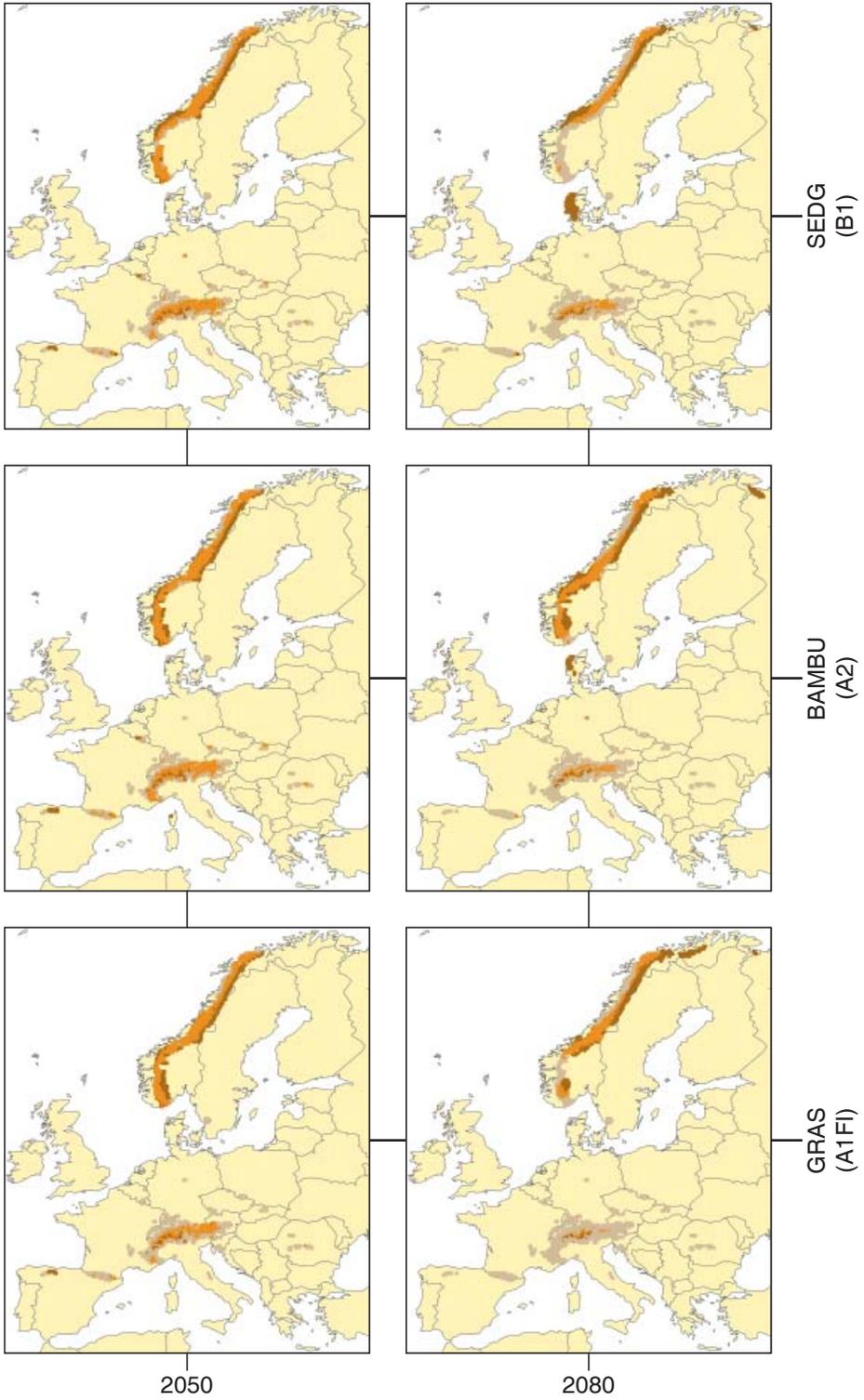
Climate risk category: HR.



Observed species distribution (50 x 50 km² UTM grid; black circles) and modelled actual distribution of climatic niche (orange areas)



Multidimensional climatic niche. Occurrence probability defined by accumulated growing degree days until August (Gdd) and soil water content (Swc) for combinations of minimum, lower tercile, upper tercile and maximum values of annual temperature range and annual precipitation range. Climatic conditions: orange – unsuitable; green – hostile; black line – modelled threshold



Parnassius apollo (LINNAEUS, 1758) – Apollo



© Albert Vliegenthart

		Full dispersal	No dispersal
2050	SEDG	-1887 (-30.08%)	-2568 (-40.94%)
	BAMBU	-2609 (-41.59%)	-3126 (-49.83%)
	GRAS	-2915 (-46.47%)	-3479 (-55.46%)
2080	SEDG	-2234 (-35.61%)	-3431 (-54.69%)
	BAMBU	-3319 (-52.91%)	-4177 (-66.59%)
	GRAS	-3972 (-63.32%)	-4758 (-75.85%)

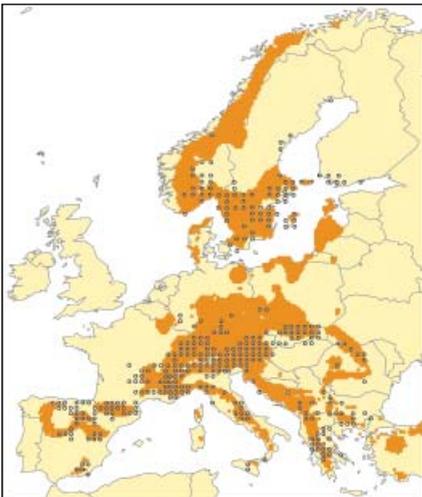
Changes in climatic niche distribution
(in 10'x10' grid cells; present niche space: 6273 cells)

The Apollo occurs in areas on steep, sunny slopes with sparse vegetation. In Europe, there are many different subspecies, forms and aberrations, because of the large isolation of populations. The butterflies are fond of visiting thistles and other flowering plants for their nectar. The female lays her eggs singly or in small groups on or near the foodplant stonecrop (*Sedum* spp.). The eggs develop but the tiny caterpillar hibernates inside the eggshell or as newly hatched larvae. It emerges in the spring, and starts feeding on the buds of the foodplant. The caterpillars of later instars also eat the leaves. When it is time to pupate, the caterpillars look for a safe place between the stones, where they then spin a flimsy cocoon for pupation. The Apollo is single-brooded.

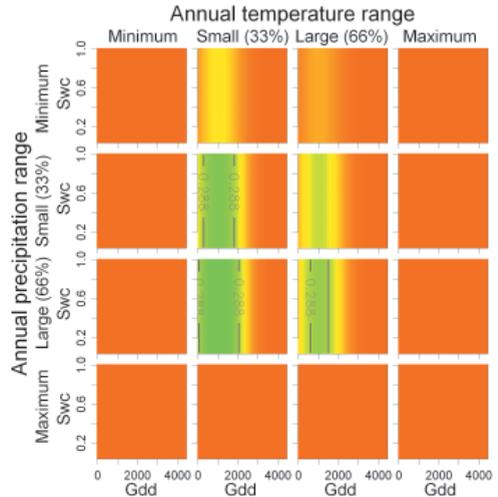
This species is listed in Annex IV of the Habitats' Directive.

Present distribution can be explained by climatic variables to a moderate extent (AUC = 0.8).

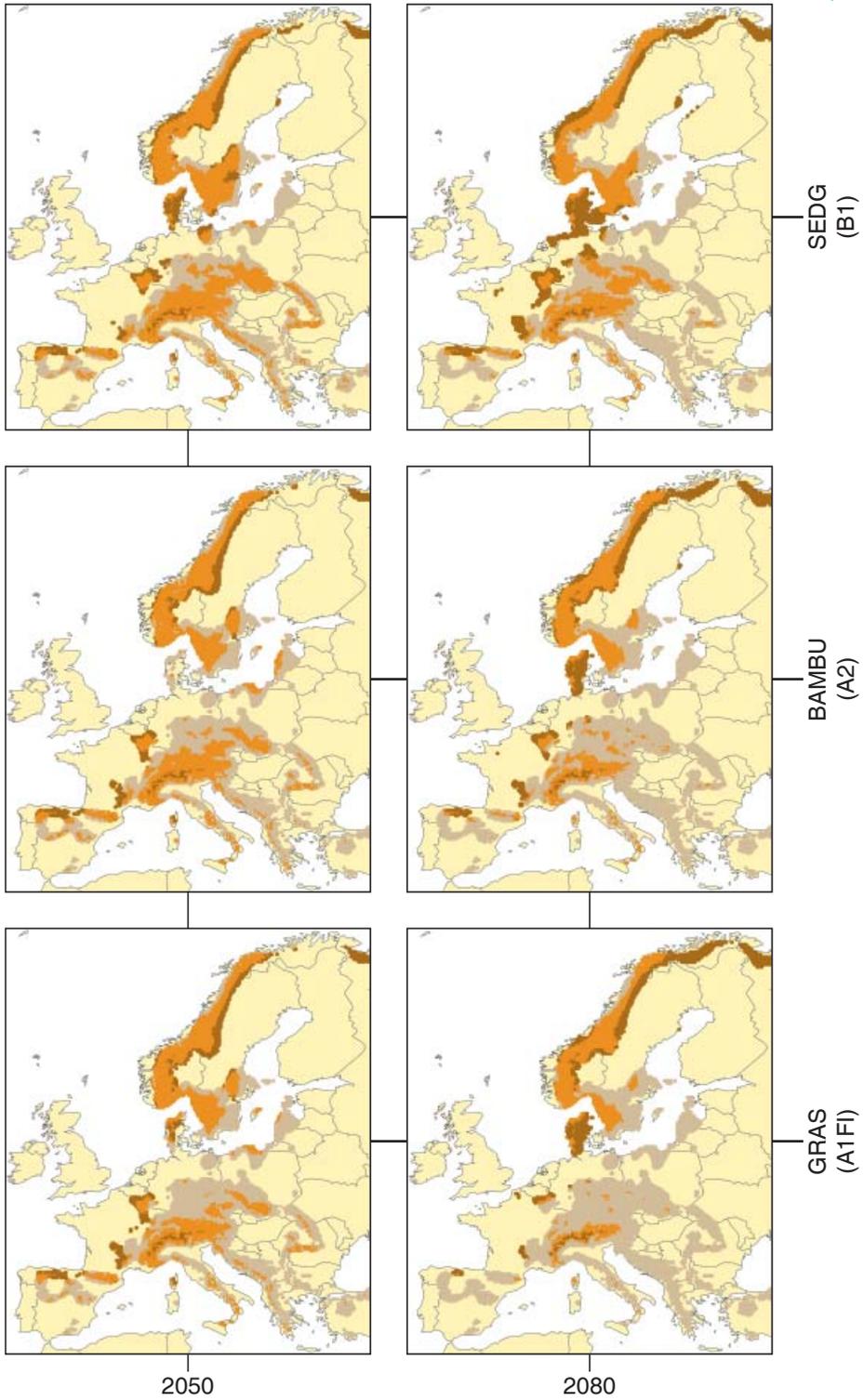
Climate risk category: HR.



Observed species distribution (50 x 50 km² UTM grid; black circles) and modelled actual distribution of climatic niche (orange areas)



Multidimensional climatic niche. Occurrence probability defined by accumulated growing degree days until August (Gdd) and soil water content (Swc) for combinations of minimum, lower tercile, upper tercile and maximum values of annual temperature range and annual precipitation range. Climatic conditions: orange – unsuitable; green – hostile; black line – modelled threshold



Iphiclides podalirius (LINNAEUS, 1758) – Scarce Swallowtail



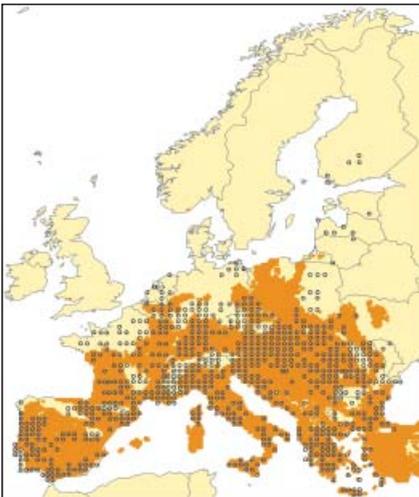
© Chris van Swaay

		Full dispersal	No dispersal
2050	SEDG	4099 (39.5%)	-483 (-4.65%)
	BAMBU	3818 (36.79%)	-852 (-8.21%)
	GRAS	3058 (29.47%)	-1226 (-11.81%)
2080	SEDG	4380 (42.2%)	-1186 (-11.43%)
	BAMBU	3105 (29.92%)	-3182 (-30.66%)
	GRAS	3433 (33.08%)	-4169 (-40.17%)

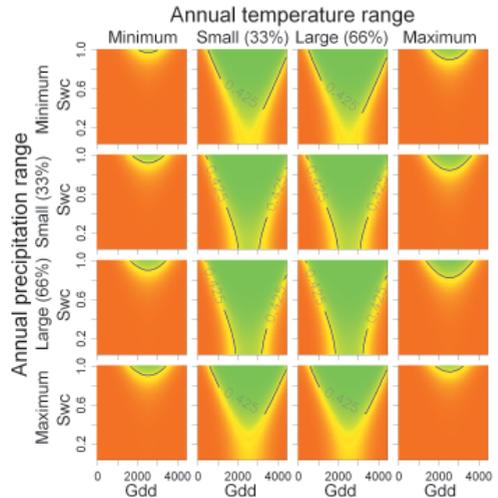
Changes in climatic niche distribution
(in 10'x10' grid cells; present niche space: 10378 cells)

This large, conspicuous butterfly with its elegant gliding flight, is very impressive. It occurs in warm, dry places with scrub and rough vegetation. The males of the Scarce Swallowtail congregate on hilltops, dancing in the air and waiting for the females, a type of behaviour known as “hill-topping”. They visit thistles and other flowers rich in nectar. The eggs are laid on the leaves of small bushes or trees of Blackthorn (*Prunus spinosa*) and other species of *Prunus*. The caterpillars feed on the leaves. When fully-grown, they pupate, the pupa suspended in a silken girdle in the foodplant. Depending on its position in the range and on the altitude, the Scarce Swallowtail has one to three generations a year.

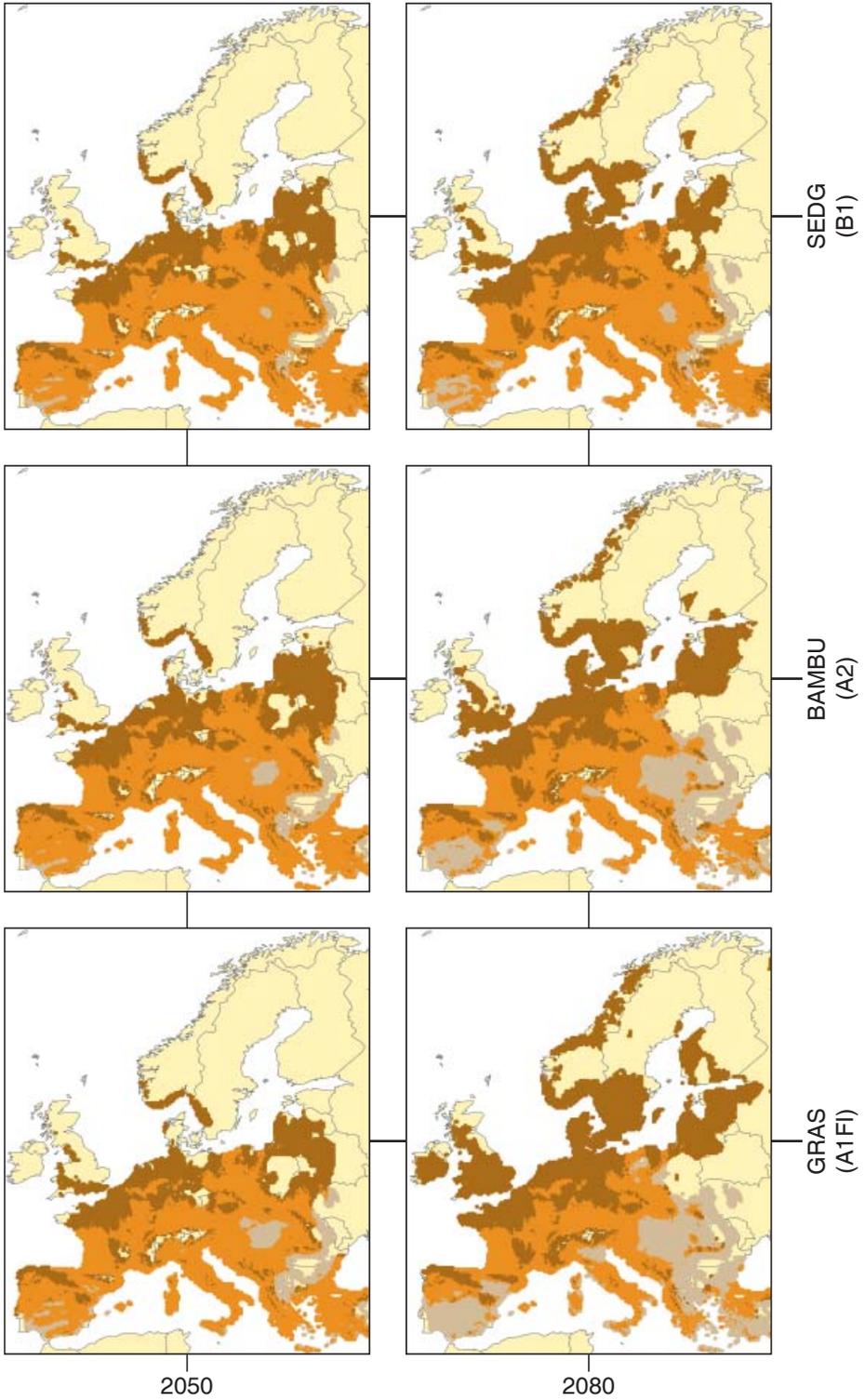
Present distribution can be explained by climatic variables to a moderate extent (AUC = 0.76).
Climate risk category: LR.



Observed species distribution (50 × 50 km² UTM grid; black circles) and modelled actual distribution of climatic niche (orange areas)



Multidimensional climatic niche. Occurrence probability defined by accumulated growing degree days until August (Gdd) and soil water content (Swc) for combinations of minimum, lower tercile, upper tercile and maximum values of annual temperature range and annual precipitation range. Climatic conditions: orange – unsuitable; green – hostile; black line – modelled threshold



Papilio machaon LINNAEUS, 1758 – Swallowtail



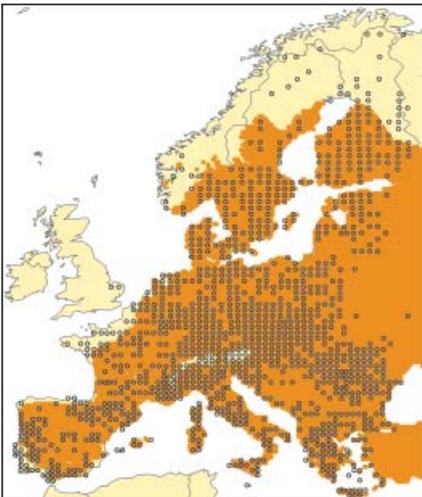
© Peter Ginzinger

		Full dispersal	No dispersal
2050	SEDG	1744 (8.18%)	-449 (-2.1%)
	BAMBU	1206 (5.65%)	-428 (-2.01%)
	GRAS	1346 (6.31%)	-742 (-3.48%)
2080	SEDG	2637 (12.36%)	-809 (-3.79%)
	BAMBU	1066 (5%)	-2547 (-11.94%)
	GRAS	227 (1.06%)	-4167 (-19.53%)

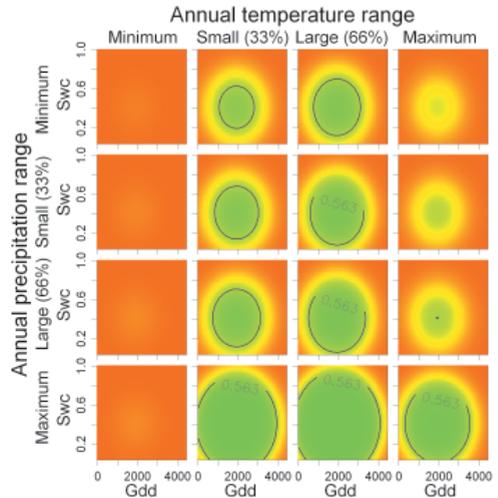
Changes in climatic niche distribution
(in 10'x10' grid cells; present niche space: 21332 cells)

The Swallowtail is a species of flower-rich meadows and small-scale farmland. The males and females meet at elevated places or above high trees, showing a type of behaviour known as “hill-topping”. The butterfly of the Swallowtail needs a lot of nectar. Eggs are laid on various umbellifers, including Wild Carrot (*Daucus carota*). The fully-grown larvae are very conspicuous, bright green with black stripes and orange spots. Caterpillars from autumn broods leave the foodplant to pupate on the ground and hibernation takes place as a pupa. The caterpillars of the summer broods pupate low down on the larval foodplant. Depending on geographic setting, the Swallowtail produces one to three generations a year.

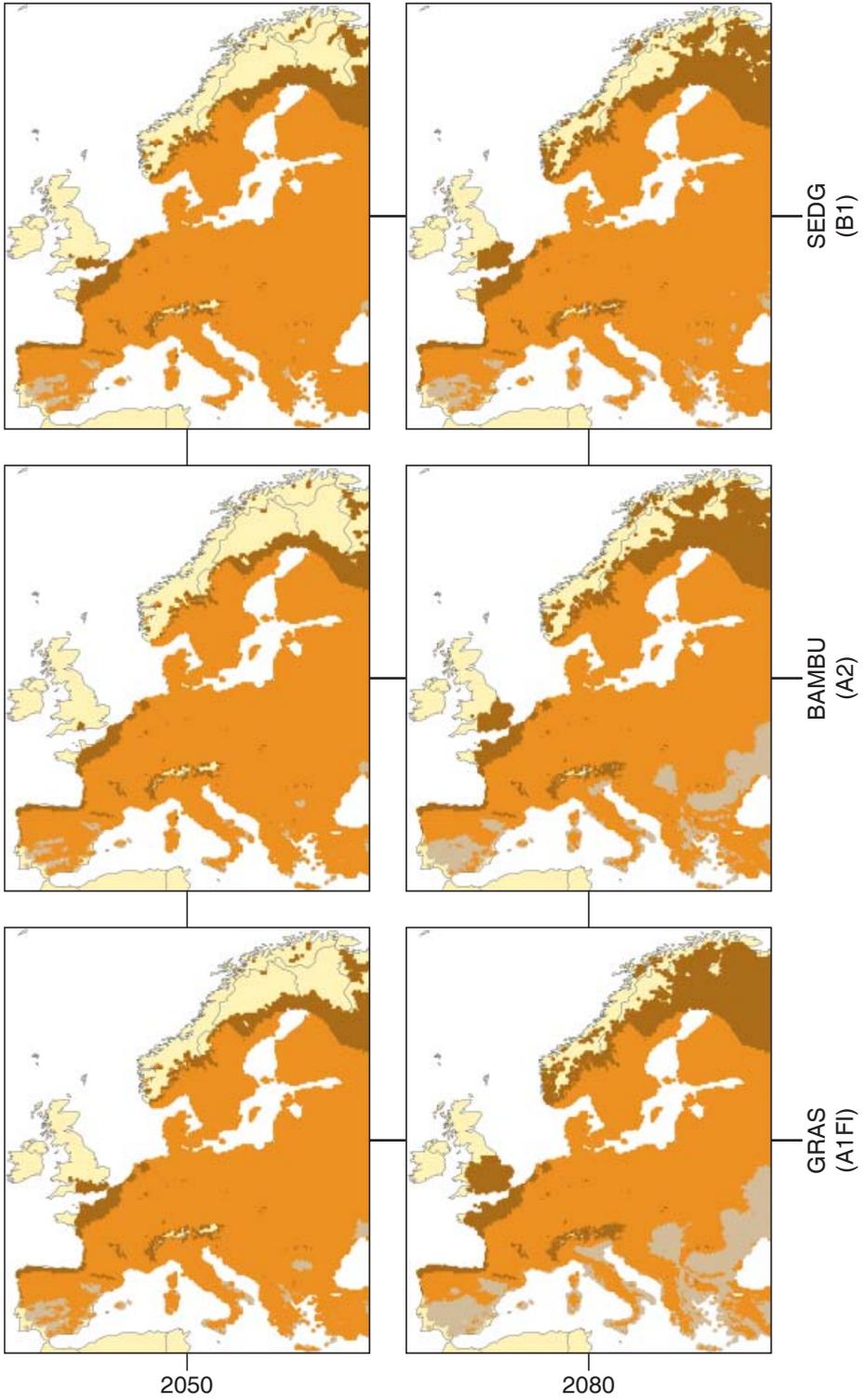
Present distribution can be explained by climatic variables to only a limited extent (AUC = 0.67). Climate risk category: PR.



Observed species distribution (50 x 50 km² UTM grid; black circles) and modelled actual distribution of climatic niche (orange areas)



Multidimensional climatic niche. Occurrence probability defined by accumulated growing degree days until August (Gdd) and soil water content (Swc) for combinations of minimum, lower tercile, upper tercile and maximum values of annual temperature range and annual precipitation range. Climatic conditions: orange – unsuitable; green – hostile; black line – modelled threshold



Papilio alexanor ESPER, 1799 – Southern Swallowtail



© Josef Pennerstorfer

		Full dispersal	No dispersal
2050	SEDG	-224 (-32.61%)	-404 (-58.81%)
	BAMBU	-277 (-40.32%)	-436 (-63.46%)
	GRAS	-278 (-40.47%)	-454 (-66.08%)
2080	SEDG	-257 (-37.41%)	-455 (-66.23%)
	BAMBU	-380 (-55.31%)	-534 (-77.73%)
	GRAS	-462 (-67.25%)	-592 (-86.17%)

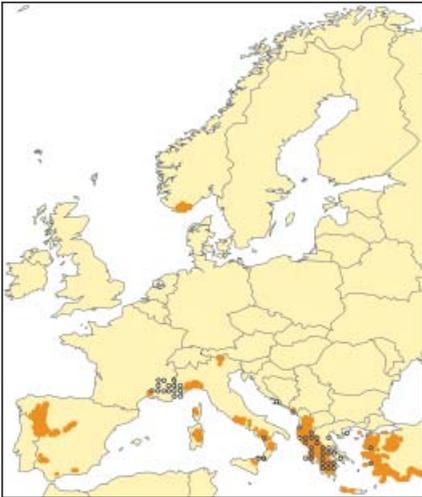
Changes in climatic niche distribution
(in 10'x10' grid cells; present niche space: 687 cells)

The Southern Swallowtail is mostly found on warm, dry calcareous slopes with a flower-rich vegetation and low-growing bushes. They prefer slopes that are steep and rocky. Different foodplants are known, all of them umbellifers. *Ptychotis saxifraga* is the most important one in the western part of its range, but eggs are also laid on *Opopanax chironium*, *Seseli montanum*, and *Trinia glauca*. In the eastern part, the caterpillars feed mostly on various of fennels (*Ferula* spp.), and also on *Opopanax hispidus*, Burnet saxifrage (*Pimpinella saxifraga*), *Scaligeria cretica*, and Wild Parsnip (*Pastinaca sativa*). The caterpillars eat the flowers and ripening seeds. The Southern Swallowtail is single-brooded and passes the winter in the pupa stage.

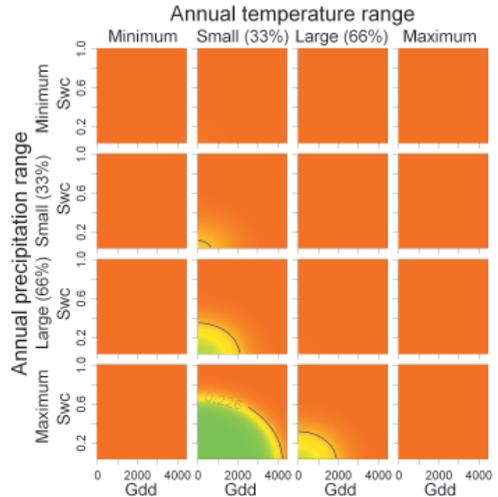
This species is listed in Annex IV of the Habitats' Directive.

Present distribution can be well explained by climatic variables (AUC = 0.94).

Climate risk category: HHR.



Observed species distribution (50 x 50 km² UTM grid; black circles) and modelled actual distribution of climatic niche (orange areas)



Multidimensional climatic niche. Occurrence probability defined by accumulated growing degree days until August (Gdd) and soil water content (Swc) for combinations of minimum, lower tertile, upper tertile and maximum values of annual temperature range and annual precipitation range. Climatic conditions: orange – unsuitable; green – hostile; black line – modelled threshold

