

Acer spp

Description of model and ensemble projections

The current distribution of *Acer spp.* (incl. *A. pseudoplatanus*, *A. platanoides* and *A. campestre*) predicted to cover most of the Swiss Plateau, the lower altitudes of the Jura Mountains, and the Northern Pre-Alps. In addition, the species also grows at higher altitudes in the inner alpine valleys and in the Ticino. This species group naturally inhabits primarily the lower montane and subalpine region, and regenerates partly well in beach forests on the Plateau (mostly *A. pseudoplatanus*). The distribution model predicts most of the area very well, except some of the high altitude locations in the Western Jura and Pre-Alps regions.

Under expected climate change using the A1B scenario, most combinations of statistical and regional climate models predict that these *Acer* species slowly disappears from the Plateau, meaning that these regions will harbor climate conditions, under which no presence of these species is currently being observed. The species “escapes” to higher altitudes throughout the Alps, and remains to be widely distributed in the Jura mountains and in the Ticino. The current distribution is modelled generally well, but with the typical “uncertainty” originating from the fact that the species group does not always occur where climate conditions are suitable.

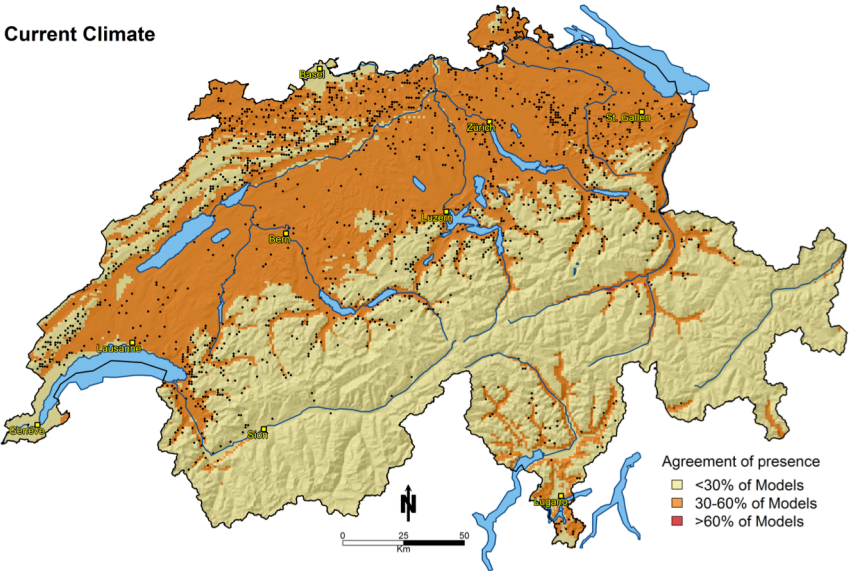


Figure 1. Current distribution (black dots) from the Swiss National Forest inventory (LFI 1) and simulated habitat suitability under current climate as calibrated from forest inventory data across the Alps (MANFRED project).

Synthesis and Conclusions

The current distribution of this *Acer* species group is modelled comparably well, but some higher altitude areas in Western Switzerland and in the Pre-Alps are under-predicted, meaning that the 22% overlap between current and future range is likely too pessimistic, and a larger overlap actually exists. The species group reveals comparably high temperature amplitudes. By 2050 some areas on the Plateau become unsuitable for the group, but might still well be suitable for *A. campestre*, which has the highest tolerance to high temperatures and drier climates. Overall, the range of the species is predicted to become smaller (70% of the current range size).

Two of the three species (*A. pseudoplatanus*, *A. platanoides*) have very similar requirements as *Fagus sylvatica*, and seem to have similar tolerances as well regarding future climate conditions. Regarding soil requirements, the two species are likely more demanding than *Fagus sylvatica* (Walther *et al.* 2013), and will not accompany *Fagus* under all possible soil conditions. They require a higher base saturation and will not grow well on very acidic soils. Also, the species has a very slow migration capacity according to Meier *et al.* (2012), and may therefore have general difficulties to track climate change if large areas have to be overcome to find suitable habitats. It therefore may spread less well than predicted in the Ticino and in some inner Alpine valleys under changing climate conditions.

Range change statistics		
	CH	Europe
Current range size [km ²]	17'960	–
Future (2080) range size	12'546	–
Range Change 2080/2000 [%]	69.8%	–
Overlap 2000/2080 [km ²]	3'980	–
Overlap/current range [%]	22.1%	–

References

Meier ES, Lischke H, Schmatz DR, Zimmermann NE (2012) Climate, competition and connectivity affect future migration and ranges of European trees. *Global Ecology and Biogeography* **21**, 164-178.

Walthert L, Pannatier EG, Meier ES (2013) Shortage of nutrients and excess of toxic elements in soils limit the distribution of soil-sensitive tree species in temperate forests. *Forest Ecology and Management* **297**, 94-107.

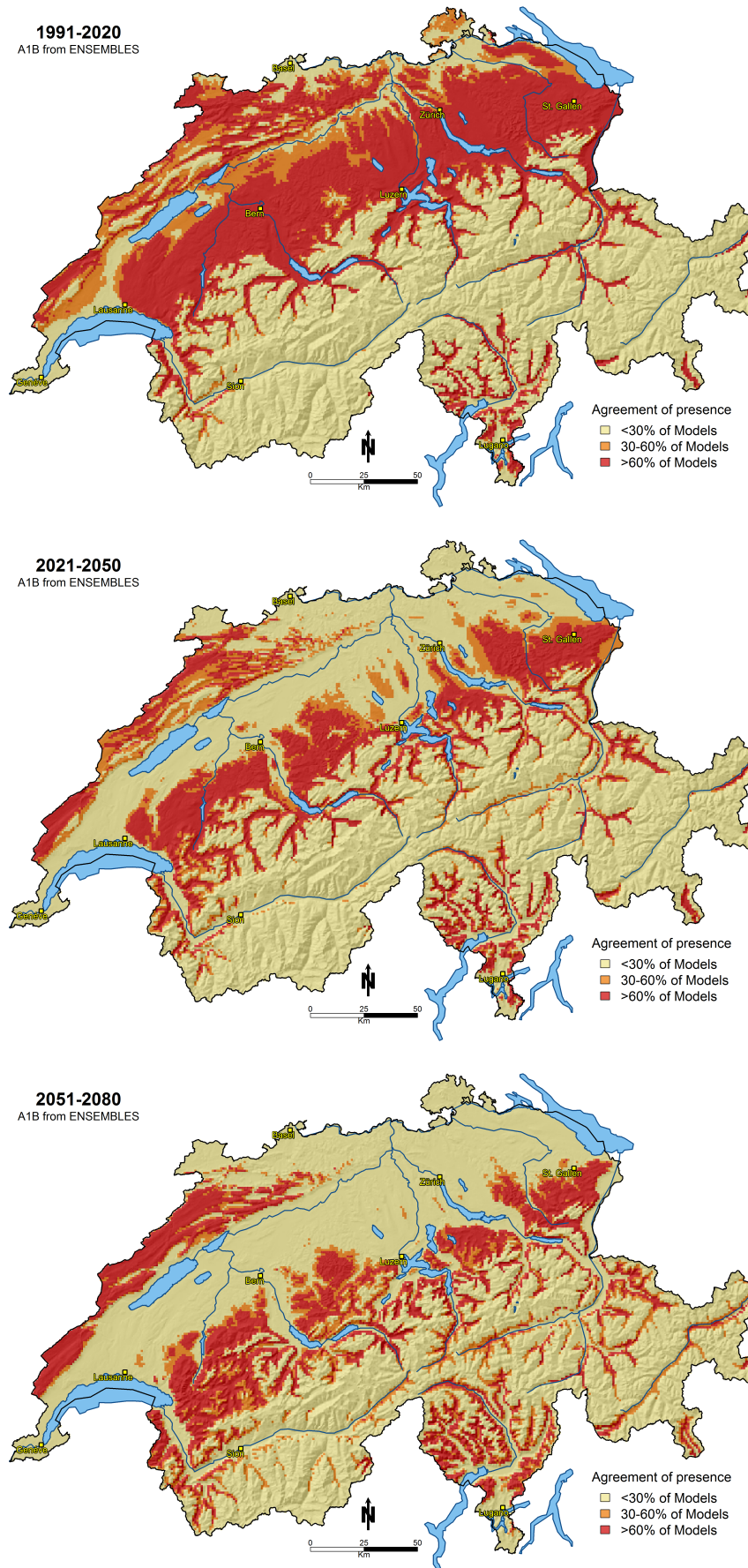


Figure 2: Ensemble of projected future ranges of suitable habitat as modeled from six RCMs and six statistical models. Light yellow colors indicate that all climate & statistical model combinations project absence of the species, while dark red colors indicate presence. Orange colors indicate uncertainty regarding habitat suitability.