

Acer pseudoplatanus

Description of model and ensemble projections

The current distribution of *Acer pseudoplatanus* is predicted to cover most of the Swiss Plateau, 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. The species naturally inhabits primarily the montane and subalpine region, and is planted widely on the Plateau. The distribution model does not well predict 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 *Acer pseudoplatanus* slowly disappears from the Plateau, meaning that these regions will represent climate conditions, under which no presence of *Acer* is currently being observed. The species “escapes” to higher altitudes throughout the Alps, and remains to be widely distributed in the Jura mountains.

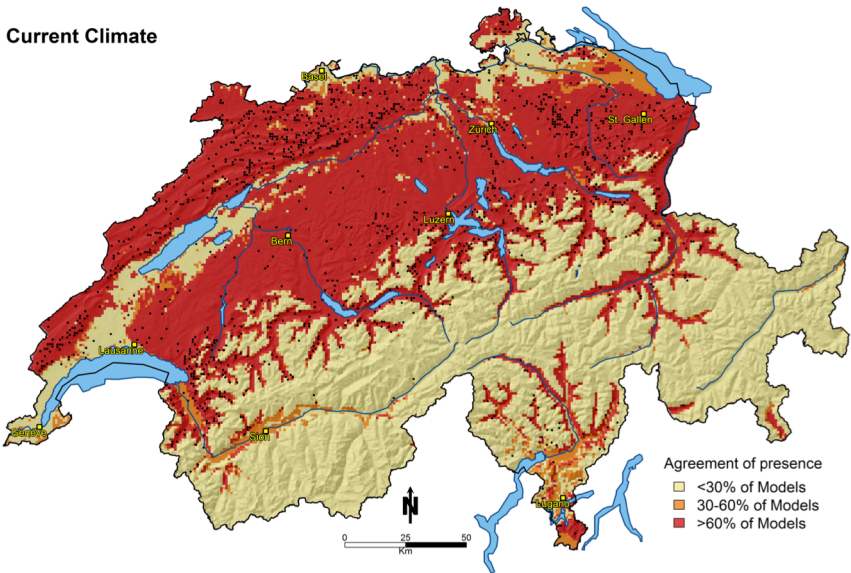


Figure 1. Current distribution (black dots) from the Swiss National Forest inventory (LFI 1) and simulated habitat suitability under current climate as calibrated from LFI forest inventory data of Switzerland.

Synthesis and Conclusions

The current distribution of *Acer pseudoplatanus* is modelled comparably well, but some higher altitude areas in Western Switzerland and in the Pre-Alps are under-predicted. Yet, the scenario predicting 45% overlap between current and future range is likely realistic, and a larger overlap may not exist in practice. At the European scale the overlap is quite high (>60%), which indicates that the species is not likely to face significant problems from migration limitation under a changing climate. The species reveals comparably high temperature amplitudes, and only by 2050 some areas on the Plateau become unsuitable. Due to a possibly slow immigration or expansion of other species (*Quercus* spp., possibly *Abies*), *Acer pseudoplatanus* might well be suitable past 2050 as a valuable tree in forests of the Plateau. Both, at the Swiss and

Range change statistics		
	CH	Europe
Current range size [km²]	18'777	76'067
Future (2080) range size	13'129	47'924
Range Change 2080/2000 [%]	69.9%	63.0%
Overlap 2000/2080 [km²]	8'384	46'417
Overlap/current range [%]	44.6%	61.1%

at the European scale, the species is expected to lose 30-40% of its current range size.

The species has very similar requirements as *Fagus sylvatica*, and seems to have similar tolerances as well regarding future climate conditions. Regarding soil conditions, the species is likely more demanding than *Fagus sylvatica*, and will not accompany *Fagus* under all possible soil conditions. It requires a higher base saturation and will not grow well on very acidic soils (Walther *et al.* 2013). 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.

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.

Walther 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.

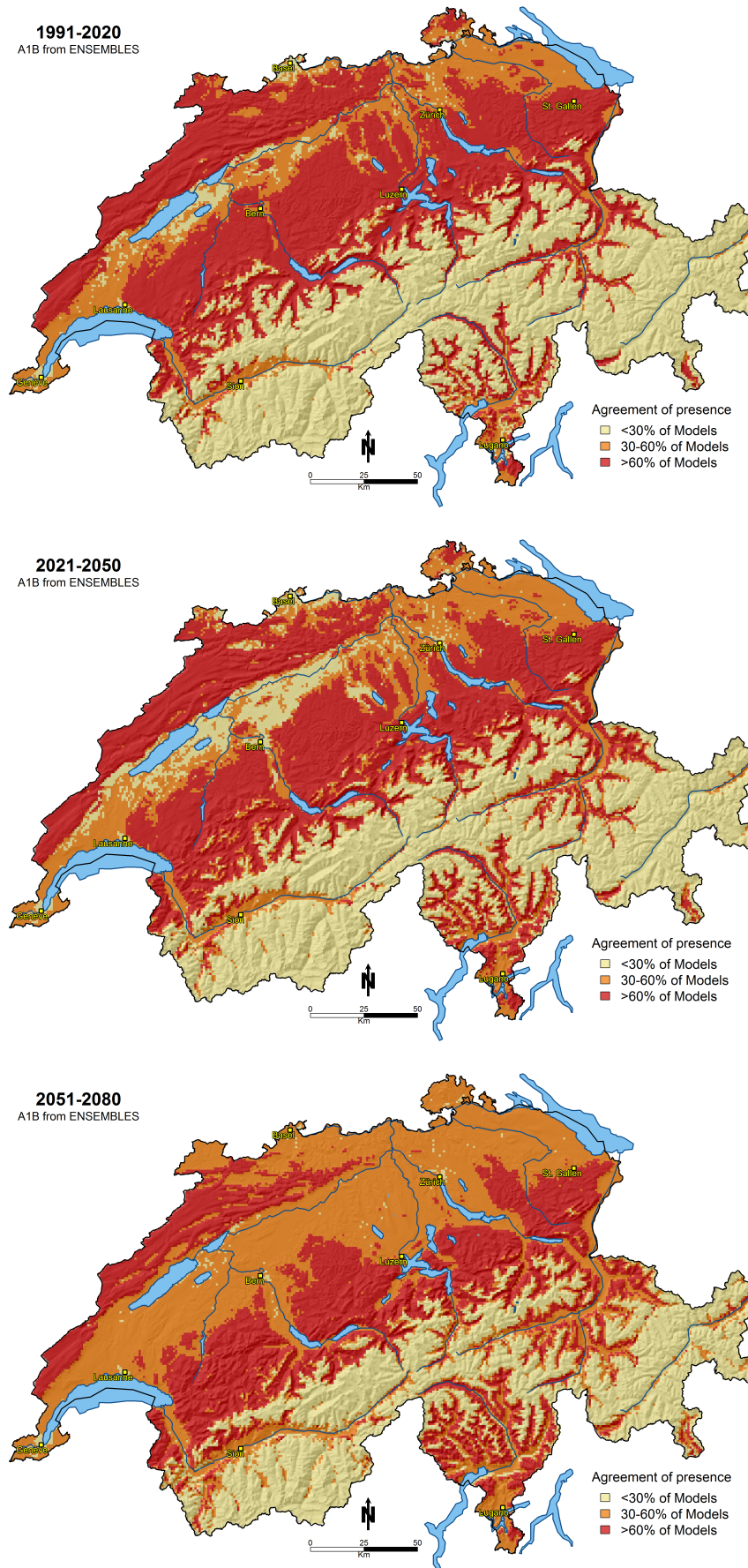


Figure 2: Ensemble of projected future ranges of suitable habitat as modeled from six RCMs and six statistical models. Light yellow colors indicate that all climate & statistical model combinations project absence of the species, while dark red colors indicate presence. Orange colors indicate uncertainty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