

Elevation-driven microclimates
shape
physiological, metabolomic, and
microbial terroir in a
steep-slope vineyard network in
Lavaux (Switzerland)

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- Complex system of AOCs, Grand Crus, and Premier Crus in Switzerland.
- Adapt the Swiss system to European AOP/IGP standards.

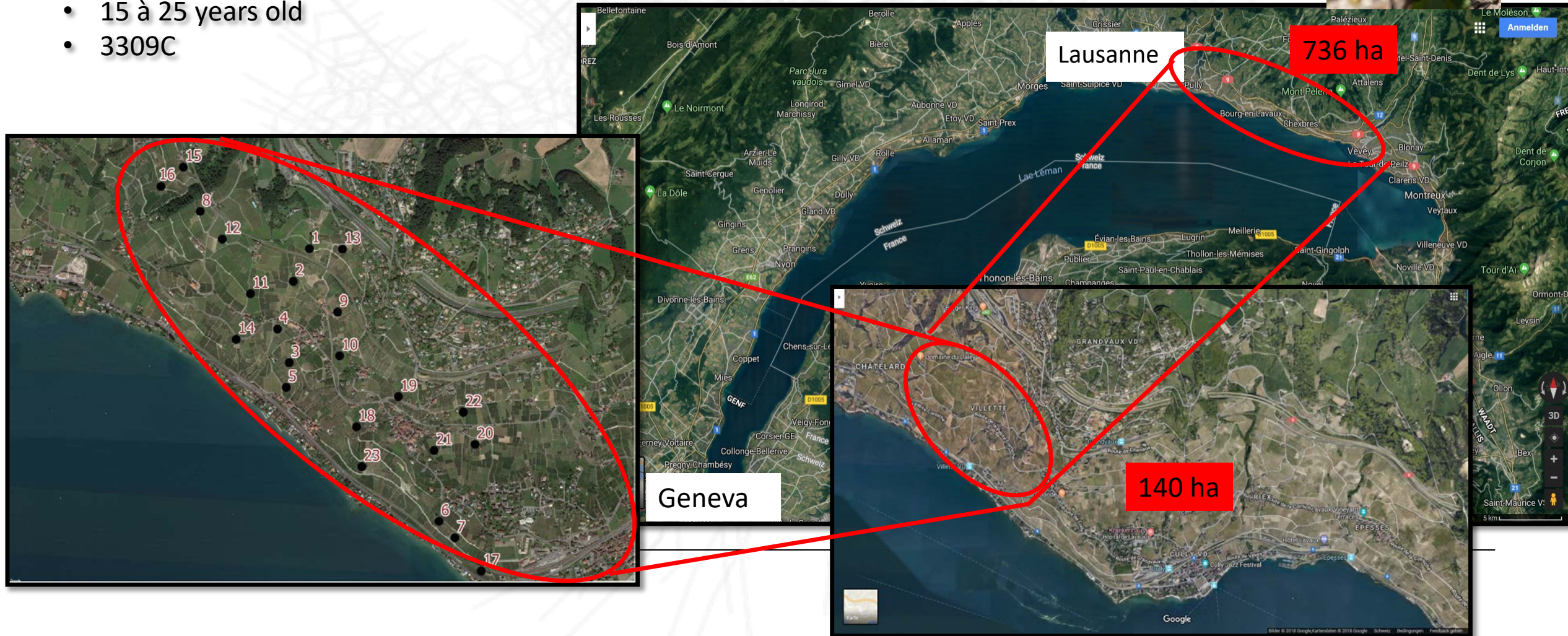


Provide a “simple” basis and methodology that can help establish different AOP / IGP and Grand Cru zones within small sub-regions and better understand and valorize the “TERROIR EFFECT”

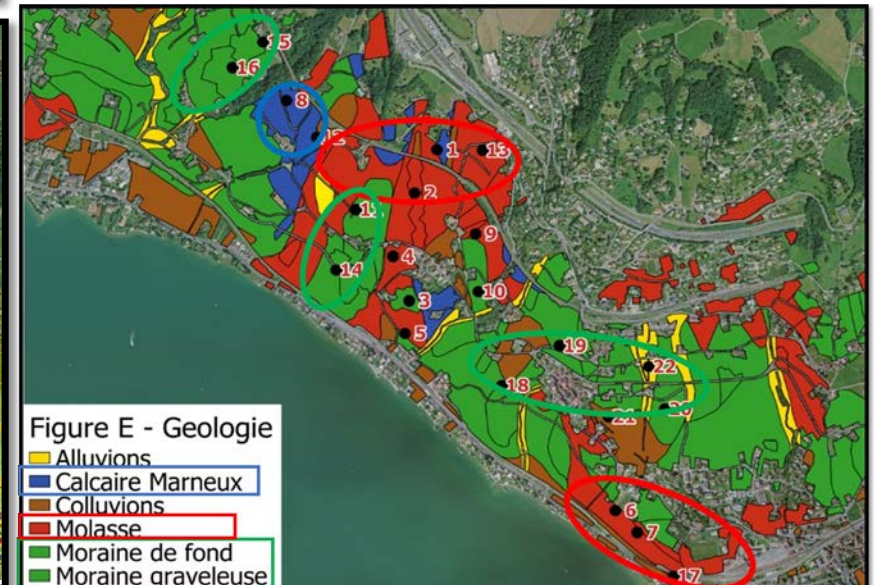
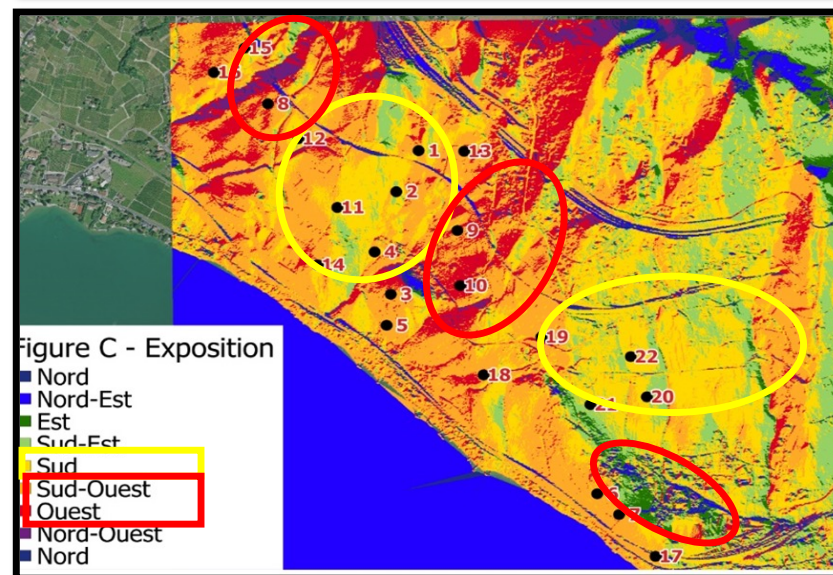
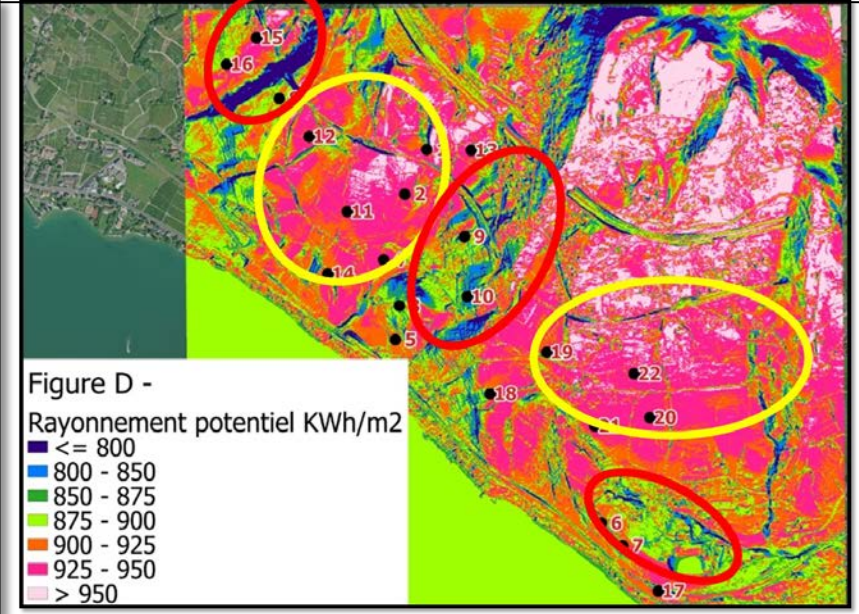
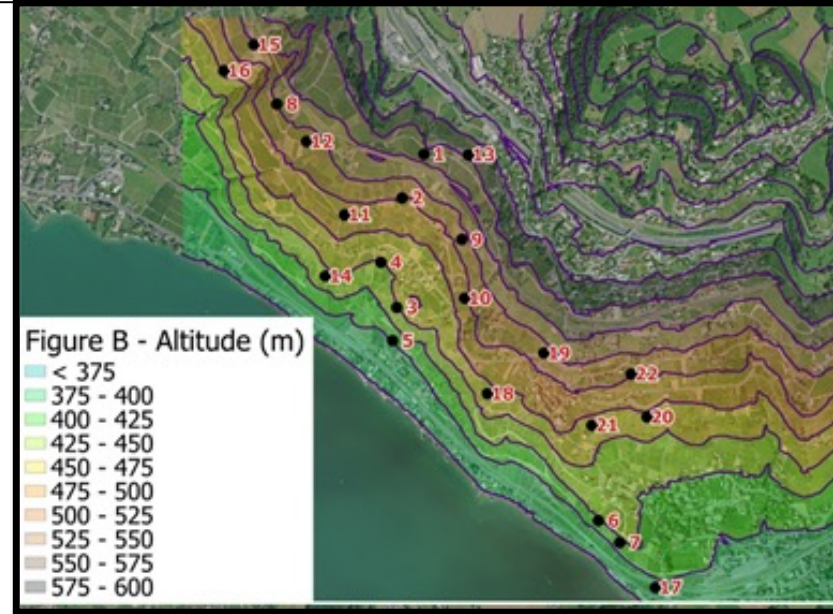


The plots

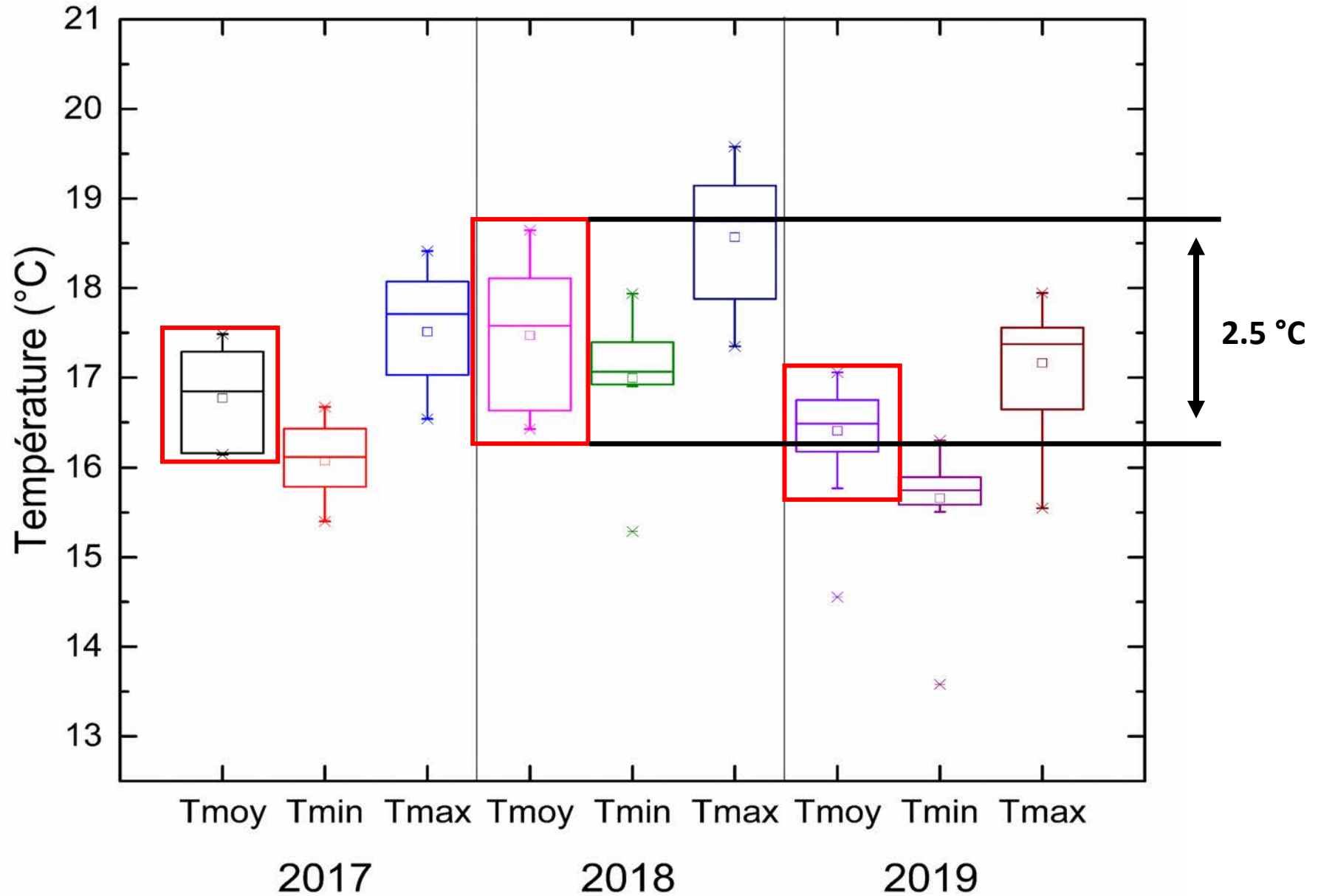
- AOC Lavaux – 22 plots
- Chasselas
- 15 à 25 years old
- 3309C

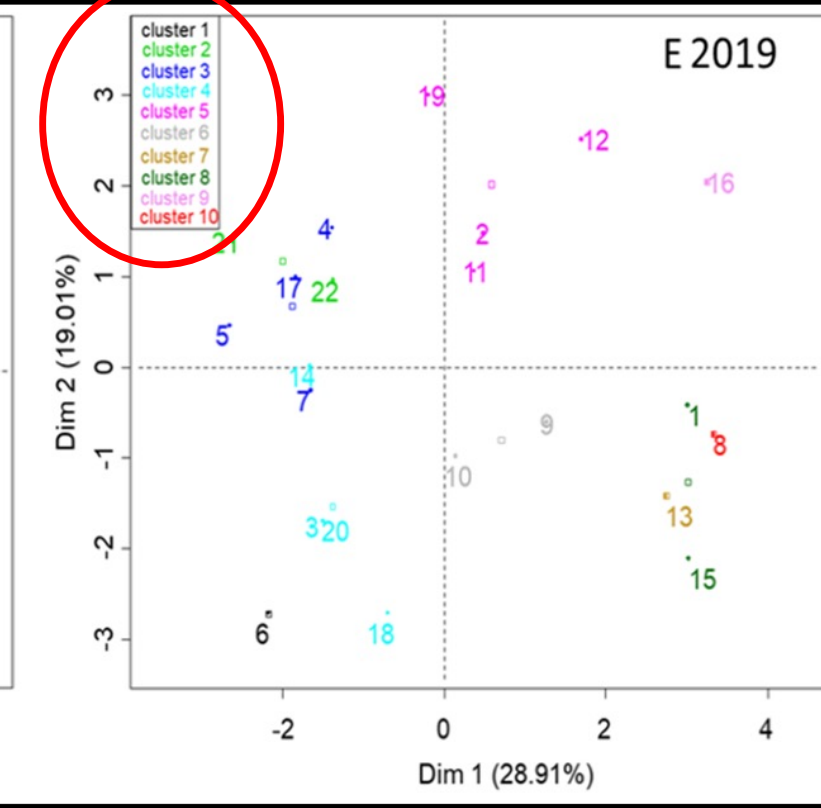
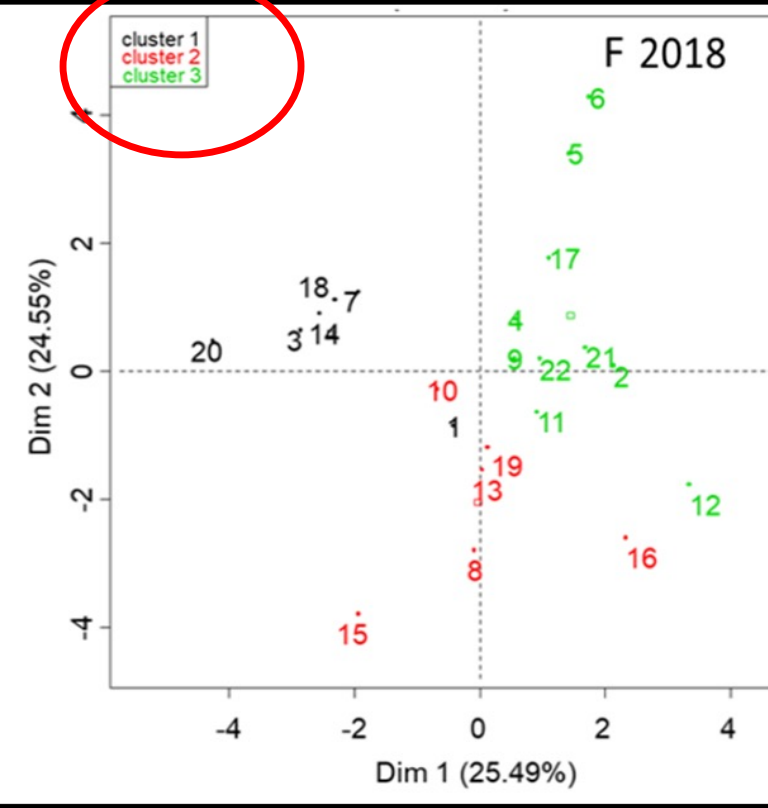
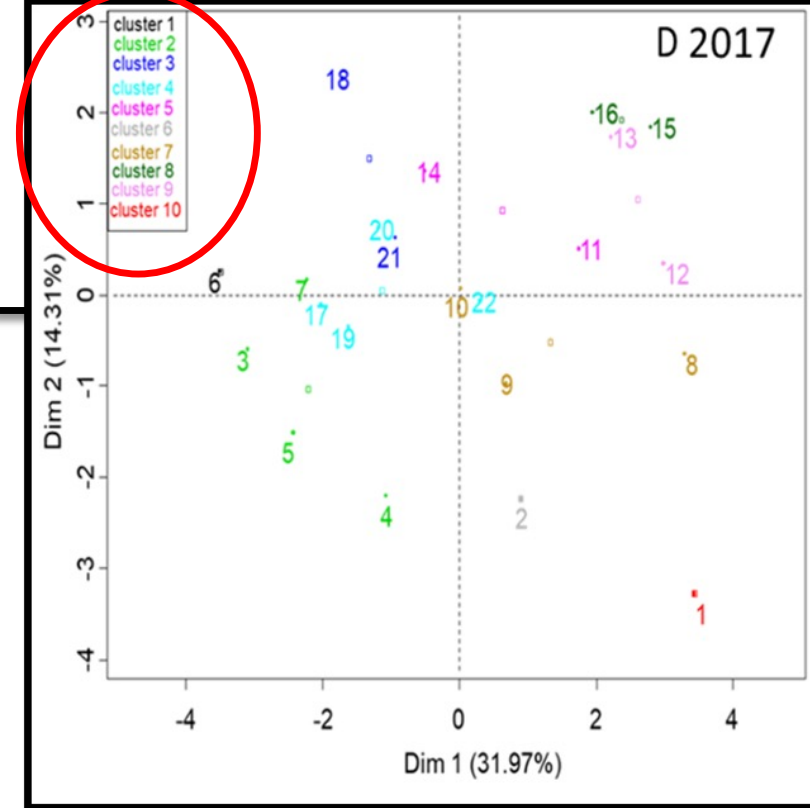
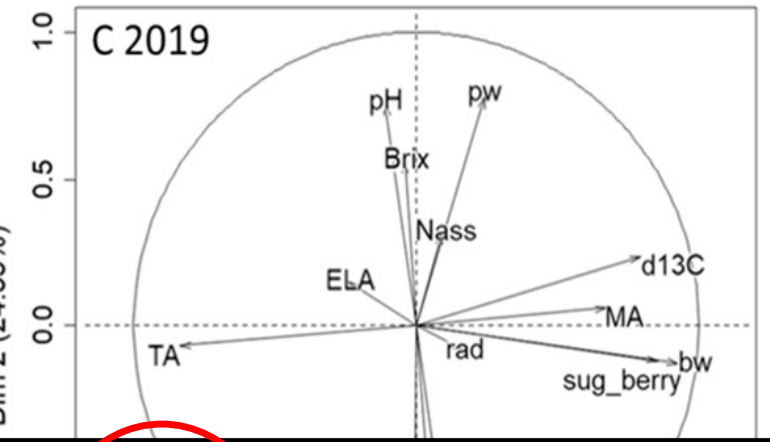
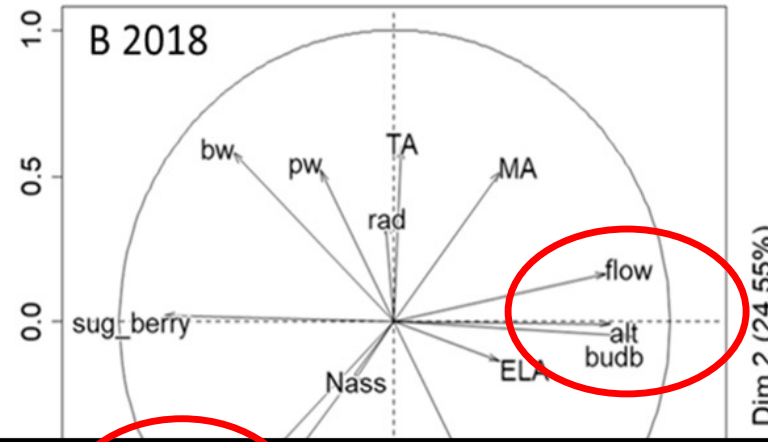
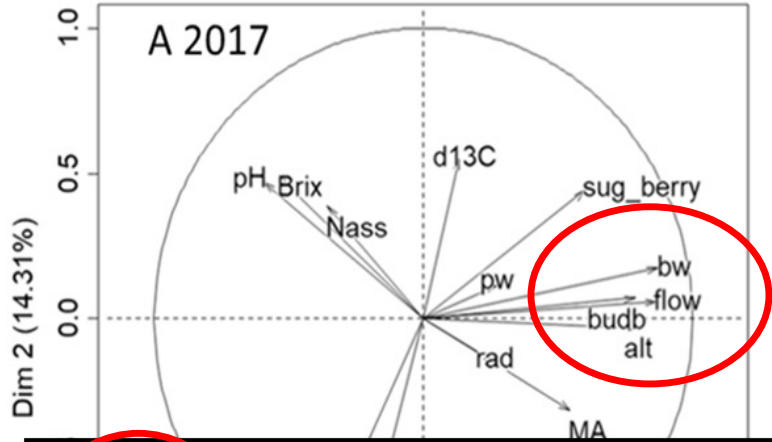


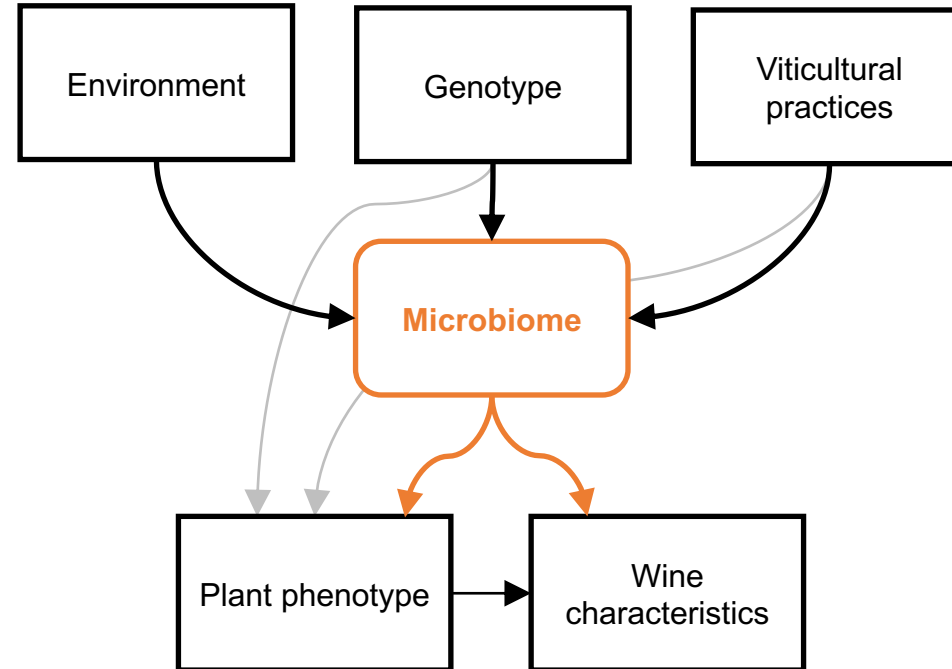
- Phenology
- Vigour
- Yield
- Water stress
- Berry quality
- Temperature



Temperature variability







Terroir

...regional variation in product characteristics

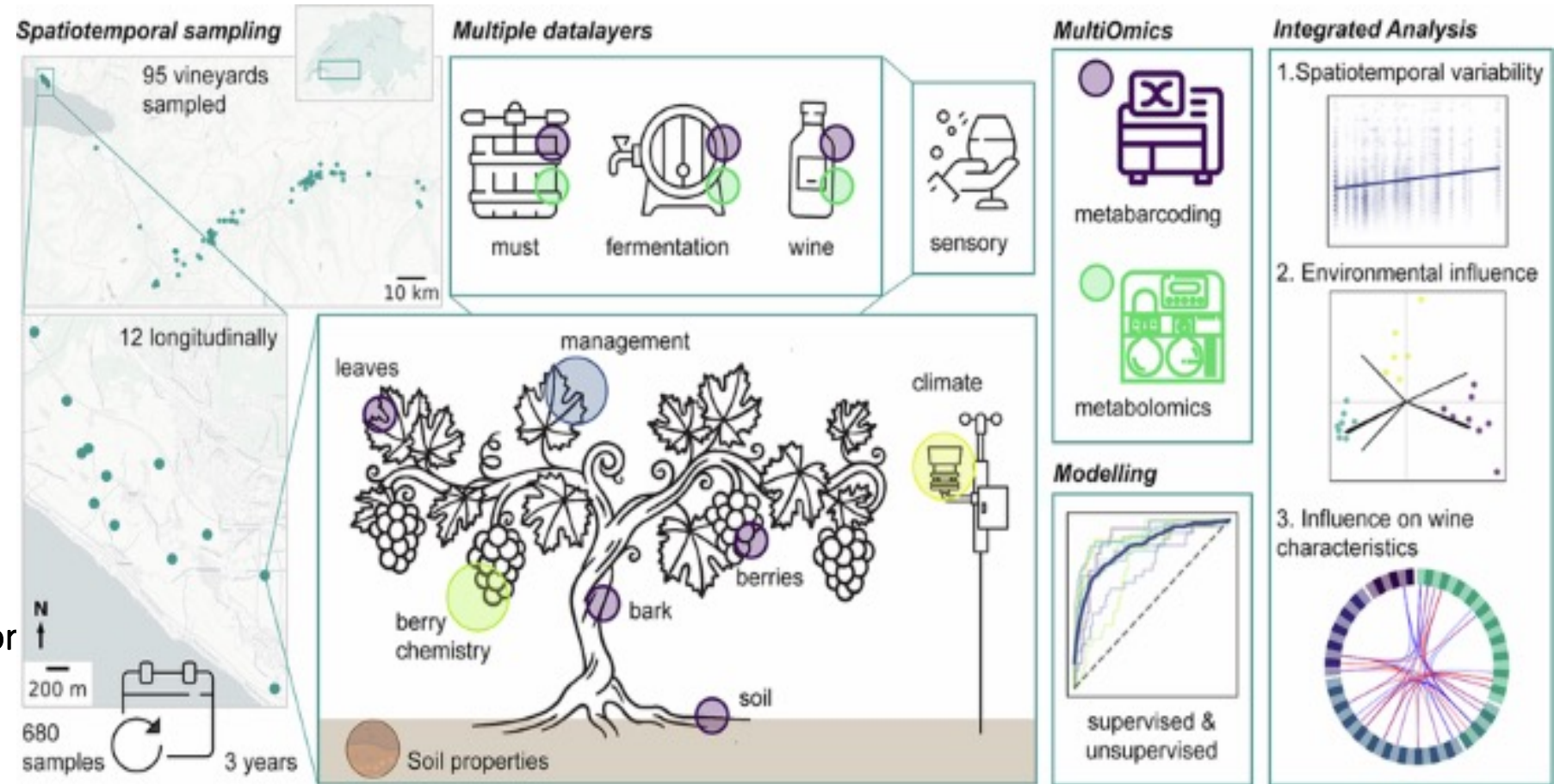
Microbial terroir

... regionally variable microbial communities contributing to wine *terroir*



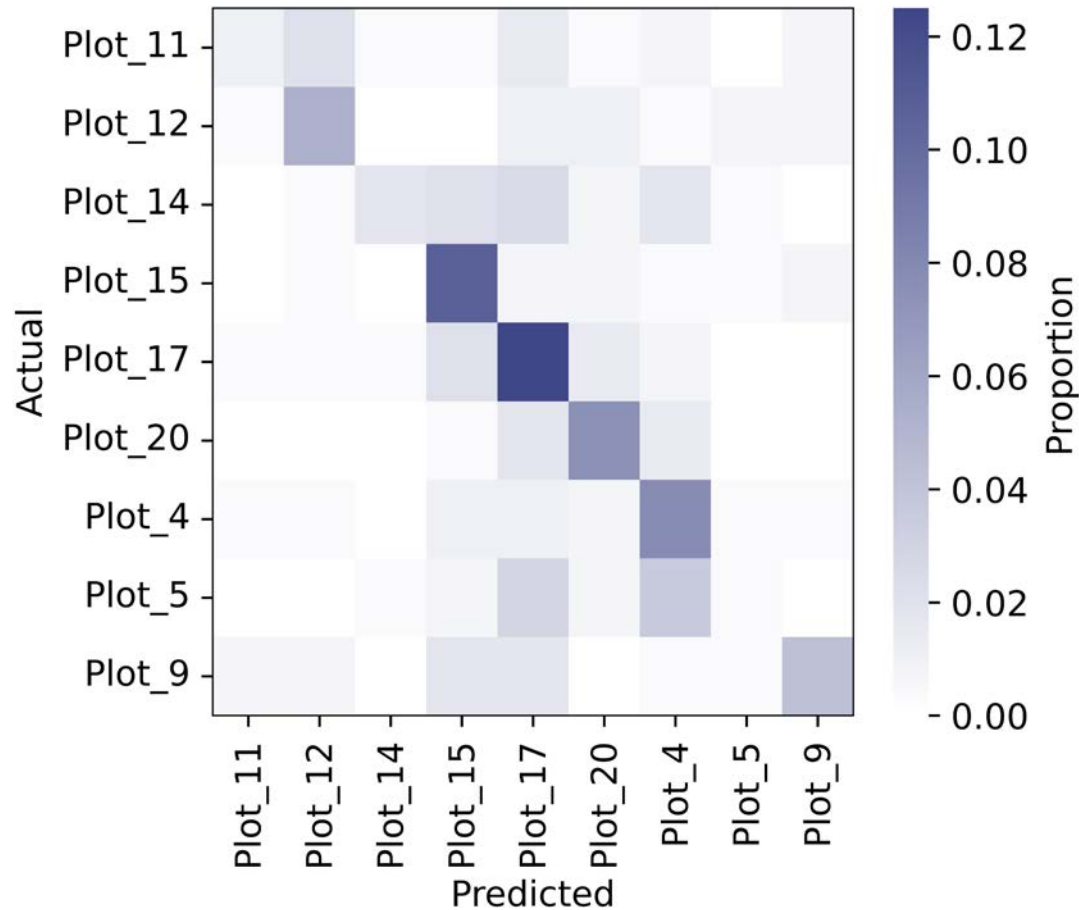
Subset of 12 vineyards + 95
vineyards in the valais

- Temperature, RH
- Grapes/Berries
- Soil
- Bark
- Leaves
- Vinifications
- 16S rRNA gene sequencing for
Bacteria
- ITS amplicon sequencing for
fungi
- Untargeted GC-MS & LC-
MS metabolomics

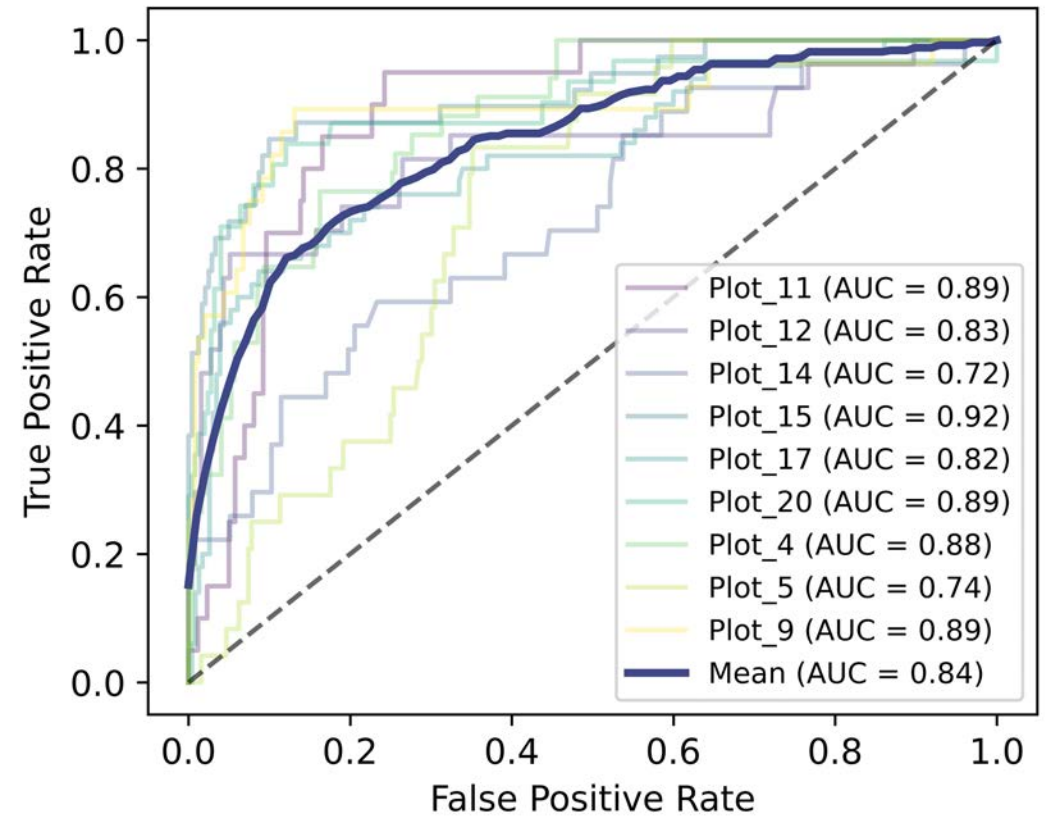


Prediction of the vineyard from fungal community composition.

Nested cross-validation (NCV) random forest classification using harvest 2021 berry samples
Confusion Matrix

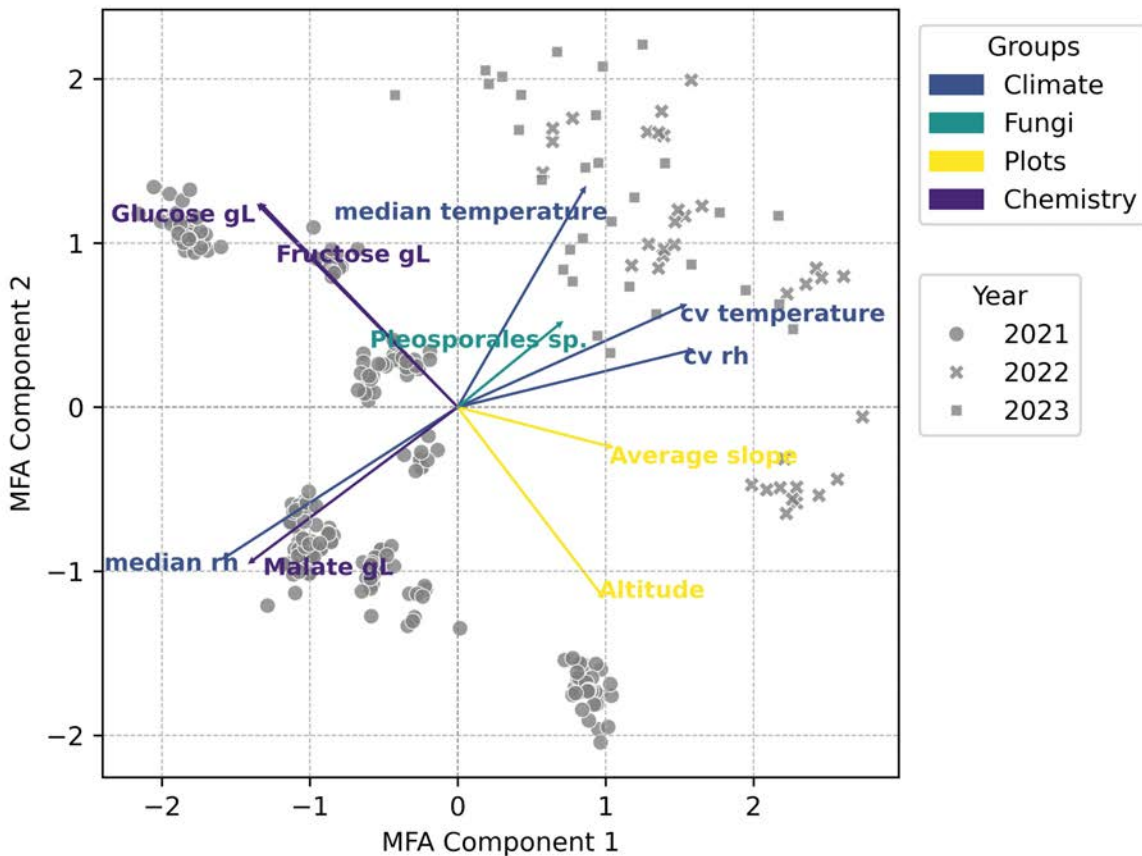


Receiver Operating Characteristic (ROC) curves



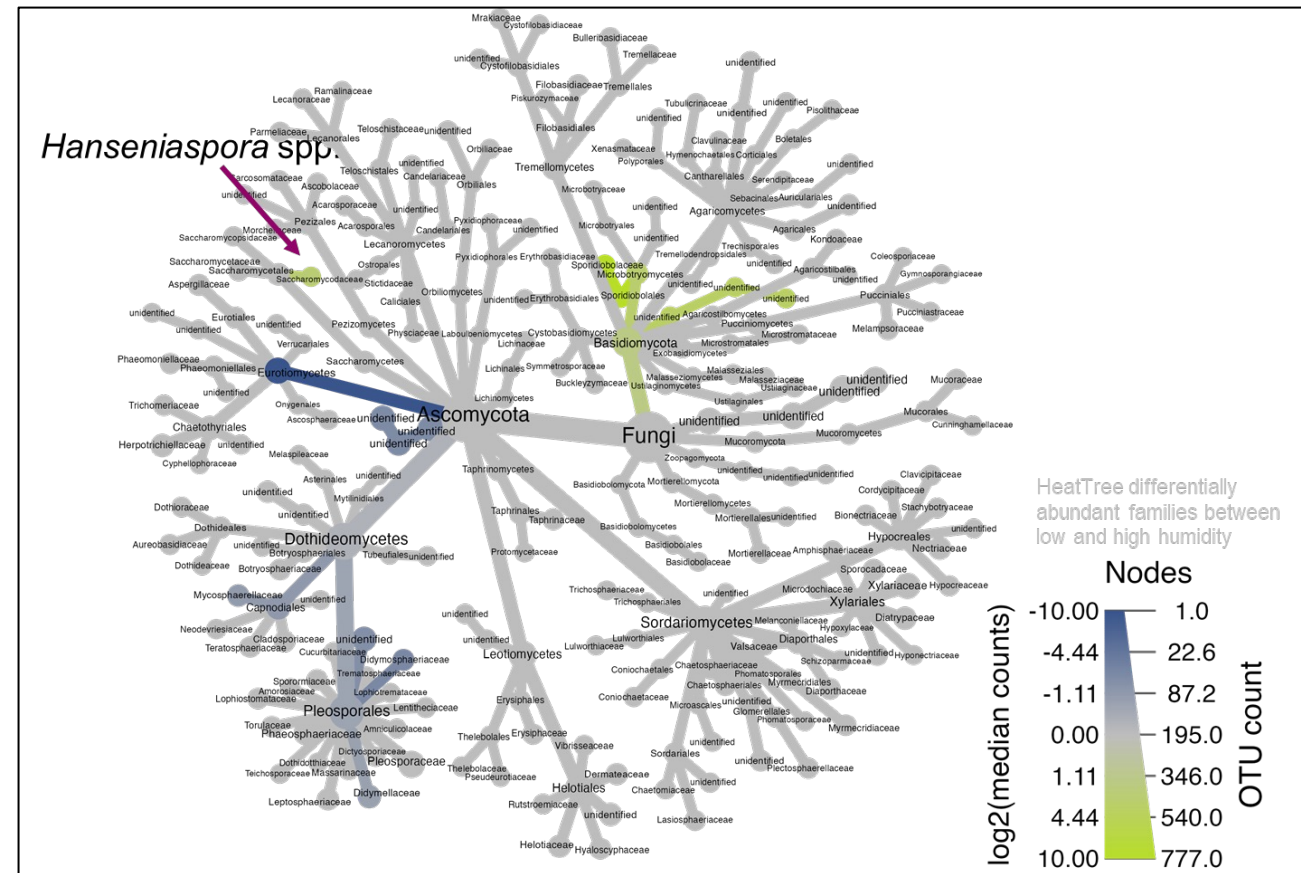
Climate and Topography collectively
are key drivers.

Multifactor Analysis (MFA): Biplot Top 10



10 components: 18.56% of variance

Relative Humidity Influences Presence Of Fermentative Yeasts



Flörl et al., 2026

- Terroir is not only soil, climate, and topography — it also has a microbial dimension
- Microbial terroir is strongly shaped by microclimate and topography
- Vintage effect more dominant than a «soil, geology or pedology effect»

→ Similar to some studies (Pereira *et al.*, 2006b; Tomasi, 2013; Wang *et al.*, 2015) but opposed to others: (Bonfante *et al.*, 2015; Bonfante *et al.*, 2018)



Thank you for your attention

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ETH zürich

Laboratory of Food Biochemistry
Plant Nutrition Research Group



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