

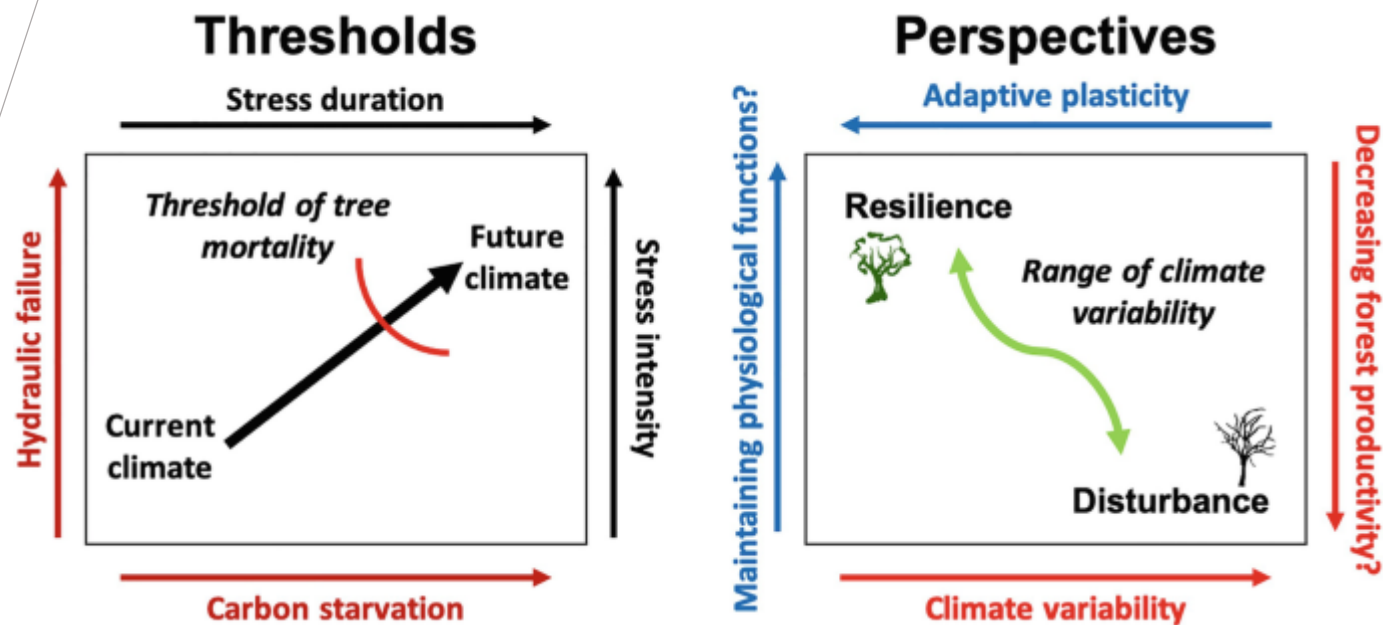
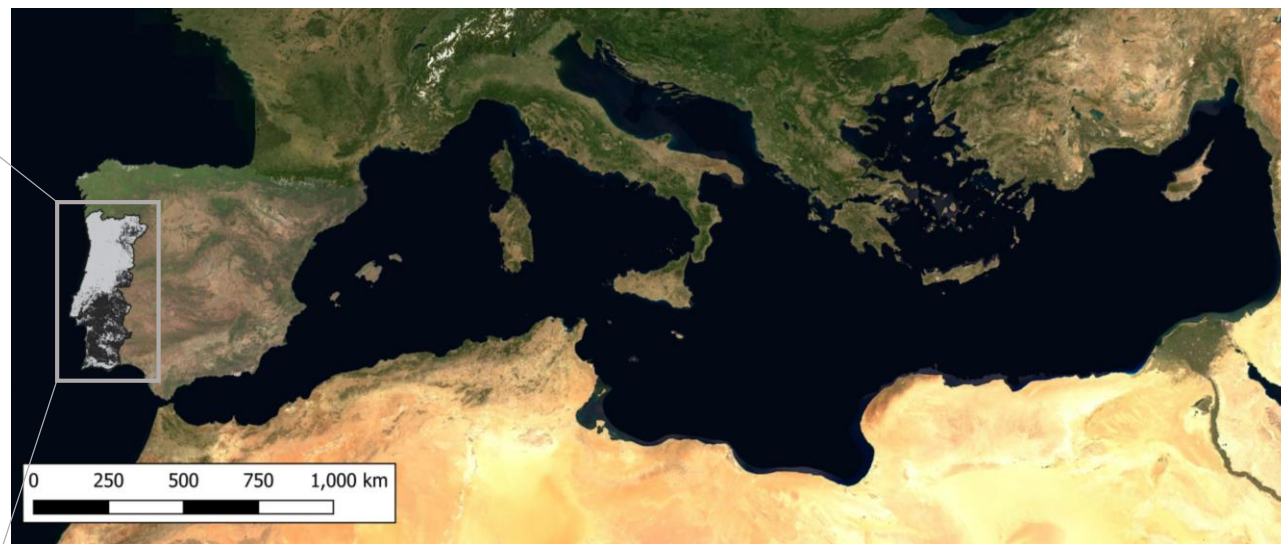
The relationship between canopy greenness and water availability in the Portuguese *montado*

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October – 2023

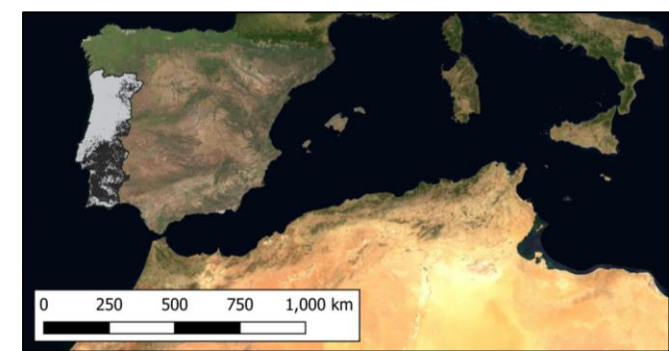
Forest health in a changing climate



Aim: Quantify the relationship between vegetation greenness and water availability in the Portuguese *montado*

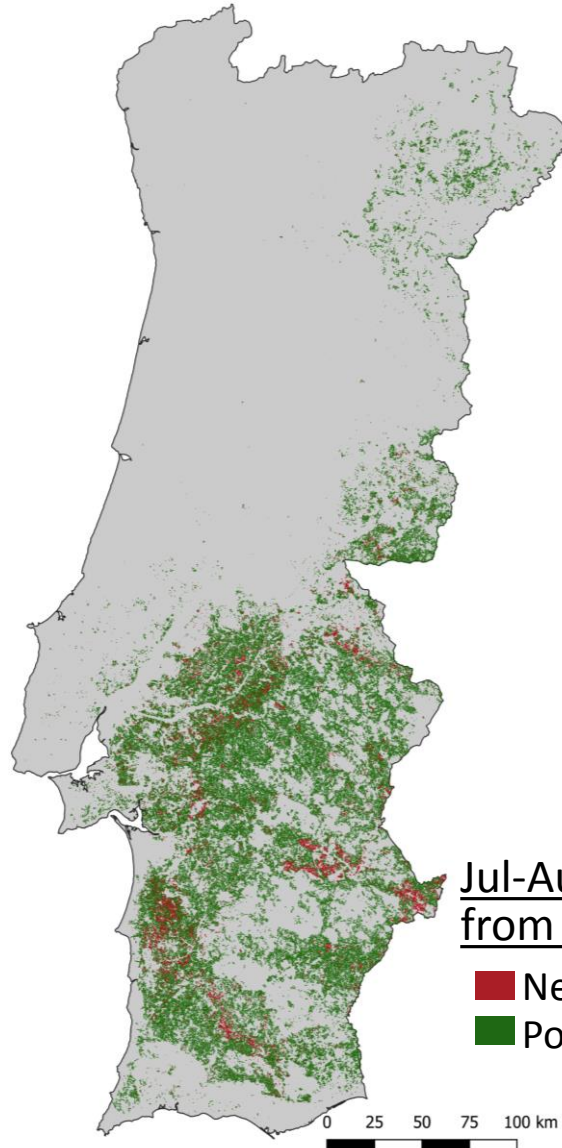
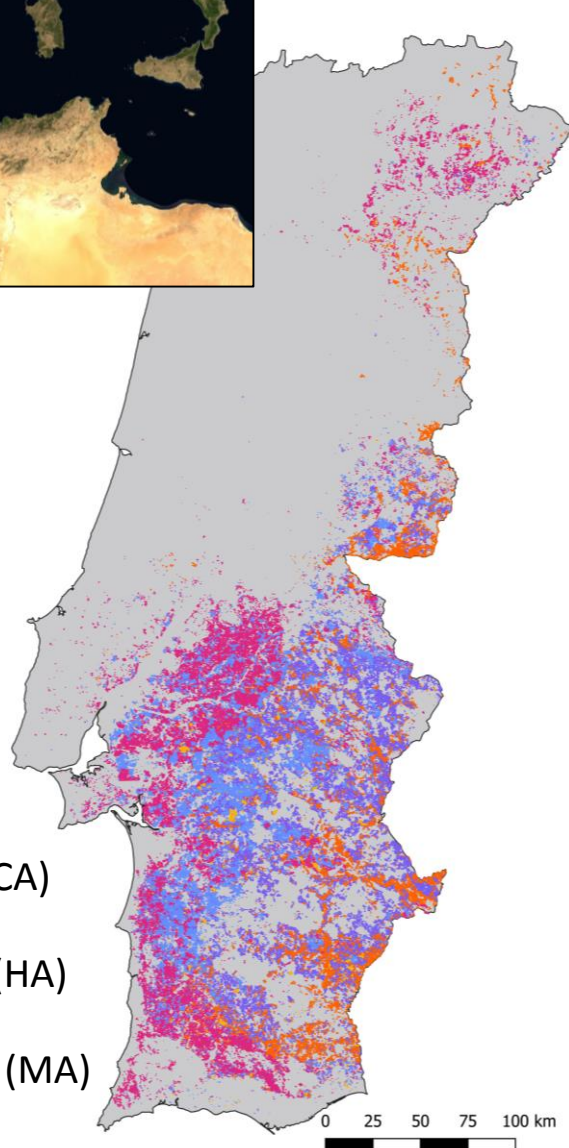
- Focusing on the relationship at different time lags
- Determine whether there are differences between land uses
- Expect past trends of vegetation to play a role

Stratified random sampling – 1,000 points with 100 points per sampling class



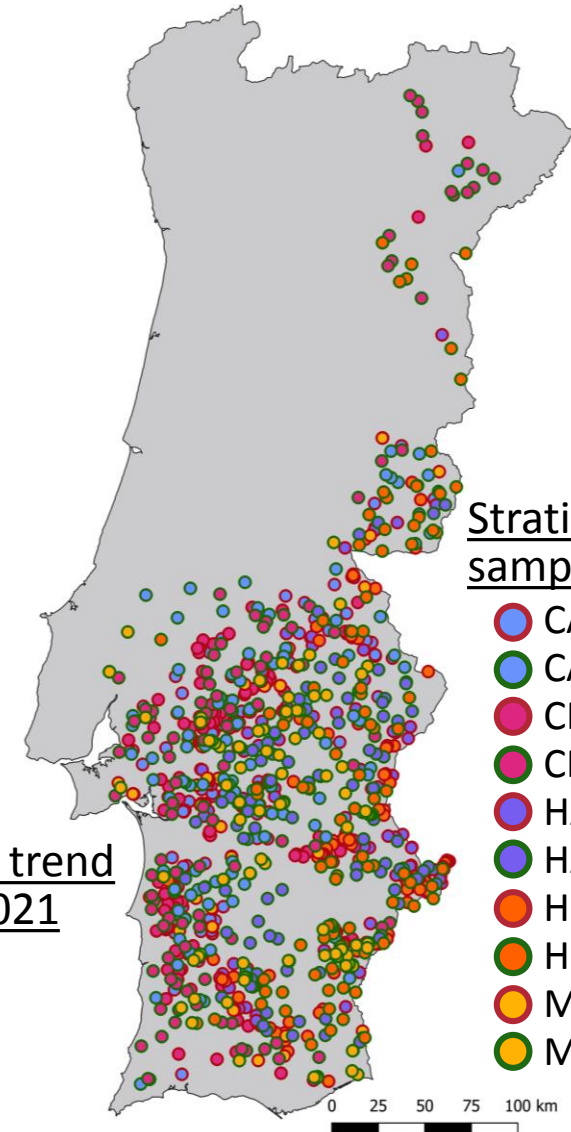
Land Uses (LUs)

- Cork Agroforest (CA)
- Cork Forest (CF)
- Holm Agroforest (HA)
- Holm Forest (HF)
- Mixed Agroforest (MA)



Jul-Aug NDVI trend from 1984-2021

- Negative
- Positive



Stratified random sampling class

- CA negative
- CA positive
- CF negative
- CF positive
- HA negative
- HA positive
- HF negative
- HF positive
- MA negative
- MA positive

NDVI – Normalized Difference Vegetation Index

HEALTHY
VEGETATION REFLECTANCE

50% NIR 8% RED



NDVI = 0.72

STRESSED
VEGETATION REFLECTANCE

40% NIR 30% RED



NDVI = 0.14

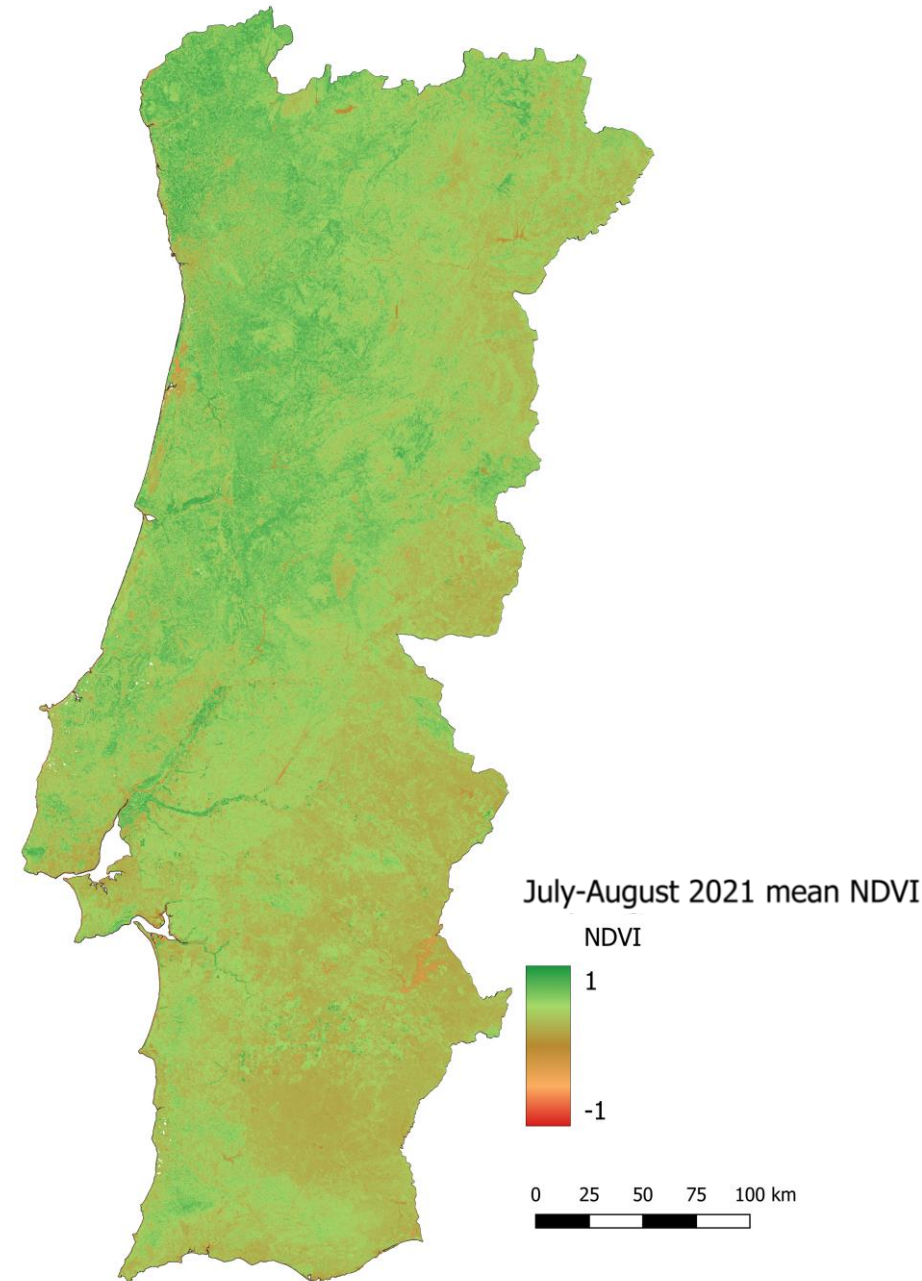
$$\text{NDVI} = \frac{\text{NIR} - \text{RED}}{\text{NIR} + \text{RED}}$$

Source: agricolus.com

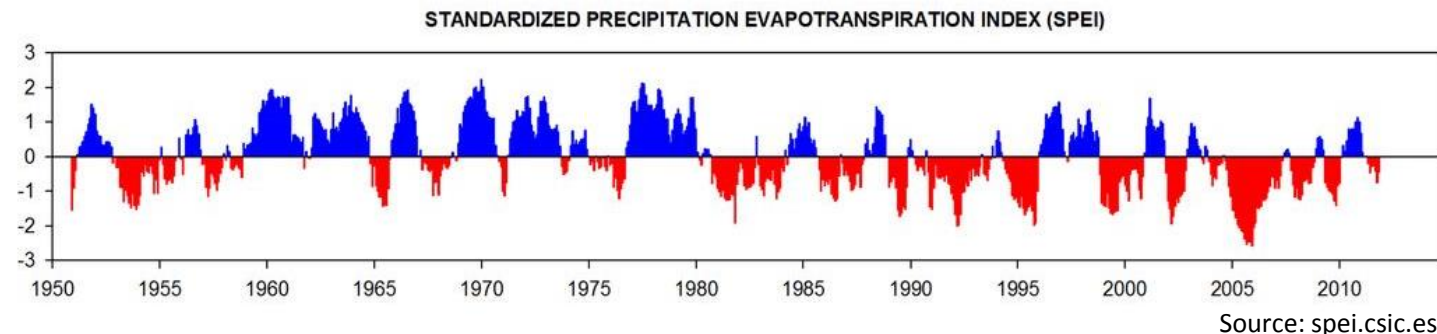
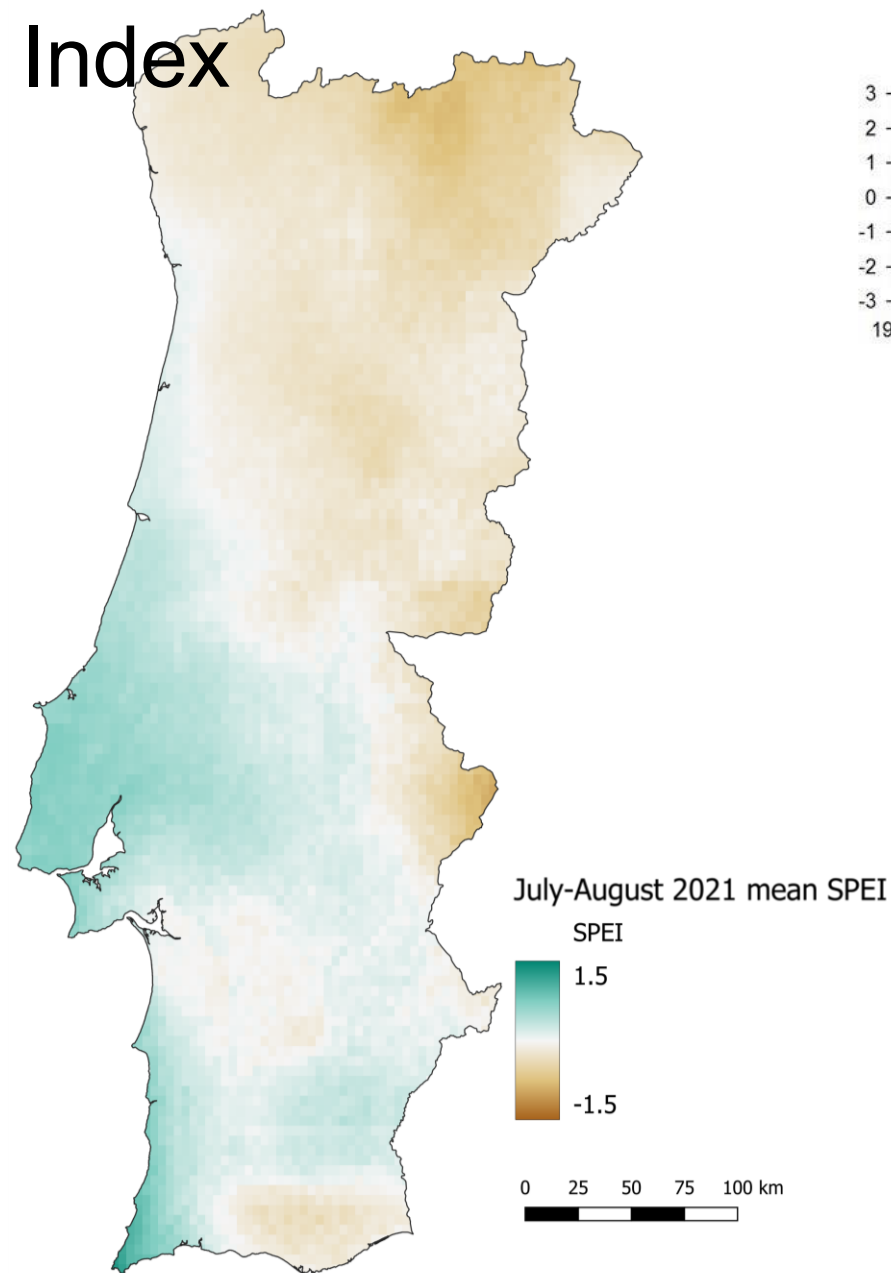
Landsat 5 TM
Landsat 7 ETM+
Landsat 8 OLI



Inter-calibrated mean
July & August NDVI
values from 1984-2021



SPEI – Standardized Precipitation Evapotranspiration Index



[Precipitation – Potential Evapotranspiration]

TerraClimate dataset – Climatic Water Balance (CWB) calculation and extraction



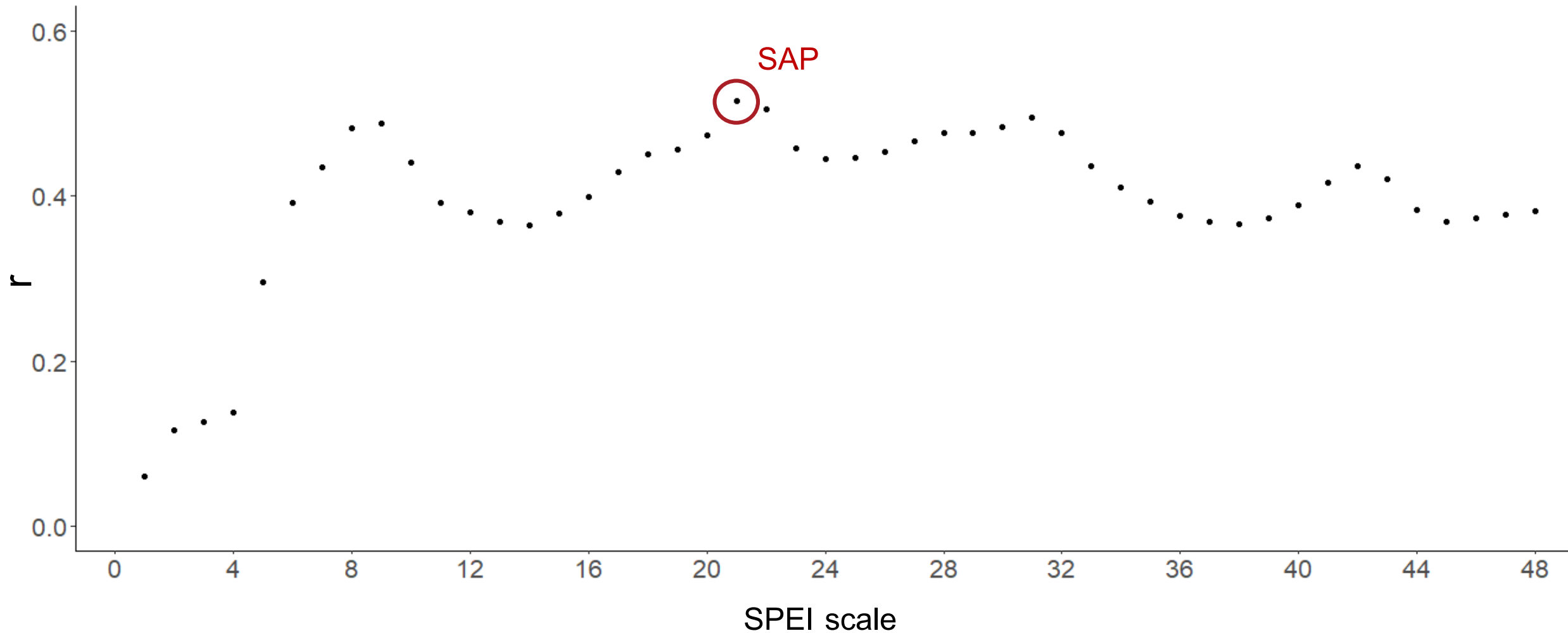
SPEI calculation for July & August – 48 periods of cumulative CWB values



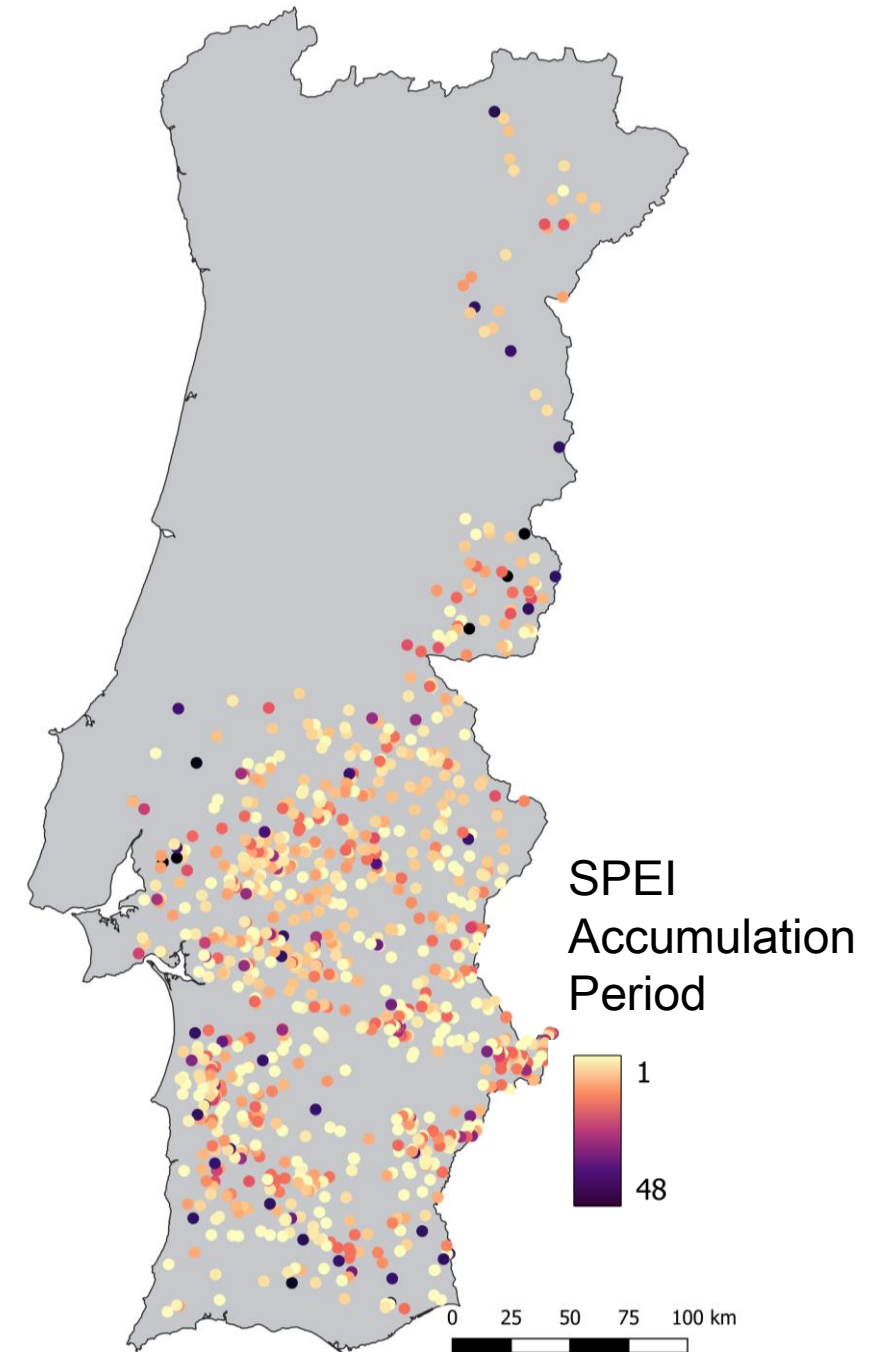
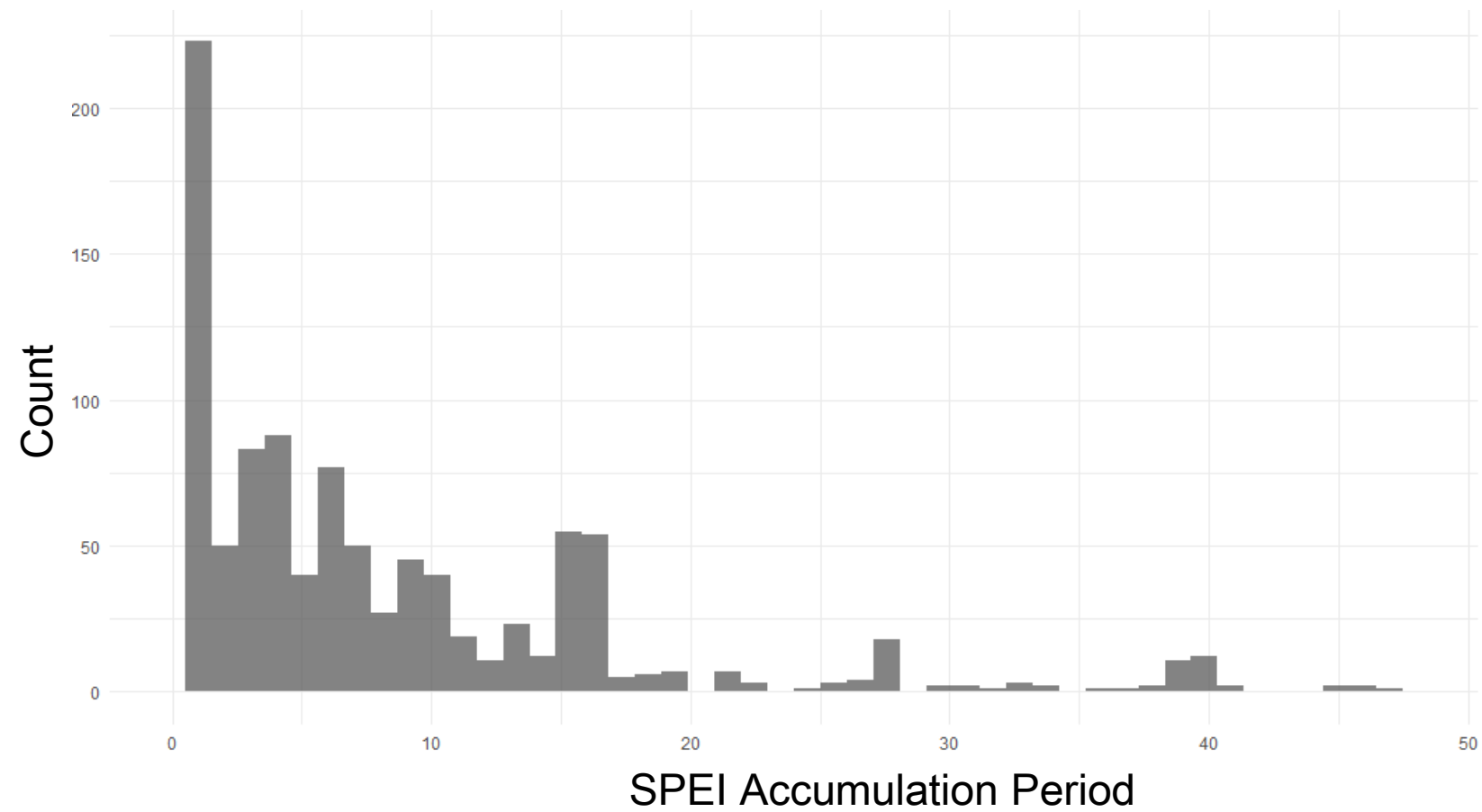
mean July & August $SPEI_1 - SPEI_{48}$ values from 1984 to 2021

Pearson's correlations – NDVI ~ SPEI₁₋₄₈

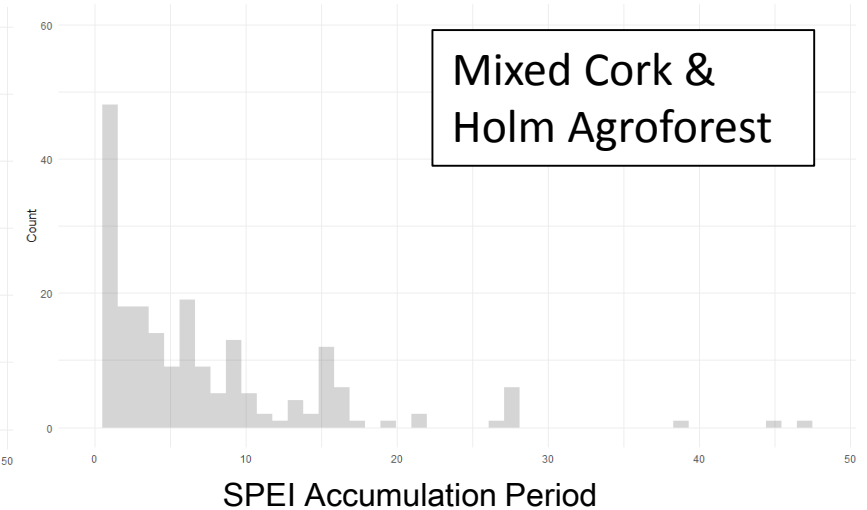
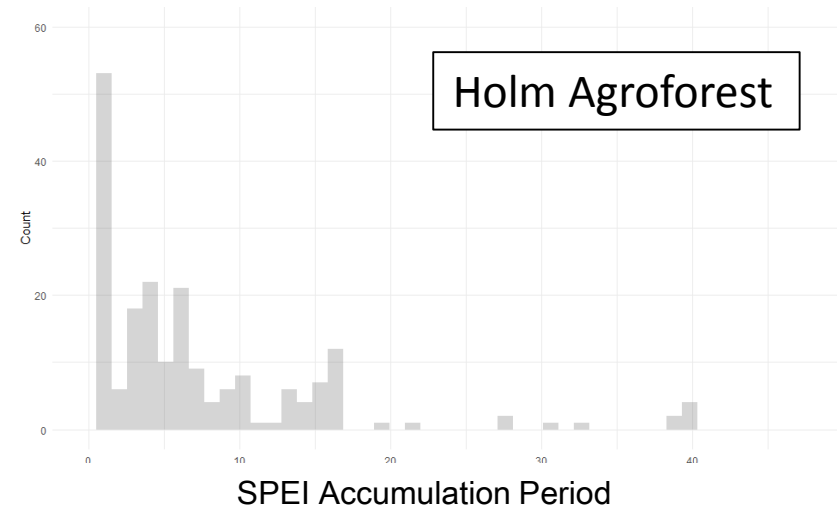
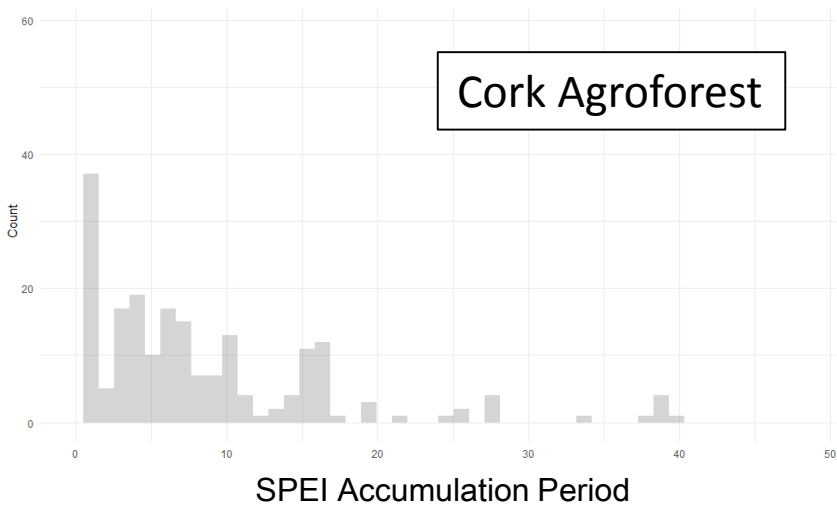
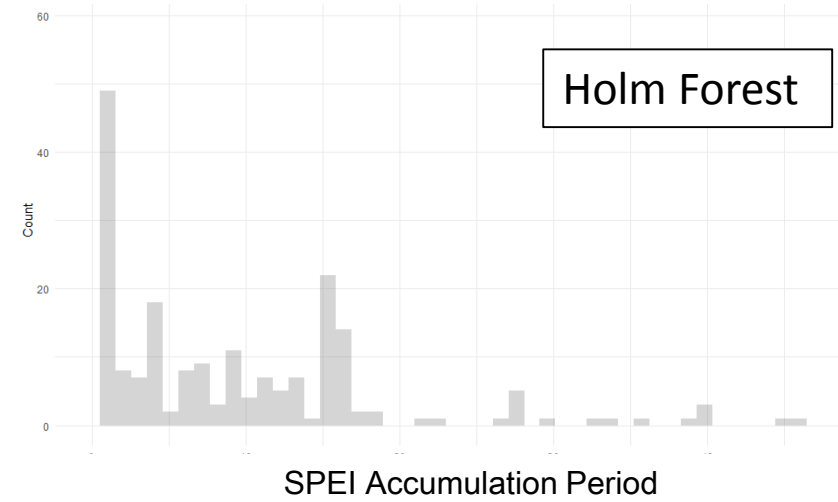
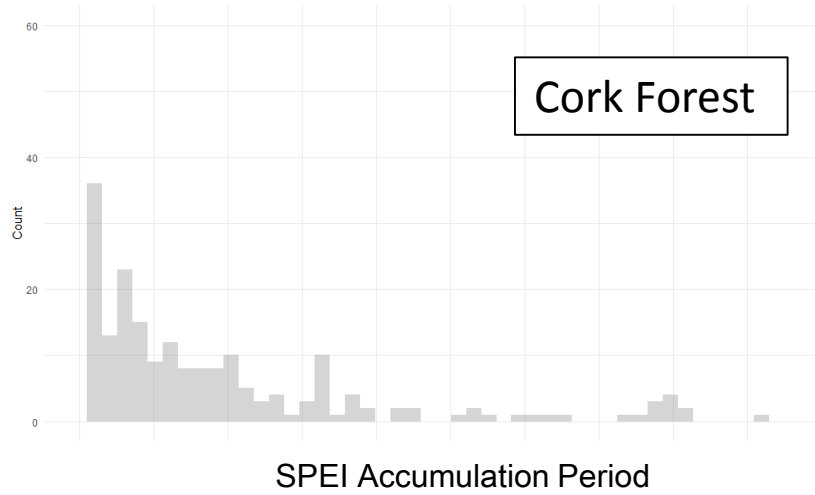
SPEI Accumulation Period (SAP) – Period of cumulative water availability conditions most linked with variations in vegetation greenness



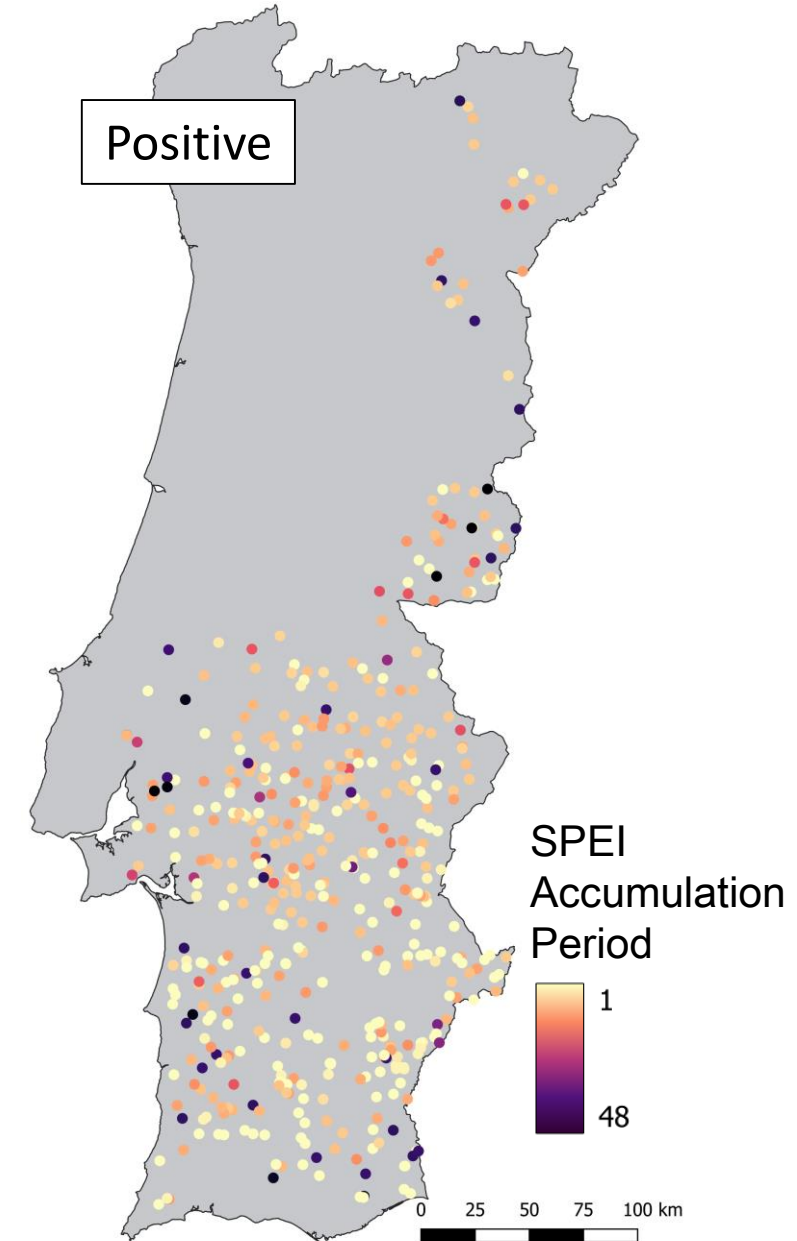
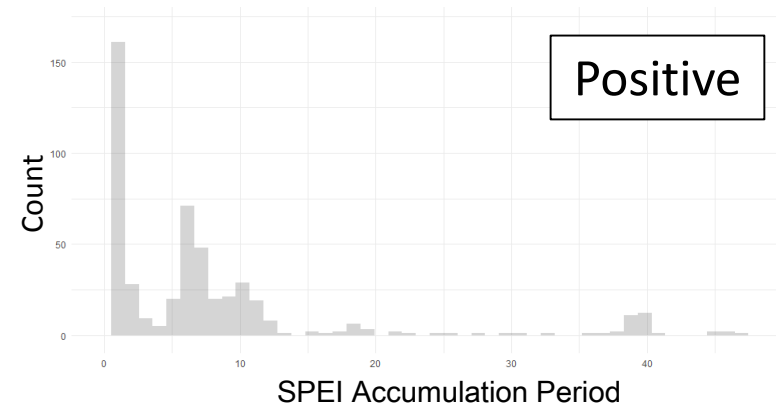
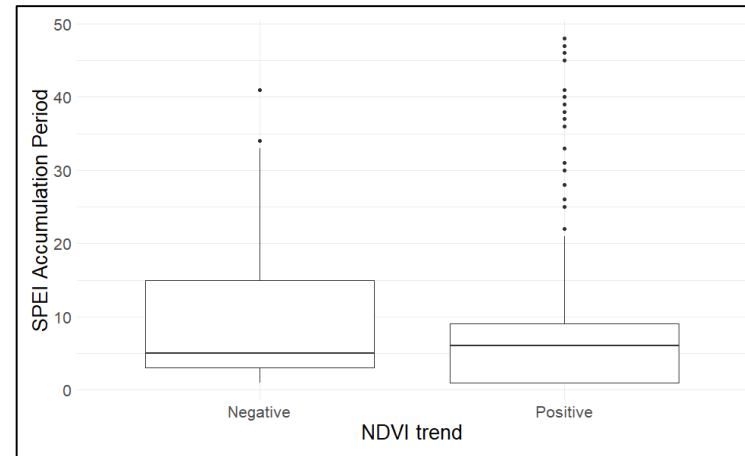
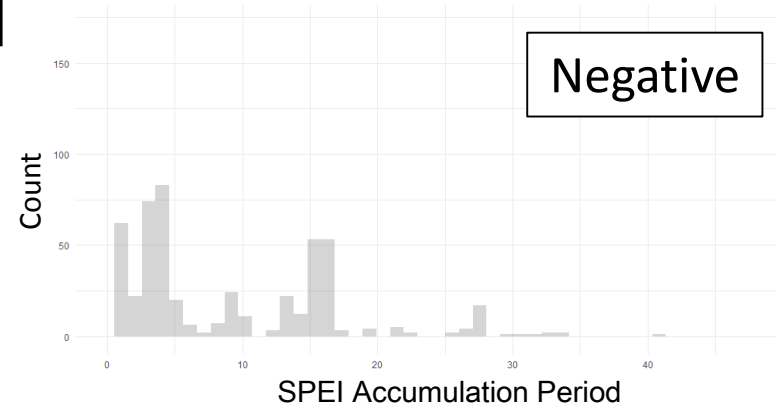
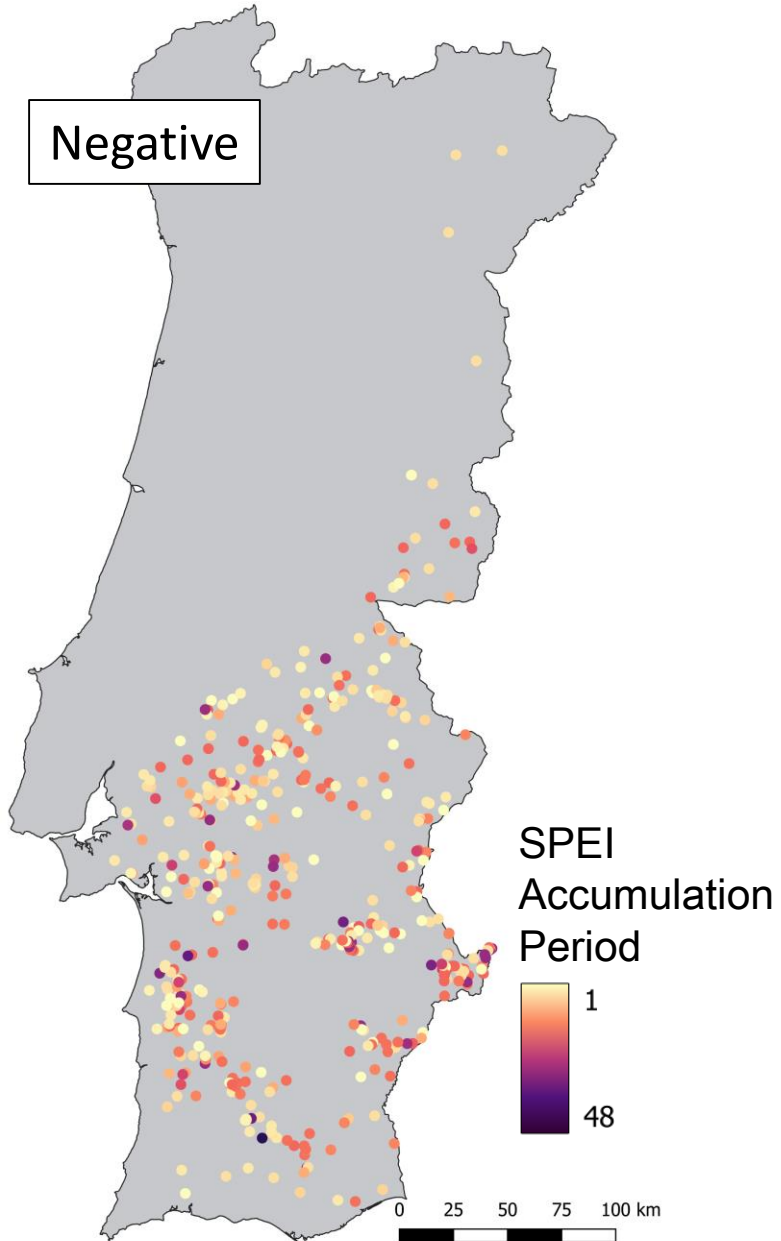
Results – All sampling points



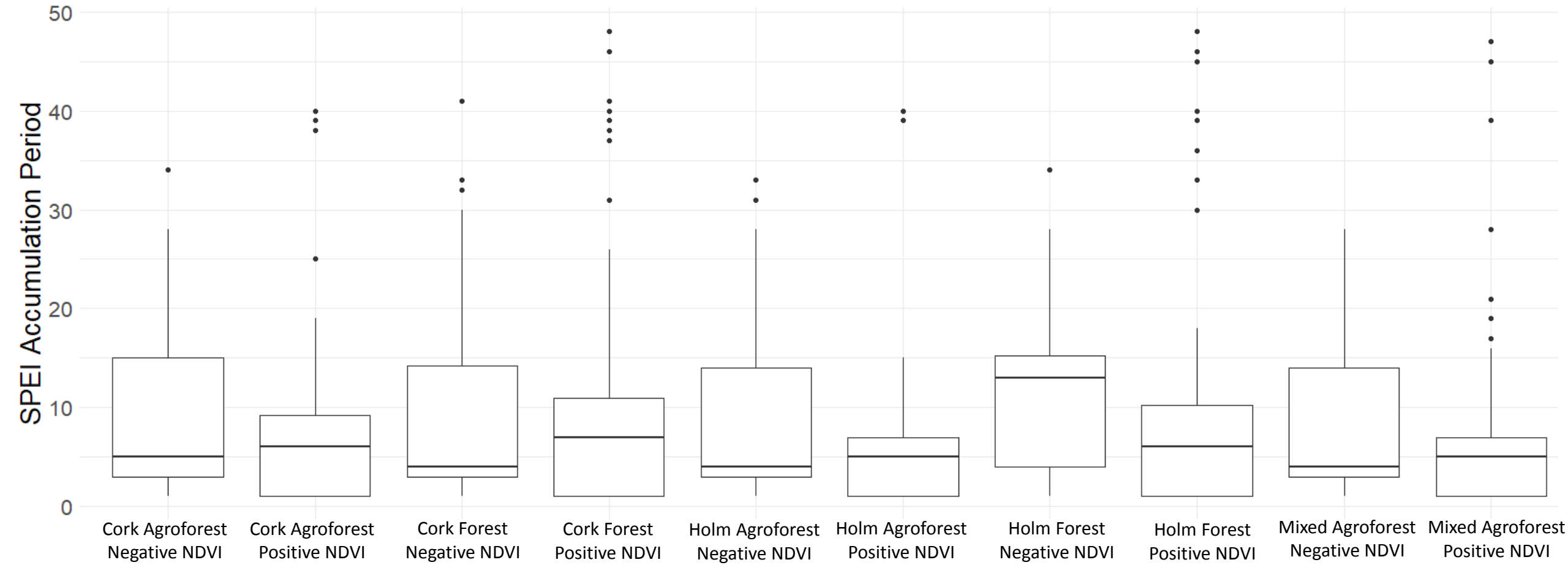
Results – by Land Use



Results – by NDVI trend



Results – by stratification class



Aim: Quantify the relationship between vegetation greenness and water availability in the Portuguese *montado*

- Focusing on the relationship at different timescales
 - A large portion of points had a SPEI Accumulation Period of 1 month.
- Determine whether there are differences between land uses
 - Land uses presented similar distribution in SPEI Accumulation Periods.
- Expect past trends of vegetation to play a role
 - We found differences between areas of contrasting trends in vegetation greenness.
 - Positive NDVI trend – more similar periods in which changes in water availability influence greenness.
 - Negative NDVI trend – slightly more dispersed patterns of SPEI Accumulation Periods, suggesting the vegetation in these areas may have a more varied response.

Thank you for your attention!

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