Event Week on Heatwaves and Droughts 2023

Session 3 - 31 May 2023

Impacts of Extremes on Vegetation dynamics and Crops

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Context

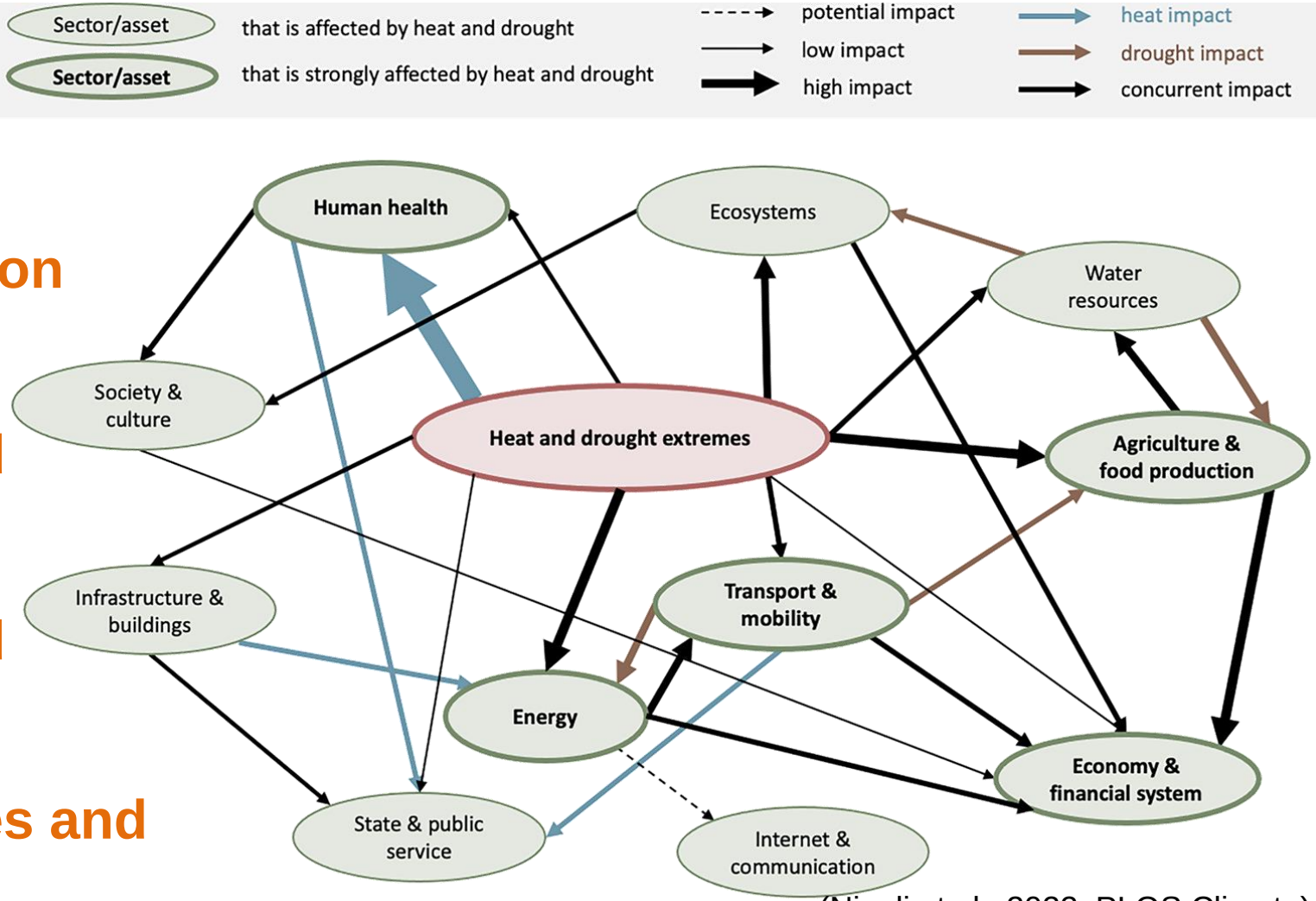
1 Drought and vegetation

2 Heatwaves and vegetation

3 Drought, heatwaves and vegetation

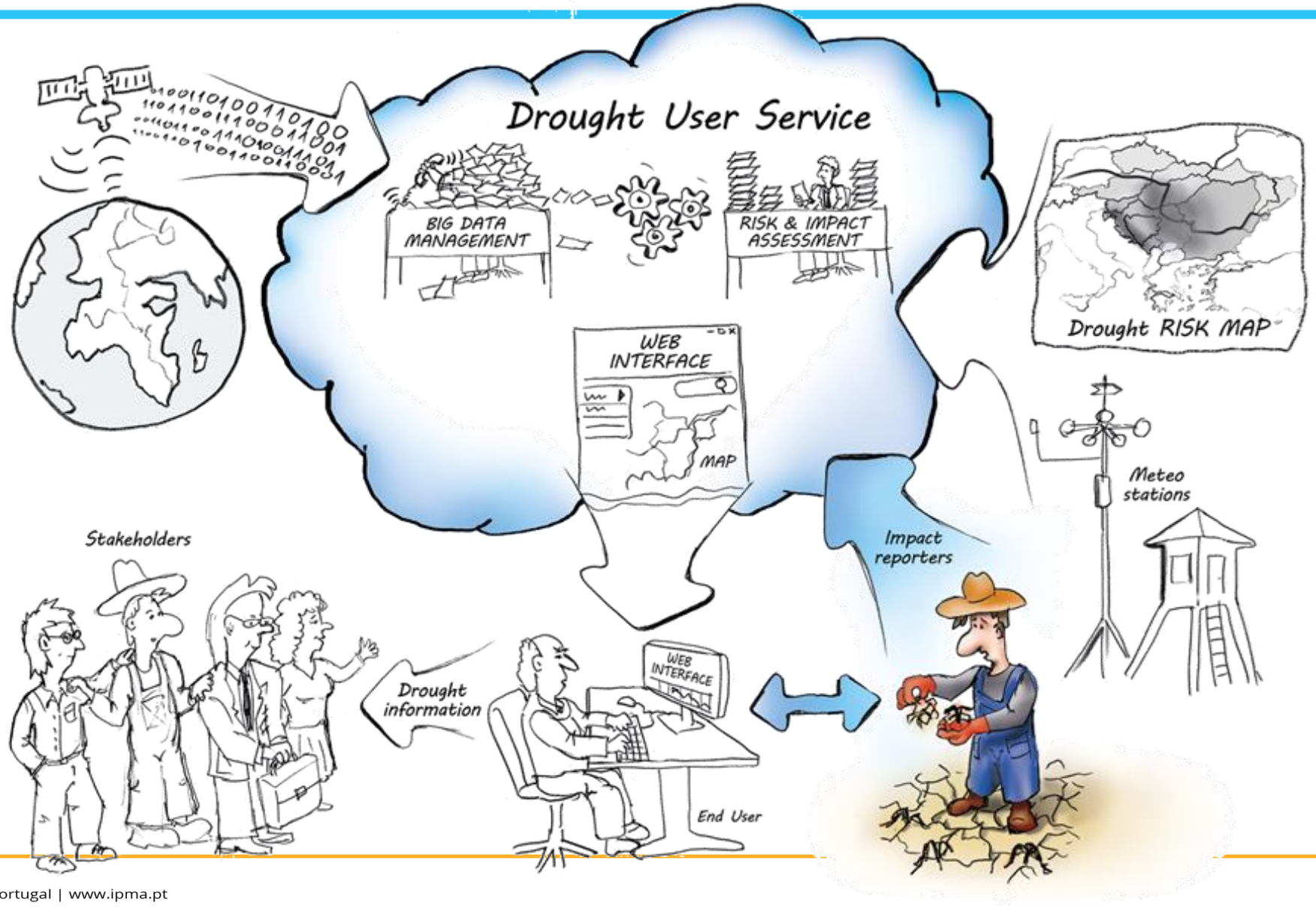
4 Drought, heatwaves and crops

5 Drought, heatwaves, fires and vegetation



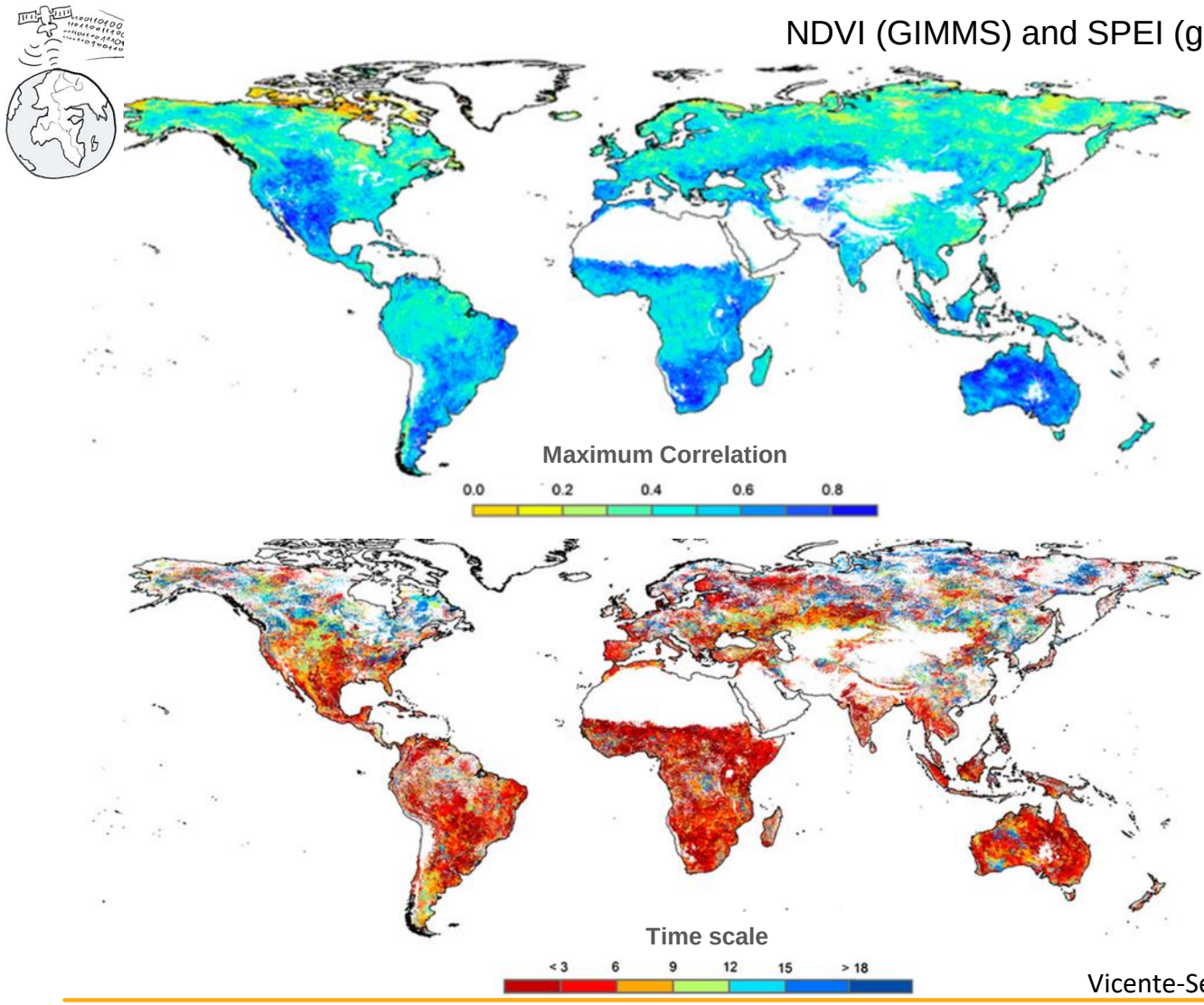
(Niggli et al., 2022, PLOS Climate)

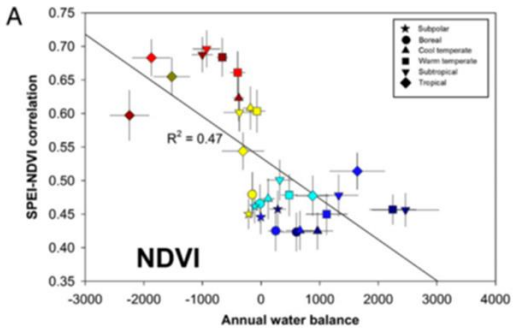
1 Drought and vegetation

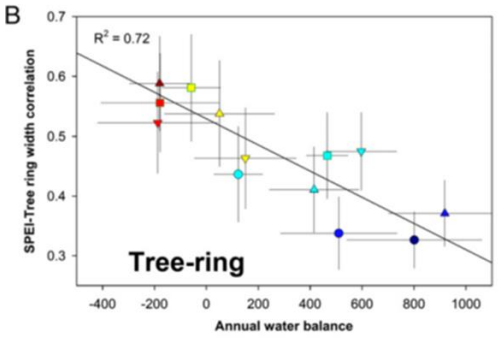


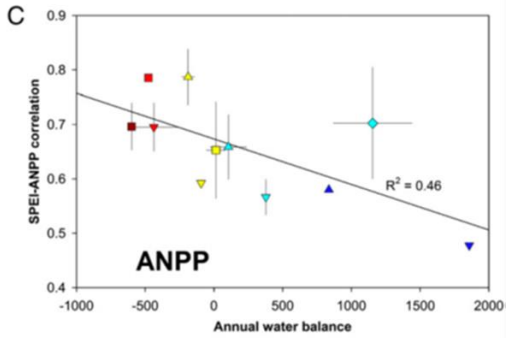
1 Drought and vegetation

NDVI (GIMMS) and SPEI (global)





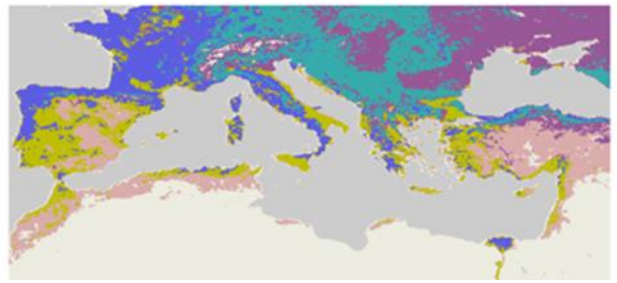


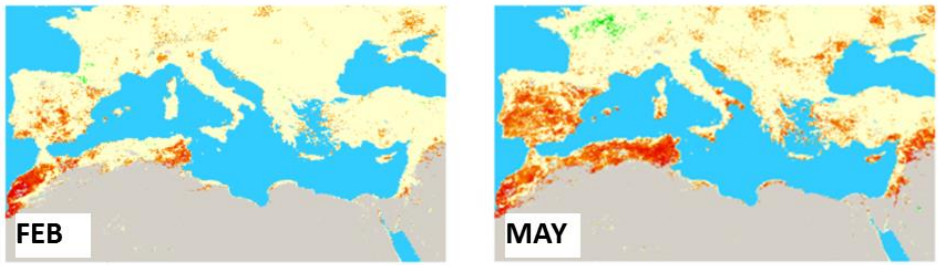


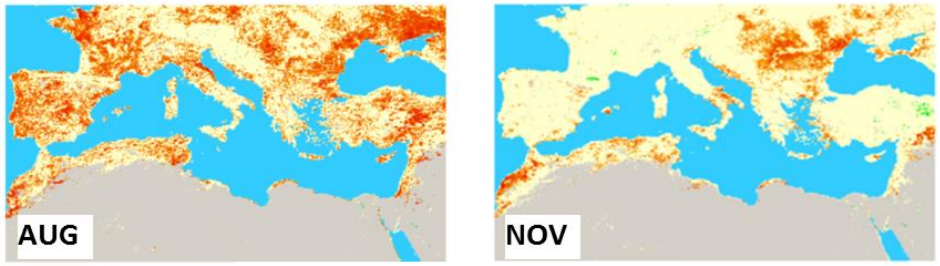
Vicente-Serrano et al (2013), PNAS

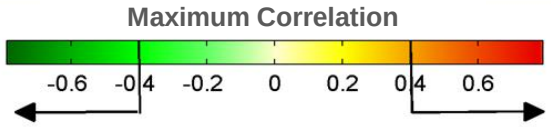
1 Drought and vegetation

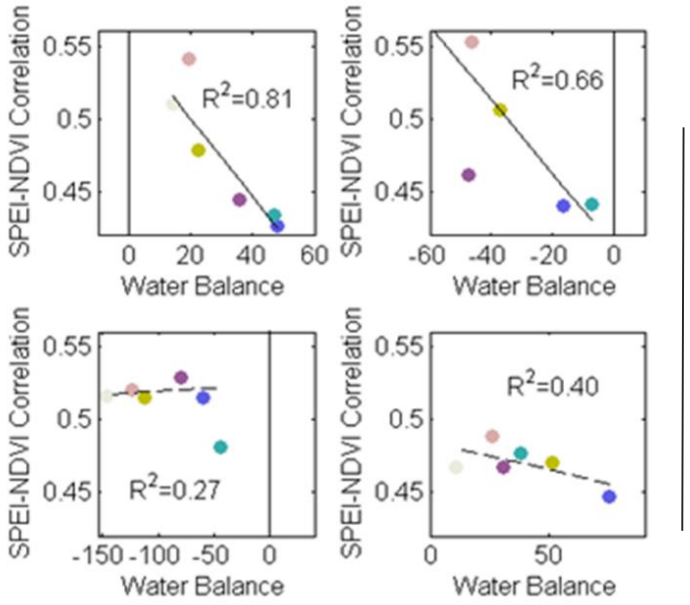
NDVI (GIMMS) and SPEI (Mediterranean)

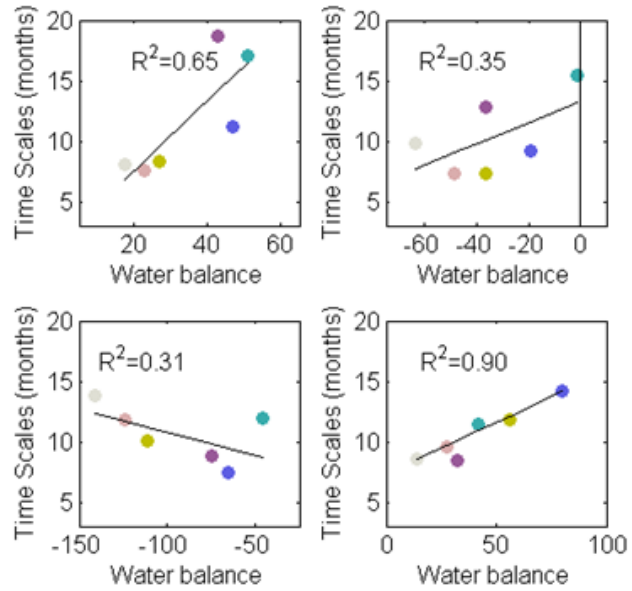












Gouveia et al (2017, Global and Planetary Change)

$$TCI = \frac{LST_{max} - LST}{LST_{max} - LST_{min}},$$

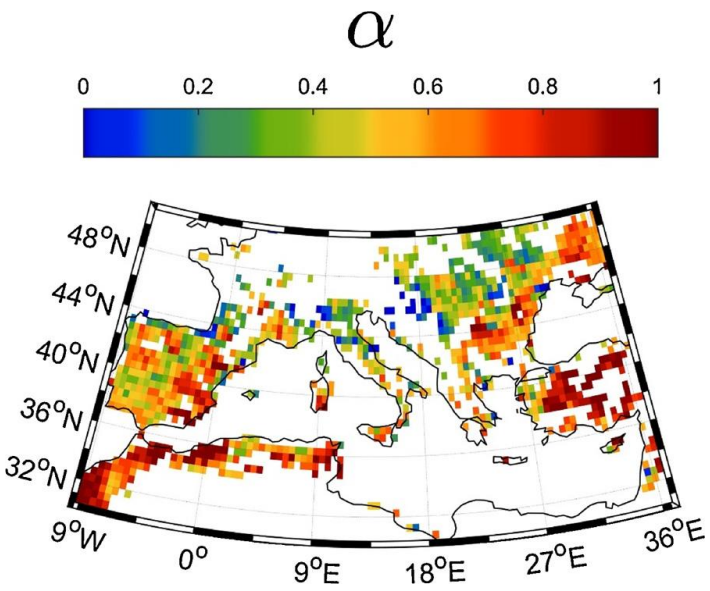
$$VCI = \frac{NDVI - NDVI_{min}}{NDVI_{max} - NDVI_{min}},$$

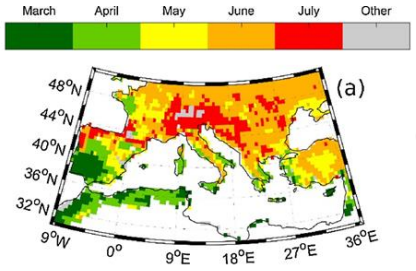
$$VHI = \alpha VCI + (1 - \alpha)TCI,$$

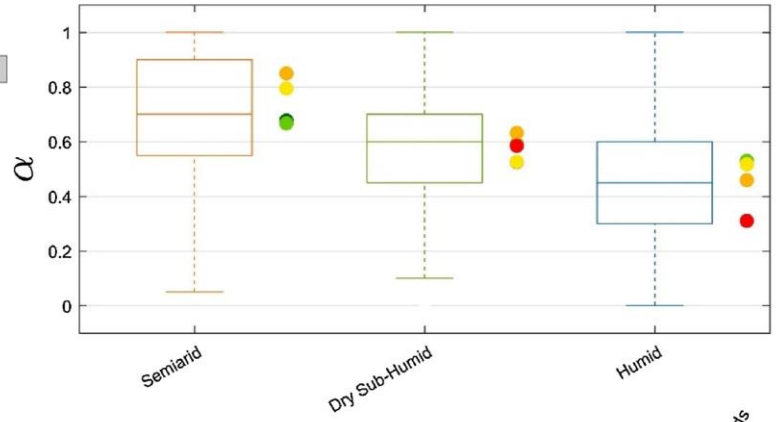
α = 0.5 (?)

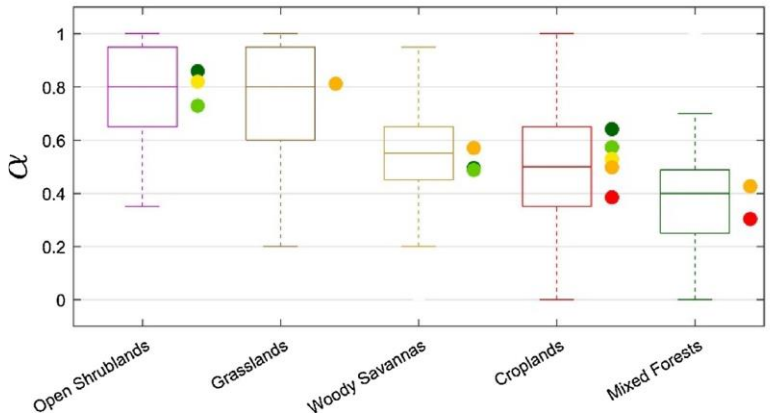
(Kogan, 1997, 2001)

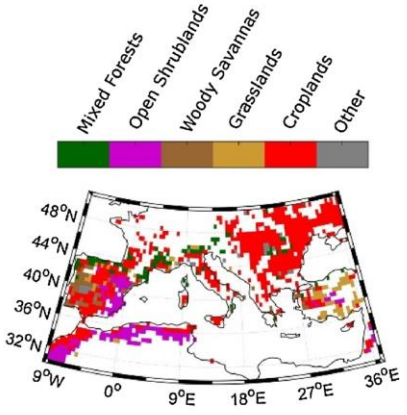
VHI and SPEI (Mediterranean)











Bento et al (2019a)

1 Drought and vegetation

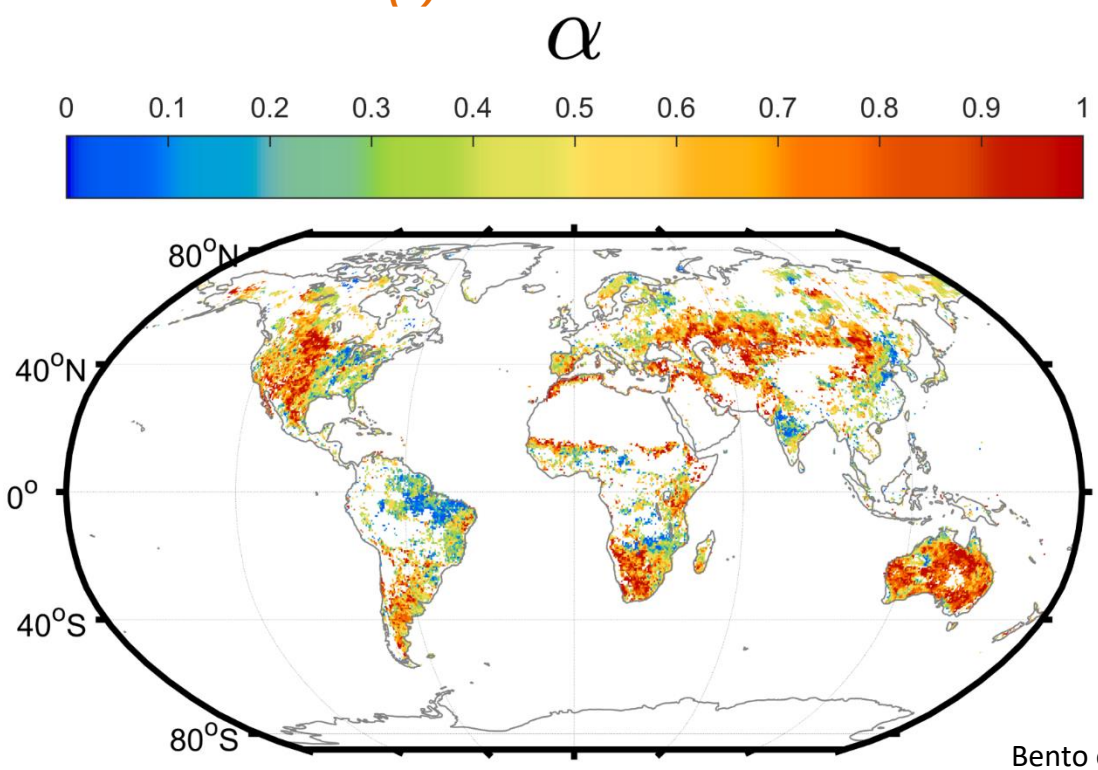
$$TCI = \frac{LST_{max} - LST}{LST_{max} - LST_{min}},$$

$$VCI = \frac{NDVI - NDVI_{min}}{NDVI_{max} - NDVI_{min}},$$

$$VHI = \alpha VCI + (1 - \alpha)TCI,$$

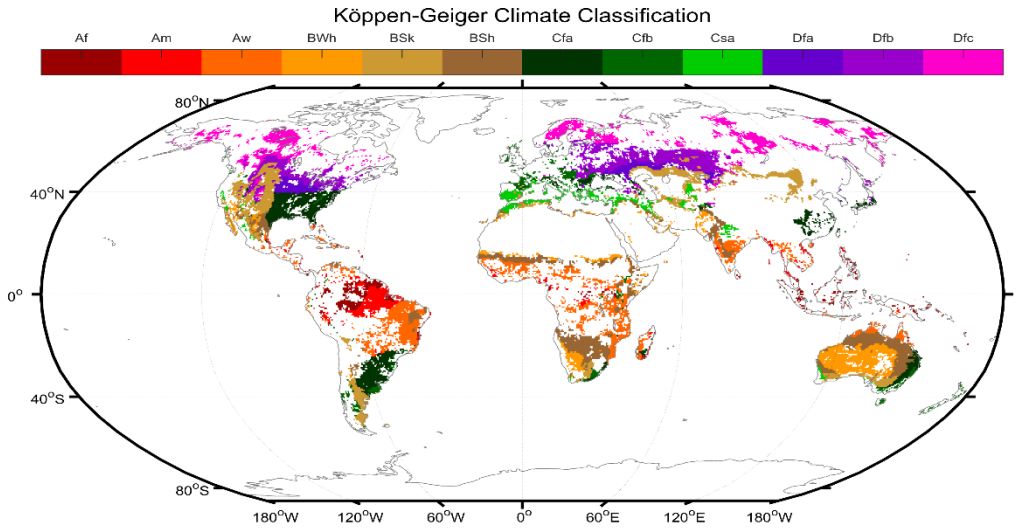
α = 0.5 (?)

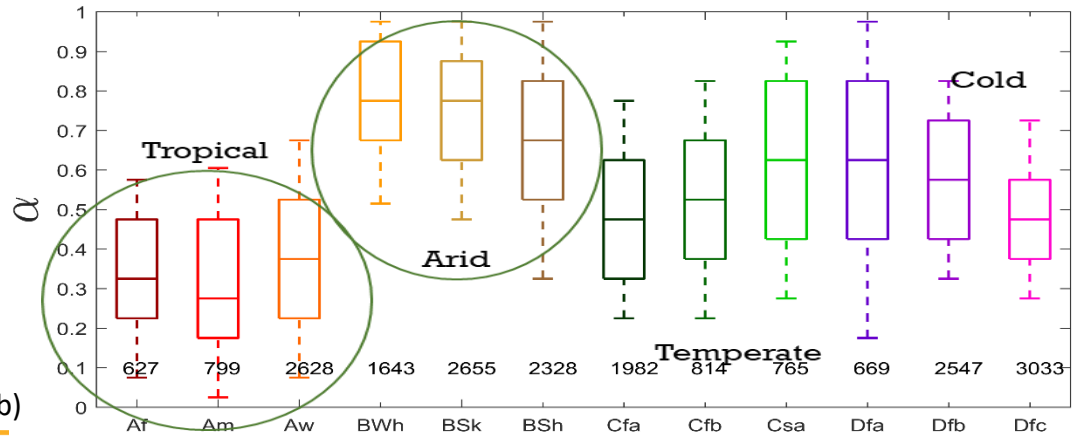
VHI and SPEI (Global)



Bento et al (2019b)

Stratification of the contributions





Are remote sensing products useful for monitoring drought impacts on vegetation at global and regional scale ?

2 Heatwaves and vegetation

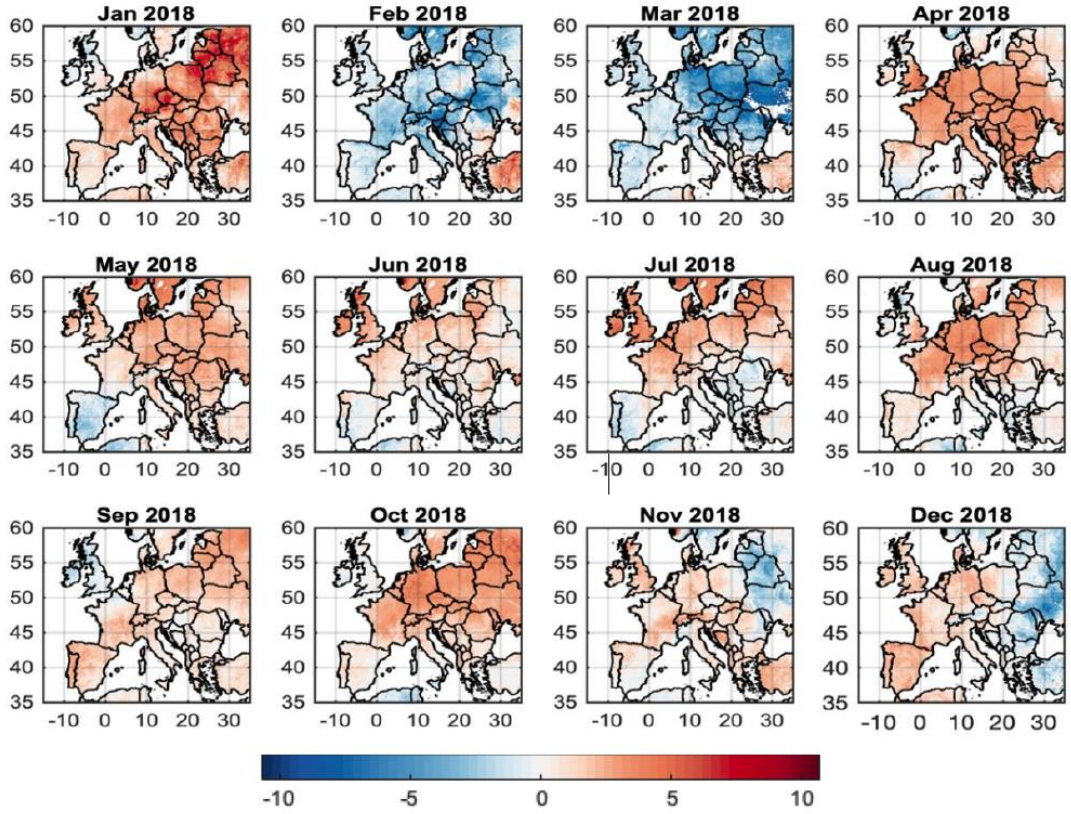


Figure 3. Monthly anomaly values of MSG LST during 2018 over Europe, with respect to 2004–2019.

LST (SEVIRI – MSG)
2004-2019

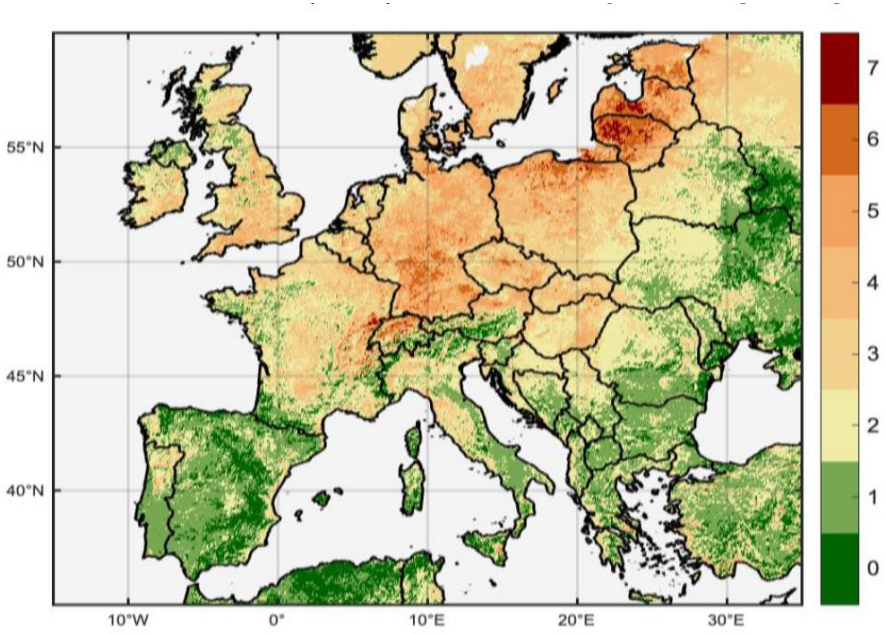
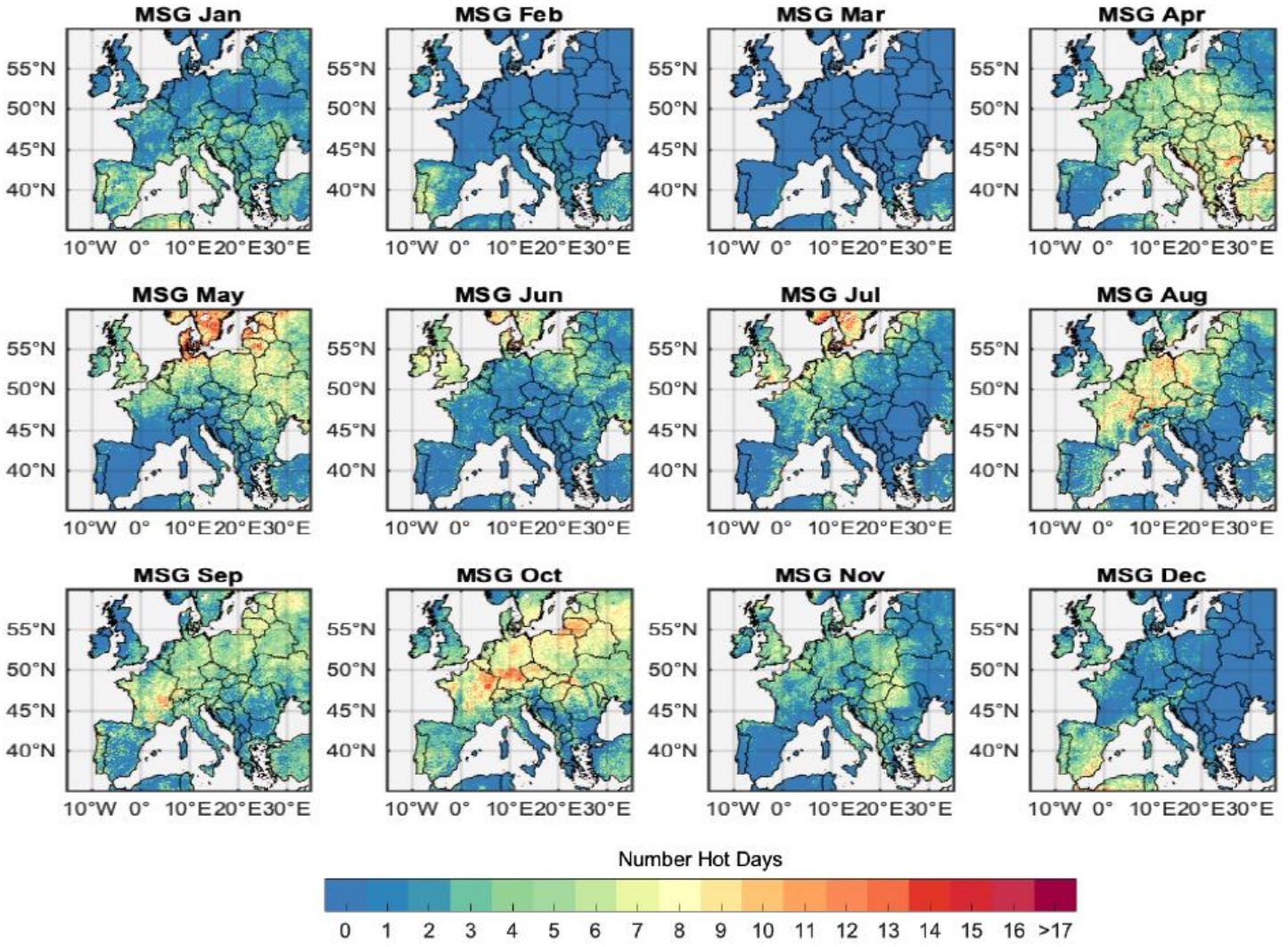


Figure 4. Spatial patterns of the number of months in 2018 which recorded the highest monthly MSG LST anomaly value regarding the 2004 to 2019 period.

(Gouveia et., al 2022)

2 Heatwaves and vegetation



(Gouveia et., al 2022)

Figure 5. Monthly number of hot days (NHD) during 2018 over Europe, with respect to the period from 2004–2019.

2 Heatwaves and vegetation

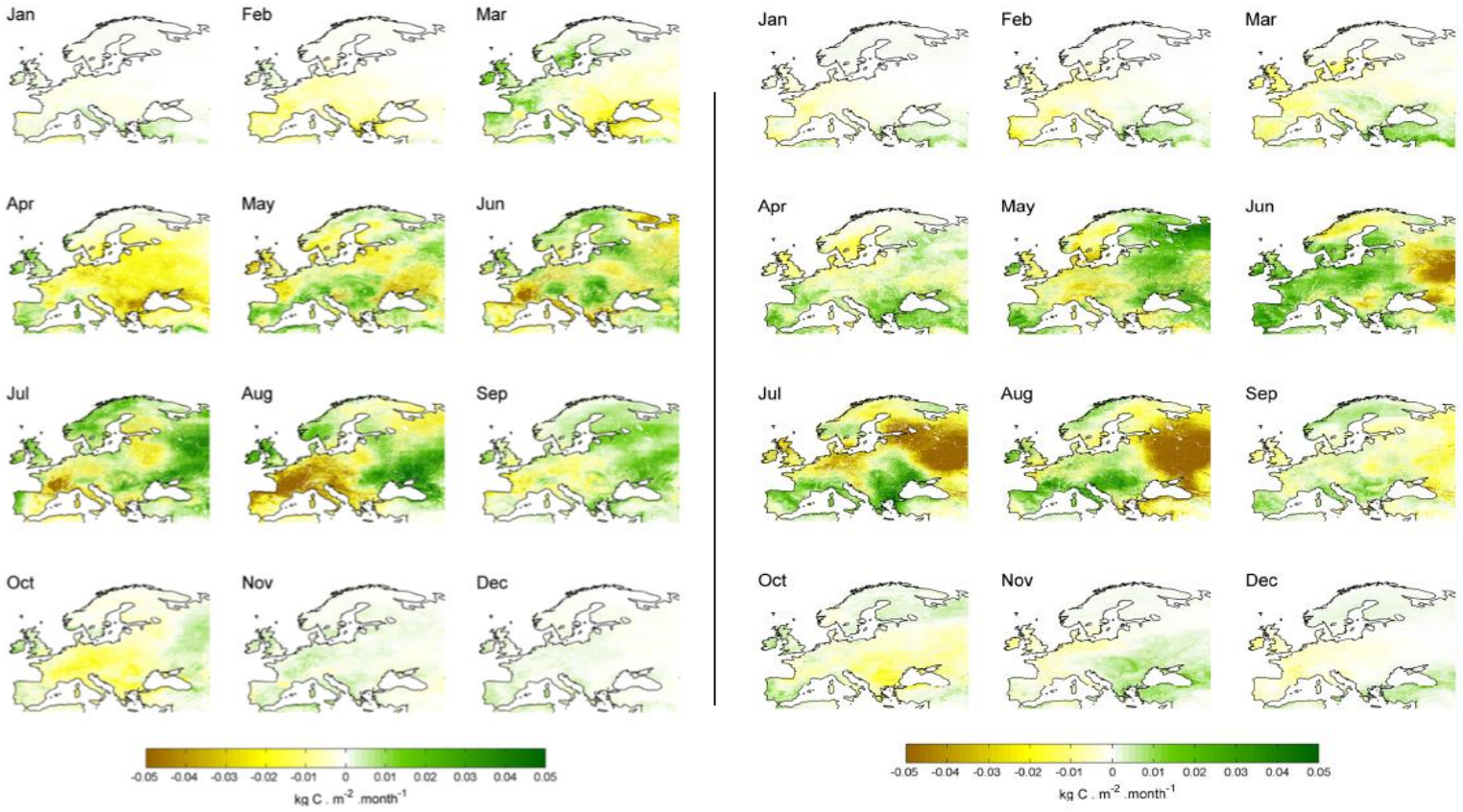
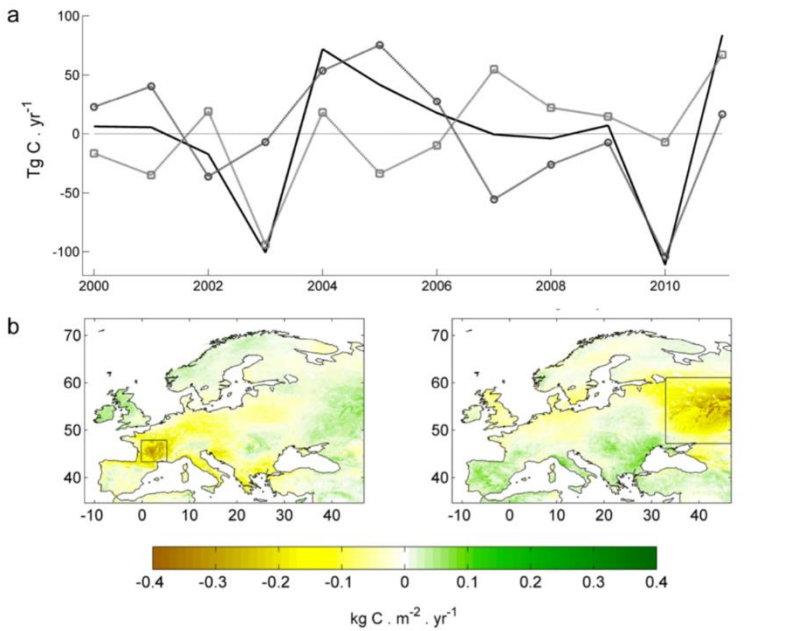
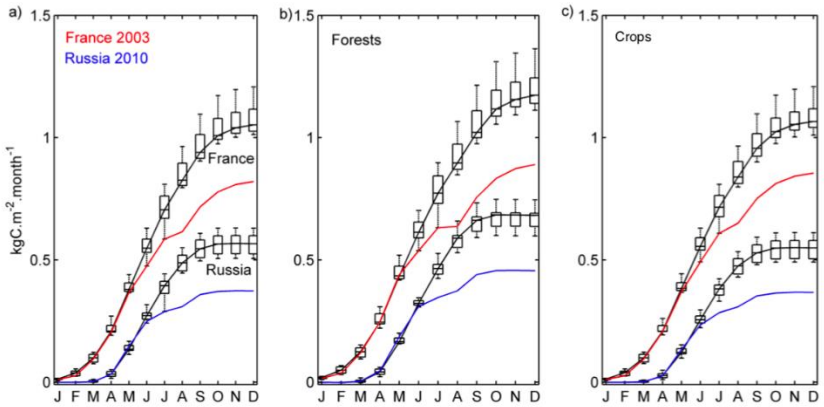


Figure 5. Monthly PsN_{anom} fields from MOD17A2 during 2003.

Figure 6. As in Fig. 5, but for 2010.

NPP, GPP (MODIS)





Bastos et al (2014)

remote sensing

MDPI

Article

Vegetation Productivity Losses Linked to Mediterranean Hot and Dry Events

Tiago Ermitão [1,*], Célia M. Gouveia [1,2], Ana Bastos [3] and Ana C. Russo [1]

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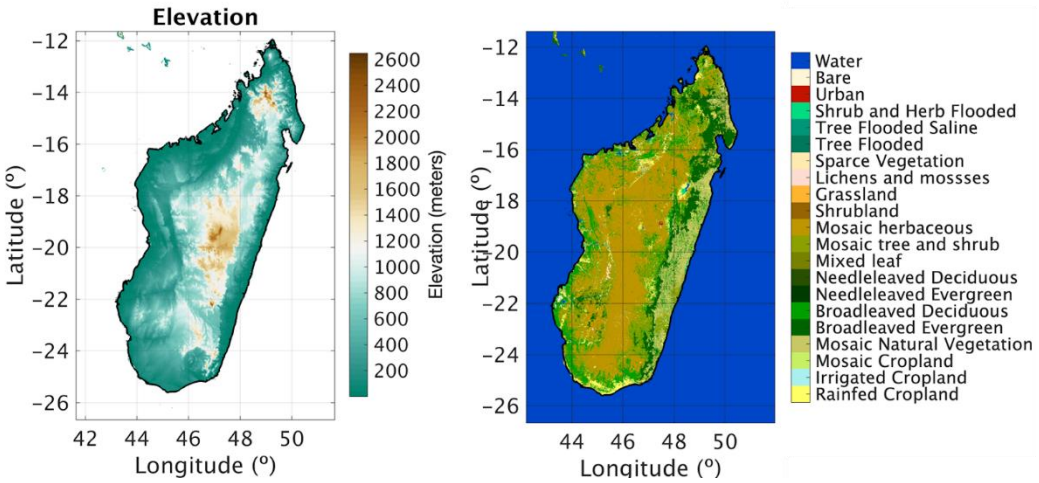
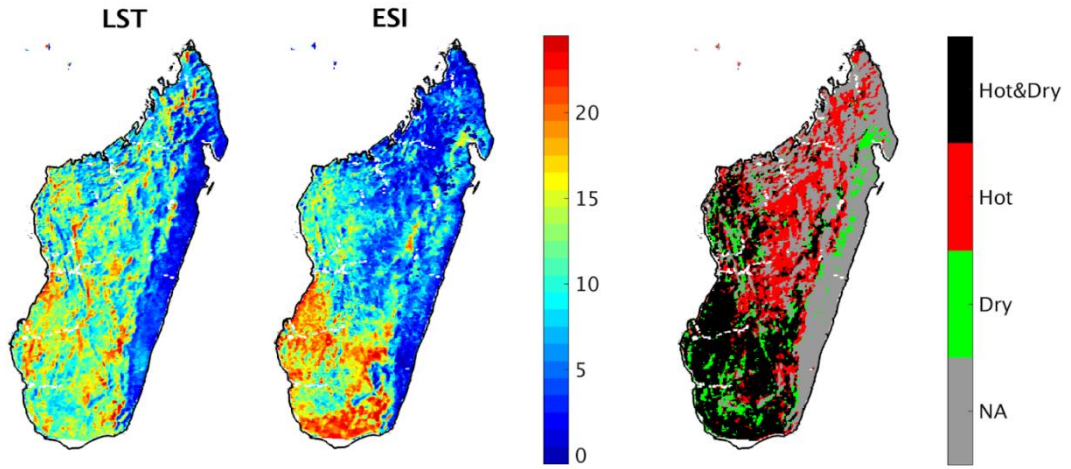
2 Instituto Português do Mar e da Atmosfera, I.P., Rua C do Aeroporto, 1749-077 Lisbon, Portugal
3 Max-Planck Institute for Biogeochemistry Department, Hans-Knöll Str. 10, 07745 Jena, Germany; abastos@bgc-jena.mpg.de
* Correspondence: tmrsilva@fc.ul.pt

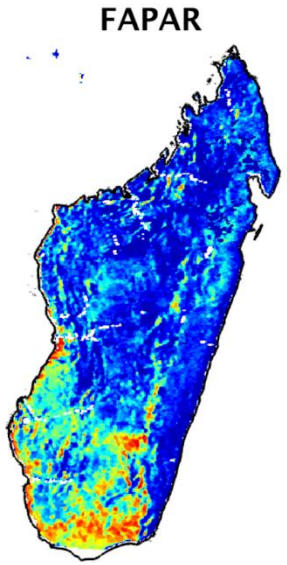
Session 4 - 1 June 2023

3 Drought, heatwaves and vegetation

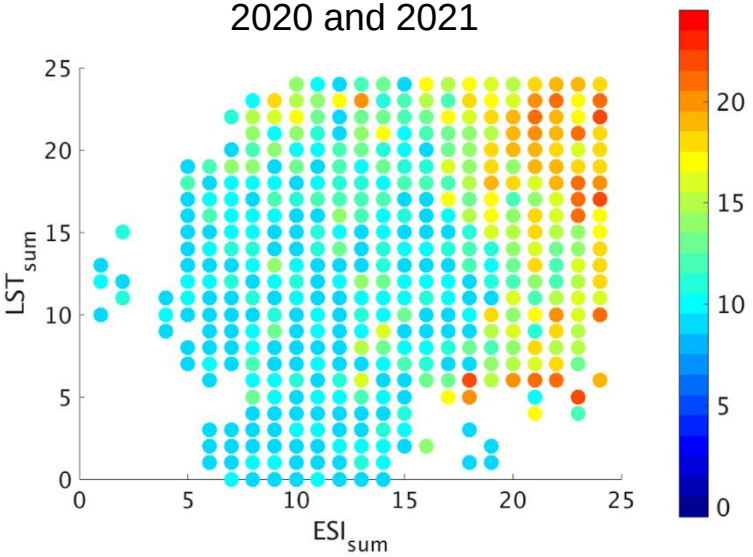




LST, ET, ET0,
FAPAR
SEVIRI – MSG
2004-2021



2020 and 2021



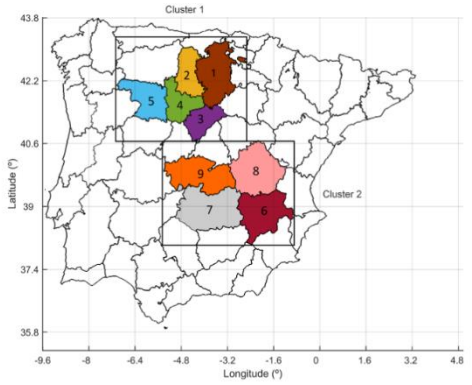
Gouveia et al (in revision)

slido

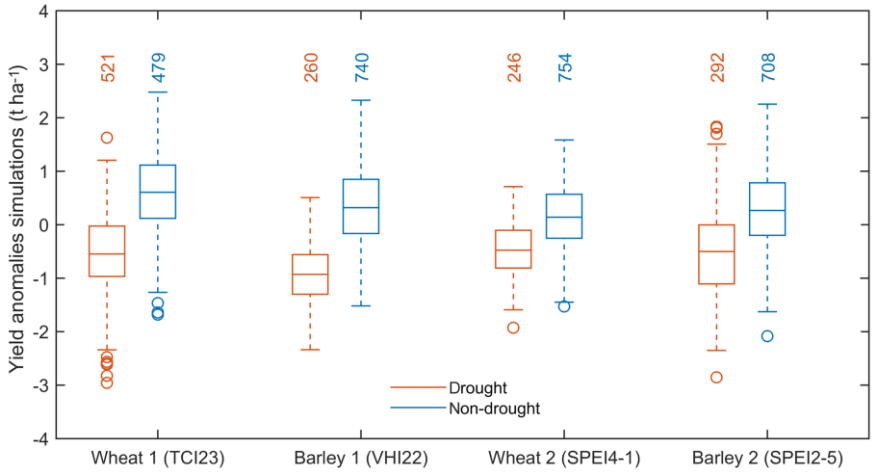
Are remote sensing products able to detect and monitoring heat extremes and impacts on vegetation dynamics?

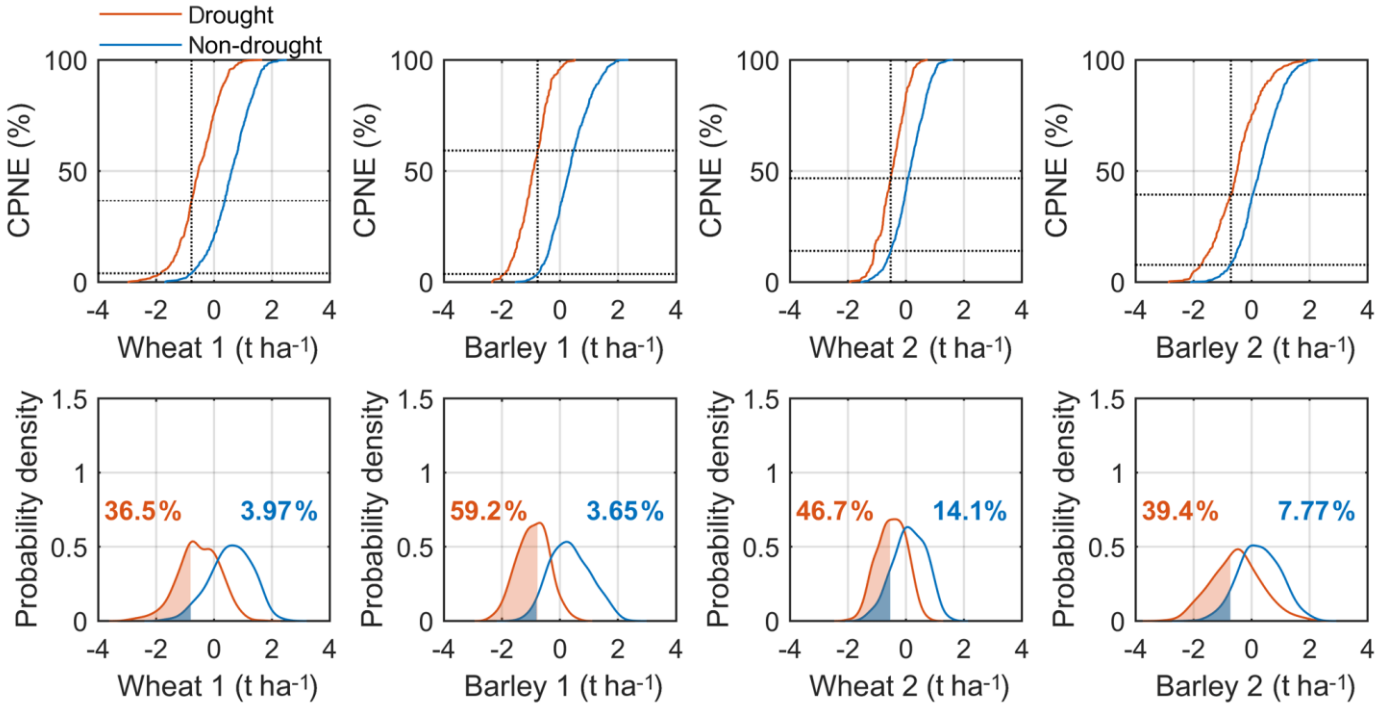
ⓘ Start presenting to display the poll results on this slide.

4 Drought, heatwaves and crops



Cereal (X)	Drought indicator (Y)	Standardized regression coefficients
Wheat 1	TCI 23	0.76
Barley 1	VHI 22	0.91
Wheat 2	SPEI 4–1	1.05
Barley 2	SPEI 2–5	1.07

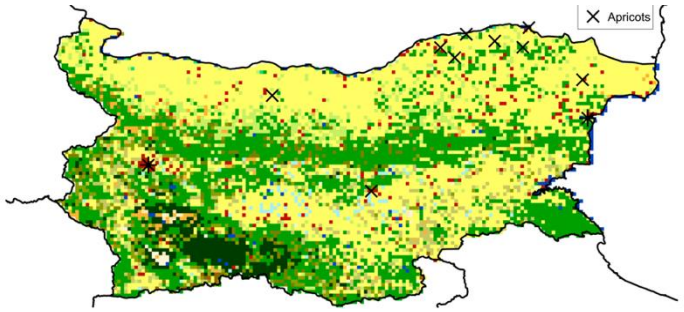




Ribeiro et. al (2019a, 2019b)

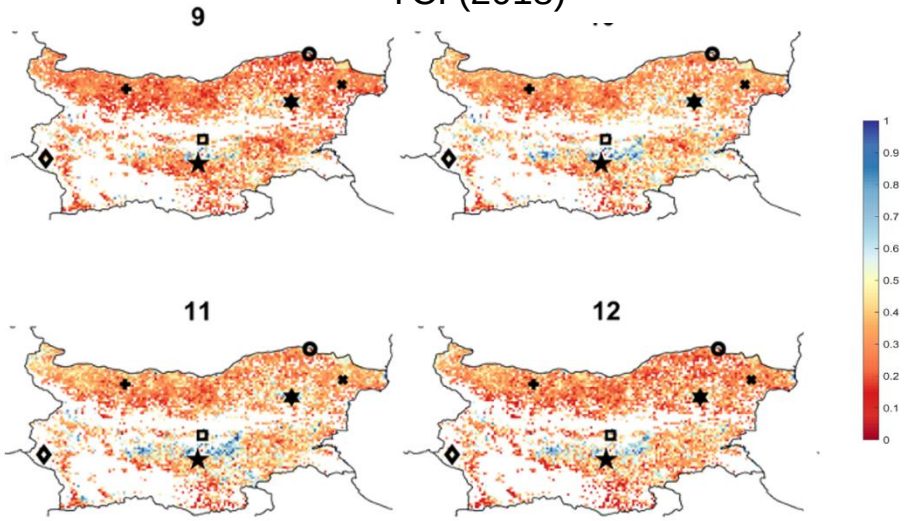
4 Drought, heat extremes and crops

FROST impacts on APRICOT Production In Bulgary

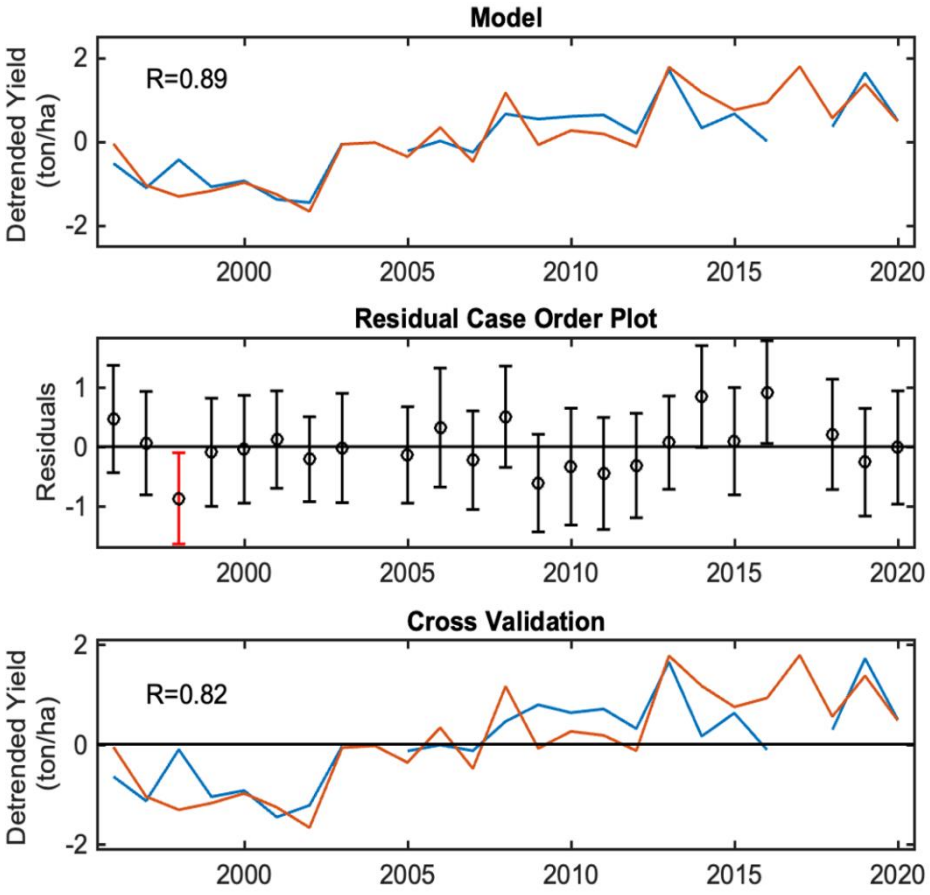


APRICOT
TCI and VCI (NOAA)
1994-2021

TCI (2018)



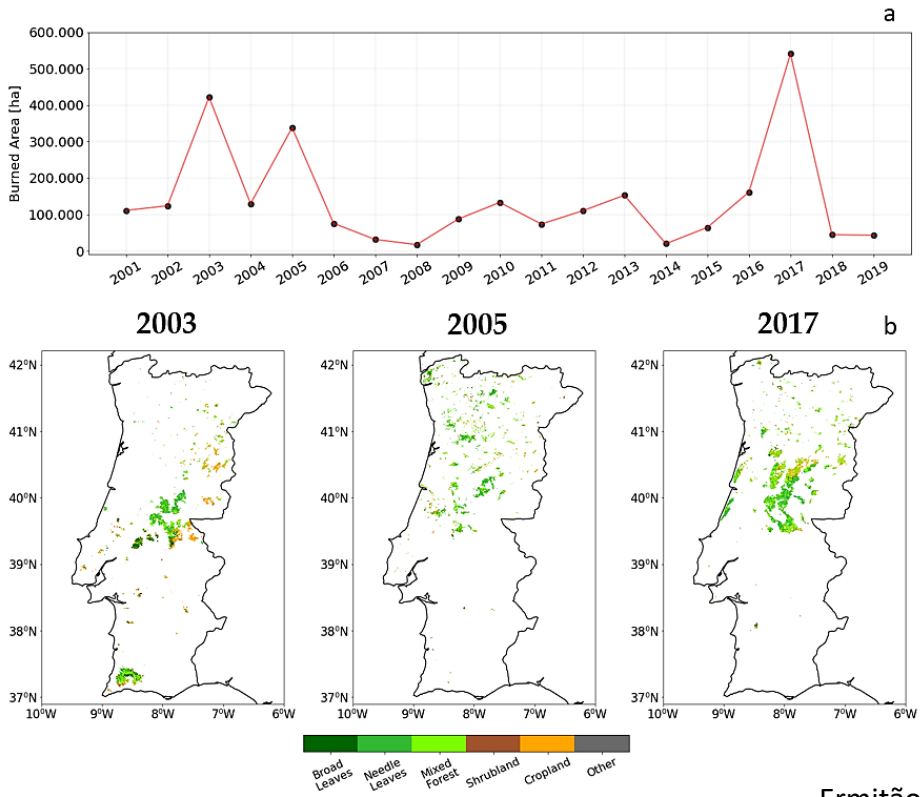
VCI (weeks 4, 13, 34, 47) + TCI (43)

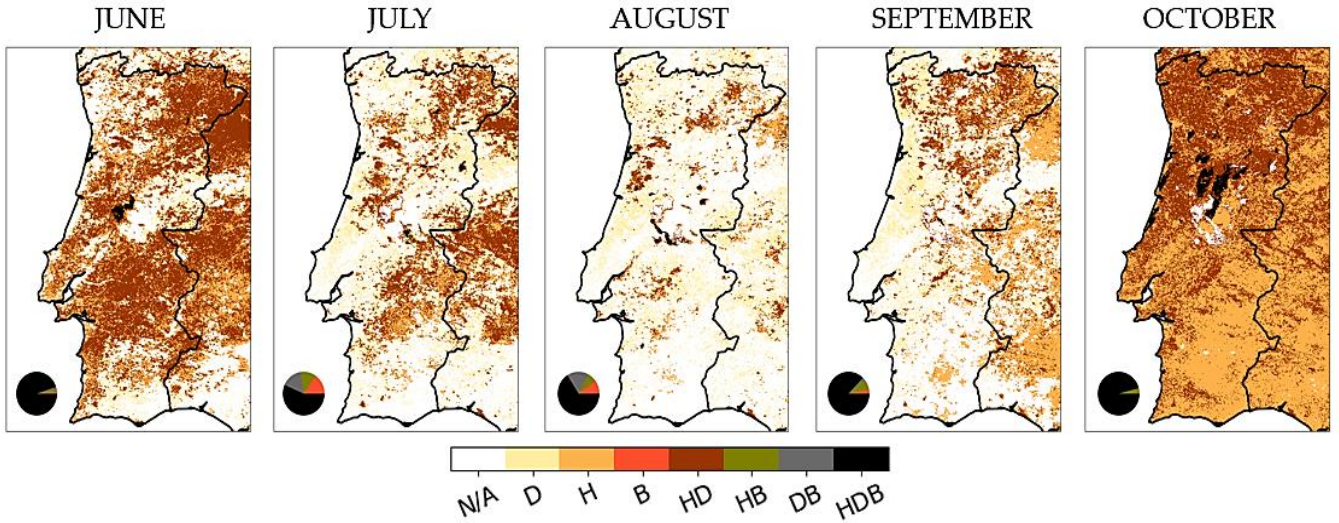


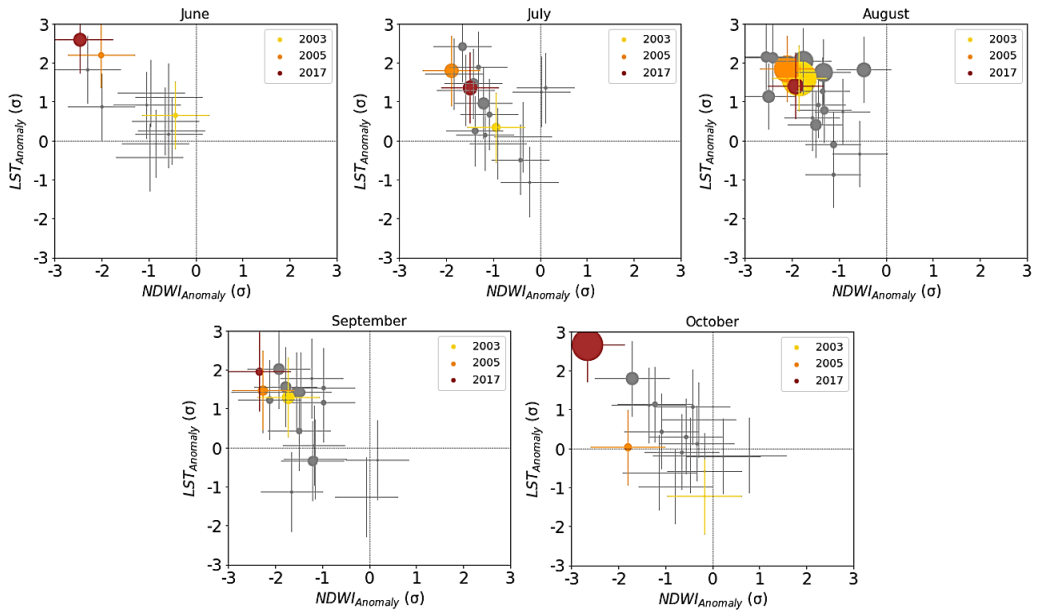
Gouveia et al (in revision)

5 Drought, heatwaves, fires and vegetation

GPP, NPP, LST
(MODIS)
FireCCI51
2001-2019





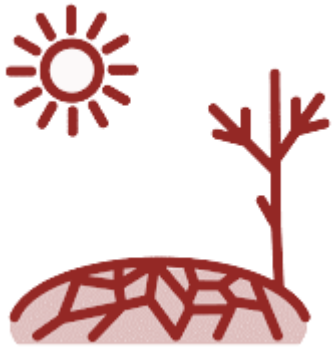


Ermitão et. al (2022)

slido

Are remote sensing products useful for applications related with composite events including drought, temperature extremes, vegetation, crops and fires?

ⓘ Start presenting to display the poll results on this slide.



Thank you for your attention!

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Sergio Vicente-Serrano
Virgílio Bento
Carlos da Camara
Ana Russo
Andreia Ribeiro
Isabel Trigo
Tiago Ermitão
Ana Bastos
Catarina Alonso
Veska Georgieva
Valentin Kazanjiev
Mafalda Silva
Rita Durão
João Paulo Martins