

the PORTO PROTOCOL

WATER MANAGEMENT IN VINEYARDS

Climate Talks

-Research Edition

January 23,
9am London



WATER MANAGEMENT IN VINEYARDS

Research Edition

Climate change is significantly altering rainfall patterns, presenting both challenges and opportunities for viticulture. On one hand, shifting precipitation regimes—whether through prolonged droughts or unpredictable heavy rainfall—can stress vines, impact yields, and increase the risk of disease. Water scarcity can lead to reduced vine vigor and compromised grape quality, while excessive rainfall can cause erosion, nutrient leaching, and fungal outbreaks.

On the other hand, in some regions, changing rainfall patterns may offer benefits, such as extended growing seasons, improved water-use efficiency through adaptation strategies, and the potential for viticulture in previously unsuitable areas. Adapting to these changes requires innovative water management practices to ensure long-term vineyard resilience and sustainability.



HOST



Jihany Brecci
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GUESTS



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OPENING QUESTIONS

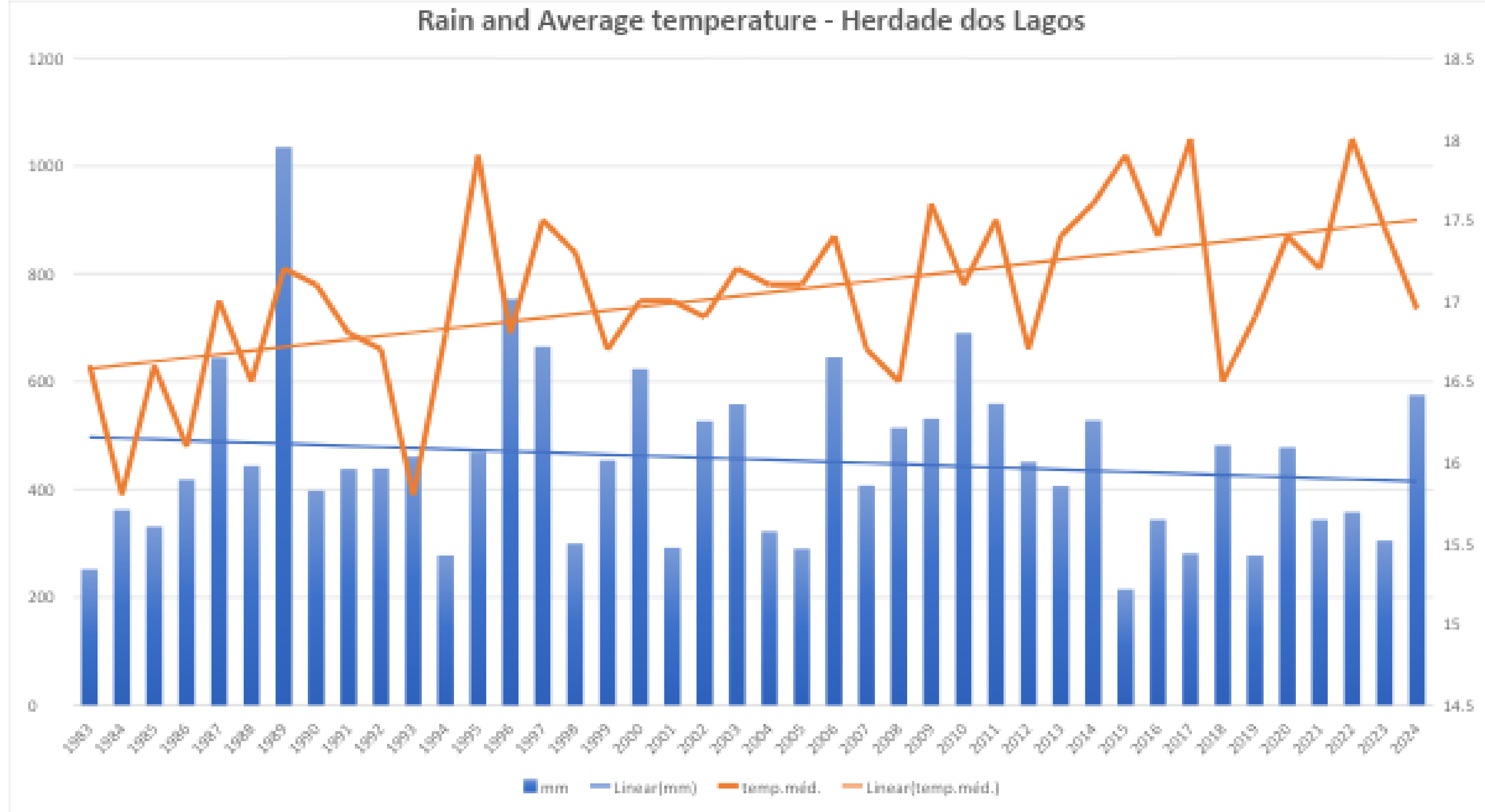
Water is a critical resource in vineyard management, especially in the face of climate change.

To set the stage, could each of you briefly share how your work intersects with the challenges of water management in viticulture?



Herdade dos Lagos





OPENING QUESTIONS

How do water constraints influence the terroir expression of wine, and what are some of the key findings from your research on this topic?

Impacts of water deficit on vine physiology

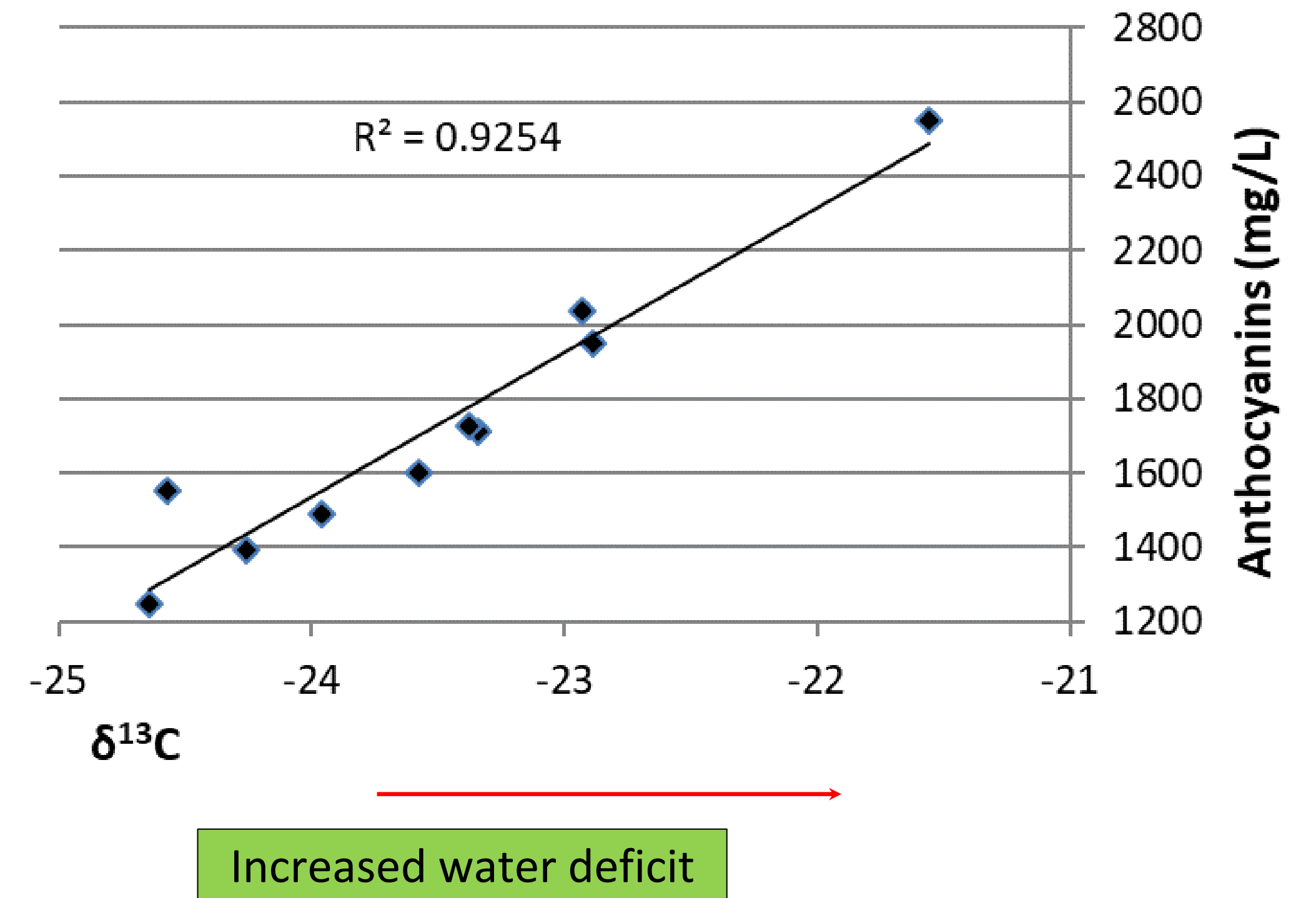
- Earlier shoot growth cessation



- Smaller berries



- Increased anthocyanins in berries
 - -> Better quality, in particular for red wine
- Improved aromas (red and white wine)
- Lower yields

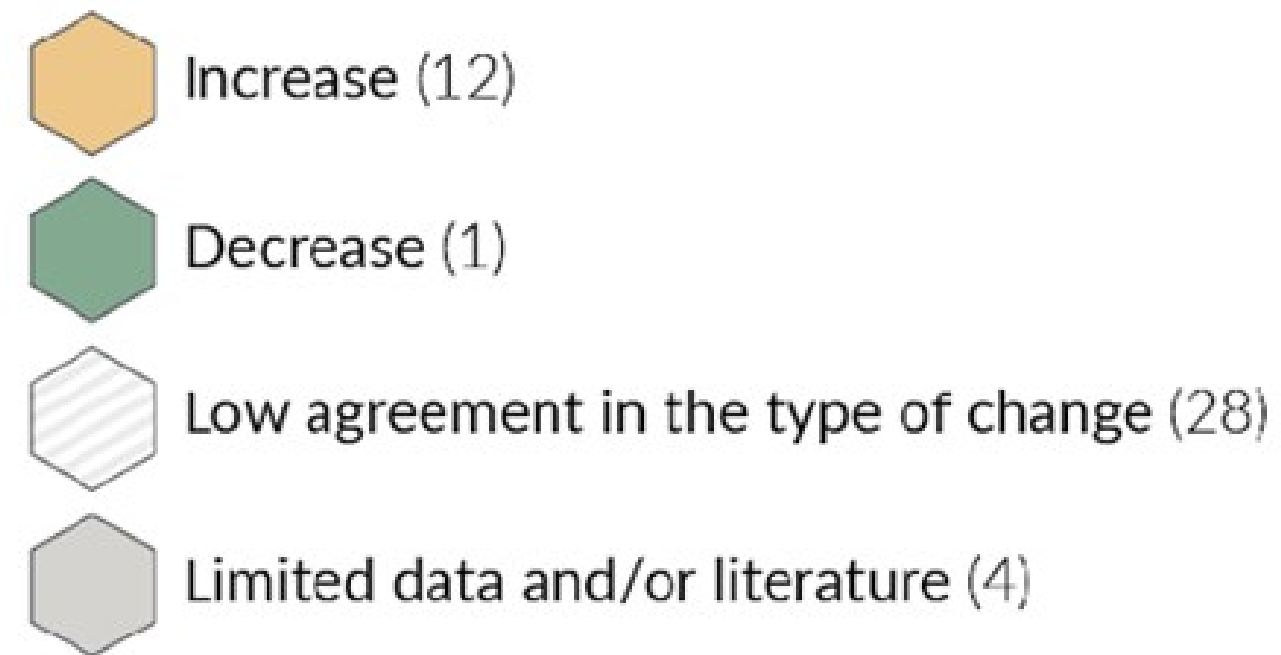


RESEARCH-FOCUSED QUESTIONS

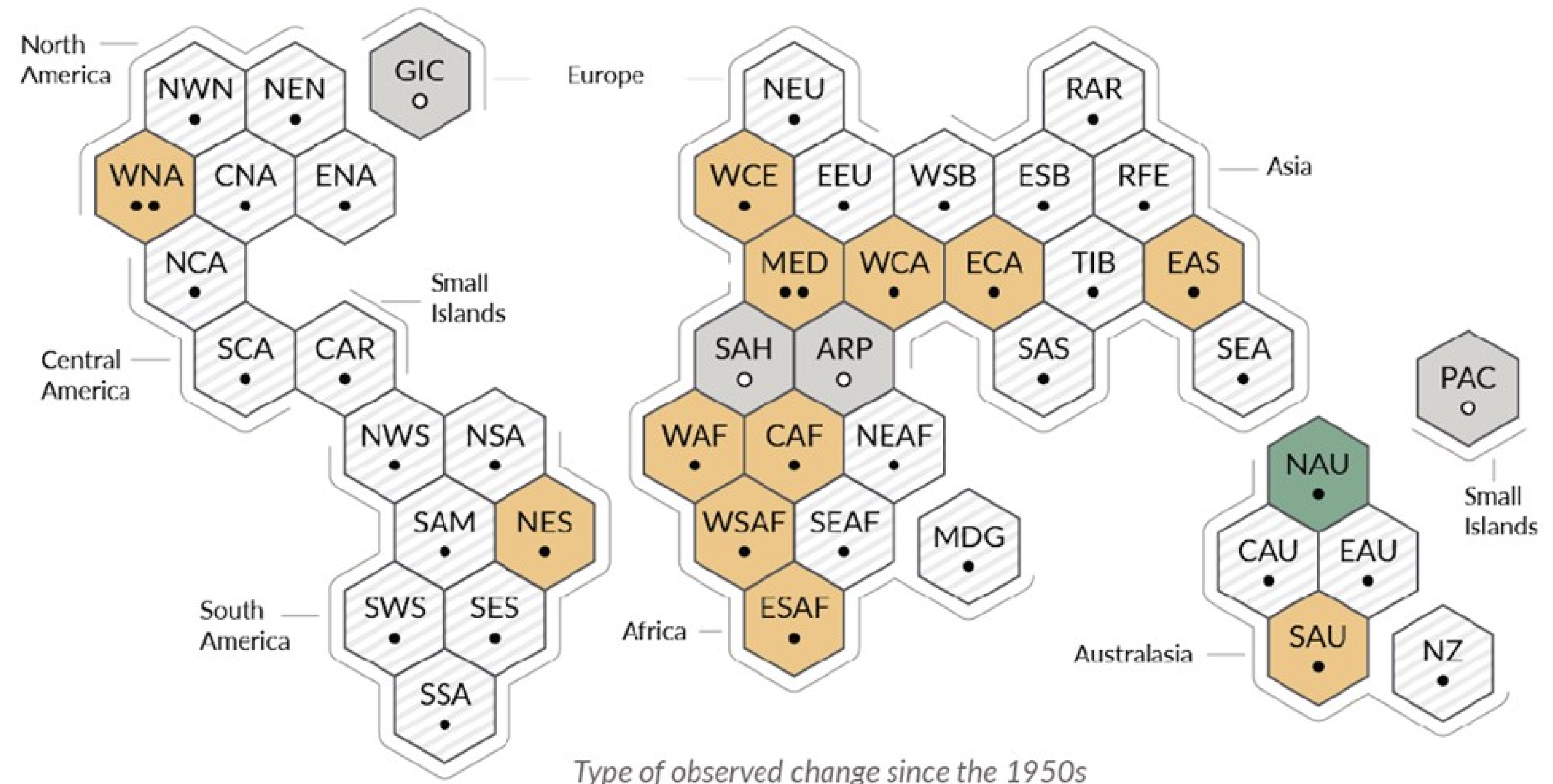
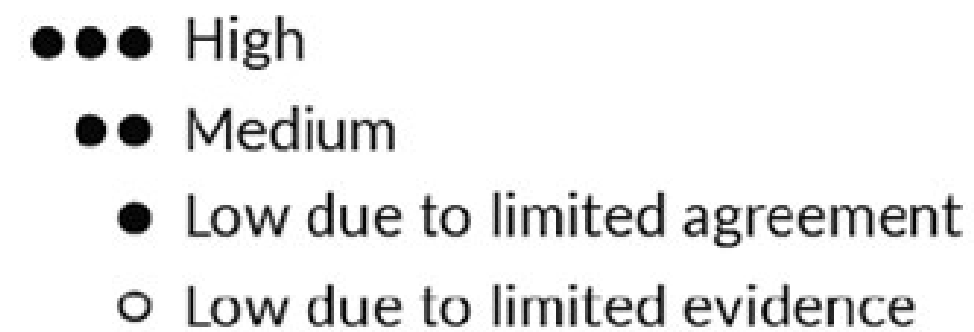
Could you elaborate on how shifts in global water cycles are affecting viticulture.

Synthesis of assessed, observed and attributable regional changes in agricultural and ecological drought

Type of observed change in agricultural and ecological drought

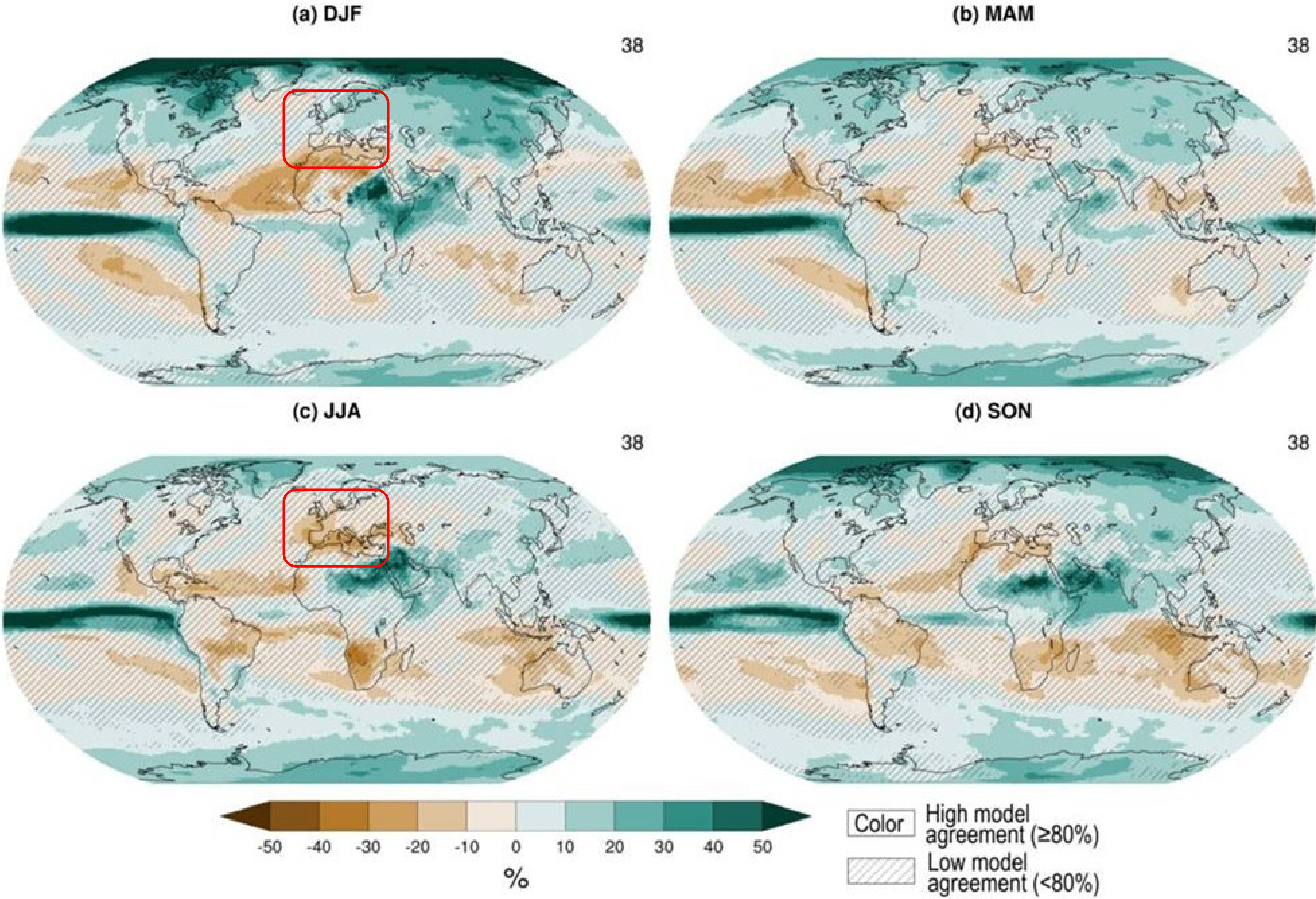


Confidence in human contribution to the observed change



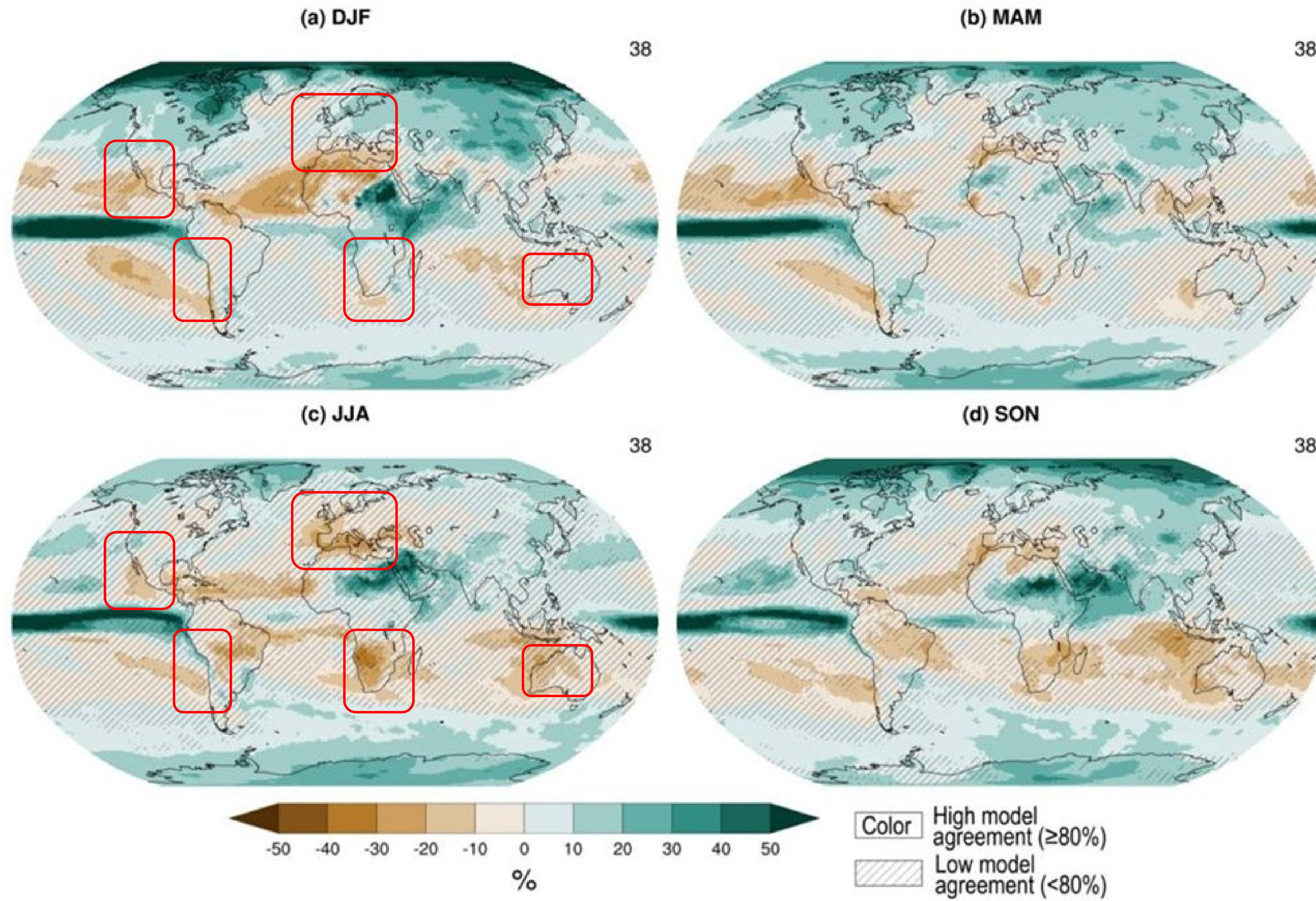
Source: IPCC AR6 WG1 Summary for Policymakers.

Change in average seasonal precipitation (2081-2100 vs 1995-2014, SSP2-4.5)



Source: IPCC AR6 WG1 Summary for Policymakers;
<https://www.youtube.com/watch?v=SpqajTbGh74>

Change in average seasonal precipitation (2081-2100 vs 1995-2014, SSP2-4.5)



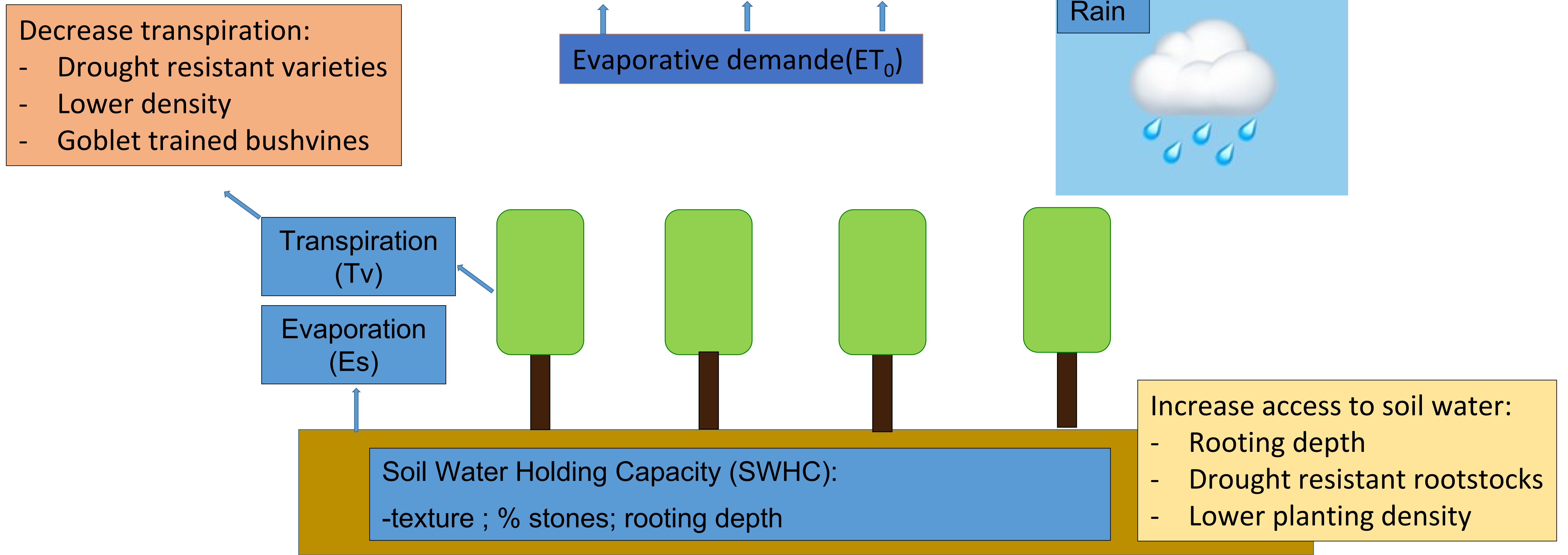
Source: IPCC AR6 WG1 Summary for Policymakers;
<https://www.youtube.com/watch?v=SpqajTbGh74>

RESEARCH-FOCUSED QUESTIONS

How can winegrowers balance maintaining the typicity of their *terroir* with the need to adapt to increasing water scarcity?

The cycle of water - water balance modeling: Where are the levers to increase drought resistance?

- $\text{SoilWater}(d) = \text{SoilWater}(d-1) + \text{Rain}(d) + \text{Irrigation}(d) - \text{Tv}(d) - \text{Es}(d)$



RESEARCH-FOCUSED QUESTIONS

How can research findings, like those on geo-climatic analogues be translated into actionable strategies for winegrowers?

Climate Analogue Techniques



- The concept of climate analogues matches the proposed future climate of a region of interest with the current climate of another region, generally using precipitation and temperature data.
- The analogues (regions with similar climatic conditions to the future conditions of the selected location) are defined by Euclidean distances.

<https://climate.copernicus.eu/climate-analogues-finding-tomorrows-climate-today>

Climate Analogue Techniques

Question
How might the climate in **Roma, Rome, Italy** change in the future? [Show comparison](#)

Answer
It could be comparable to the climate today in **Jijel, Algeria**

«If there is limited mitigation in emissions, in 2070 the climate in Roma, Rome, Italy could be comparable to Jijel, Algeria today.»

Share

Compare the locations

Present Location	"Future" Location
Roma, Rome, Italy	Jijel, Algeria
Elevation 42 a.s.l.	Elevation 342 a.s.l.
Temperature (Average) 16.43 °C	Temperature (Average) 17.76 °C



Photo by MAO YUQING on Unsplash



Photo by Daoud Abismail on Unsplash

Global warming will make a difference

To better understand the impact of climate change, we have included some illustrations showing future (or past) conditions.

Conditions in: **Rome, Italy**
Today: 2021 Future: 2070 Difference:

- Screenshot from the Climate Analogues application, illustrating that in 2070:
 - the climate of **Rome (Italy)** could be similar to the current climate of **Jijel (Algeria)**.

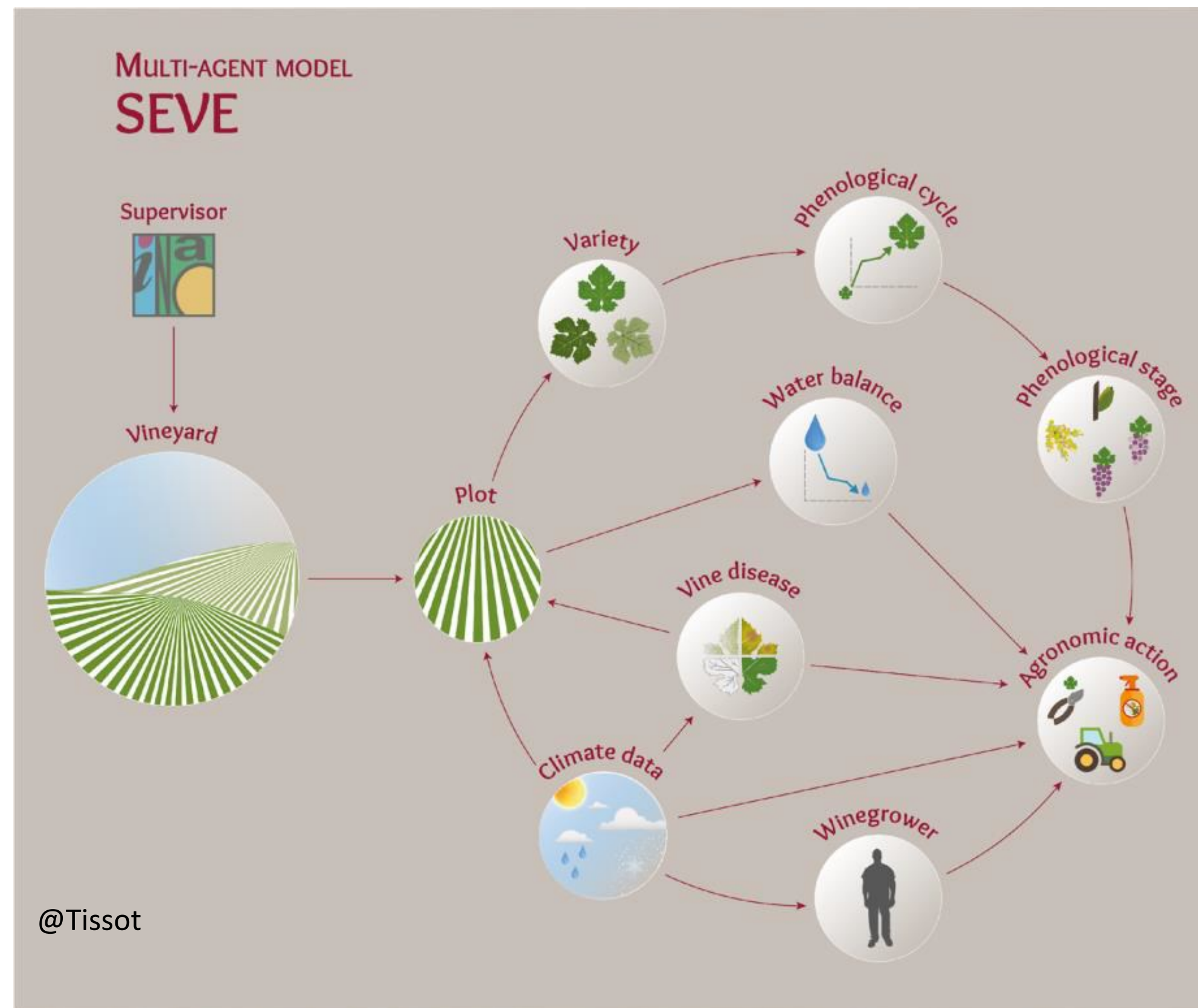
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Geo-Climatic analogues approach

Country	Region	Grape variety
France	Sancerre, Anjou, Bordeaux, Burgundy, Rhone Valley	Sauvignon blanc, Pinot noir, Chenin, Cabernet franc, Syrah
New Zealand	Marlborough, Waipara	Sauvignon blanc, Pinot noir
South Africa	Swartland	Chenin, Cabernet franc
USA	California	Syrah

- The geo-climatic approach, considering climate, soil type, grape varieties, and cultural practices at fine scale.
- The aim is to have, for the same grape variety, one site characterized by a hot/warm/temperate climate and another by a cooler climate.
- This climate analogue based on a "geo-climatic" approach allows to draw on the agroclimatic experience and viticultural practices of a wine-growing region whose current climate will correspond to the future climate of one of the other sites.

Geo-Climatic analogues approach



- The geo-climatic approach, considering climate, soil type, grape varieties, and cultural practices at fine scale.
- The aim is to have, for the same grape variety, one site characterized by a hot/warm/temperate climate and another by a cooler climate.
- This climate analogue based on a "geo-climatic" approach allows to draw on the agroclimatic experience and viticultural practices of a wine-growing region whose current climate will correspond to the future climate of one of the other sites.
- By specifically including the question of water resources and adaptation practices, the simulations aim to determine sustainable viticultural areas.

PRACTICAL APPLICATION QUESTIONS

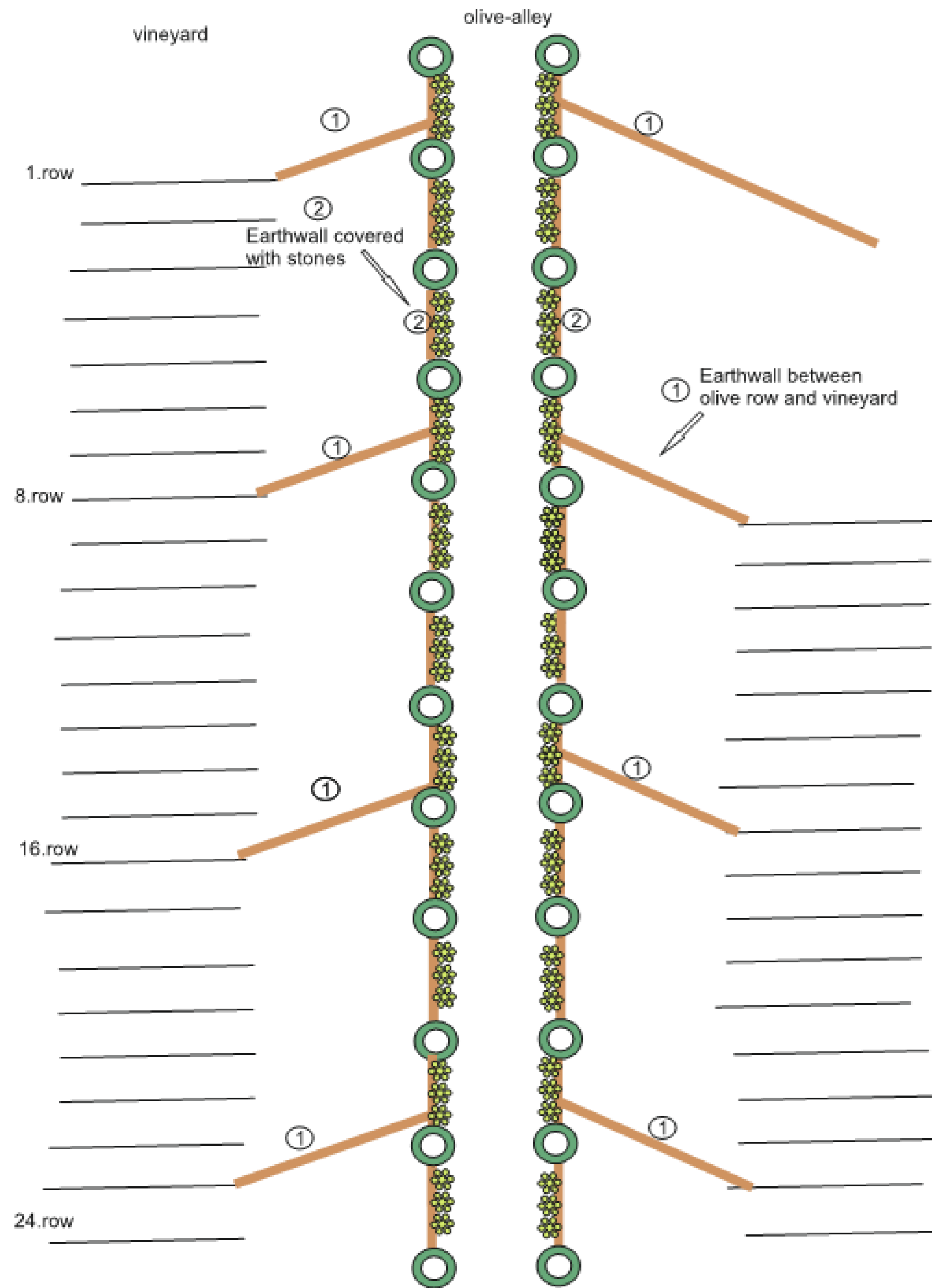
At Herdade dos Lagos, you've implemented innovative approaches to water management, I hear through the grapevine that you “create water” in the vineyard.

Could you walk us through some of these practices and their outcomes?

COVER CROPS

“Water management in the vineyard – practical examples”





EARTHWORK

“Water management in the vineyard – practical examples”



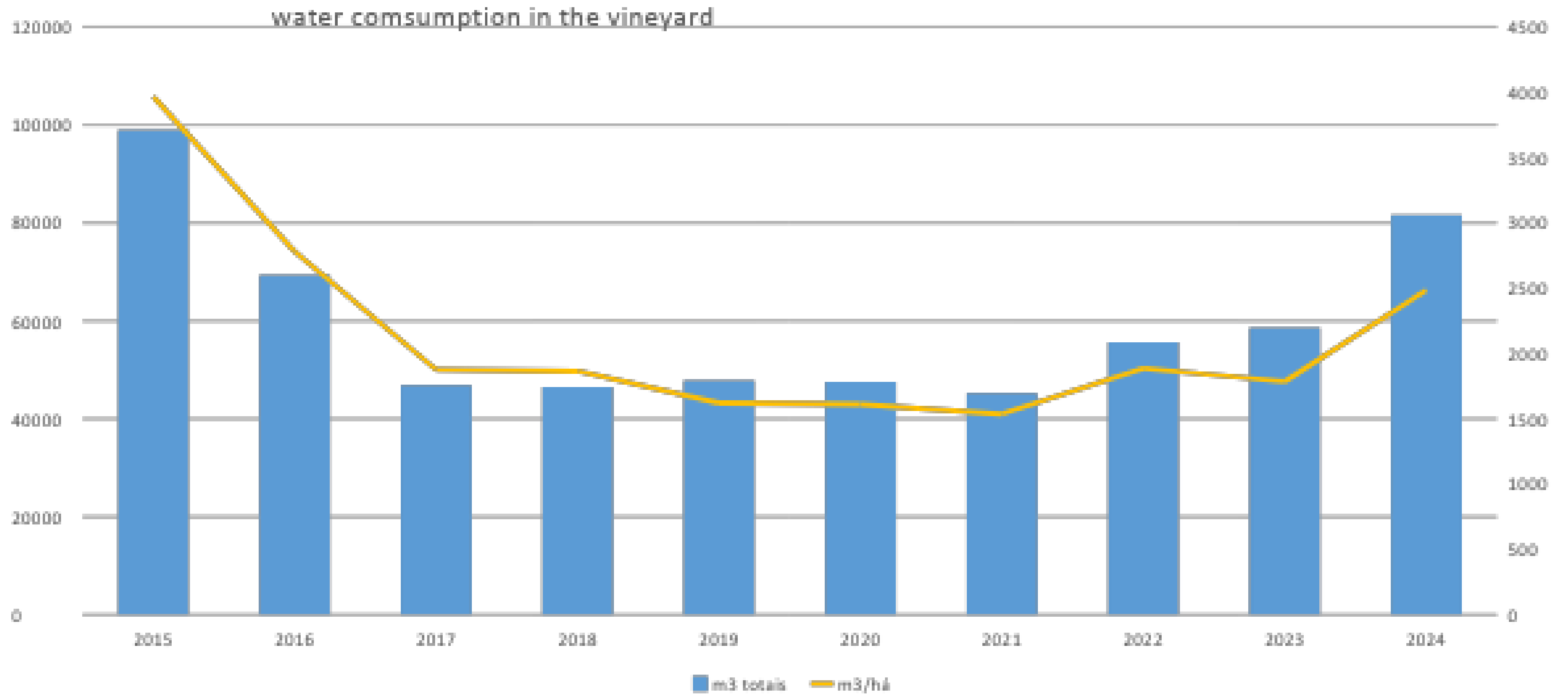


Year	Sector	pH	%OM
2024	04	8,33	4,66
2023	04	8,34	3,90
2022	04	8,04	2,78
2021	04	7,71	3,06
2020	04	7,92	3
2019	04	8,44	1,53
2017	04	8,78	1,83
2015	04	7,5	0,99
2003	04	7,3	0,75

ORGANIC MATTER

21 years in the making

year	Sector	pH	% MO
2024	13	7,07	2,29
2024	11	8,16	3,64
2024	07	8,54	3,69
2024	04	8,33	4,66
2024	17	6,97	2,76



PRACTICAL APPLICATION QUESTIONS

What role do emerging technologies or sustainable practices play in mitigating water scarcity in vineyards? What can we learn from the past?

CLOSING QUESTIONS

How can industry professionals and researchers collaborate more effectively to foster resilience in viticulture -specifically on the subject of water as a resource?

CLOSING QUESTIONS

If there's one key takeaway you'd like the audience to remember about water management in vineyards, what would it be?

HOST



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