Impacts of recent climate change and weather variability on UK viticulture

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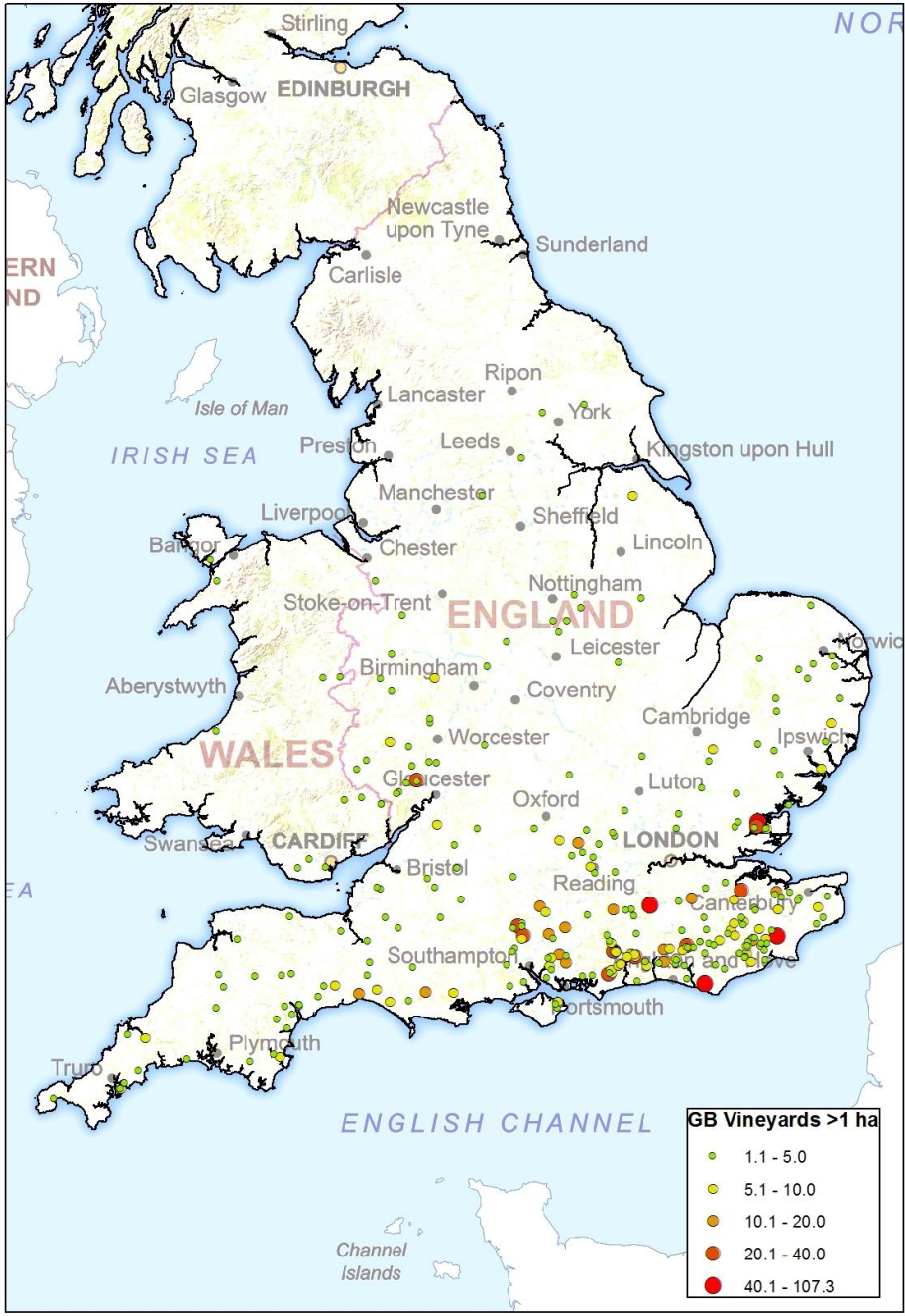
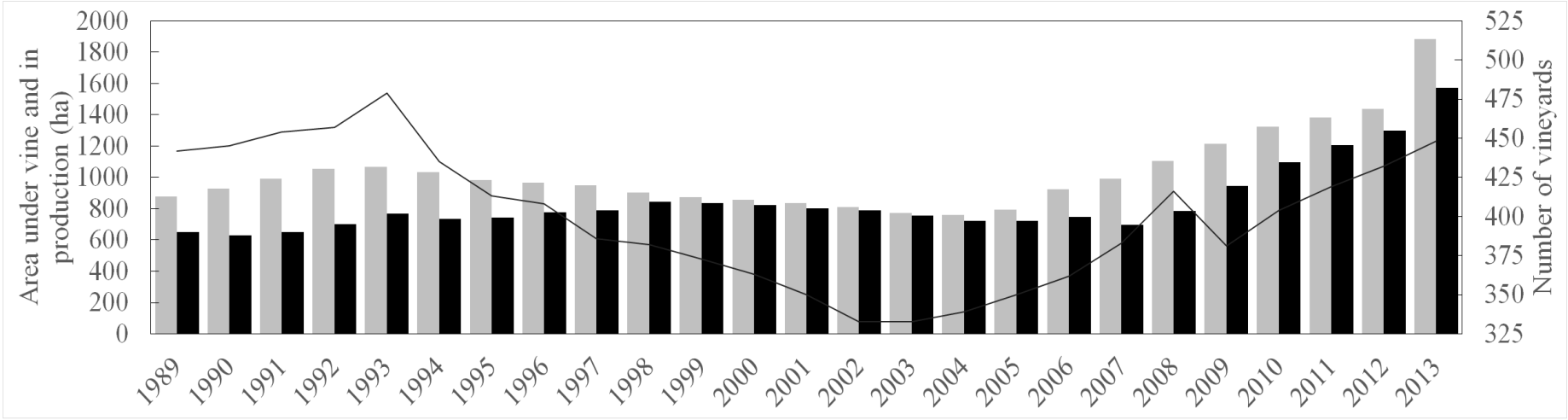
Sector growth

- Relationship with climate change
- Threats and opportunities
- Combined weather and climate records with producers' perspectives

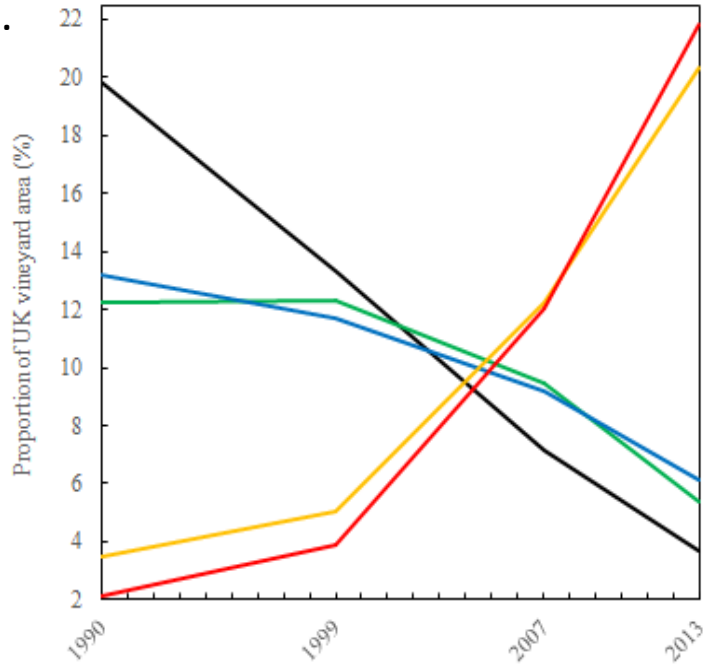


English and Welsh viticulture trends



Area under vine in England and Wales (■), area in production (■), and vineyard numbers (1989–2013) (—).

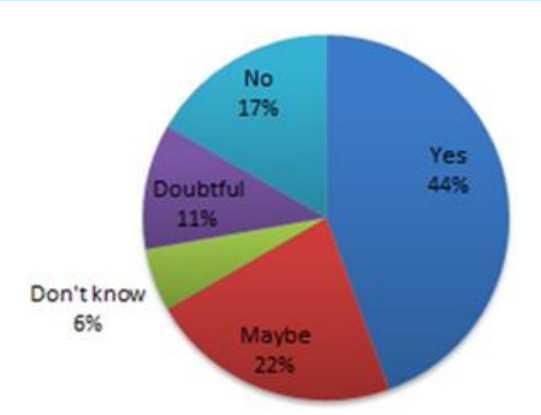
Changing distribution of dominant (by volume) cultivars (1990–2013), as a proportion of total vineyard area. Müller Thurgau (—), Reichensteiner (—), Seyval Blanc (—), Pinot Noir (—) and Chardonnay (—)



Data from the Food Standards Agency (2014)

English and Welsh wine producers' perspectives of climate change impacts

Has climate change contributed to the growth of the wine production industry?



Other factors?

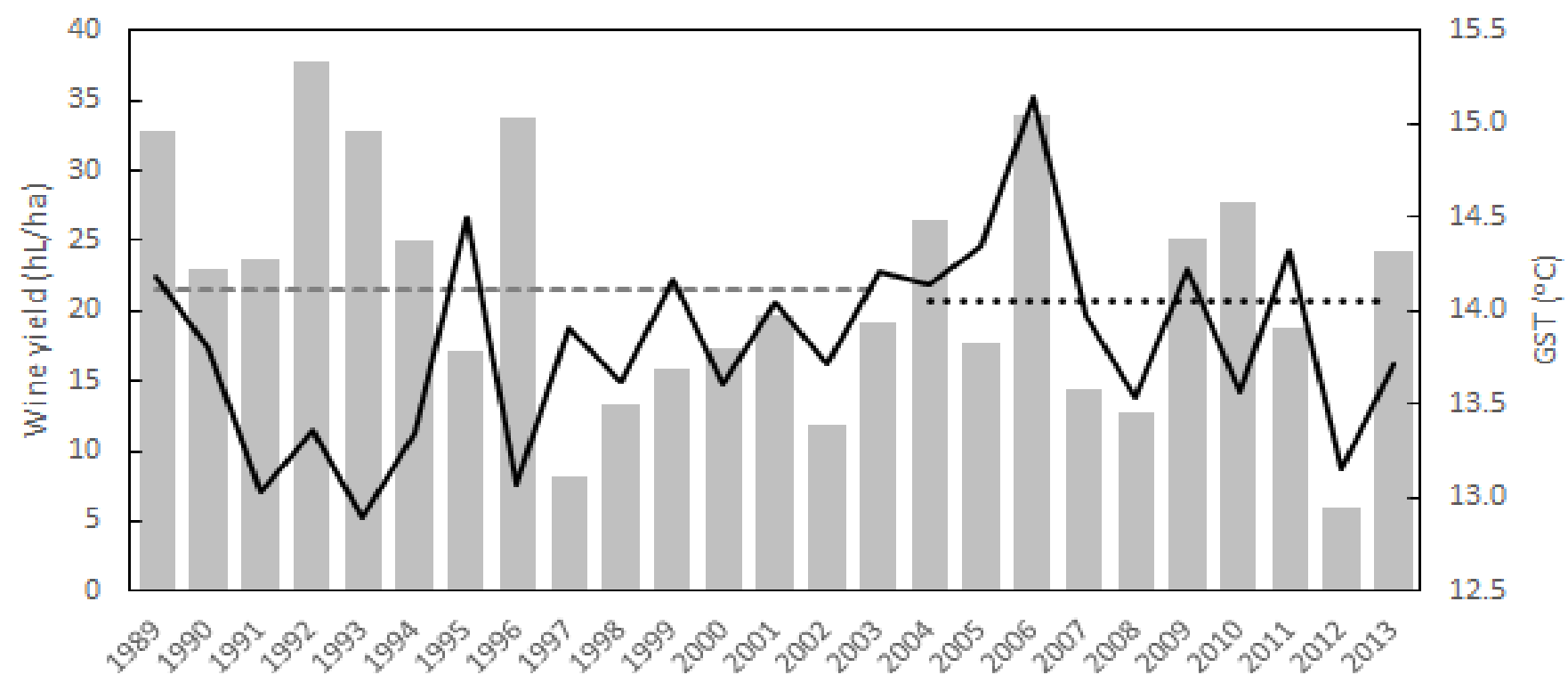
Threat – 64%

- Inter-annual weather variability
- Extreme weather
- Increased disease pressures due to warm and wet weather
- Weather during critical periods of flowering and maturation
- Unpredictable weather
- Increasing gap from good to bad years
- Gulf stream may end!

Opportunity – 7%

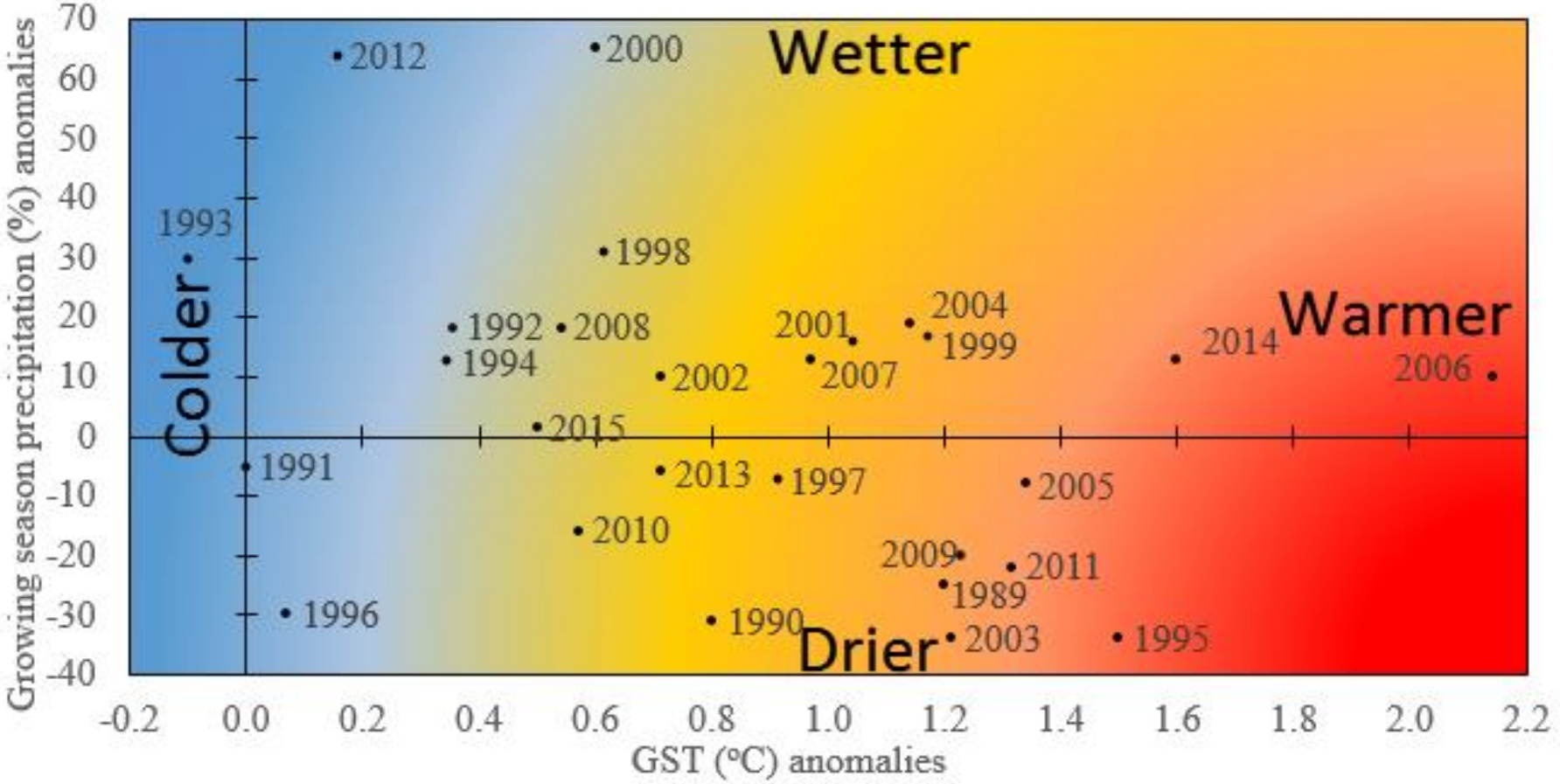
- Warmer growing season weather improving yields and quality
- More viable cultivars
- Later harvest dates and increased ripening potential
- Average temperatures will go up in 10-20 years
- Weather may settle over time

English and Welsh wine yields (1989-2013) and growing season average temperature (GST)



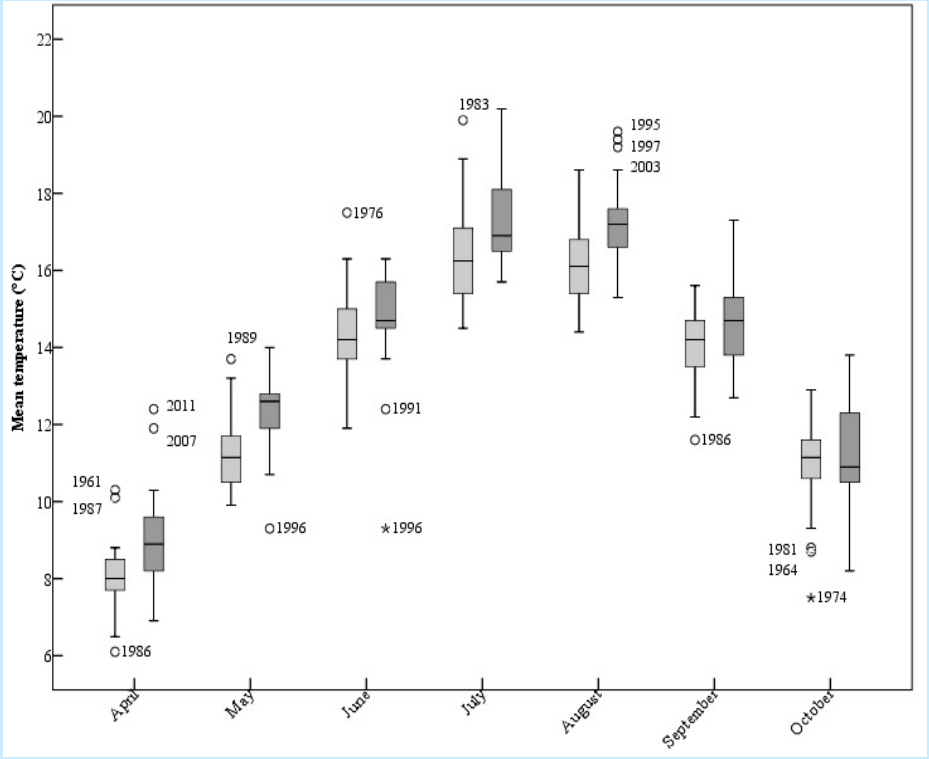
Wine yield in England and Wales (■) including the average in 1989–2003 (- - - -) and 2004–2013 (— — —), with GST for south-east and south-central England (—).
Data from the Food Standards Agency (2014).

“Warmer, not drier!”

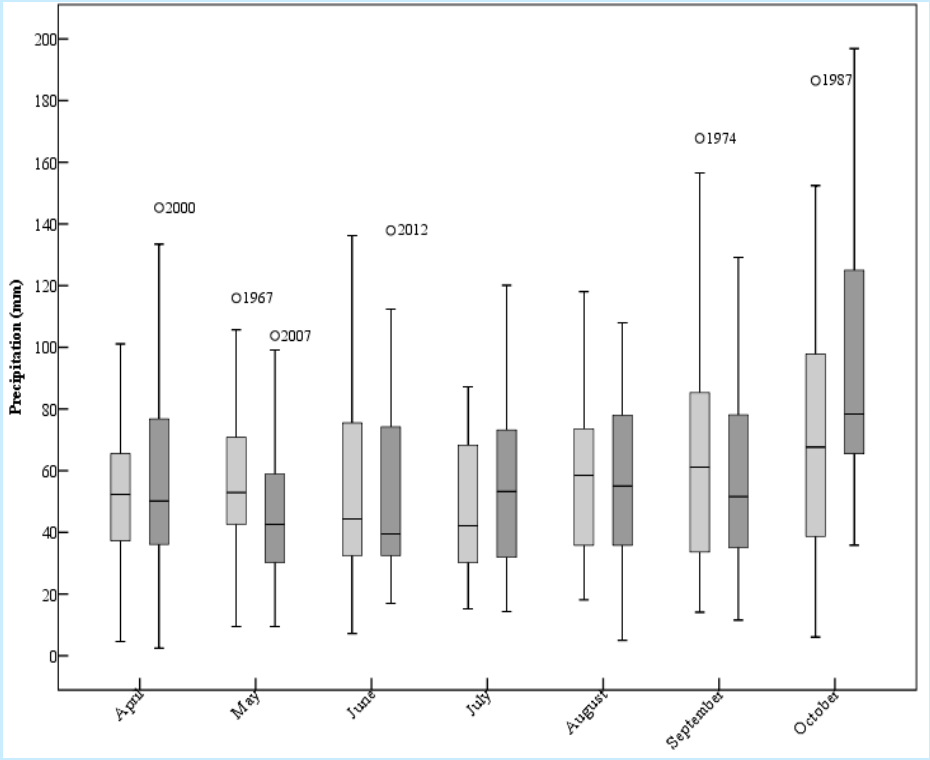


South-east and south-central England growing season precipitation (%; y-axis) and growing season temperature (°C; x-axis) anomalies for 1989–2015 against 1961–1990 means of 407 mm and 13°C, respectively. 0.0 = 13°C, 1.0 = 14°C and 2.0 = 15°C GST.

Change in south-east and south-central England growing season monthly mean temperature and total rainfall dispersion (1961-1990 to 1989-2013)

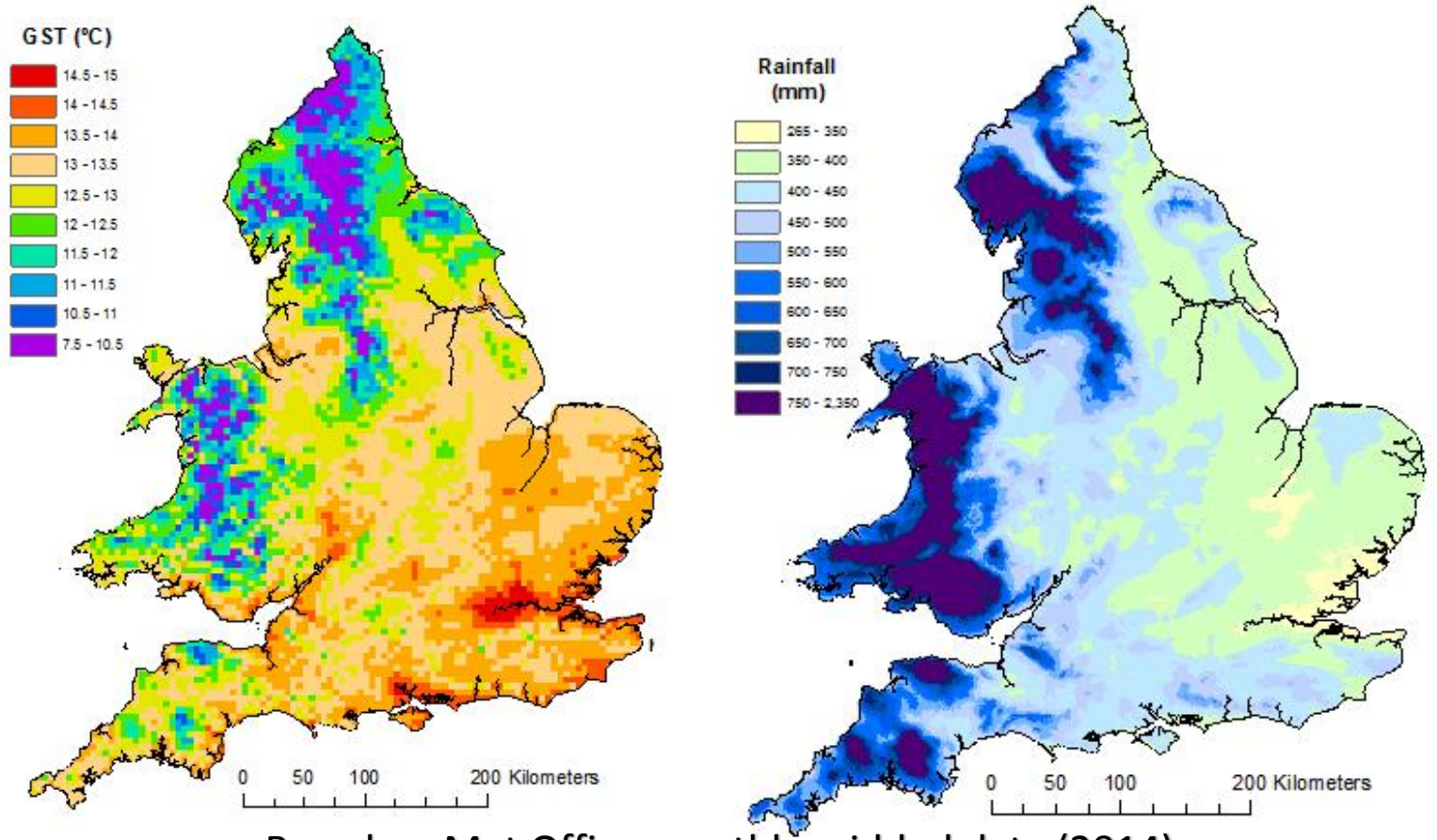


Temperature dispersion for 1961–1990 (■) and 1989–2013 (■). ○, outlier (1.5–3 x box length), *, extreme (>3 x box length).



Precipitation dispersion for 1961–1990 (■) and 1989–2013 (■).○, outlier (1.5–3 x box length).

Spatial variability in GST and growing season rainfall (1981-2010)



Based on Met Office monthly gridded data (2014)

Conclusions

- Non-linear growing season warming
- GST average (2004-2013) for the main viticultural areas >13.5^{o}C
- Low and variable yields
- Sector is vulnerable to inter-annual weather variability
- Rainfall in June most powerful predictor of yield
- Early season warming increases spring air frost risk
- Opportunities for spatial adaptation in England and Wales

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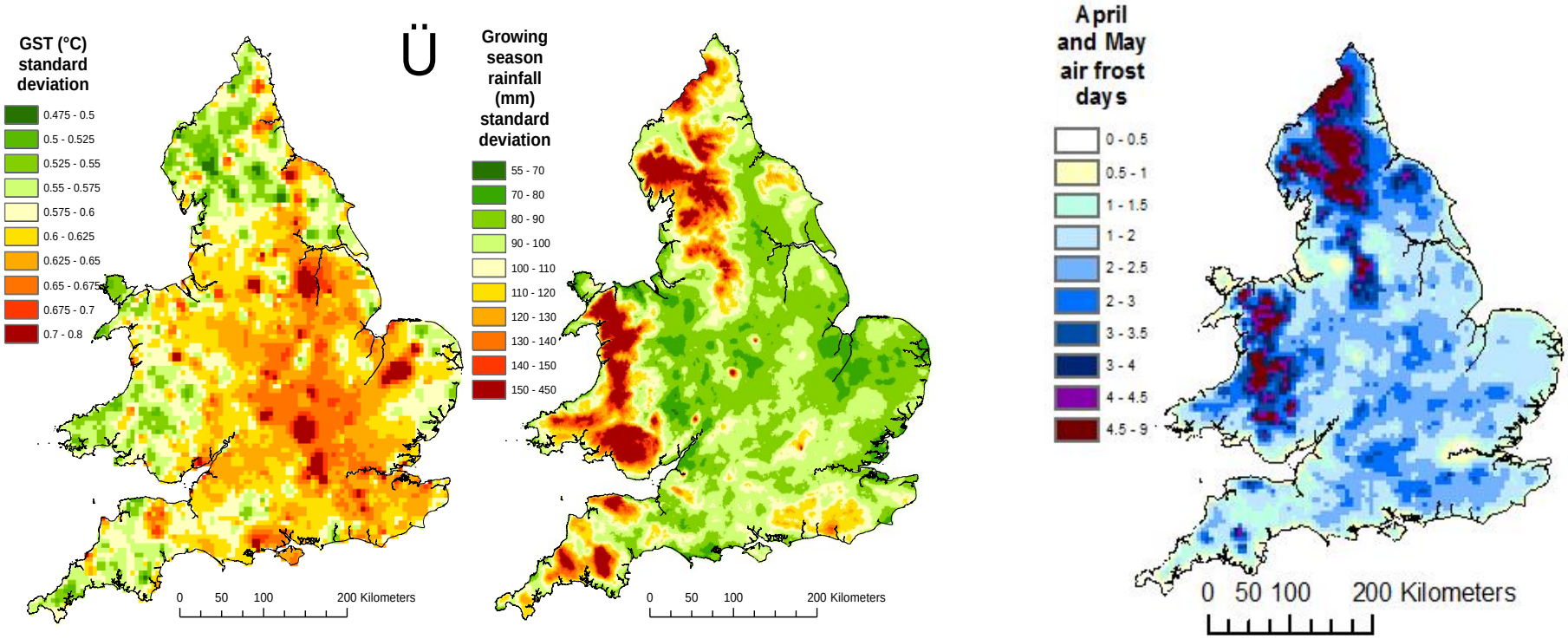
THANK YOU

Spatial variability in GST and growing season rainfall inter-annual variability (1981-2010)



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Opportunities for adaptation?