SUPPLEMENTARY DATA
Nesbitt, A., Dorling, S., Jones, R., Smith, D. K., Krumins, M., Gannon, K. E., Dorling, L., Johnson, Z., & Conway, D. (2022). Climate change projections for UK viticulture to 2040: a focus on improving suitability for Pinot noir. *OENO One, 56*(3).
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Supplementary Information

Climate change projections for UK viticulture to 2040: a focus on improving suitability for Pinot Noir.

SI Table 1. Examples of future Viticulture Climate studies and the associated models and climate change scenarios.

Study/Authors	Climate models used	Scenario(s) applied	Area of study
Jones *et al.* (2005)	Hadley Centre Coupled Atmosphere-Ocean General Circulation Model, Version 3 (HadCM3).	Special Report on Emissions Scenarios; Scenario A2	27 of the world's wine producing regions.
White *et al.* (2006)	Adbus Salam Institute for Theoretical Physics: Regional Climate Model; Version 3 (RegCM3).	Special Report on Emissions Scenarios; Scenario A2	Western United States of America
Hall and Jones (2009)	Commonwealth Scientific and Industrial Research Organisation; Climate System Model Mark 3.0	Special Report on Emissions Scenarios; Scenario A1B.	Australia
Caffarra and Eccel (2011)	Hadley Centre Coupled Atmosphere-Ocean General Circulation Model; Version 3 (HadCM3).	Special Report on Emissions Scenarios; Scenarios A2 & B2.	Italian alps
Moriondo *et al.* (2013)	Hadley Centre Coupled Atmosphere-Ocean General Circulation Model, Version 3 (HadCM3).	Special Report on Emissions Scenarios; Scenarios A2 & B2.	Europe
Briche *et al.* (2014)	ARPEGE v.4.6	Special Report on Emissions Scenarios; Scenarios B1, A1B & A2	Champagne, France
Cabré and Nuñez (2020)	IPSL-CM5A-MR	RCPs 4.5 & 8.5	Argentina

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SI Table 2. GST, GDD, GSP and Air Frost definitions and classifications.

Bioclimatic Index	Equation	Time period	Classifications
Growing Season average Temperature GST (°C)	$\frac{\sum_{d=1}^{n}[Tmax + Tmin]/2}{n}$ Tmax = Daily Maximum Temperature Tmin = Daily Minimum Temperature	1 April – 31 October	Cool: 13.0 < GST ≤ 15.0 Intermediate: 15.0 < GST ≤ 17.0 Warm: 17.0 < GST ≤ 19.0 Hot: 19.0 < GST ≤ 24.0
Growing Degree Days GDD	$\sum_{d=1}^{n}\left[\frac{Tmax + Tmin}{2} - 10.0\right]$ *Where 10 °C is the base temperature*	1 April – 31 October	*Region Ia. 850 < GDD ≤ 1111 Region Ib. 1111 < GDD ≤ 1389 Region II. 1389 < GDD ≤ 1667 Region III. 1667 < GDD ≤1944 Region IV. 1944 < GDD ≤ 2222 Region V. 2222 < GDD ≤ 2700
Growing Season Precipitation GSP	$\sum_{d=1}^{n}(P)$ *P = Precipitation (mm)*	1 April – 31 October	N/A
Air frost days	$\sum_{d=1}^{n}[Tmin \leq 0\ °C]$	15 March – 31 May	N/A

** GDD classes are based on rounded °F limits as defined by Winkler et al. (1974), which produce non-rounded classes in °C units.*

SI Table 3. Vintage BCIs for the Montagne de Reims, Côtes des Bar and Côtes de Nuits (derived from the mean values of the overlain ERA5-Land cells and weather station rainfall data)

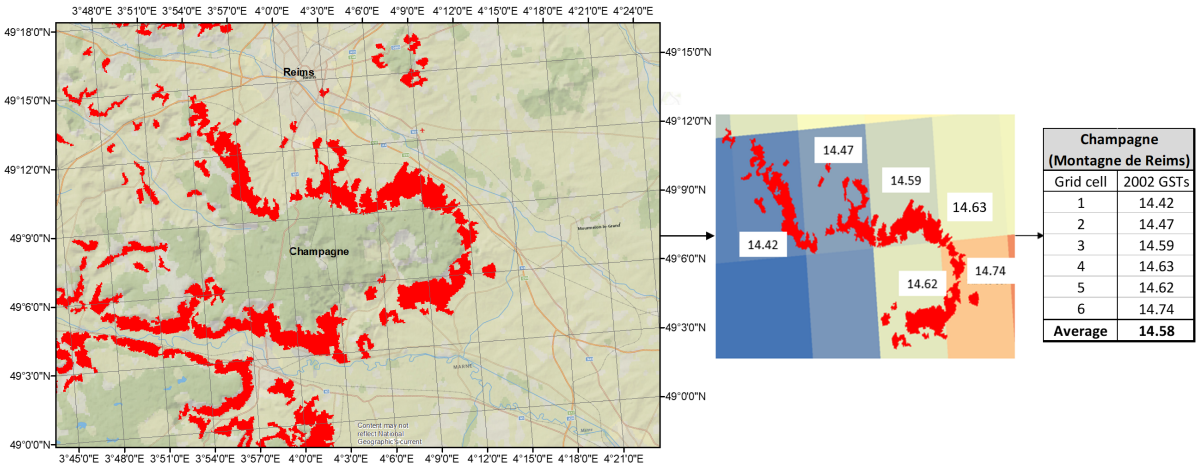
	Champagne (Montagne de Reims & Côtes des Bar)		Burgundy (Côtes de Nuits)	
Year / BCI	2008	2012	2005	2015
GST	14.3	14.8	16.1	16.2
GDD	1014	1108	1337	1376
GSP	408	423	374	364

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SI Table 4. 1999–2018 mean BCIs (ERA5-Land and Station Data) for Pinot Noir growing areas in Champagne (Montagne de Reims and Côte des Bar – sparkling Pinot Noir), Burgundy (Côte de Nuits – still Pinot Noir) and Baden (still Pinot Noir). Values highlighted represent highest and lowest grid cells for each BCI.

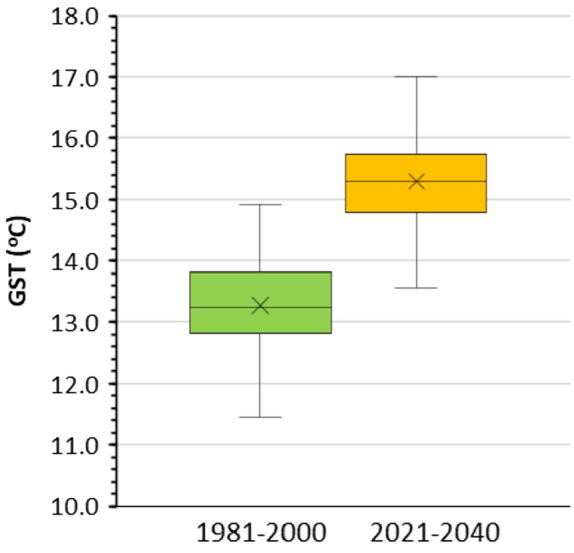
Burgundy (Côtes de Nuits)				**Champagne (Montagne de Reims & Côtes des Bar)**				**Baden**			
Grid cell	GST (°C)	GDD	GSP (mm)	Grid cell	GST (°C)	GDD	GSP (mm)	Grid cell	GST (°C)	GDD	GSP (mm)
1	15.7	1257	Dijon Longvic station data	1	15.1	1147	Reims Champagne, Reims Prunay and Troyes Barbery station data	1	14.7	1085	Lahr station data
2	15.9	1307		2	15.2	1154		2	14.9	1124	
3	15.4	1216		3	15.3	1175		3	14.6	1062	
4	15.8	1283		4	15.3	1180		4	15.5	1220	
Average	**15.7**	**1266**	**450**	5	15.4	1199		5	15.2	1165	
				6	15.3	1178		6	15.4	1208	
				7	15.5	1220		7	15.3	1208	
				8	15.5	1224		8	15.4	1214	
				9	15.4	1221		9	15.0	1131	
				10	15.5	1234		10	15.7	1268	
				11	15.3	1198		11	16.0	1333	
				12	15.3	1186		12	16.2	1372	
				13	15.3	1200		13	15.8	1303	
				14	15.3	1185		14	15.4	1209	
				15	15.2	1182		15	14.9	1123	
				16	15.5	1230		16	14.3	1024	
				17	15.3	1196		17	15.1	1162	
				Average	**15.3**	**1195**	**384**	18	15.1	1170	
								19	15.5	1224	
								Average	**15.3**	**1190**	**540**

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Champagne (Montagne de Reims)	
Grid cell	2002 GSTs
1	14.42
2	14.47
3	14.59
4	14.63
5	14.62
6	14.74
Average	**14.58**

SI Figure 1. Left: Vineyard mapping (red areas = vineyards; CORINE Land map). Right: grid overlay (ERA5-Land) and data (GST) extraction process



SI Figure 2. Box and Whisker plots of UKCP18 model simulations (x12) for GSTs during 1981–2000 and 2021–2040 time periods, showing both bias adjusted model and inter-annual variability for a single 5 x 5 km grid cell encompassing several vineyards in south-east England (Figure 6).