SUPPLEMENTARY DATA
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Supplementary Material

TABLE S1. The 32 models and modeling groups that provided Coupled Model Intercomparison Project phase 5 (CMIP5) data used in this study.

#	Model	Center
1	ACCESS1.0	Commonwealth Scientific and Industrial Research Organization (CSIRO) and Bureau of Meteorology (BOM), Australia
2	ACCESS1.3	Commonwealth Scientific and Industrial Research Organization (CSIRO) and Bureau of Meteorology (BOM), Australia
3	BCC-CSM1.1(m)	Beijing Climate Center, China Meteorological Administration
4	BCC-CSM1.1	Beijing Climate Center, China Meteorological Administration
5	CanESM2	Canadian Centre for Climate Modelling and Analysis
6	CCSM4	National Center for Atmospheric Research
7	CESM1(BGC)	Community Earth System Model Contributors
8	CESM1(CAM5)	Community Earth System Model Contributors
9	CMCC-CM	Centro Euro-Mediterraneo per I Cambiamenti Climatic
10	CMCC-CMS	Centro Euro-Mediterraneo per I Cambiamenti Climatic
11	CNRM-CM5	Centre National de Recherches Météorologiques / Centre Européen de Recherche et Formation Avancée en Calcul Scientifique
12	CSIRO-Mk3.6.0	Commonwealth Scientific and Industrial Research Organization in collaboration with Queensland Climate Change Centre of Excellence
13	EC-EARTH	EC-EARTH consortium
14	FGOALS-g2	LASG, Institute of Atmospheric Physics, Chinese Academy of Sciences and CESS,Tsinghua University
15	GFDL-CM3	NOAA Geophysical Fluid Dynamics Laboratory
16	GFDL-ESM2G	NOAA Geophysical Fluid Dynamics Laboratory
17	GFDL-ESM2M	NOAA Geophysical Fluid Dynamics Laboratory
18	GISS-E2-H	NASA Goddard Institute for Space Studies
19	GISS-E2-R	NASA Goddard Institute for Space Studies
20	HadGEM2-AO	National Institute of Meteorological Research/Korea Meteorological Administration
21	HadGEM2-CC	Met Office Hadley Centre (additional HadGEM2-ES realizations contributed by Instituto Nacional de Pesquisas Espaciais)
22	HadGEM2-ES	Met Office Hadley Centre (additional HadGEM2-ES realizations contributed by Instituto Nacional de Pesquisas Espaciais)
23	INM-CM4	Institute for Numerical Mathematics
24	IPSL-CM5A-LR	Institut Pierre-Simon Laplace
25	IPSL-CM5A-MR	Institut Pierre-Simon Laplace
26	MIROC-ESM-CHEM	Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies
27	MIROC-ESM	Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies
28	MIROC5	Atmosphere and Ocean Research Institute (The University of Tokyo), National Institute for Environmental Studies, and Japan Agency for Marine-Earth Science and Technology
29	MPI-ESM-LR	Max-Planck-Institut für Meteorologie (Max Planck Institute for Meteorology)
30	MPI-ESM-MR	Max-Planck-Institut für Meteorologie (Max Planck Institute for Meteorology)
31	MRI-CGCM3	Meteorological Research Institute
32	NorESM1-M	Norwegian Climate Centre

TABLE S2. Growing season average temperature (GST) index values corresponding to 10 September and 10 October for the Willamette Valley American Viticultural Area obtained from quadratic fits to calculations of the GST index and Pinot noir specific applications of the grapevine sugar ripeness (GSR) model (Parker *et al.*, 2020a), which predict the day of the year for a 220 g/L sugar concentration level, calculated on a mean decadal basis using (a) historic and RCP4.5 future Localized Constructed Analogs (LOCA) Coupled Model Intercomparison Project phase 5 (CMIP5) (Pierce *et al*., 2015a; Pierce *et al*., 2015b) model datasets associated with the GST index-based optimal LOCA CMIP5 ensemble listed in Table 2, (b) the gridded daily meteorological dataset developed for northwestern North America (PNWNA) (Werner *et al*., 2019), and (c) CanESM2 historic and RCP8.5 future LOCA CMIP5 model datasets. The R-squared value is reported for each fitted quadratic model.

(a) LOCA CMIP5 Historic and RCP4.5			
	R-squared	GST Index (°C)	
Time Period		Sep. 10	Oct. 10
1950s	0.998	17.47	14.79
1950s - 1960s	0.998	17.43	14.80
1950s - 1970s	0.998	17.43	14.80
1950s - 1980s	0.998	17.40	14.80
1950s - 1990s	0.998	17.36	14.80
1950s - 2000s	0.998	17.43	14.80
1950s - 2010s	0.998	17.48	14.79
1950s - 2020s	0.998	17.52	14.79
1950s - 2030s	0.998	17.52	14.80
1950s - 2040s	0.998	17.54	14.79
1950s - 2050s	0.998	17.58	14.79
1950s - 2060s	0.998	17.57	14.79
1950s - 2070s	0.998	17.58	14.79
1950s - 2080s	0.998	17.58	14.79
1950s - 2090s	0.998	17.59	14.79
(b) PNWNA			
1950s - 1990s	0.993	17.18	14.81
(c) LOCA CMIP5 (CanESM2) Historic and RCP8.5			
1950s - 2090s	0.995	17.65	14.66

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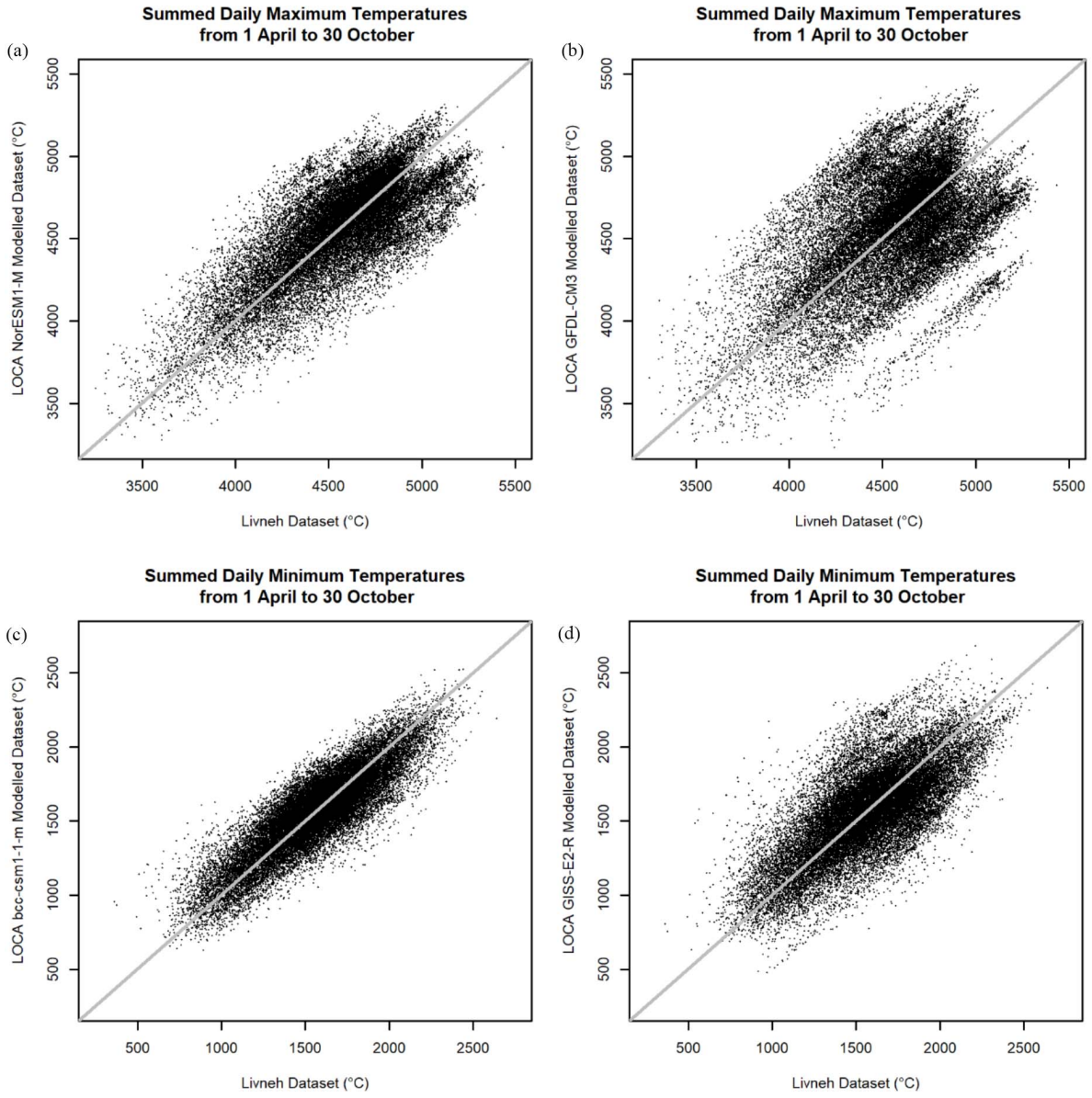


FIGURE S1. For the LOCA CMIP5 historical period (1950-2005) and the 553 model-observation comparison points shown in Figure 1 (a) which cover the Willamette Valley American Viticultural Area, scatter plots of simulated and observed values from the best ((a) and (c)) and worst ((b) and (d)) models, as measured by their calculated RMSEs, with summing daily maximum ((a) and (b)) and minimum ((c) and (d)) surface air temperature values from 1 April to 30 October.

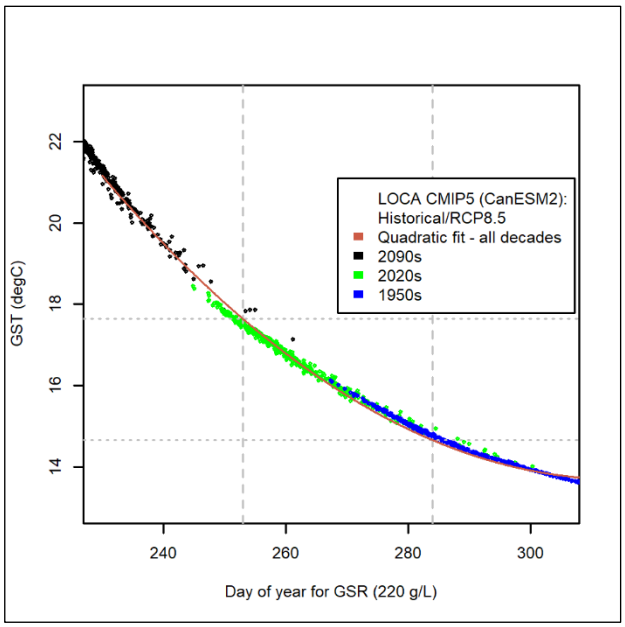


FIGURE S2. Scatter plot of the decadal mean grapevine sugar ripeness (GSR) model (Parker *et al*. 2020a) day of year (from 1 January) for Pinot noir to reach a 220 g/L sugar concentration level and the growing season average temperature (GST) index (Jones, 2006) throughout the Willamette Valley (WV) American Viticultural Area (AVA), computed for the 1950s, 2020s, and 2090s using historic and RCP8.5 future Localized Constructed Analogs (LOCA) Coupled Model Intercomparison Project phase 5 (CMIP5) (Pierce *et al*., 2015a; Pierce *et al*., 2015b) CanESM2 model datasets. Also shown is the quadratic model fit (R2 = 0.995) to the GSR and GST decadal mean calculations across all fifteen decades (1950s-2090s) and the fitted model GST index values that correspond to 10 September and 10 October.