



# CLIMATE SERVICES FOR GRAPES AND THE WINE SECTOR

*“Timely knowledge of climate can save an entire production”*

*Antonio Graça, SOGRAPE Vinhos*

Grape and wine production is heavily affected by weather and climate, thereby is highly vulnerable to climate change. MED-GOLD will propose climate services deploying forecast information at the medium (next 6 months) and long-term (next 30 years). This information will be provided at higher spatial resolution than what is currently available. To provide the highest value for decision-making, the services will be co-developed with professional users from the sector.

Wine producers face diverse challenges affecting several decision processes in their business, such as strategical definitions, viticulture, oenological and stock management. Some examples are presented below to show how climate services - in this case, predictions of climate variables and bioclimatic indices - can improve decision-making and win over challenges posed by climate variability and climate change.

Time scale	Decision area	Challenge	MED-GOLD climate service	Benefits				
Long-term (30 years)	Long-term strategy	<ul style="list-style-type: none"> <li>Purchase of new vineyards and/or selection of future new locations.</li> <li>Choice of grape varieties, rootstocks and vineyard design.</li> <li>Anticipation of needs to change wine style.</li> </ul>	<ul style="list-style-type: none"> <li>Temperature</li> <li>Precipitation</li> <li>Growing season average temperature</li> <li>Warm spell duration index</li> <li>Growing degree days</li> <li>Number of heat stress days</li> <li>Spring total precipitation</li> </ul>	<ul style="list-style-type: none"> <li>Indication of areas with suitable climate to meet production and quality goals for the next decades.</li> <li>Matching adequate grape varieties and rootstocks to expected climate.</li> <li>Identification of likely moment with adverse climate for current wine style.</li> </ul>				
		Medium-term (6 months)			Viticulture management	<ul style="list-style-type: none"> <li>Better pruning and canopy management.</li> <li>Improve planning of treatments and harvest setting with higher accuracy.</li> <li>Better labour management, operational subcontracting and environmental protection.</li> </ul>	<ul style="list-style-type: none"> <li>Temperature</li> <li>Precipitation</li> <li>Growing season average temperature</li> <li>Warm spell duration index</li> <li>Growing degree days</li> <li>Number of heat stress days</li> <li>Spring total precipitation</li> </ul>	<ul style="list-style-type: none"> <li>Longer anticipation of best timing for vineyard operations.</li> <li>Identification of time periods with high-demand for labour and inputs.</li> <li>Schedule of best moments for treatments with higher temporal precision.</li> </ul>
					Oenological management	<ul style="list-style-type: none"> <li>Better maturation control planning.</li> <li>Improve harvest efficiency.</li> </ul>		
Medium-term (6 months)	Stock management	<ul style="list-style-type: none"> <li>Improve supplier negotiation.</li> <li>Better prices and supply chain.</li> <li>Marketing and promotions.</li> </ul>	<ul style="list-style-type: none"> <li>Temperature</li> <li>Precipitation</li> <li>Growing season average temperature</li> <li>Warm spell duration index</li> <li>Growing degree days</li> <li>Number of heat stress days</li> <li>Spring total precipitation</li> </ul>	<ul style="list-style-type: none"> <li>Anticipation of seasonal climate trends with adequate temporal and spatial resolution.</li> </ul>				

## Planning of plant protection treatments

Several diseases affecting grapevines are favoured by specific climatic conditions. These diseases may be of fungal origin, namely downy and powdery mildew, among others, and of bacterial origin or caused by pests, namely insects. Fungal diseases occur when the plant, being a carrier, is exposed to favourable climatic conditions such as high humidity and mild-warm temperatures, which associated to poor aeration promote their development. When emerging at critical phenological stages, these diseases damage grapes, ultimately reducing yields and resulting in a loss of wine quality.

Currently, SOGRAPE (MED-GOLD's champion user for the wine sector) uses 4 to 5-day lead-time forecasts to schedule their spraying while avoiding product loss from subsequent rainfall. This anticipation of vineyard protection planning results in important, sustainable benefits. Medium-term decisions are currently undertaken with reference to past average conditions, both intuitively and using 30-year climate data series available from the national weather service.



### Advantages of having access to medium-term (seasonal) climate predictions:

1. **Efficient management of spraying against diseases**, supporting vineyard development or inducing grapevine's resistance against humidity-driven diseases (fungal) in more sensitive phenological states.
2. **Efficient stock management** to be prepared in advance to avoid higher prices and stock disruptions.
3. **Accurate setting of harvest dates**, which is influenced by adverse conditions, namely pests risk.

## Glossary

**Climate services:** transformation of climate-related data and other information into customized products such as trends, economic analysis, advice on best practices, and any other climate-related service liable to benefit that may be of use for the society

**Weather forecasts:** probabilistic forecasts of climate variables for the next hours and days (up to two weeks)

**Climate predictions:** probabilistic forecasts of climate variables that extend further into the future than weather forecasts, from months and seasons up to decades

**Seasonal predictions:** climate predictions for the next season. These predictions can be provided for the next 6 months

**Climate projections:** probabilistic forecasts of climate variables that extend even further into the future than climate predictions, from decades up to centuries

**Growing season average temperature (GST):** average of daily average temperatures between April 1<sup>st</sup> and October 31<sup>st</sup> (Northern Hemisphere)

**Growing degree days (GDD):** sum of daily differences between daily temperature averages and 10°C (vegetative growth minimum temperature) between April 1<sup>st</sup> and October 31<sup>st</sup> (Northern Hemisphere)

**Spring total precipitation (SprR):** total rainfall from April 21<sup>st</sup> to June 21<sup>st</sup> (Northern Hemisphere)

**Number of heat stress days (SU35):** annual count of days when daily maximum temperatures exceed 35°C

**Warm spell duration index (WSDI):** annual count of days with at least 6 consecutive days when the daily maximum temperature exceeds its 90<sup>th</sup> percentile

## About MED-GOLD

**MED-GOLD**, Turning climate-related information into added value for traditional **MED**iterranean **G**rape, **O**Live and **D**urum wheat food systems, is a 4-year project contributing to make European agriculture and food systems more resilient, sustainable and efficient in the face of climate change by using climate services to minimize climate-driven risks/costs and seize opportunities for added value



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