



## **Simulation of the Climatic Risks episodes in the Demarcated Douro Region Vineyards using the WRF model**

Mónica Alexandra Rodrigues (1,2), Alfredo Rocha (2,5), Ana Monteiro (1,6), Hervé QuénoI (3), and José Rodrigues de Freitas (4)

(1) Geography Department, Faculdade de Letras, University of Porto; FLUP, Via Panorâmica, s/n, 4150-564, Porto, Portugal (monica.a.rodrigues@hotmail.com ; anamonteirosousa@gmail.com), (2) Physics Department, University of Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal (alfredo.rocha@ua.pt), (5) CESAM – Centre for Environmental and Marine Studies, University of Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal , (6) ISPUP- Institute of Public Health, University of Porto, Rua das Taipas nº 135, 4050-600, Porto, Portugal , (3) Laboratoire COSTEL, UMR6554 LETG, Université Rennes 2, Place du Recteur Henri Le Moal, 35043 Rennes, France (herve.quenol@uhb.fr), (4) General Direction of Agriculture and Fishing in the North (DRAPN). Department of the Advices of Douro, 5050-071, Peso da Régua, Portugal (jose.freitas@drapn.min-agricultura.pt)

The knowledge of the climate risks at small scales is yet essential for agricultural activities and production like vine growing, because of their serious economics impacts. We know that some meteorological processes operate over slightly restricted areas and may bring some risks to people due to their activity, like floods, fog and frost (Monteiro, 2003). This is what happens, for example in viticulture where the quality of the wine, the selection of the grapevines or even the characteristics of the farming soil, also depending from local soil features like topography, proximity of a river or water body, will act locally on the weather. Spring frosts are of significant concern to growers of many cultures crops such as winegrapes. Because of their high latitude and some altitude, the vineyards of the Demarcated Douro Region (DDR) are subjected to Spring frost, which cause serious damages. These Spring frosts occur mainly in radiative atmospheric situations (low speed wind, clear sky at night) where spatial variations in minimum temperatures are very important. But the hazards of vineyard don't confine to the incidents of the fortuitous and/or meteorological character. The illnesses and plagues affect frequently the vineyards of DDR due, namely to the weather, to the high power of the regional stocks, to the dense vegetation badly drained and favourable to the setting of numberless fungi, viruses and/or poisonous insects. The grapevine is hostess to several enemies responsible for the appearance plagues or illnesses. These show disturbances which interfere with the normal structure, the physiological functions or the economic value of a plant visible through modified symptoms. At the level of developing factors concerning plagues or illnesses we have to notice the biotic causes (presence of insects, fungi or viruses) meteorological and cultural causes (used techniques). In the case of DDR it is worth noticing the meteorological conditions due to the weather characteristics. Although there are several illnesses and plagues the most important enemies for the vine in the DDR are the mildew, oidium, grey rotteness, grape moth, . . . , if the climatic conditions favour their appearance and development. For this study, we selected some months for different periods, at the 30 weather stations of the Region of Douro. We use the Weather Research and Forecast Model (WRF) to study and possibly predict the occurrence of risk episodes. The model is first validated with the meteorological data obtained at the weather stations. The knowledge of frost and plagues occurrence allows one to decrease its risks not only by selecting the cultural species and varieties but also the places of growth and the planting and sowing dates.

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### Reference:

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