



The role of Evapotranspiration and Water Use Efficiency in Agriculture in Portugal

José Vaz¹, Célia M. Gouveia^{1,2}, and Isabel F. Trigo^{1,2}

¹Instituto Portugues do Mar e da Atmosfera, LISBOA, Portugal (cmgouveia@fc.ul.pt)

²Instituto Dom Luiz (IDL), Faculdade Ciencias Universidade de Lisboa, LISBOA, Portugal

Understanding climate variability and change and its impacts on natural systems is becoming more and more important as changes in earth surface condition near surface air temperature and precipitation. Over Portugal, the observed warming trends have been found to be asymmetric with respect to seasonal and diurnal cycles, with greatest warming occurring for the minimum temperature and during winter and spring. These observed trends exert strong influences on agriculture systems, affecting production viability through changes in winter hardening, frost occurrence, growing season lengths and heat accumulation for ripening potential.

Remote sensing technology has been developing steadily and its products can provide many applications in agriculture, namely crop identification, crop growth monitoring and yield prediction. Recently the LSA SAF team set up a strategy to generate long term data records from Meteosat Second Generation satellite series (2004 to present), releasing Land Surface Temperature (LST), Reference Evapotranspiration (ETREF) and Vegetation parameters (FAPAR, LAI and FVC) using a stable set of input data and algorithm, which would be suitable for climate variability and change detection studies. On the other hand, a new product to characterize the ecosystem processes, the Gross Primary Production (GPP), is under production since 2018.

In this work we propose to computed Water Use Efficiency (WUE), as the ratio between Gross Primary Production (GPP) and Reference Evapotranspiration (ETREF), using LSA-SAF Products. WUE translates the exchanges of carbon and water gross fluxes, between natural ecosystem and the atmosphere, allowing to monitor the adaptability of the ecosystems to climate change. The role played by Evapotranspiration and Water Use Efficiency for different crops in Portugal is evaluated, namely on Wine Production for Douro Region. Results for 2018 and 2019 highlights the vulnerability of the different sectors of Douro Region to dry and wet conditions, namely helping to analyze the impact of droughts on Douro wine production.

Acknowledgements: This study was performed within the framework of the LSA-SAF, co-funded by EUMETSAT This work was partially supported by national funds through FCT (Fundação para a Ciência e a Tecnologia, Portugal) under projects CLMALERT (ERA4CS/0005/2016).