



## **Yearly European grids of heating, cooling, and growing degree days for 2001-11. A deeper look on the Mediterranean Area over the last 60 years.**

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The increase of temperatures in Europe in the last century, together with more frequent occurrences of extreme events such as summer hot waves or very cold winters, has many consequences: amongst them, the increase in energy consumption and a reduction in agricultural production in some regions. Cold and heating degree days (CDD, HDD) can be defined as the sum of daily degrees that are respectively higher or lower than a chosen threshold (usually varying between 15 °C and 21°C). Those days are summed up over the year or a season, and quantify how much a place need to be heated or air conditioned. Growing degree days (GDD) are calculated over the growing season (usually from March or April to September or October) and are similar to cooling degree days, provided that the temperature threshold is modified according to the crop or fruit studied. Using a blended dataset of temperature and precipitation made of approximately 4,700 stations we drew high resolution yearly maps of CDD, HDD, and GDD for Europe for the last 11 years. By means of the daily gridded E-OBS dataset, we obtained anomaly grids for HDD, CDD, and GDD from 1951 to 2011. In order to calculate degree days, we used an improved method that considers also minimum and maximum daily temperatures, not only mean temperatures. Particular attention has been dedicated to the Mediterranean Region, where CDD strongly increased in the last 15 years, and so did GDD. However, for many crop species, the increasing number of GDD and the longer growing season has not resulted in better agricultural production, because Mediterranean regions are becoming too dry. Also, we computed maps of the Winkler Index for Italy and France, a special degree-day indicator used for grapevines.