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Improving modelled impacts on the flowering of temperate fruit trees in the Iberian Peninsula of climate change projections for 21st century

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Flowering of temperate trees needs winter chilling, being the specific requirements dependent on the variety. This work studied the trend and changes of values of chilling hours for some representative agricultural locations in Spain for the last three decades and their projected changes under climate change scenarios. According to our previous results (Pérez-López et al., 2012), areas traditionally producing fruit as the Ebro (NE of Spain) or Guadalquivir (SO) valleys, Murcia (SE) and Extremadura (SO) could have a major cold reduction of chill-hours. This would drive a change of varieties or species and may enhance the use of chemicals to complete the needs of chill hours for flowering. However, these results showed high uncertainty, partly due to the bias of the climate data used, generated by Regional Climate Models.
The chilling hours were calculated with different methods according to the species considered: North Carolina method (Shaltout and Unrath, 1983) was used for apples, Utah method (Richardson et al. 1974) for peach and grapevine and the approach used by De Melo-Abreu et al. (2004) for olive trees. The climate data used as inputs were the results of numerical simulations obtained from a group of regional climate models at high resolution (25 km) from the European Project ENSEMBLES (http://www.ensembles-eu.org/) first bias corrected for temperatures and precipitation (Dosio and Paruolo, 2011; Dosio et al., 2012).
This work aims to improve the impact projections obtained in Pérez-López et al. (2012). For this purpose, variation of chill-hours between 2nd half of 20th century and 1st half of 21st century at the study locations were recalculated considering 1) a feedback in the dates in which the chilling hours are calculated, to take into account the shift of phenological dates, and 2) substituting the original ENSEMBLES data set of climate used in Pérez-López et al. (2012) by the bias corrected data set. Calculations for the 2nd half of 20th century will be used to evaluate the quality of the new data set of projections.

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