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Prime and subprime vintage years: a climatological study looking at 500 years of grape harvest dates and grape quality records as well as at early instrumental temperature data

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Detection and quantification of extreme weather conditions in the past is important for correctly assessing the significance of today's extremes. We defined a list of 40 extreme years (1540-2007), where two or more of several parameters (phenological records or mean temperatures) available at that time exceed the double standard deviation with regard to a 105-years lasting reference period. As vine flowering, grape mellowness and grape harvest dates are on hand, the term "extreme" adverts to anomalous temperature conditions during spring and early summer time, i.e. to mean temperatures which correlate highly significantly to these phenological records. By analyzing the phenological data of the region of Vienna, Burgundy and the Swiss Plateau Region on one hand as well as the temperature series of Vienna, Basel, Geneva and Strasbourg on the other, we tried to extend extreme events to an inter-regional scale. Apart from these data we used independent descriptive sources from the municipal archive of the town Retz in Lower Austria for affirming and amending these results. For instance in Western Europe 1542, 1718, 1811, 1821, 1822, 2003 and 2007 did have extreme spring to early summer temperatures and/or exceptional phenological dates; four out of only seven cold extremes cluster between 1816 and 1879. Not a single mean temperature extreme at Vienna (according to our definition of double standard deviation) is present between 1874 and 1983 and no extreme positive grape harvest date anomalies arise after 1980.