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A regional phenology model for croplands

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The phenological events are good indictors for climate change, because bud break, leaf onset, and leaf senescence are sensitive to changes in climate. The existing phenological models for croplands (e.g. LPJ-ml, CENTURY, SIBcrop) do not explain the relation of phenological events and climate factors well in a uniform model. This study adopted a revised growing season index (GSI) to detect the onset day of crops based on climate factors, such as, mean air temperature, vapor press deficit (VPD), and photoperiod. The accumulated day light temperature from the leaf onset day was used to define the harvest day of crops. The observed leaf onset day and crop harvest day were derived from the remotely sensed data and site measurements of carbon flux data. The simulated results have a good agreement with the observed onset day and harvest day for wheat, barley, rape, rice, barley in Ireland, and maize in US. The mean absolute error (MAE) of predicted onset day compared with the observed onset day of NEE was 6, 2.68, 11.75, 13, 8.3, and 5.3 days respectively. The MAE of predicted harvest day compared with the observed harvest day of NEE was 5.7, 4, 6.75, 7, 6.3, and 7.4 days respectively. The changes in spatial pattern of the phenological events for European crops in response to the climate change will be presented in the near future.