Geophysical Research Abstracts,
Vol. 11, EGU2009-6934, 2009
EGU General Assembly 2009

Phenological responses of plants in Europe: Differences in timing due to the type of event, the location and human density

N. Estrella and A. Menzel

Chair of Ecoclimatology, Technische Universitaet Muenchen, Am Hochanger 13, 85354 Freising, Germany, (estrella@met.forst.tu-muenchen.de)

The 4th assessment report of the IPCC confirms that there is already a change in biological and physical systems in the expected direction due to climate change. Even the human influence could be verified in these changes. Plant phenological observations provide a good tool to track the quality and quantity of plant reactions to temperature. In Europe, in particular, there has been a long tradition of collecting onset dates for various plant phenological phases. We analysed a huge phenological data set collected during the COST 725 Action 'Establishing a European Phenological Data Platform for Climatological Applications' containing more than 36,000 phenological time series (between 1971-2000) for Europe. This dataset was analysed by Menzel et al. (2006) on a national basis and they discovered that there was a extensive and apparent change in phenology over the three decades towards earlier start for spring phases and a slightly delayed beginning of leaf colouring in autumn. In contrast to the Menzel et al (2006) study we examined pan-European differences in the behaviour of phenological phases on the basis of station time series. We focussed on the temperature response of phenological phases and their regional patterns and the relationship between local temperature and phenological trends as well as the influence of human population density. The temperature information was derived from a high-resolution climate grid of Europe (0.5° x 0.5° grid CRU TS 2.1 (Mitchell & Jones 2005)). The data on population density were downloaded from Euro Stat. The results of our analyses confirm differences in behaviour between annual and perennial plants in Europe; the temperature response of perennial plants was greater (-4.2 days/°C) than that of annual agricultural crops (-3.0 days/°C). The correlation between the temperature trend and the phenology trend was strongest for leaf unfolding of fruit and deciduous trees (r=-0.63 and r=-0.46 respectively).
Geographical coordinates (latitude and longitude) alone only had little impact on the mean onset of the group of phases, including altitude there was an influence for some groups. We could show that human population density influenced the mean onset date of the group of phases.