Pan European PEP725 Phenology DB

www.pep725.eu MONITORING OF PHENOLOGICAL SPRING EVENTS

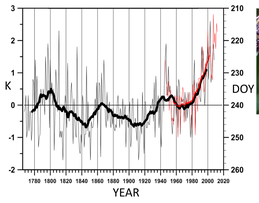
22 Partners and Markus Ungersböck, Thomas Hübner, Anita Paul, Elisabeth Koch

Zentralanstalt für Meteorologie und Geodynamik, Vienna, http://www.phenowatch.at/

MOTIVATION

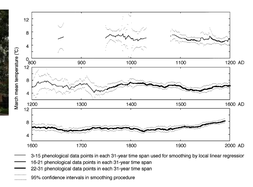
PHENOLOGY AS CC IMPACT INDICATOR

"… the timing of seasonal activities of animals and plants is perhaps the simplest process in which to track changes in the ecology of species in response to climate change" (IPCC 2007). Phenology has come back to the center of interest, not only in research but also as a way to communicate effects of climate change to the public. The first and most obvious biological impacts of climate change was detected in the environment using long-term phenological data.



Sambucus nigra
fruit ripening (red) and April-Sept temperature anomalies in Austria

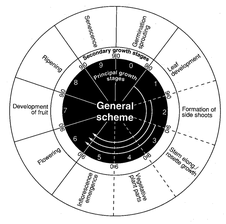
Prunus jamasakura
flowering data used for temperature reconstruction Kyoto (Yasuyuki and Kazui, 2007)



PEP725 COMMUNITY

The PEP 725 database www.pep725.eu allows for collecting data from different European institutions with a common coding system and offers therefore a unique compilation of plant phenological observations. The PEP 725 database with its open, unrestricted data access for science, research and education is an important research infrastructure.

In Europe collecting phenological data has a long tradition but trans boundary cooperation was difficult due to the lack of common guidelines for phenological observations. The COST725 action succeeded to introduce the BBCH code as classification system for phenological events used now by all phenological network operators who contribute to the PEP725 database.

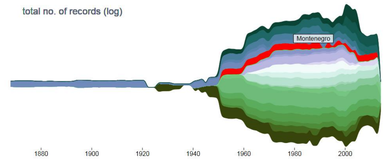


Principal and secondary growth stages of the BBCH code (Meier, 1997)

PEP725 DATABASE

The database includes: more than 11 000 000 observations from more than 20 000 locations from more than 250 different plants/cultivars. The data is quality checked by a multi-stage-quality control, which is still further improved.

The database is usually updated once a year. But as some networks has recently started to collect real time data we are now developing a real monitoring using ground phenological data.



STREAMGRAPH showing records in PEP725 DB.

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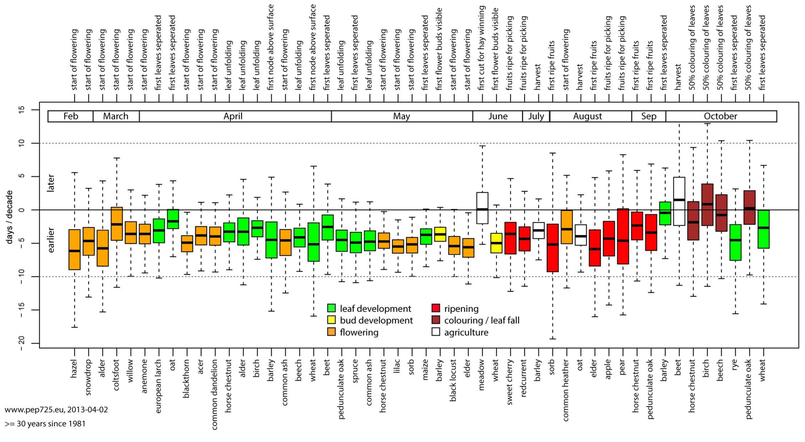
PHENOLOGICAL REAL TIME MONITORING SPRING 2015

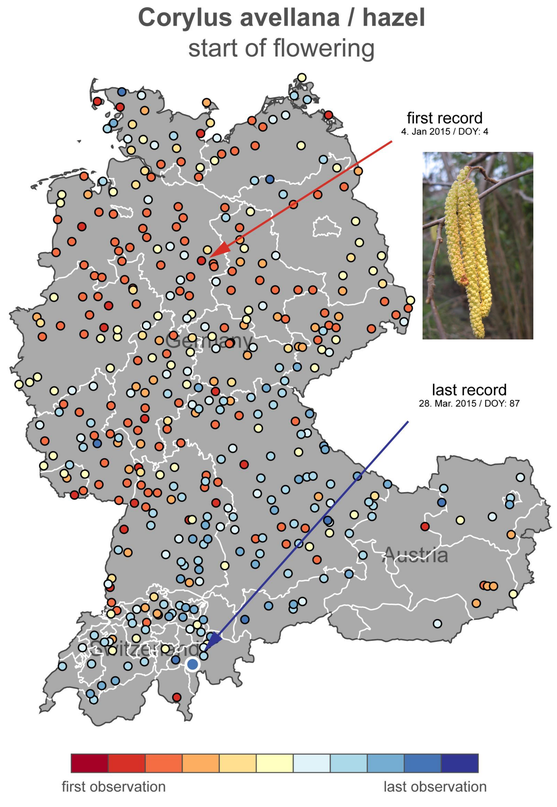
FLOWERING OF HAZEL IN 2015

Traditionally the "old" phenological networks are collecting the observation data once a year. Deutscher Wetterdienst and MeteoSwiss started only recently to get phenological observation data via web; in Austria this system was introduced by ZAMG already in 2007. "Young" Networks, mostly established in the 21st century as for instance in The Netherlands, UK or Sweden-rely only on web based data entries.

Here we show the beginning of male flowering (BBCH 60) of *Corylus avellana*. Hazel is an important allergenic plant and starts pollen shedding very early in the year. The figure below shows that the entry date had advanced since 1981 for about one week per decade in Europe.



Trends in days per decade of phenological events in 1981 to 2000 (Ungersböck et al., 2013)



FLOWERING OF HAZEL AND NAO

We had access to the German, Austrian and Swiss D-A-CH data and can now present the onset of flowering on hazel in 2015 in these countries. The total number of app. 420 observations is quite high but the spatial distribution is not satisfying yet showing an empty space in the central parts of Austria. Though some special features of hazel flowering, an indicator plant for first spring can be seen:

In January prevailed a high positive NAO (North Atlantic Ocean Index) resulting in mild weather in the first and last 10 days of this month. Scheifinger et al. (2002) could show that the common variance values between the January NAO index and the beginning of pollination of *Corylus avellana* is highest in higher latitudes. One can also detect this pattern in the 2015 situation with many "red" dots in Northern and Western parts of Germany and in Southern parts of Switzerland and Austria. Corresponding to the high positive NAO index monthly mean temperatures in D-A-CH were 1 to 3 K above the mean of 1981 to 2010 with ~3 K, in Northern and Western parts of Germany, Tessin and in the more Southern and Eastern regions of Austria. Meteoswiss reported the pollination of hazel in the Tessin already on January 10th. February temperatures were around the mean in D-A-CH resulting in a slowed down vegetation development. Finally on March 28th hazel flowering was reported from Graubünden in 1250 m a.s.l.

OUTLOOK

With the visualisation of some plant phases from the DACH area, we have shown that the time is ripe for a pan-European realtime dataservice. It is planned to promote this idea within the community as such a service would pave the way for many new phenology based products, like improved cross-border pollen forecasts.

To meet this target we have to define first of all a versatile data structure capable to hold all different plants, maybe animals and phases. Within PEP725 and the preceding COST725 action we have already gained some experience within the European community but to succeed an international approach will be necessary. The goal should be an easy but versatile exchange protocol (maybe a kind of "PhenoXML"

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