COST725 => PEP725 and BACCHUS

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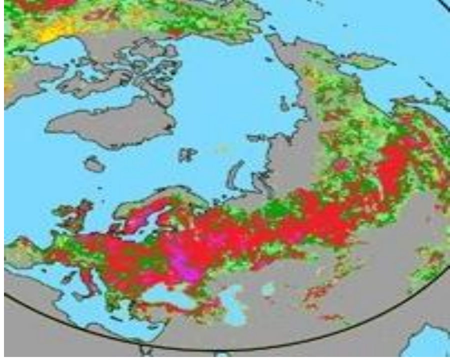
cost 725



Phenology what for?

- Important tool for climate change impact studies - IPCC AR4
- interaction between atmosphere and biosphere is a crucial area of study for increasing knowledge of critical exchanges in the planetary carbon balance
- important and necessary to have ground truth observations for NDVI-data (normalized differential vegetation Index – photosynthetic activity)
- vegetation influences the albedo, the evapo/transpiration and thus the energy budget of the earth – atmosphere system
- knowledge about and the input of the status of vegetation leads also to a better performance of NWP models

PEP

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Box 1.3. Phenological responses to climate in Europe: the COST725 project

The COST725 meta-analysis project used a very large phenological network of more than 125,000 observational series of various phases in 542 plant and 19 animal species in 21 European countries, for the period 1971 to 2000. The time-series were systematically (re-)analysed for trends in order to track and quantify phenological responses to changing climate. The advantage of this study is its inclusion of multiple verified nationally reported trends at single sites and/or for selected species, which individually may be biased towards predominant reporting of climate-change-induced impacts. Overall, the phenology of the species (254 national series) was responsive to temperature of the preceding month, with spring/summer phases advancing on average by 2.5 days/°C and leaf colouring/fall being delayed by 1.0 day/°C.

The aggregation of more than 100,000 trends revealed a clear signal across Europe of changing spring phenology with 78% of leaf unfolding and flowering records advancing (31% significantly (sig.)) and only 22% delayed (3% sig.) (Figure 1.6). Fruit ripening was mostly advanced (75% advancing, 25% sig.; 25% delayed, 3% sig.). The signal in farmers' activities was generally smaller (57% advancing, 13% sig.; 43% delayed, 6% sig.). Autumn trends (leaf colouring/fall) were not as strong. Spring and summer exhibited a clear advance by 2.5 days/decade in Europe, mean autumn trends were close to zero, but suggested more of a delay when the average trend per country was examined (1.3 days/decade).

The patterns of observed changes in spring (leafing, flowering and animal phases) were spatially consistent and matched measured national warming across 19 European countries (correlation = −0.69, $P < 0.001$); thus the phenological evidence quantitatively mirrors regional climate warming. The COST725 results assessed the possible lack of evidence at a continental scale as 20%, since about 80% of spring/summer phases were found to be advancing. The findings strongly support previous studies in Europe, confirming them as free from bias towards reporting global climate change impacts (Menzel et al., 2006b).

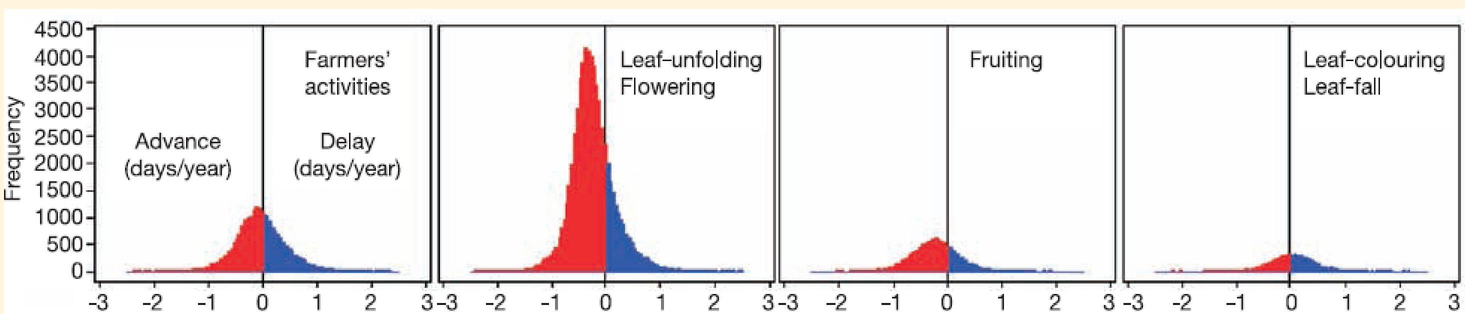


Figure 1.6. *Frequency distributions of trends in phenology (in days/year) over 1971 to 2000 for 542 plant species in 21 European countries. From Menzel et al. (2006b).*

PEP725 Pan European Phenological Database

PEP725

Key-Deliverables

D1 Development, operations and management of the PEP725 database

- D1a Improve Data Quality Checks
- D1b Data organisation

D2 Development, operations and management of the PEP725 webportal with free unrestricted data access

- D2a Development data input and data query
- D2b Visualisation of data

D3 Workshops conferences, reporting

PEP725 Project core team &

PM: Elisabeth

Project team: Silke Adle

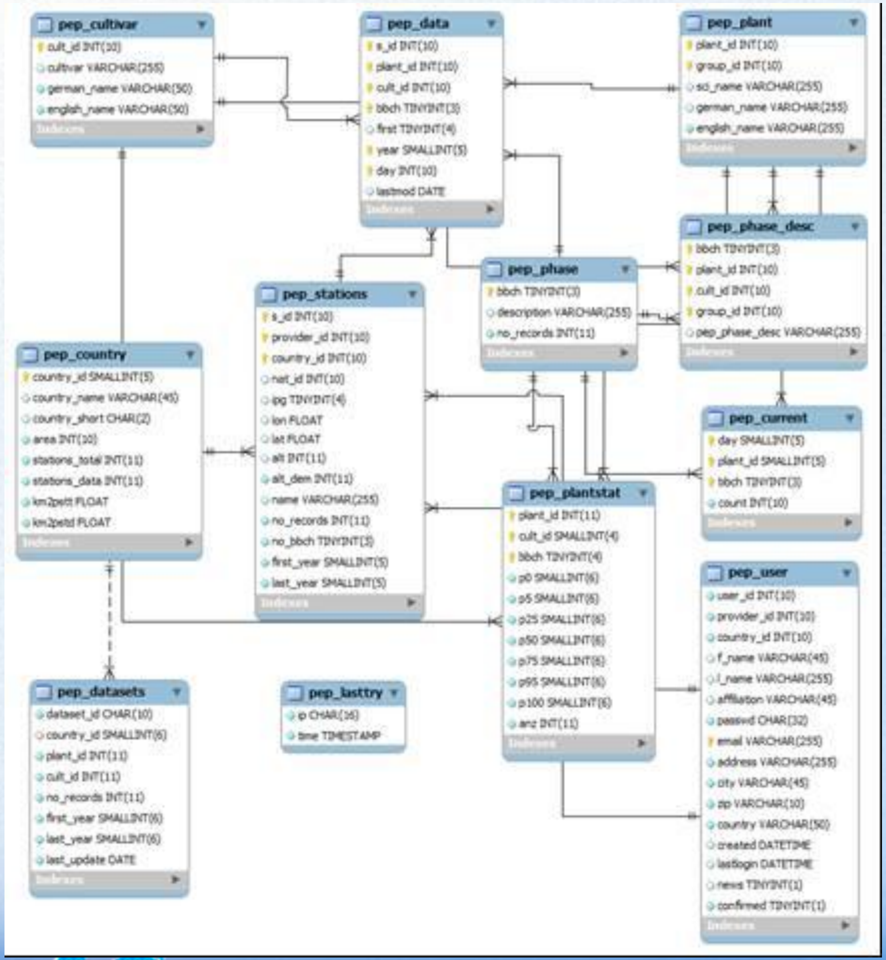
Markus U n-

Hermann

+ 16 European NMHS and 8

ZAMG, Austria
RMI, Belgium
DHMZ, Croatia
FMI, Finland
DWD, Germany
OMSZ, Hungary
Met Èireann, Ireland
Met.no, Norway
IMGW, Poland
RHMSS, Republic of Serbia
EARS, Slovenia
AEMet, Spain
MeteoSwiss, Switzerland
CHMI, Czech Republic
NMAR, Romania
SHMÚ, Slovak Republic

PEP725 Deliverable Database



Redesign of COST725 database

Open for new plants/animals and phases

Implementation of the COST database: 8 Mill. Records

Update of new data

PEP725 Deliverable Webpage zamg.ac.at/pep725

THE PAN EUROPEAN PHENOLOGICAL DATABASE

Email: Pwd: Login

PEP725

2011-103

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  - project members
- the PEP dataset
  - next events
  - station browser
- data download
  - registration
  - data selection
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- contact information

About PEP725

PEP725 a project funded by ZAMG, the Austrian ministry for science & research bm:w_f and EUMETNET (the network of European meteorological services), started in 2010 and will be running for 5 years.

The main objective of PEP725 is to

promote and facilitate phenological research by delivering a pan European phenological database with an open, unrestricted data access for science, research and education (datapolicy)

So far 16 European meteorological services and 7 partners from different phenological network operators have joined PEP725.

ZAMG RMI DHMZ DWD OMSZ MET éireann IMGW METEO ROMÂNIA SHMU AEMet SWE-NPN Meteorologisk institutt met.no TRINITY COLLEGE DUBLIN www.MeteoSwiss.ch

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News

2011-04-13
PEP725 workshop on 6 April 2011
presentations given by the invited speakers: Stein Rune Karlsen, This Rutishauser, Susanne Jochner, Christa Hammerl, Mirco Migliavacca, Helfried Scheifinger and Bridget O`Neill. Most of the presentations are available on demand: write to pep725@zamg.ac.at

2011-02-11
PEP725 Management meeting

2011-01-12
Dataset Update Slovenia

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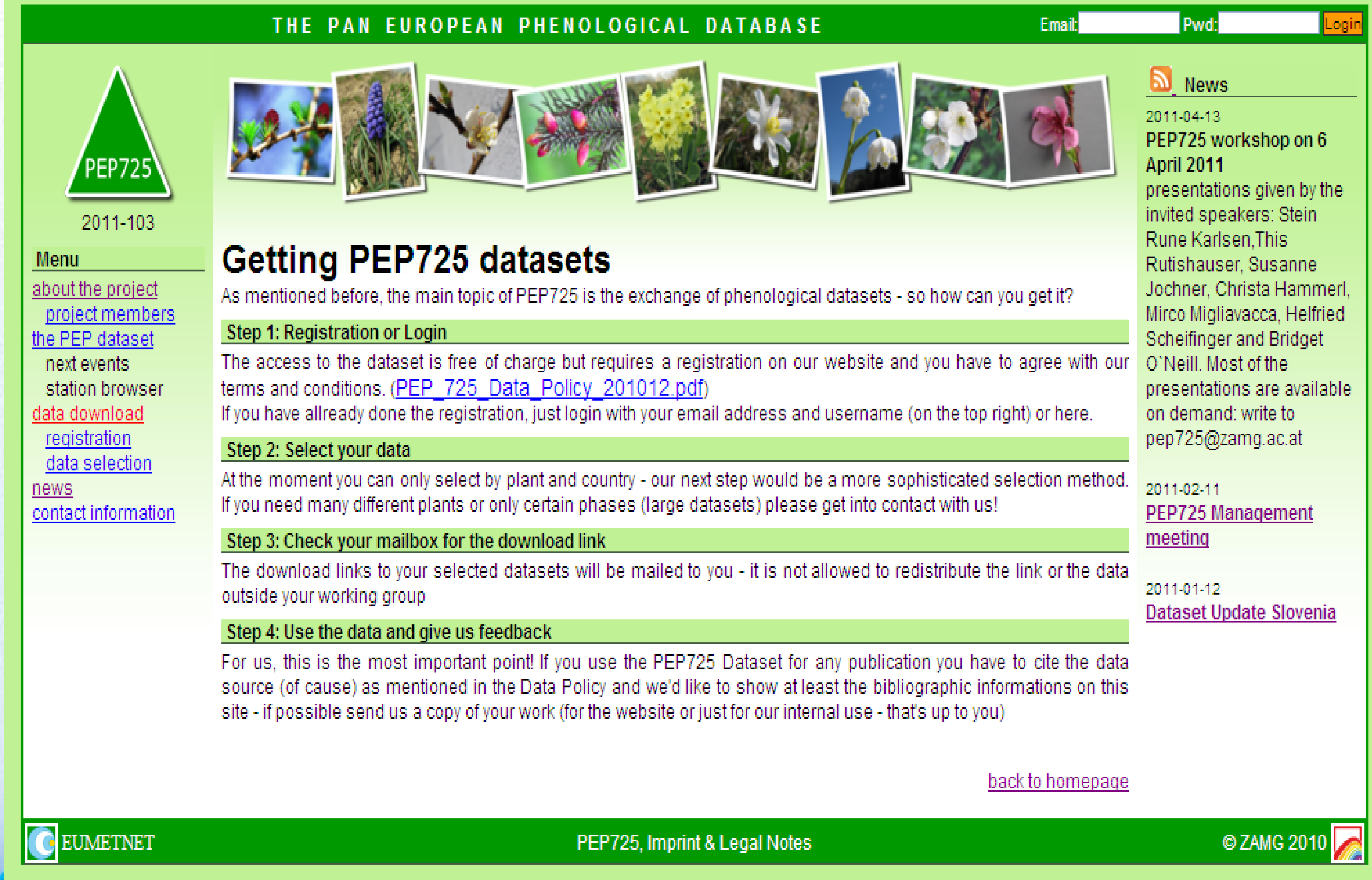
PEP725

PEP725 Deliverable data download



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Getting PEP725 datasets

As mentioned before, the main topic of PEP725 is the exchange of phenological datasets - so how can you get it?

Step 1: Registration or Login

The access to the dataset is free of charge but requires a registration on our website and you have to agree with our terms and conditions. (PEP_725_Data_Policy_201012.pdf)
If you have allready done the registration, just login with your email address and username (on the top right) or here.

Step 2: Select your data

At the moment you can only select by plant and country - our next step would be a more sophisticated selection method. If you need many different plants or only certain phases (large datasets) please get into contact with us!

Step 3: Check your mailbox for the download link

The download links to your selected datasets will be mailed to you - it is not allowed to redistribute the link or the data outside your working group

Step 4: Use the data and give us feedback

For us, this is the most important point! If you use the PEP725 Dataset for any publication you have to cite the data source (of cause) as mentioned in the Data Policy and we'd like to show at least the bibliographic informations on this site - if possible send us a copy of your work (for the website or just for our internal use - that's up to you)

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PEP725

PEP725 Deliverable Organisation of Workshops/Conferences

THE PAN EUROPEAN PHENOLOGICAL DATABASE PEP725 www.zamg.ac.at/pep725

Elisabeth Koch, Silke Adler, Wolfgang Lipa, Markus Ungersböck
Zentralanstalt für Meteorologie und Geodynamik, contact: pep725@zamg.ac.at

PEP725

PEP725 is a 5 years project,having started in 2010 is funded by EUMETNET and ZAMG with its main objective to collect and distribute phenological data from all of Europe.

PEP725

PEP Database status of 201103: 31 european countries, 8152 stations, for some more (152) at least META data (location and data holder) aereal coverage one station every 27037km² (or 37 millionth stations per km²) - densifying the dataset in the next years is intended

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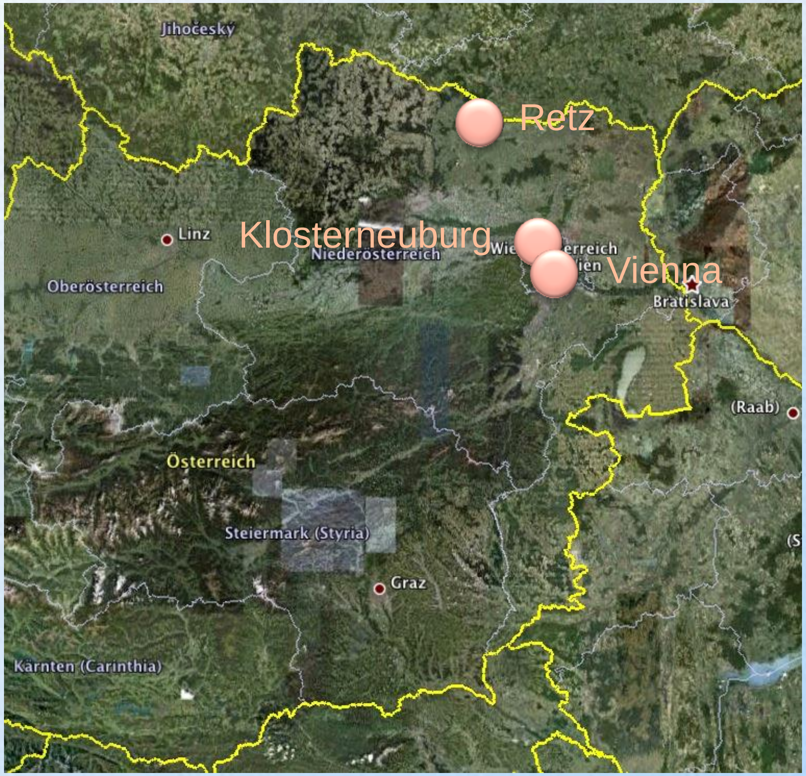
* free and unrestricted for science, research and education!!

PEP 725 Data Use Policy

All data and information collated by PEP 725 are made available online with as few restrictions as possible, on a nondiscriminatory basis.
The PEP725 project management team, as operators of the website, requires all Database Users who have access to the PEP725 data to abide by the following terms and conditions of this policy document.

ZAMG RMI DHMZ DWD OMSZ MET éireann METEO ROMÂNIA SHMU AEMet Agencia Estatal de Meteorología Meteorologisk institutt met.no SWE-NPN www.MeteoSwiss.ch EUMETNET

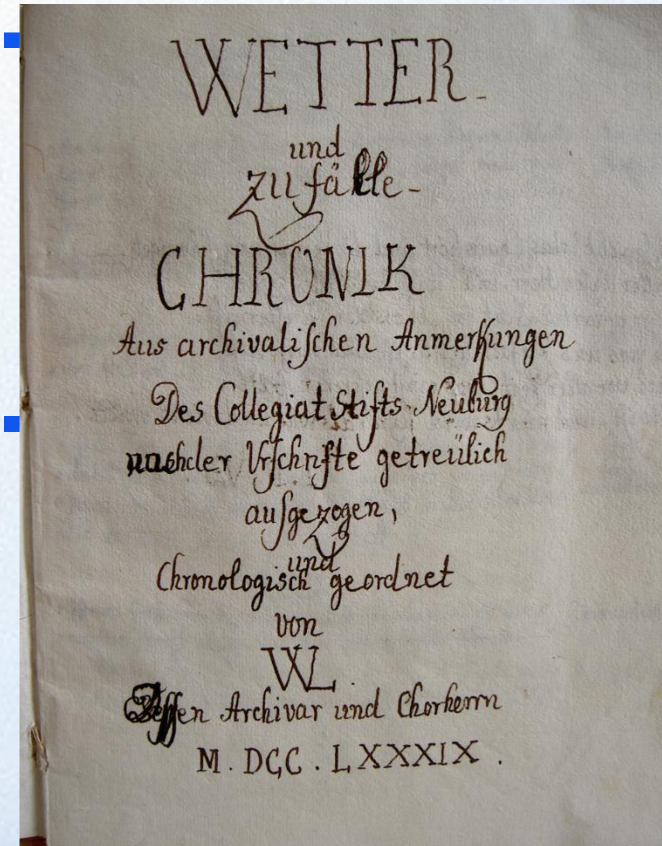
BACCHUS * historical phenological vine data

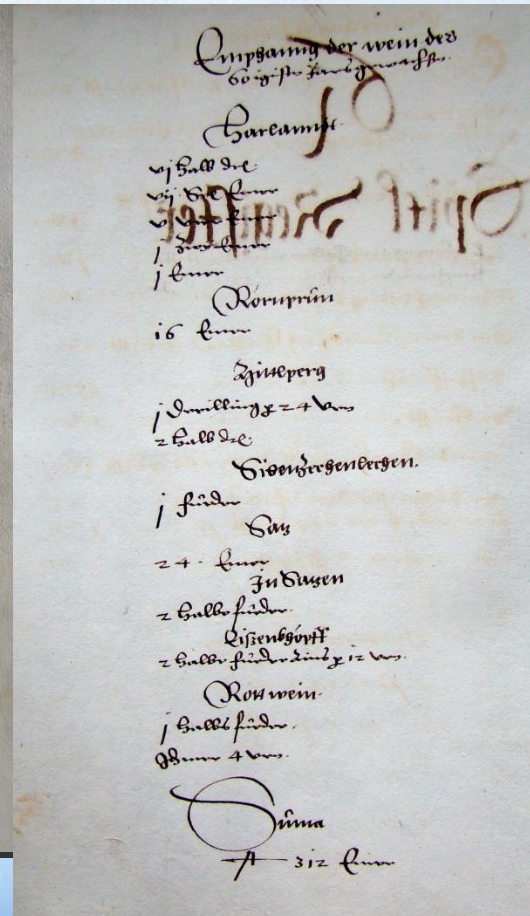


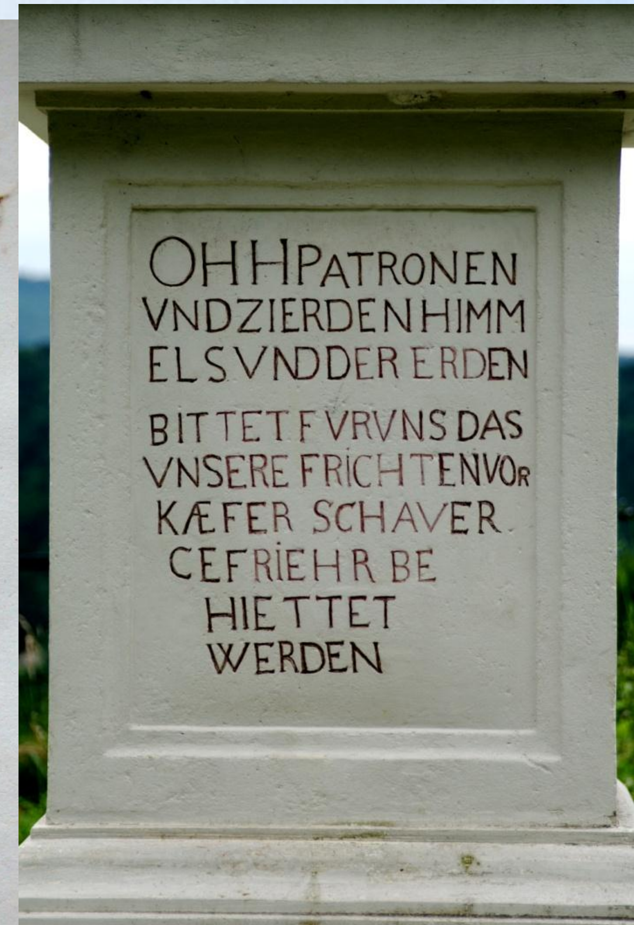
Spatial
Vienna, Klosterneuburg, Retz

Temporal (1500 – today)

BACCHUS – Historical sources





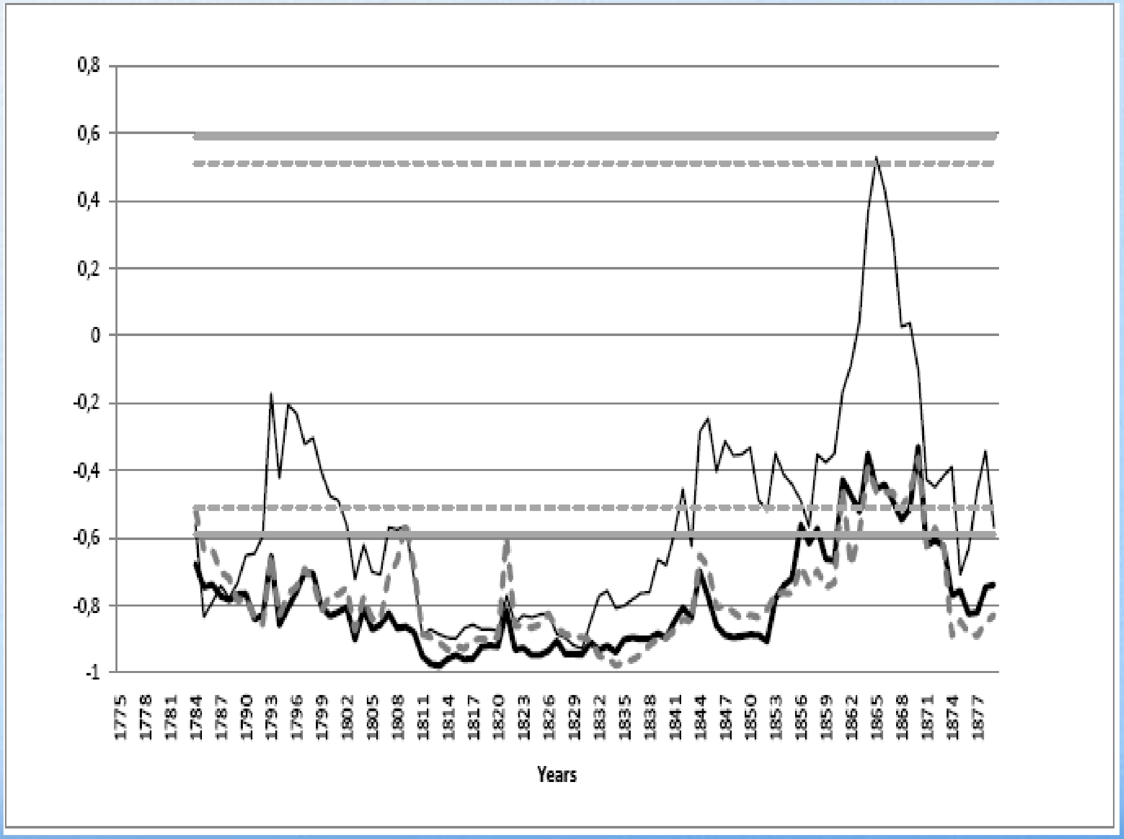


BACCHUS Running Correlation

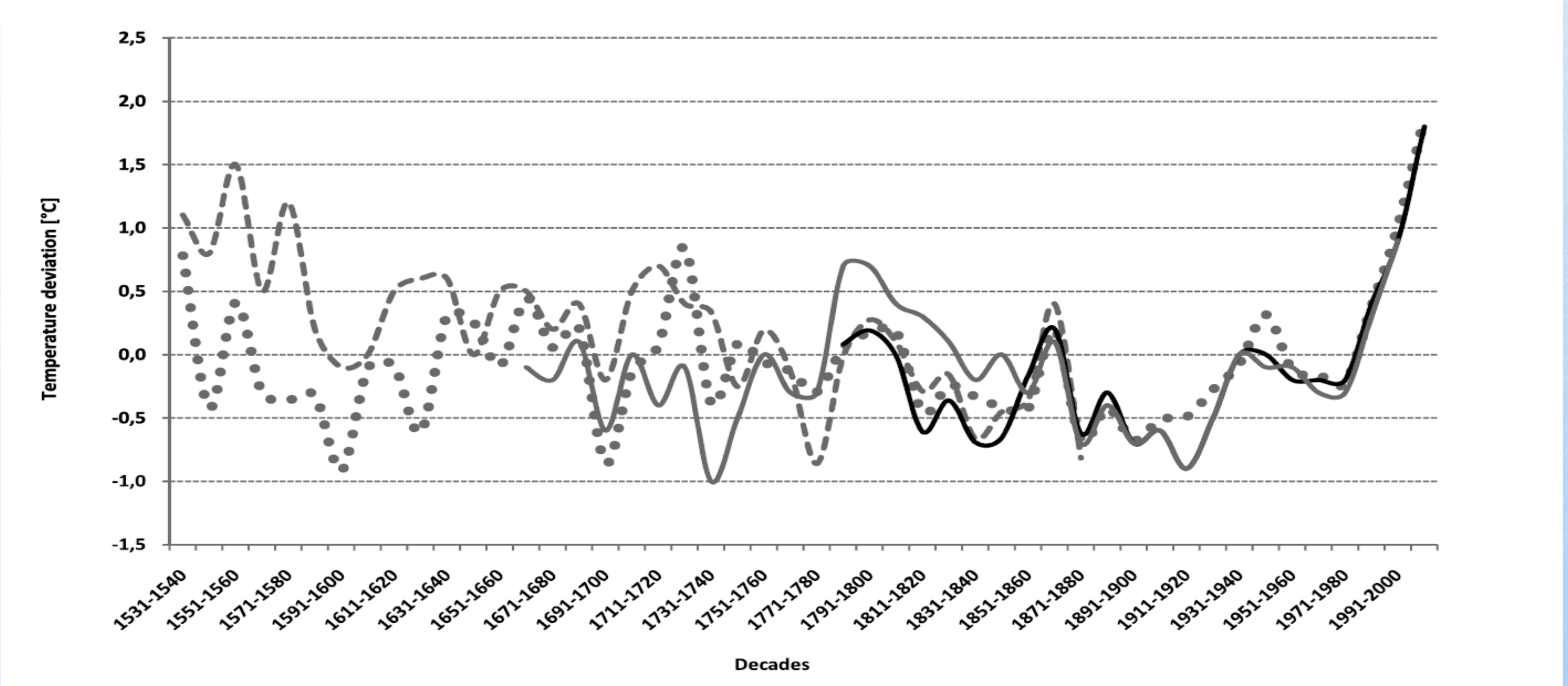
between „historic“ Klosterneuburg GHD and mean temperatures Vienna

Running Correlations (10-year-windows) are **largely stable, if several months are combined, exception around 1860-1870**

=> sum of squared errors reaches its maximum in the corresponding decade of the temperature reconstruction



BACCHUS –temperature reconstruction May to July -comparison



Deviation from 1961-1990: BACCHUS grey dashed, Casty et al. grey solid, Dobrovolny et al. grey dotted, black: observed (Auer et al.)in: Maurer, Ch., E. Koch, Ch. Hammerl, T. Hammerl, and E. Pokorny (2009) Klosterneuburg Wine and Climate Change in Lower Austria (BACCHUS) temperature reconstruction for the period 16th to 18th centuries from Viennese and Klosterneuburg grape harvest dates, J. Geophys. Res., doi:10.1029/2009JD011730

Temperature records from Austria, Burgundy and Swiss Plateau

- **Instrumental temperature data**
  HISTALP data base www.zamg.ac.at/histalp

Basel-Binningen	>= 1760
Geneva-Cointrin	>= 1760
Hohe Warte-Vienna	>= 1775
Strasbourg-Entzheim	>= 1801

sources:

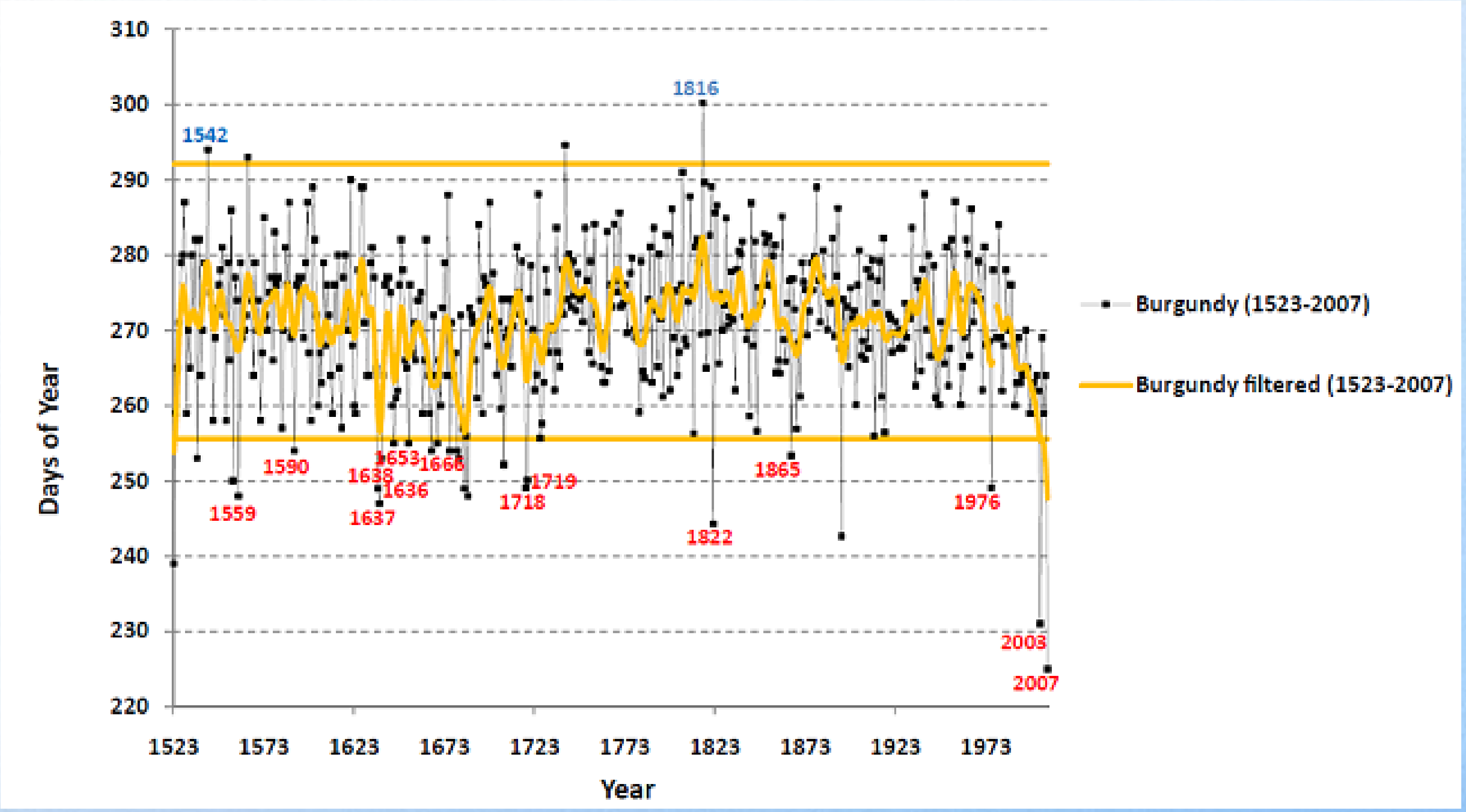
Auer et al., 2007
Böhm et al., 2008 - bias-corrected version

Methods: definition of extremes

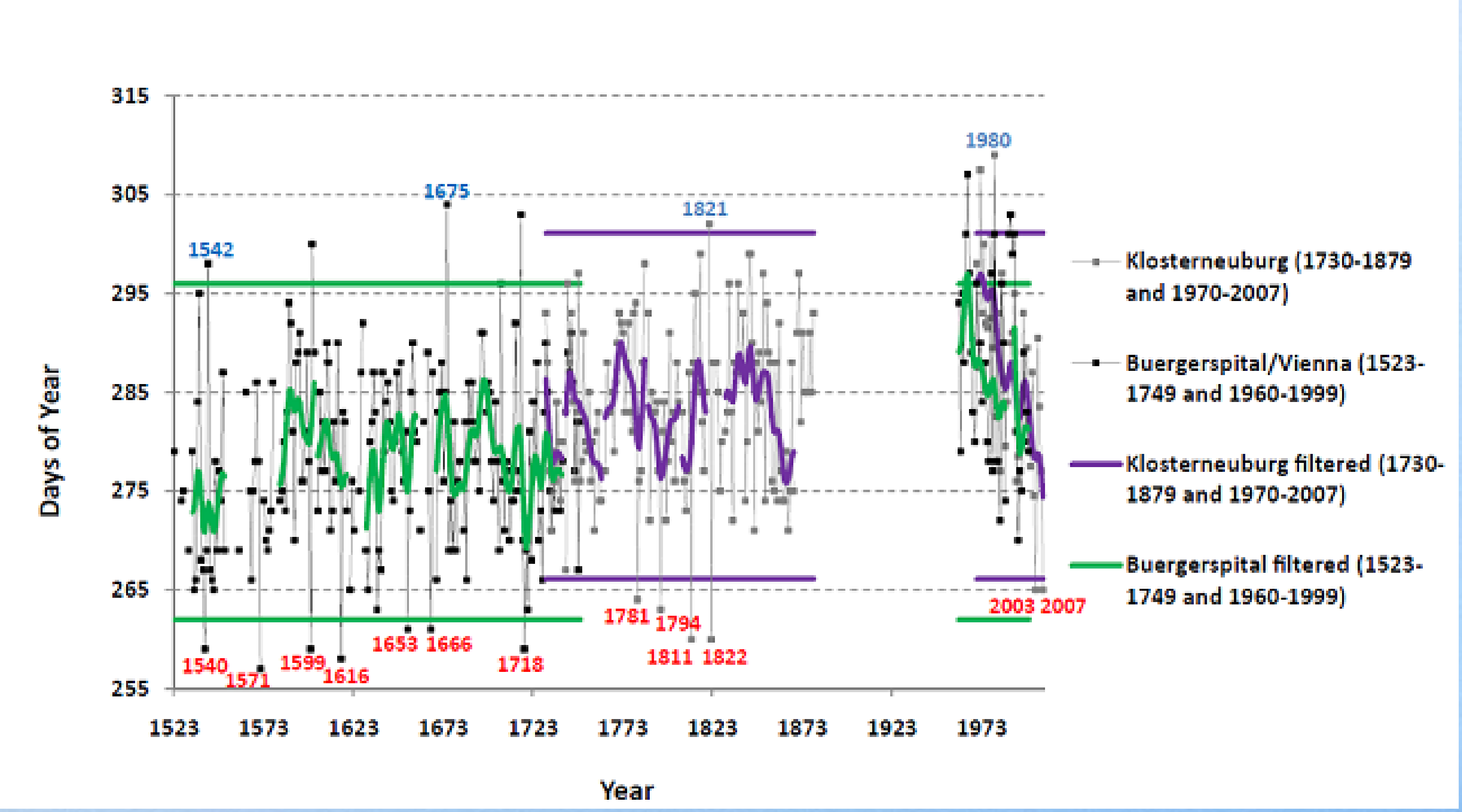
searching for:

- **„historical" pre-instrumental period 1523-1774**
  grape harvest, flowering and mellowness dates exceeding the *double standard deviation* with regard to 105-year reference periods.
- **„historical" instrumental period 1775-1960**
  grape harvest, flowering and mellowness dates as well as multi-month mean temperatures (AMJJ,MJJ) exceeding the *double standard deviation* with regard to the same reference periods.
- **„modern" instrumental period 1961-2007**
  grape harvest dates and highly significantly correlated multi-month mean temperatures exceeding the double standard with regard to the same reference periods.

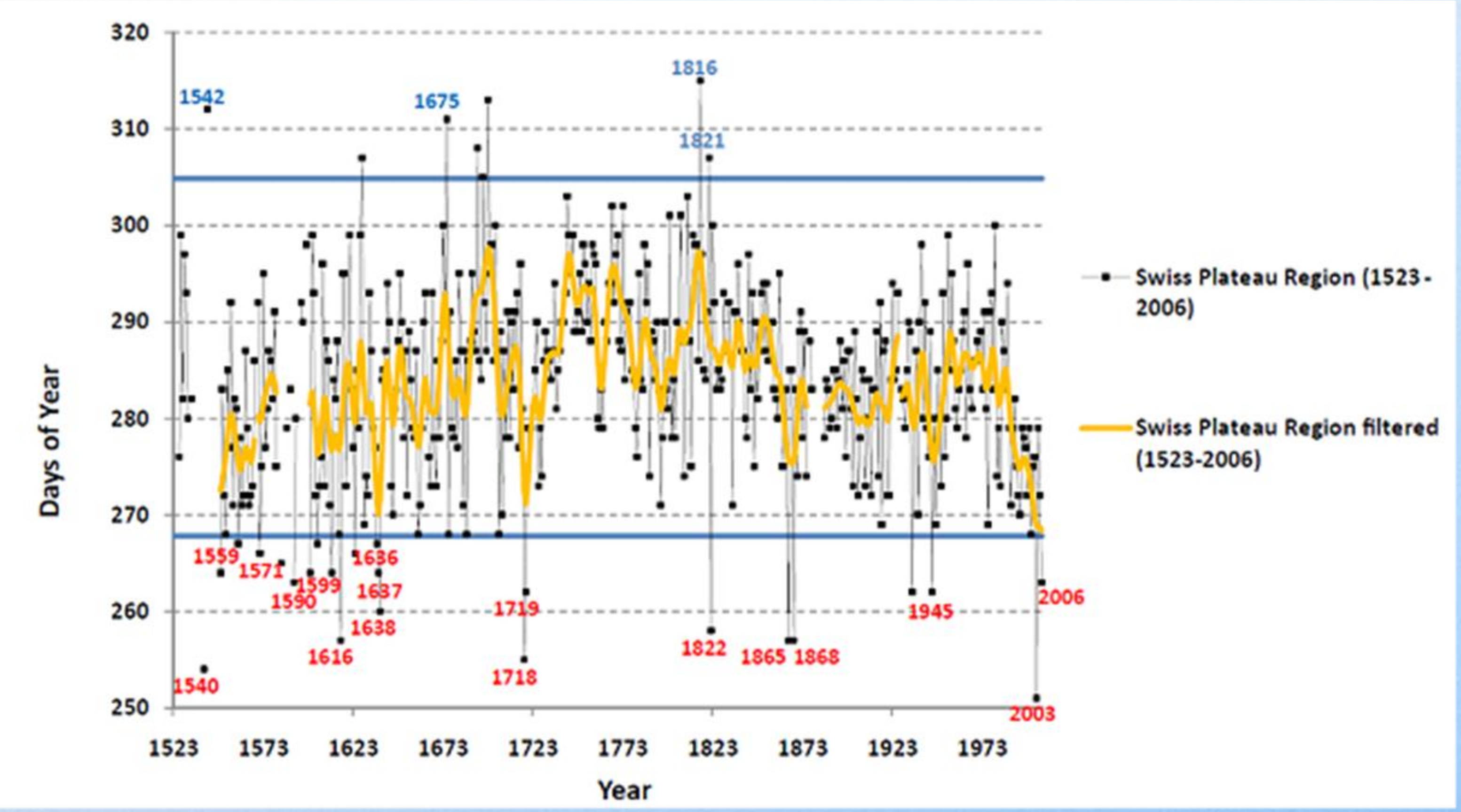
Results: time series GHD Burgundy



Results: time series GHD Klosterneuburg and Vienna



Results: time series GHD Swiss Plateau



eruption of Tambora 1815 >> late harvest / cold year 1816

Austria

Puntschert, J.K. : Denkwürdigkeiten der Stadt Retz (Selbstverlag der Stadt Retz 1894)

1815 no harvest (hail)
1816 medium quality and quantity .

manuscript121, Stiftsarchiv Klosterneuburg
Gedenck Buch und Wein Chronieck

1815 Little snow, February and March warm
17 April frost May warm 5 June vine flowering
19 July hail window glass broken
12 October harvest good quality but small quantity
1816 21 to 31 March snow , May cold,
22 June vine flowering
September October cold
25 October harvest vine sour

temperature records Vienna

-2.4° C May to July

eruption of Tambora 1815 > late harvest / cold year 1816

Grape harvest

+29 days delayed in Swiss plateau
+24 days delayed in Burgundy
+19 days delayed in Klosterneuburg

Monthly mean temperatures

May to July: -2.4° C all regions

Results: Cold pre-instrumental years 1542, 1675

- **1542:**
  - Harvest was remarkably delayed at all three locations.
  - Bad year for wine in Retz, which is affirmed by a source from Würzburg (Germany) and ascribed to the cold summer.
- **1675:**
  - One of the two years with the latest grape harvest in the region of Vienna and Swiss Plateau, which seems to be due to a very cold May with snow and frost.
  - Retz chronicles tell us about little and bad wine after a late harvest.
  - Quantity was also reduced by a bug plague, therefore an order of the Austrian government called for the collection of the bugs.

Results: Cold instrumental years 1821,1980

- **1821:**
  - Very wet conditions dominated the vegetation period in nearly all European countries, leading to floods which destroyed large parts of the harvest.
  - An extreme negative anomaly of about -4 degrees Celsius in June mean temperature is reflected in the depiciton of an unusually late coldness. Cold winds, morning frost and snowfall are reported in some parts of Austria on June 20th.
  - The Retz chronicles note bad and little wine.
  - One manuscript of Klosterneuburg speaks of a „late grape harvest, the saddest in Austria within living memory".
- **1980:**
  - Grape harvest date looks record-breaking, but has to be seen under the light of apparent change in vinification in the region of Vienna.

Results: Warm pre-instrumental years 1540,1718

- **1540:**
  - Second earliest grape harvest in the Swiss Plateau Region after 2003.
  - Retz experiences a dry and very hot summer, followed by a very early harvest and very good and strong wine.
  - Grape harvest in Vienna „yielded such an amount that people did not have enough barrels into which to pour the most“.
- **1718:**
  - „Terrible heat“ in Retz, which caused the grape harvest to be finished everywhere at the beginning of October. The wine was praised as beeing very good.
  - Negative grape harvest anomalies at all three investigated sites
  - The draught even resulted in a public order to pray for rain. Apart from grapes, all other field crops turned out badly. People had to fight against forest fires; wells dried out.

Results: Warm instrumental years 1811, 2003

- **1811:**
  - Remarkable temperature deviations culminating in a positive anomaly of about 5 degrees in June.
  - No earlier harvest date can be found in the region of Vienna
  - Retz chronicles report „Famous, brilliant first class wine year. The vines sprouted and withered fast; the grapes ripened in August. Very much and excellent wine.“ The price per 56.59 (= 1 „emer“) l is given between 80-185 fl (!).
- **2003:**
  - Burgundy and the Swiss Plateau Region had never before experienced such an early grape harvest date.
  - The harvest at Klosterneuburg was advanced by 19 days, which is in the range of advances in the „historical“ period.

Conclusions

- This study aimed at quantifying phenological and/or highly correlated mean temperature extremes with regard to a past long term average and their development under the influences of trends. The exclusiveness refers to spring to (early) summer conditions.
- In 1540, 1718, 1811 and 2003 (and 2007) **very extreme early** phenological conditions occured at all three vine-growing sites (region of Vienna, Swiss Plateau Region and Burgundy).
- In 1542, 1675, 1816, 1821, 1837, 1879, 1980 were extreme negative temperature anomalies and/or extreme positive phenological anomalies

Discussion

- **Austrian speciality**: mean temperatures and grape harvest dates in Vienna both show a positive trend, >>>change in vinification explains the unexpected results (only „moderate“ negative extreme in 2003 but record-breaking positive extreme in 1980) at the turn of 20th/21th century.
- **data gaps in the Viennese and Klosterneuburg data** >>restrictions in finding extremes in the pre-instrumental period In some years, like 1740, harvest dates were not recorded, pherhaps merley because of the fact that vintage turned out to be so bad.
- **Contradictory descriptive information** on a small scale (e.g. Retz chronicles 1797) is **rare but occurs** local influences??? errors ??? In transcritpions where we could not find the original sources

THANK YOU

ZAMG - Mehr als nur Wind und Wetter

PEP725