La Serra d’Almos (Catalonia): an example of phenological data rescue and preservation in Catalonia

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La Serra d’Almos is a small Mediterranean massif located in Southern Catalonia, 116 km south-east of Barcelona, 17 km from the sea, near the mountains of Llobregat. 226 m above sea level

Working scheme

1. Digitation
2. Quality control of the phenological series:
   a. plausibility check
   b. time consistency check
   c. correction of some wrong data.
3. Homogenization
   a. Non-climatic factors such as relocation of the station and a change of instrument have influenced the normal climate evolution of the series.
4. Calculation of:
   a. phenological trends
   b. climate trends
   c. correlations

References

FENOCAT - The Meteorological Service of Catalonia created FENOCAT (the phenological network of Catalonia) in 2013.

FENOCAT is an example of citizen science, with 50 observers reporting phenology data in a regular basis, and is involved in the Pan European Phenology Database (PEP275 project).

Mr. Josep Borrell, the observer of La Serra d’Almos (blue cross in the map), offered us his phenological series, with continuous data from 1971.

Phenological trends and climatic correlations of 16 plants and 5 birds in Serra d’Almos (1971-2015). Trends exceeding the statistically significant level (Mann-Kendall test) are shown in yellow, and the most remarkable are identified in bold. Significant correlations are identified in green whereas positive correlations are highlighted in red. Tmean annual temperature; Tmax maximum temperature; Tmin minimum temperature. Lag: 14-15 days; lag: 22 days; JS: 30 days

Acknowledgements

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CLIMATIC TRENDS (1971-2015)

Mean annual temperature (°C)

Annual precipitation (mm)

Trends [
\( \text{Trend (°C/Decade)} \)
\( \text{Trend (%/decade)} \)
\( \text{Precipitation} \)

<table>
<thead>
<tr>
<th>Season</th>
<th>Mean</th>
<th>Trend (°C/Decade)</th>
<th>Trend (%/decade)</th>
<th>Precipitation</th>
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<td>Autumn</td>
<td>2.84</td>
<td>0.02</td>
<td>0.02</td>
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</tbody>
</table>

Evolution of Summer days (1971-2015) and Annual total precipitation considering days with PPT>30 mm (3WSG) in La Serra d’Almos (1971-2015).

Annual and seasonal mean temperature trends (%/decade) and precipitation trends (%/decade) in La Serra d’Almos observatory (1971-2015). Asterisk shows trends exceeding the statistically significant level (95%, Mann-Kendall test).

Conclusions

• Collecting meteorological and phenological data from the same place offers the possibility to learn about climate influence in phenology.
• Statistical analysis of data shows an early flowering, early ripening, early harvesting and a delay in leaf fall. All these trends are consistent with advance of spring and autumn delay.
• There is no correlation between pheno-phases and precipitation, but there is a negative correlation between temperature and leaf fall. There is also a negative correlation between maximum mean annual temperature and barn swallow emigration.

Acknowledgements

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