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Phenological data set of five taxonomic groups and agrarian activities in temperate climate: trends and influencing factors, Latvian case study

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A phenological data set collected by volunteers' observers from the Latvia Phenological Observation Network covering period 1970 to 2018 has digitized from original paper based publications in Nature Calendars and analysed. The data set includes more than 40 thousand observations, 148 phenological phases across five different taxonomic groups: insects, amphibian, birds, fungi and plants as well as agrarian activities like sowing, harvesting date and some meteorological parameters like first and late frost, snow, ice regime.

The phenological changes or trends was analysed in two ways: 1. by combining data rows (station-phase-species) for one phase, such as leafing (BBCH11) for all trees and bushes; 2. by performing regression analyses for each phase and for each observation point separately.

More than 80% of spring data series shows negative tendency as reported in most scientific publications on European phenology. In our data set, overall, autumn phenologies are occurring later over time or the trends are neutral.

Regression analyses of phenology date versus year shows the disparities among species and among locations within a species: spring migrants' return earlier, while staying longer in the fall with exceptions, for example the white stork in autumn leaves earlier than in the beginning of the period.

The commencement of the agricultural activities in spring such as sowing date have not changed significantly. However, such activities as livestock grazing and sowing of winter cereals takes place latter in the autumn. These both appear to have affected by both technological changes and changes in meteorological parameters, for example, the trend of first autumn frost and first snow is positive – they have observed latter.

We have analysed trends and cross correlation with phenology in temperature regime, heat waves, precipitation, drought indexes, evapotranspiration, and soil temperature for the last 40 years.

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