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Forecasting the weather
- ensemble techniques
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The phenology of spring arrival of birds in Latvia response to atmospheric circulation pattern

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Several bird species have advanced the timing of their spring arrival in response to recent climate change. In Latvia the systematic recording of phenological events, like arrival of birds, has not been traditionally undertaken. The first arrival data of birds from various published and unpublished bird records has been collected.
This study is based on the first arrival of six bird species – Alauda arvensis, Grus grus, Ciconia ciconia, Hirundo rustica, Cuculus canorus and Luscinia luscinia in Latvia, collected for the period 1963-2010.
The character of large atmospheric circulation has been studied by several indices (North Atlantic oscillation NAO, East Atlantic pattern EA, East Atlantic/Western Russia pattern EATL/WRUS, Scandinavia pattern SCAND, Polar/Eurasia pattern, Arctic oscillation AO, West Pacific WP, East Pacific/West Pacific pattern EP-NP, and relationships of these circulation indices with the phenology of spring arrival of birds in Latvia are evaluated.
To detect possible long- term trends in the timing of bird species and climatic variables Mann-Kendall test (MK_test), linear regression and the Person's correlation coefficients were used.
Under the conditions of climate change the dates of spring arrival of birds were noticeably earlier for both short-distance and long-distance migrants. The first results reveal that all analyzed species in last 48 years are arriving earlier: earlier arrival was statistically significant for four species of six analyzed. The average arrival date of Grus Grus in last 48 years is getting earlier on average at a rate of 5,07 days per decade (MK_test – 5,85, $p<0,01$). The long distance migrants are arriving on the range from 0,8 to 0,13 days per decade earlier.
The particular study confirmed that spring arrival of birds in Latvia is mainly influenced by North Atlantic oscillation, East Atlantic, Scandinavian and Arctic oscillation indices. The correlation coefficients between spring arrival of birds and circulation patterns in Europe has shown that in Latvia phenology of spring arrival of short distance migrants (Alauda arvensis, Grus grus) is primarily influenced by the NAO, EA, SCAND, and AO indices during January to April ($r= - 0,43 – -0,73$, $p<0,01$, $n=48$), but the long distance migrants (Hirundo rustica, Luscinia luscinia) statistically significant correlate with SCAND and EA indices from February to May ($r=-0,40 – -0.52$, $p<0,01$, $n=48$). The trends of arrival dates of Ciconia ciconia and Cuculus canorus in spring time response to atmospheric circulations in Europe are not statistically significant.