



On Connections Between Weather Types and the Arrival of Migratory Birds in Estonia

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Migration is one of the most energy-consuming activities in the lives of birds. The timing must be such that flying would not be overly strenuous and that there would be favourable conditions for feeding and nesting available at arrival. The wide year-to-year variation in the arrival dates of migratory birds suggests that birds are able to both accelerate and delay their migration according to the weather conditions in the destination area. Often, the arrival date cannot be explained by the average daily temperature or any other single meteorological parameter. Relatively simple tools for exploring the links between climate and wildlife are weather types that combine most of the meteorological variables.

The aim of the present work is to study the connections between the arrival of migratory birds in Estonia and the weather types. We examine the weather types that most frequently occurred on those days when birds arrived in Tartu (located in the Eastern part of Estonian mainland) and in Kuressaare (West-Estonian archipelago).

For this purpose, the arrival dates of 42 species of migratory birds were analysed and compared to the weather types of 73 classifications generated by COST 733 action (COST 733 catalogue 1.2). Since the weather type classifications were generated using ERA40 air pressure datasets, the period available for analysis is 1958-2002. We selected weather types that occurred on the arrival dates of each migratory bird species. Also, the data on two days prior to the arrival were analysed. We assume that birds "took the decision" to fly to Estonia due to the weather conditions on those two days.

Frequency of the selected weather types was analysed and compared to the long term frequency of these types during the spring season (MAM). We assume that birds "prefer" those weather types whose frequency on migration days exceeds their long-term frequency. Similarly, we studied the weather types that birds seem to avoid.

The results show that despite the fact that Tartu and Kuressaare are located on the same latitude (58°N) and their distance is relatively small (ca 250 km), there are clear differences in the arrival dates of birds. Species that arrive in Estonia before mid-April (early arrivals) reach Kuressaare up to a week earlier compared to Tartu (the earlier the date of arrival, the greater the difference). Later arrivals, however, reach Tartu up to a week earlier than the Estonian Western islands.

Analysis of weather types revealed a clear difference in "preferences" of the late and early arrivals. The early arrivals prefer more cyclonic conditions, when the main air flow into Estonia is from the Western or South-Western directions. Late migrants prefer anti-cyclonic conditions when sunny and warm weather conditions prevail with wind from the Southern direction.

There also occurred a clear distinction between late and early migrants in the case of "avoidable" weather types. Early migrants clearly avoid the anti-cyclonic weather types and the types in whose case the general direction of air masses is from the North. In the case of late migrants, a clear weather type preference did not occur. But in general they avoid cyclonic conditions with winds from the Western or Northern directions.