Multiple climatic effects on kingbirds (Tyrannus spp.) clutch and egg sizes along a continental scale

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Abstract

AIM: Changes in bird clutch and egg sizes across geographical gradients are issues often debated among ecologists, where latitudinal cline is a central issue in several discussions. There is an understanding that these patterns are primarily driven by climatic characteristics, where latitude acts as a proxy. Many studies attempt to analyse local climatic factors causing variation in life history traits but face methodological limitations. Here, as few studies have been able to, we achieve a robust dataset that covers a large territorial extent to answer this main biogeographical question. LOCATION: American continent (New World). METHODS: We approached the geographically widespread Tyrannus genus (kingbirds) and collected breeding data from 35 scientific egg collections in South and Central America, USA, and Europe. After several data checking layers, including spatial, temporal and taxonomic checking, we analysed the relationship between kingbird's clutch and egg sizes with different climatic scales. RESULTS: The analyses of 1358 clutches and 4750 eggs confirmed that kingbird's clutch and egg sizes increase towards the poles. Both breeding traits vary according to main climates, regional sub-climates, and local temperature and precipitation conditions. Regions with more climatic variation had the largest clutches, but sites with colder winters did not have the largest clutches. Tyrannus egg size increased in environments with less extreme dry periods. The increase of egg size with latitude can be explained by the significant relationship between larger eggs with sites with lower temperatures. MAIN CONCLUSIONS: Our findings suggest a robust correlation of residual variation in breeding traits with climatic conditions at both regional and local levels. Highly locally adapted species using climatic parameters as cues should also respond to interannual weather variations. With current discussions about climate change's effects on ecosystems, the insights provided in this work can assist in understanding how species will cope under future climate scenarios.

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