LOLA-BMS

HOW LOCAL-SCALE PROCESSES BUILD UP THE LARGE-SCALE RESPONSE OF BUTTERFLIES TO GLOBAL CHANGES: INTEGRATIVE ANALYSIS ACROSS MONITORING SCHEMES

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CENTRE DE SYNTHÈSE ET D'ANALYSE SUR LA BIODIVERSITÉ

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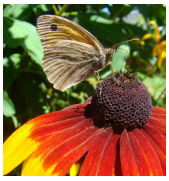
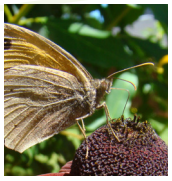
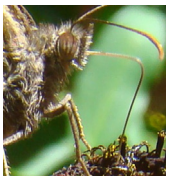

The monitoring of biodiversity in response to environmental changes still much depends on human observers, and greatly relies on the activity of volunteers. Large databases have been developed over time, following more or less standardized protocols. After birds, butterflies* are the group of animals the most studied to evaluate the consequences of global changes on biodiversity. Standard Butterfly Monitoring Schemes (BMS) provide large amounts of data on population distribution and tendencies in an increasing number of countries. Data analyses have shown important changes in this component of biodiversity. Little is known, however, as to how these changes are organized along spatial scales. The data available constitute a fantastic opportunity to understand the mechanisms and key factors explaining the dynamics of butterfly biodiversity, and thereby to better identify drivers of biodiversity loss. For instance, we know that species from open habitats have suffered a 70% population loss over the last 20 years in Europe, but few studies have assessed how this decline occurred over time and space, and how these patterns of variation at different scales also vary between species and regions.

Our project will analyse butterfly monitoring data from the most local to the most global scales to fill this knowledge gap. It aims at understanding how species ecological traits and environmental factors (habitat and climate) influence population dynamics across different scales. To this end, we gathered a consortium of experts to analyse data collected in Europe, Northern America and Israel. Beyond a better understanding of how these species respond to global changes, we will improve the quality of both the mechanisms by which information circulates between countries, and of the analyses that can be conducted jointly, opening new ways to sustained scientific interactions. In particular, we will contribute to the development of analytical tools for the various coordinators of monitoring schemes, as well as for including more opportunistic and less standardised types of monitorings.

At CESAB we will bring together the coordinators of some of the main BMS worldwide, along with statisticians specialised in the analysis of this type of data, and renown macro-ecologists. Gathering for a few days around our passion to make sense of the data collected by many volunteers who have spent so much of their time, is a rare opportunity we used to dream of when we were meeting at conferences.

STEPS

- Identify the best data sets: Among the gigantic data sets at hand, we will use those that can help unfold a story. For example: butterflies have more or less synchronous local dynamics, but how large are the correlations, and what does it mean for the mechanisms of variations? And which ones can help with identifying the drivers of change?
- Identify the proper statistical tools to address these questions. There are many tools available and they are developing fast: Bayesian hierarchy, presence probability through maximal possibility, etc.
- Create tools that can be useful beyond the Lola-BMS' fan circle.

Zoom

*Butterflies, a model group for macro-ecology

Easily spotted and identified, butterflies (*Rhopalocera* family) are observed by numerous enthusiastic naturalists who collect data. Butterflies ecological requirements, which are well-known to scientists, vary from one species to the other, depending on the distribution of the host plant of caterpillars and the flight capacities of adults. Some species are very sensitive to the fragmentation of habitats in particular. Finally, the short generation time (one to three generations per year) of these species makes this group a very sensitive indicator of global warming.

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FRB FONDATION POUR LA RECHERCHE SUR LA BIODIVERSITÉ

The FRB was launched in 2008 at the initiative of the ministry of research and the ministry for the environment of France, and was founded by 8 public research institutions (BRGM, CIRAD, CNRS, IFREMER, INRA, IRD, IRSTEA, MNHN). The FRB is a science-society platform and it supports and promotes scientific projects and expertise on biodiversity.

The CESAB is a centre for the synthesis and analysis of biodiversity created and developed by the FRB to foster knowledge on biodiversity through data and theoretical synthesis activities. CESAB provides researchers with the means to conduct these activities in a dedicated place over sustained periods of time.