

How can scientists measure evolutionary responses to climate change?

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As global temperatures continue to rise scientists are presented with the complex challenge of understanding how species respond and adapt. In a paper published in *Insect Conservation and Diversity*, Dr Francisco Rodriguez-Trelles and Dr Miguel Rodriguez assess this challenge.

Twentieth-Century <u>global warming</u> of approximately 0.6° C has already affected the Earth's biota and now the major challenge facing ecologists and evolutionary biologists is to predict how biological impacts of climate change will unfold in response to further projected temperature increases of up to 6° C by 2100.

"This relatively mild level of thermal increase has already caused shifts in species ranges, especially at higher latitudes and towards the poles," said Rodriguez-Trelles. "Understanding biological responses to global climate warming can be dauntingly complex, but primarily it requires careful quantification of the rates of temporal change,"

Assessing the trajectory of biological processes under global warming begins by obtaining accurate estimates of these processes and linking them to historical records. This reveals if changes in species are indeed long term responses, rather than the short term behavioural changes regularly prompted by the succession of the seasons.

However, updating historical records is proving to be far less straightforward than might be supposed. This is because of the complexities of global warming, which concomitantly to the increase in



Earth's temperature is causing an expansion of the length of the growing season.

This presents scientists with problems as to the precision with which time reckoning systems track the course of global warming-induced changes to the Earth System, and can lead to seriously distorted results. Long-term studies of phenological trends show that neglecting the increasing lag between seasonal climate and calendar dates can lead to confusing the direct and indirect effects of global warming.

"The evidence of Earth's life responses to global warming is overwhelming. However a widespread approach to quantify biological effects of global warming relies on comparisons Of historical with present records of biological variables," concluded Rodriguez-Trelles. "In this paper we have identified several reasons why this strategy can lead to seriously distorted estimates of biological effects of global warming, as well as ways they could be handled in future studies."

Source: Wiley (<u>news</u> : <u>web</u>)

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