# Article information:

Divergent apparent temperature sensitivity of terrestrial ecosystem respiration | Journal of Plant Ecology | Oxford Academic  
<https://academic.oup.com/jpe/article/7/5/419/2928116?login=false>

# Article summary:

1. The temperature sensitivity of ecosystem respiration (Re) varies among different terrestrial ecosystems, with lower values in tropical and subtropical areas and higher values in grasslands and wetlands.

2. The interannual variability (IAV) of the apparent activation energy (Ea), which characterizes the apparent temperature sensitivity of Re, decreases with increasing latitude but increases with radiation and corresponding mean annual temperature.

3. Spatial variations of Ea are explained by changes in temperature and an index of water availability, with differing contributions from each explaining variable among climate zones and biomes.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The article "Divergent apparent temperature sensitivity of terrestrial ecosystem respiration" published in the Journal of Plant Ecology presents a comprehensive analysis of the global variation of the apparent activation energy (Ea) and its interannual variability (IAV) for ecosystem respiration (Re). The study synthesizes data from 163 eddy covariance sites across the world to examine the spatial and temporal variations in Ea and its controlling factors.

The article provides a clear introduction to the importance of understanding the temperature sensitivity of Re, which is a major component of terrestrial carbon cycle. The authors highlight that there are considerable uncertainties in constraining parameters of the temperature response of Re, which can influence the carbon loss of ecosystems and further affect their capacity to sequester CO2 under climate change. The article also explains how most models use a fixed temperature sensitivity for respiration estimation and projection, largely because there is not much information on the spatial and temporal patterns of temperature sensitivity.

The methodology used in this study is rigorous, as it uses standardized files from FLUXNET-LaThuile database, which includes quality-controlled and gap-filled data from 253 research sites. The authors analyzed only those sites that provided at least 1 year of complete net ecosystem exchange (NEE) and meteorological data with gaps less than 5%. They excluded some sites in subtropical-Mediterranean areas where respiration was severely reduced by drought, resulting in an inverse relationship between respiration and temperature that could not be fitted using the Arrhenius equation.

The results presented in this study show a widely global variation of Ea, with significantly lower values in tropical and subtropical areas than in temperate and boreal areas, and significantly higher values in grasslands and wetlands than that in deciduous broadleaf forests and evergreen forests. The authors explain that globally, spatial variations of Ea were explained by changes in temperature and an index of water availability with differing contributions of each explaining variable among climate zones and biomes. The study also found that IAV and the corresponding coefficient of variation of Ea decreased with increasing latitude but increased with radiation and corresponding mean annual temperature.

Overall, the article provides valuable insights into the spatial and temporal variations in the apparent temperature sensitivity of Re and its controlling factors. However, there are some limitations to this study that should be noted. Firstly, the authors excluded some sites in subtropical-Mediterranean areas where respiration was severely reduced by drought, which could have influenced the results. Secondly, the study only used data from eddy covariance sites, which may not represent all terrestrial ecosystems. Thirdly, while the authors provide a comprehensive analysis of the controlling factors for spatial and temporal variations in Ea, they do not explore potential counterarguments or alternative explanations for their findings.

In conclusion, "Divergent apparent temperature sensitivity of terrestrial ecosystem respiration" is a well-written article that presents a rigorous analysis of global patterns in the temperature sensitivity of Re. While there are some limitations to this study, it provides valuable insights into how changes in temperature and water availability can influence carbon loss from ecosystems under climate change.

# Topics for further research:

* Alternative explanations for global variation in the temperature sensitivity of ecosystem respiration
* Comparison of temperature sensitivity of ecosystem respiration across different measurement techniques
* Implications of temperature sensitivity of ecosystem respiration for carbon cycle feedbacks
* Long-term trends in the temperature sensitivity of ecosystem respiration
* Effects of land use change on the temperature sensitivity of ecosystem respiration
* Interactions between temperature sensitivity of ecosystem respiration and other biotic and abiotic factors

# Report location:

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