**Title: A derivation error that affects carbon balance models exists in the current implementation of the modified Arrhenius function**

**Running Title: Derivation error in modified Arrhenius model**

Author: Bridget Murphy1,2, Joseph R. Stinziano3,\*

Affiliations: 1 Department of Biology, University of Western Ontario, London, ON, Canada; 2 Current Affiliation: Department of Cell and Systems Biology, University of Toronto, Toronto, ON, Canada;   
3 Department of Biology, University of New Mexico, Albuquerque, NM, USA

\* Corresponding author; Email: jstinziano@unm.edu; Tel: +1 (226) 678-1670

**Supplementary information**

**Appendix A – Alternate derivations of the modified Arrhenius equation**

Below are the temperature relativizations of Farquhar et al. (1980), Harley et al. (1986), and Harley et al. (1992) showing that Farquhar et al. (1980) and Harley et al. (1992) can be transformed to be identical to Equation 3 in the manuscript, while Harley et al. (1986) can be transformed to be identical to Equation 10 in the manuscript.

*Farquhar et al. (1980)*

From Eq. 36 in Farquhar et al. (1980):

Equation A1

Relativizing to 25 °C:

Equation A2

Simplifying:

Equation A3

Equation A4

where E is activation energy (Ea), S is deactivation entropy (ΔS), and H is deactivation energy (Hd).

*Harley et al. (1986)*

From Eq. 7 in Harley et al. (1986):

Equation A5

Relativizing to 25 °C:

Equation A6

Simplifying:

Equation A7

Equation A8

where ΔHa is activation energy (Ea), and ΔH­d is deactivation energy (Hd).

*Harley et al. (1992)*

From Eq. 9 in Harley et al. (1992):

Equation A9

Relativizing to 25 °C:

Equation A10

Simplifying:

Equation A11

Equation A12

where ΔHa is activation energy (Ea), and ΔH­d is deactivation energy (Hd).

**Supplementary Information**

*Instructions for installing {arrhenius.comparison} in R for review purposes*

1. Download the arrhenius.comparison.tar.gz file
2. Set working directory in R to the directory that holds the arrhenius.comparison.tar.gz file using setwd()
3. Run:  
   install.packages("arrhenius.comparison\_1.0.2.tar.gz", repos = NULL, type = "source")  
   library(arrhenius.comparison)