Dear Editor,   
*Global Ecology and Biogeography*

We are pleased to submit our study entitled “Challenges in approximating species ages from phylogenetic trees” for consideration as a *Method* article in Global Ecology and Biogeography.

An increasing number of studies is seeking to correlate species ages (i.e. the elapsed time since the origination of living species) with ecological and biogeographical traits such as range size and with current extinction risks. The ideas being tested are important in understanding eco-evolutionary dynamics and species intrinsic susceptibility to extinction. However, we generally do not have direct data (for instance in the fossil record) to establish species ages, and a recent bulk of literature has been deriving these ages from time-calibrated phylogenetic trees, using the length of the branch subtending the tip (phylogenetic age) as a proxy for the age of the species that the tip represents.

Here we explore with simulations the accuracy of this approximation and show that age estimates can be many orders of magnitude away from the true values. Further, we show that this can lead to error levels that are high enough to hamper even broad conclusions drawn from large trees and attempts to link species age with extinction risks. The deviation between true species age and phylogenetic age can span millions of years and is exacerbated by three factors: extinction, incomplete taxon sampling, and different modes of speciation. After showing that for some scenarios species age is unidentifiable from phylogenetic data alone, we develop a new probabilistic approach to reduce the bias linked to extinction. We show that our approach leads to significantly more accurate species age estimates and can drastically reduce the error rates.

We think our paper will be of interest to the broad readership of Global Ecology and Biogeography and believe it has the potential to spark a broader discussion about the limits of inferring species ages form phylogenetic trees and approaches to estimating extinction risks more broadly. By offering a solution to at least part of the problem, we hope the use our probabilistic method will make future studies linking species ages with patterns of ecological and evolutionary traits more accurate and robust.

Thank you for your consideration.

Yours sincerely,

Carlos Calderón del Cid on behalf of all co-authors.