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Interactive comment on “Impact of changes in freezing and thawing on foliar litter carbon release in alpine/subalpine forests along an altitudinal gradient in the eastern Tibetan Plateau” by F. Wu et al.

Anonymous Referee #2

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This paper describes the loss of carbon from the litter from 3 species of trees along a 900 m elevation gradient in Tibet over a two year period. The manuscript adds some interesting new data on leaf decomposition in more extreme environments like the one under discussion. Furthermore the use of the elevation study allows some interpretation of the effects of a warming climate on litter decomposition. While the paper will undoubtedly be published I do have a number of concerns with the study:

Firstly, in the abstract the authors state that “climate warming would delay the onset of C release in fresh litter in this cold region”. This is based on the observation that C re-

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lease in the deep frozen time periods is positively correlated with negative-degree days. This conclusion is both counter-intuitive and not backed up by the data presented in the paper. Loss of C from the leaf material will be caused by a combination of abiotic reactions (principally leaching) and biotic reactions (microbial degradation). In temperate systems, the rate of leaching is almost invariably positively correlated with temperature. Similarly, biotic degradation of leaf litter increases with temperature; at least up to the temperature threshold of the organisms responsible. The author's data show that for most systems studied, the greatest rate of loss of C (on a per day basis- Figure 4) were immediately following litter fall (OF1) and in the early growing season (EG1) both in the first year. Only Fir had rates of C loss in the deep frozen stage in the first year (DF1) similar to rates observed following litter fall or in the early growing season. On a per season basis again with the exception of Fir, the greatest loss of carbon is in the early growing season in the first year (which also corresponds to periods of warmer weather). I believe that the study would benefit from a more formal (statistical) analysis of variance within and between the treatments.

Secondly, I had difficulty in understanding how the authors calculated the different degree days. This part of the study could be reworded for clarity.

On more specific issues C as calculated is not necessarily a rate per se (change per unit time) because of the variability in the length of the various stages. While the thawing period is noted as TP in the figures, it is annotated as TS (Thawing stage) in the introduction. There are also a number of minor typographical errors (e.g. page 9541 line 20 should be 'repeated' not 'replicated')

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