

*Supplement to*

**Different sensitivities of litter decomposition and nutrient release to ultraviolet radiation**

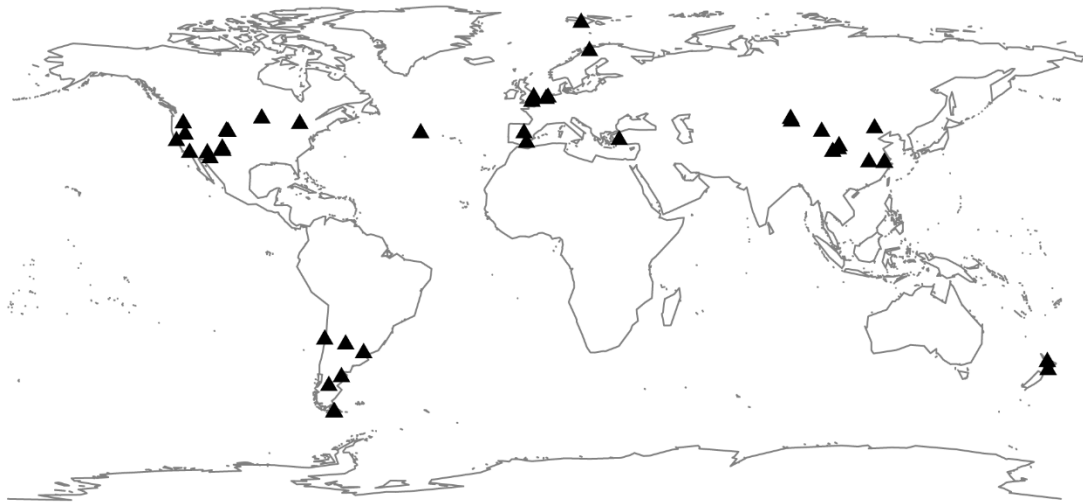
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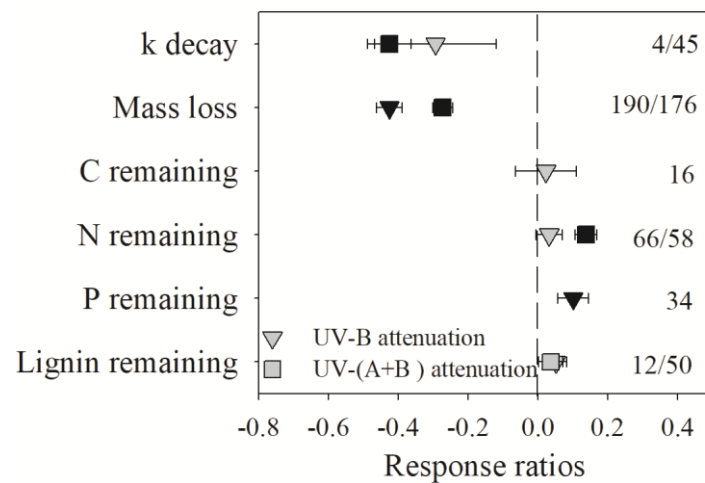
1 **Part 1** Supplementary figures for the meta-analysis.

2 **Figure S1** Global distribution of the study sites included in the meta-analysis.

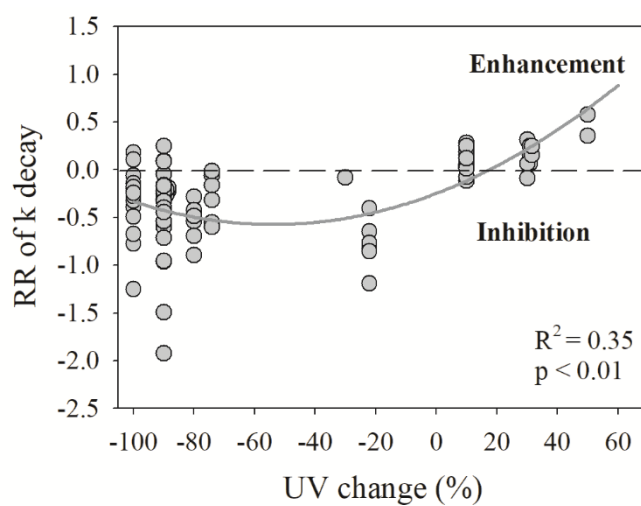


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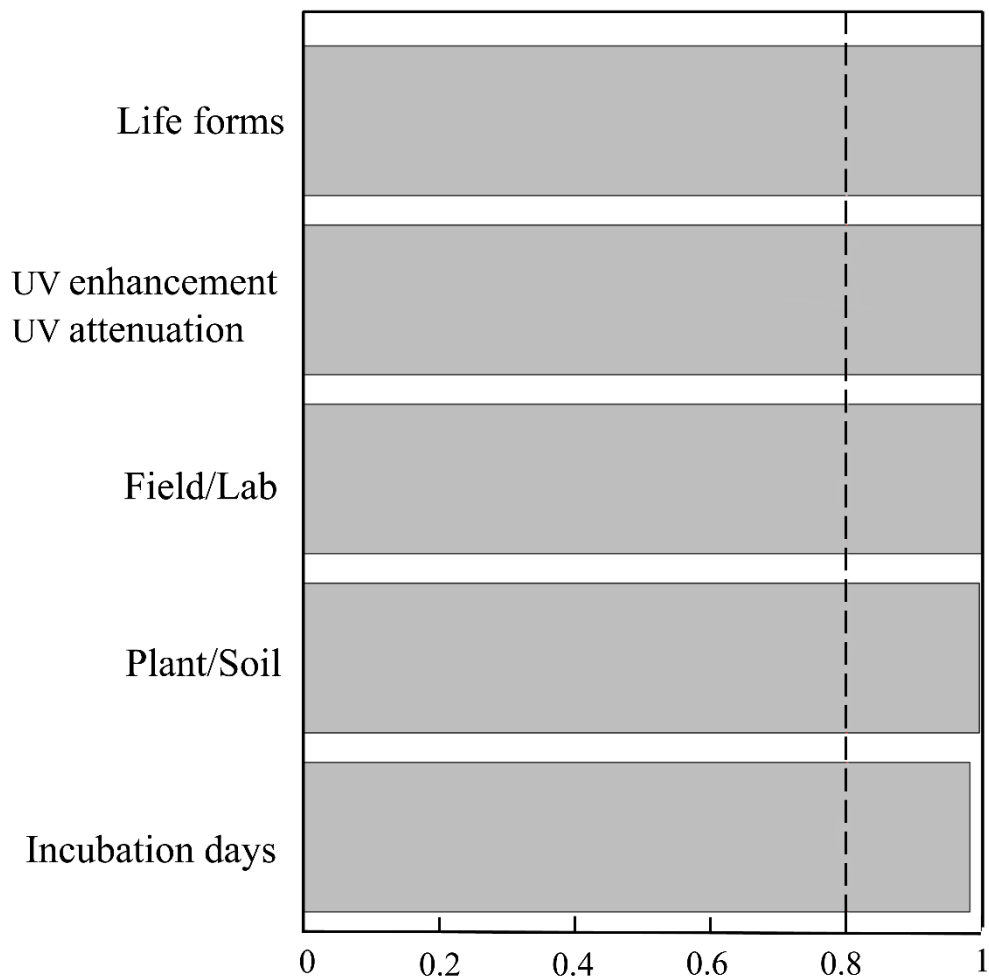
**Figure S2** Effects of UV-B and UV-(A+B) attenuation on litter mass loss and remaining nutrients. The black symbols indicate significant differences ( $p < 0.05$ ) between the response ratios (RRs) and zero. The vertical dotted line represents a mean effect size of 0. The sample size for each variable is shown and represents UV-B and UV-(A+B) attenuation from left to right, respectively.



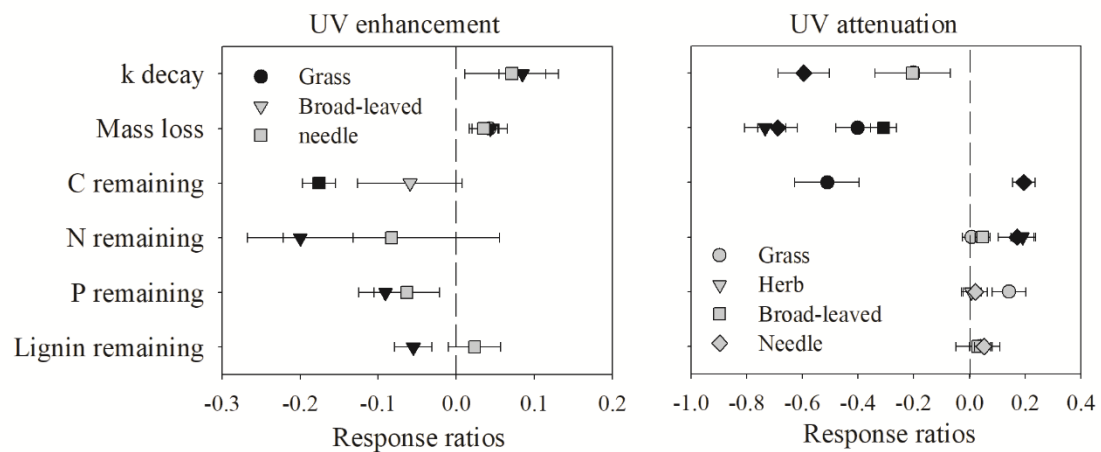
**Figure S3** Relationship between the response ratio (RR) of k decay and the change in ultraviolet (UV) radiation. Values above zero indicate enhancement, whereas those below zero indicate inhibition.



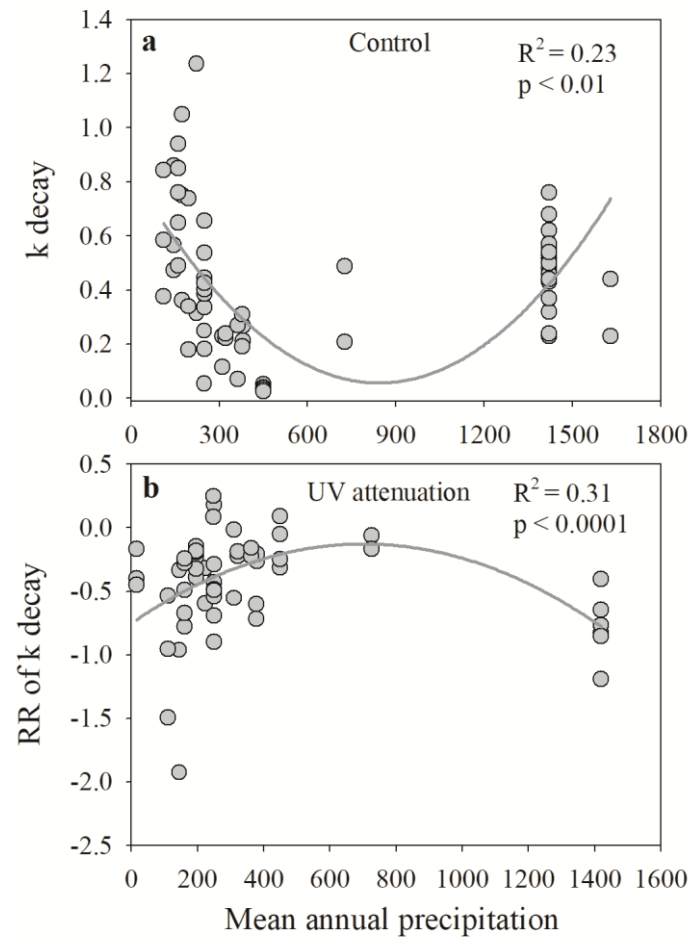
**Figure S4** Model-averaged importance of the predictors of the effects of ultraviolet (UV) radiation on mass loss of litter. The importance is based on the sum of Akaike weights derived from model selection using Akaike's information criteria corrected for small samples. The cutoff was set at 0.8 (dashed line) to differentiate important from nonessential predictors.



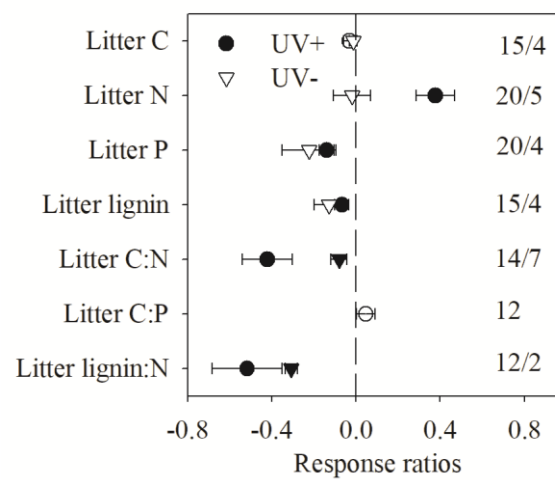
**Figure S5** Effects of UV enhancement and attenuation on litter mass loss and remaining nutrients in grasses, herbs, and broad-leaved and needle-leaved plants. The black symbols indicate significant differences ( $p < 0.05$ ) between the response ratios (RRs) and zero. The vertical dotted line represents a mean effect size of 0.



**Figure S6** Relationships between  $k$  decay and mean annual precipitation under ambient environment (a) and between the response ratio (RR) of  $k$  decay and mean annual precipitation under UV attenuation (b).

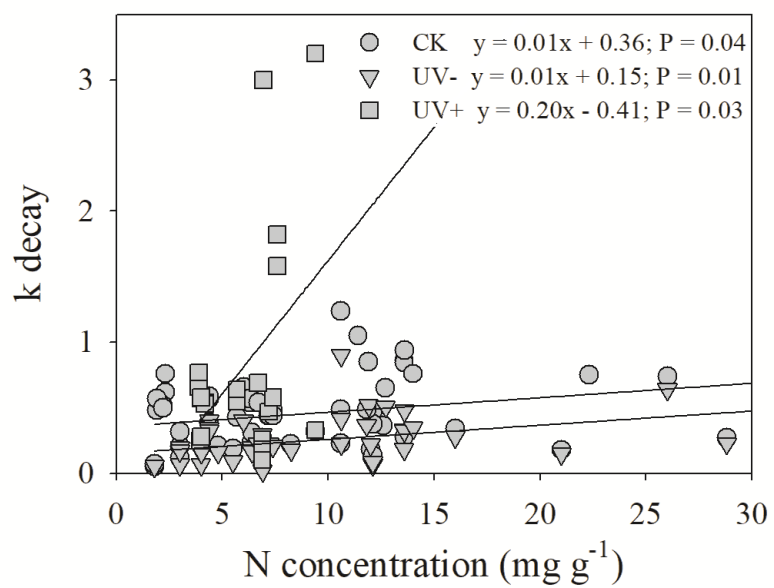


**Figure S7** Effects of ultraviolet (UV) radiation on litter chemical properties. C is carbon, N is nitrogen, and P is phosphorus. The black symbols indicate significant differences ( $p < 0.05$ ) between the response ratios (RRs) and zero. The vertical dotted line represents 0. The sample size for each variable is shown next to the confidence interval (CI) and represents UV enhancement (UV+) and attenuation (UV-) from left to right.





**Figure S8** Relationship between  $k$  decay and the N concentration of litter in ambient environment (CK), UV-attenuation (UV-) and UV-enhancement (UV+) conditions.



**Part 2:** The 54 papers from which data were extracted for the meta-analysis.

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4. Hoorens B, Aerts R, Stroetenga M (2004) Elevated UV-B radiation has no effect on litter quality and decomposition of two dune grassland species: evidence from a long-term field experiment. *Global Change Biology* 10: 200-208.
5. Newsham KK, Anderson JM, Sparks TH, Splatt P, Woods C, et al. (2001) UV-B effect on *Quercus robur* leaf litter decomposition persists over four years. *Global Change Biology* 7: 479-483.
6. Pancotto VA, Sala OE, Cabello M, Lopez NI, Robson TM, et al. (2003) Solar UV-B decreases decomposition in herbaceous plant litter in Tierra del Fuego, Argentina: potential role of an altered decomposer community. *Global Change Biology* 9: 1465-1474.
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Global Change Biology 11: 1982-1989.

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12. Brandt LA, King JY, Hobbie SE, Milchunas DG, Sinsabaugh RL (2010) The Role of Photodegradation in Surface Litter Decomposition Across a Grassland Ecosystem Precipitation Gradient. *Ecosystems* 13: 765-781.
13. Brandt LA, King JY, Milchunas DG (2007) Effects of ultraviolet radiation on litter decomposition depend on precipitation and litter chemistry in a shortgrass steppe ecosystem. *Global Change Biology* 13: 2193-2205.
14. Day TA, Zhang ET, Ruhland CT (2007) Exposure to solar UV-B radiation accelerates mass and lignin loss of *Larrea tridentata* litter in the Sonoran Desert. *Plant Ecology* 193: 185-194.

15. Gallo ME, Porras-Alfaro A, Odenbach KJ, Sinsabaugh RL (2009) Photoacceleration of plant litter decomposition in an arid environment. *Soil Biology and Biochemistry* 41: 1433-1441.
16. Gallo ME, Sinsabaugh RL, Cabaniss SE (2006) The role of ultraviolet radiation in litter decomposition in arid ecosystems. *Applied Soil Ecology* 34: 82-91.
17. Gehrke C, Johanson U, Callaghan TV, Chadwick D, Robinson CH (1995) The impact of enhanced ultraviolet-B radiation on litter quality and decomposition processes in *Vaccinium* leaves from the Subarctic. *Oikos*: 213-222.
18. Henry HAL, Brizgys K, Field CB (2008) Litter Decomposition in a California Annual Grassland: Interactions Between Photodegradation and Litter Layer Thickness. *Ecosystems* 11: 545-554.
19. Kirschbaum MUF, Lambie SM, Zhou H (2011) No UV enhancement of litter decomposition observed on dry samples under controlled laboratory conditions. *Soil Biology and Biochemistry* 43: 1300-1307.
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- China. *European Journal of Soil Biology* 47: 343-348.
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34. Day TA, Guénou R, Ruhland CT (2015) Photodegradation of plant litter in the Sonoran Desert varies by litter type and age. *Soil Biology and Biochemistry* 89: 109-122.
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Grasslands Depends on its Interaction with Local Humidity Conditions, Litter Quality and Position. *Ecosystems* 20: 527-542.

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