Climate change reshapes the drivers of false spring risk across European trees: Submission Questions (max 50 words per answer)

What is the scientific question you are addressing?

Recent major climate change has increased interest in false spring events, which affect plant performance, survival and shape species distributions. We ask which climatic and geographic factors are the strongest predictors of false springs across six tree species, and how these predictors have shifted with climate change. (48 words)

What is/are the key finding(s) that answers this question?

We find that climate change has fundamentally reshaped the relationships of climatic and geographic factors with false spring risk, while also magnifying species-level variation. Our results show that a major driver of risk before recent warming—mean spring temperature—has weakened, while the effect of other drivers has reversed. (49 words)

Why is this work important and timely?

Recent studies assess the effects of one predictor (e.g. temperature, elevation or distance from the coast), rendering inconsistent predictions for false springs. Our study shows how robust forecasting must integrate major climatic and geographic factors that underlie false spring, and allow for variation across species and time as warming continues. (50 words)

Does your paper fall within the scope of GCB; what biological AND global change aspects does it address?

By investigating leafout observations of six deciduous tree species from Europe, we unravel the species-specific effects, spring temperature, elevation, distance from the coast and NAO index on false spring risk with climate change. We found that climate-induced warming reshaped the influence of these factors. (50 words)

What are the three most recently published papers that are relevant to this question?

Ma, Q., Huang, J.G., Hänninen, H. & Berninger, F. (2018) Divergent trends in the risk of spring frost damage to trees in europe with recent warming. *Global Change Biology* **0**

Liu, Q., Piao, S., Janssens, I.A., Fu, Y., Peng, S., Lian, X., Ciais, P., Myneni, R.B., Peñuelas, J. & Wang, T. (2018) Extension of the growing season increases vegetation exposure to frost. *Nature Communications* **9**

Vitasse, Y., Schneider, L., Rixen, C., Christen, D. & Rebetez, M. (2018) Increase in the risk of exposure of forest and fruit trees to spring frosts at higher elevations in Switzerland over the last four decades. *Agricultural and Forest Meteorology* **248**, 60 – 69

If you listed non-preferred reviewers, please provide a justification for each.

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If your manuscript does not conform to author or formatting guidelines (e.g. exceeding word limit), please provide a justification.

N/A