Supplementary material

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Overview

This document provides supplementary figures for each of the 10 Austrian hydrological hotspots analyzed in the main paper. Hotspots are groups of hydrologically similar catchments sharing dominant flood-generation mechanisms; their spatial distribution is shown in Figure 1 of the main text. For each hotspot, three figures are presented:

- **Figure (a):** Process-level probability density functions of the main hydrometeorological variables represented in the model and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON).
- **Figure (b):** Projected variation of the Flood Frequency Curve (FFC), shown for each season (rows: DJF, MAM, JJA, SON).
- **Figure (c):** Projected variation of the 2-year and 100-year flood quantiles with 80% confidence intervals, distinguishing the contribution of distinct flood-generating mechanisms: the upward shift of the 0°C isotherm (*0° line*), changes in precipitation intensity and duration (*precipitation*), and variations in soil moisture (*antecedent conditions*). The *combined* scenario integrates the concurrent effects of all three mechanisms.

1 Hotspot – *[Flysch]*

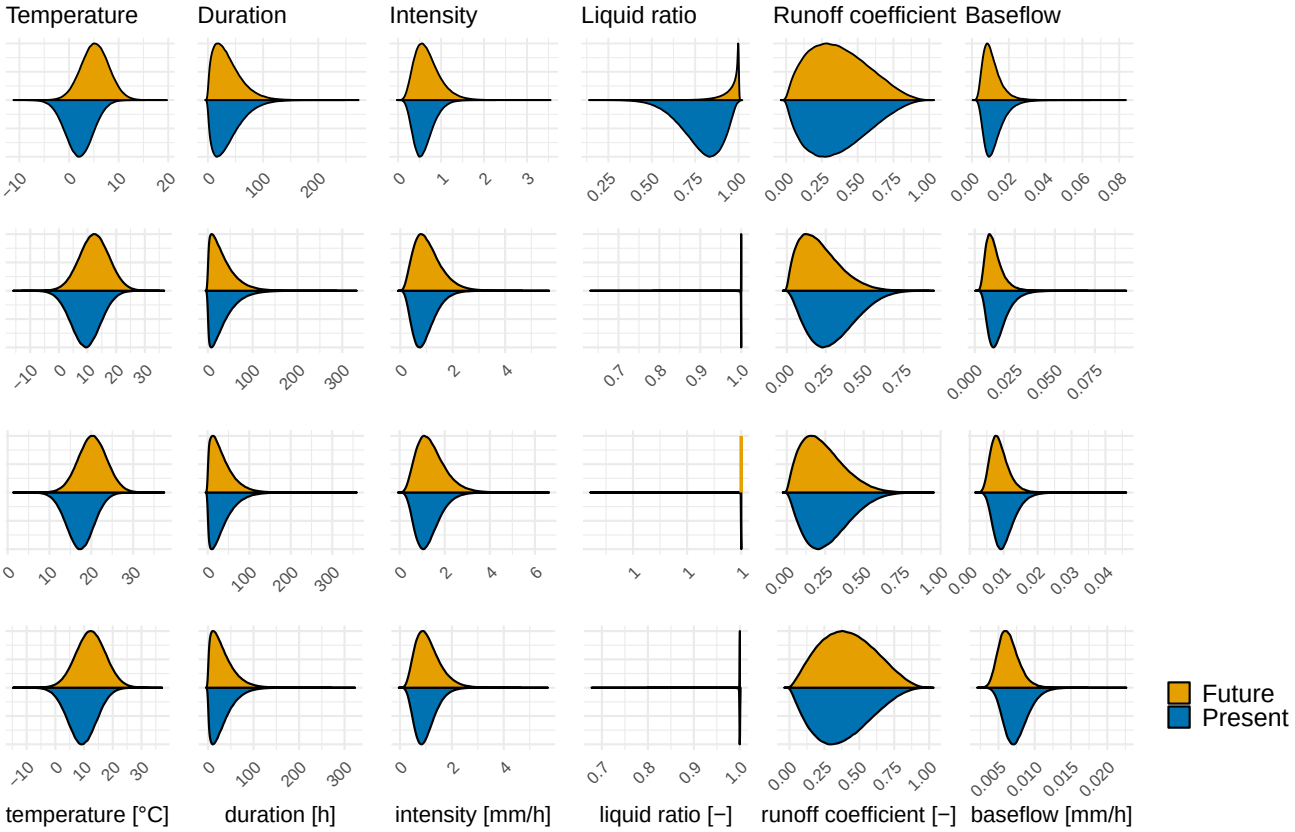

Figure 1. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

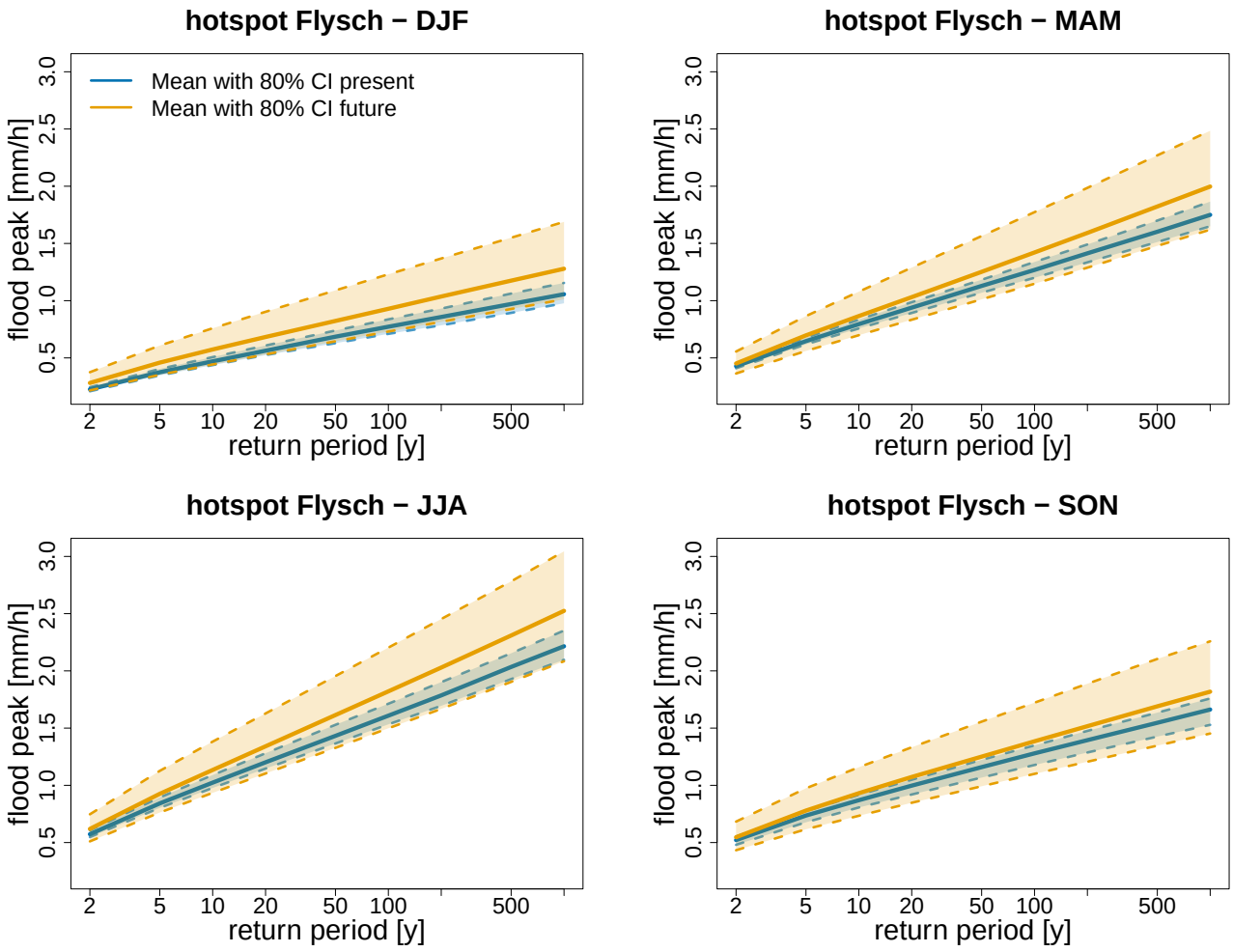

Figure 2. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

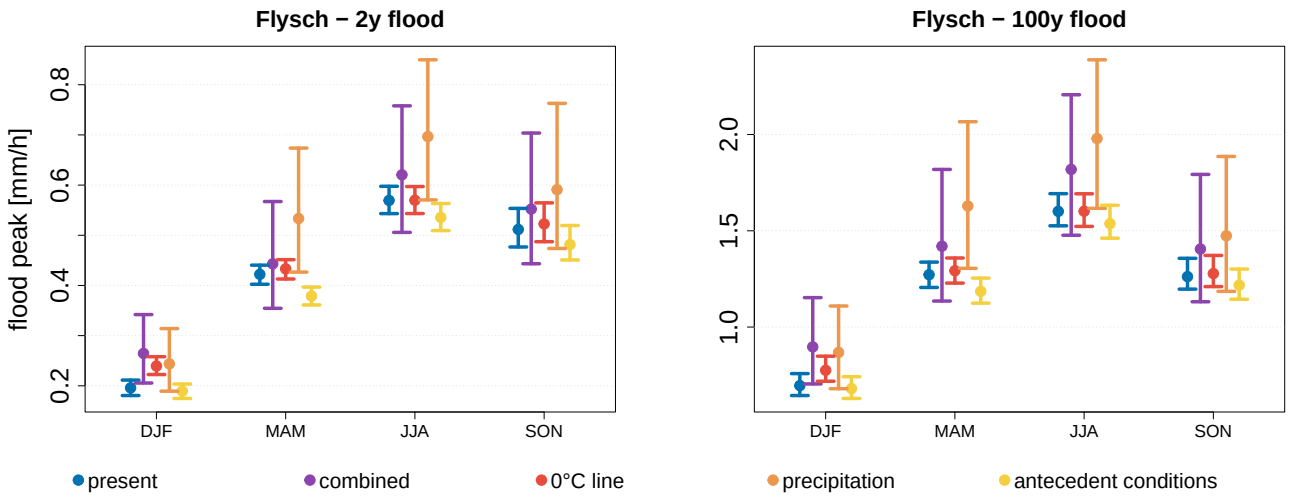

Figure 3. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.

2 Hotspot – *[Hoalp]*

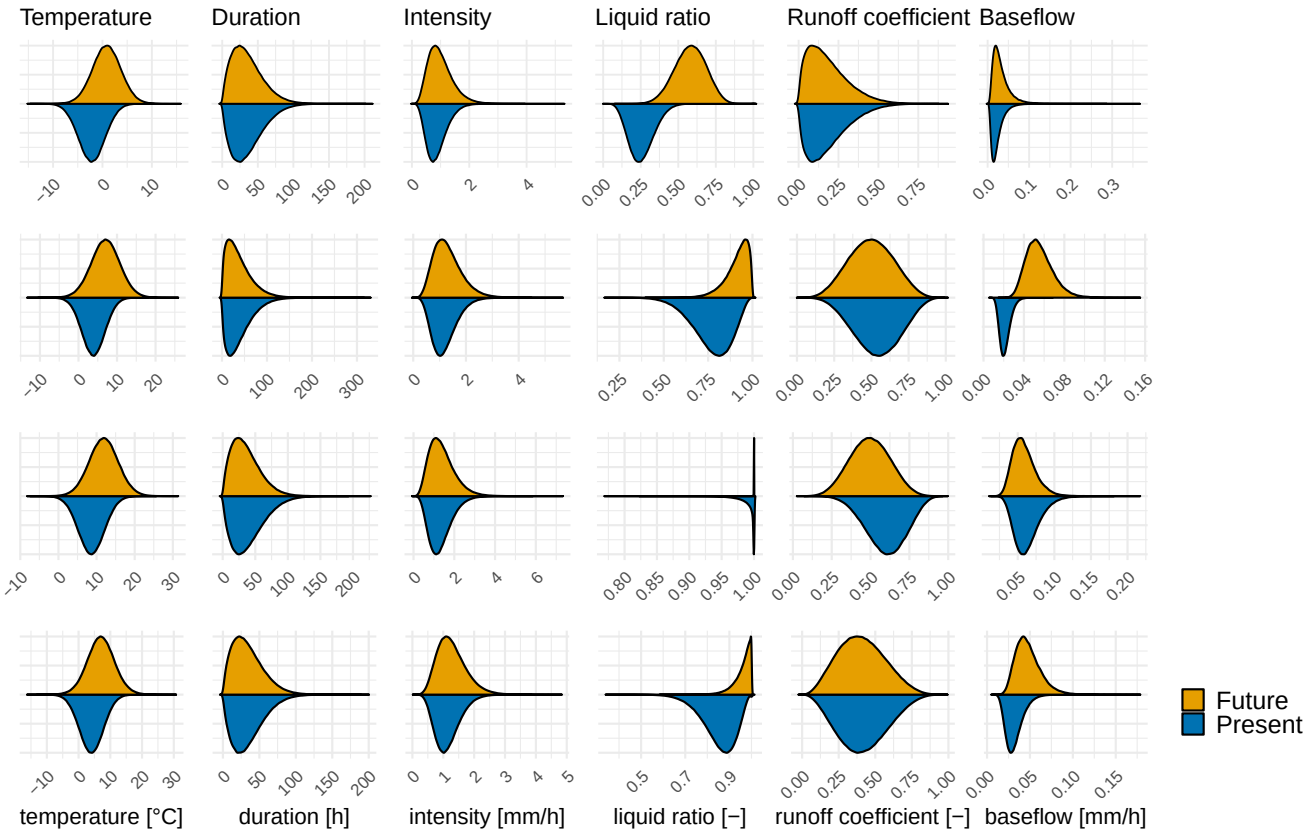

Figure 4. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

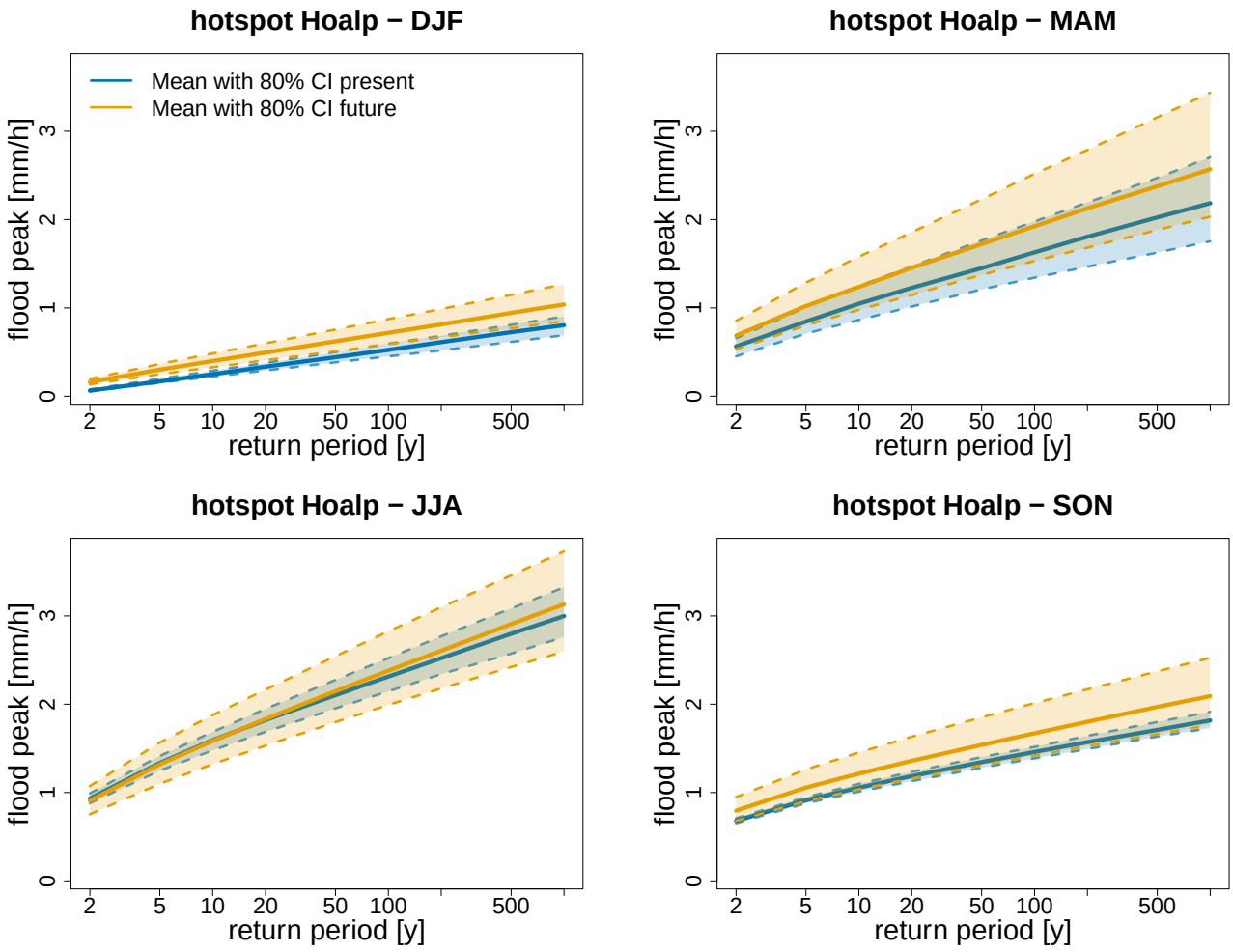

Figure 5. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

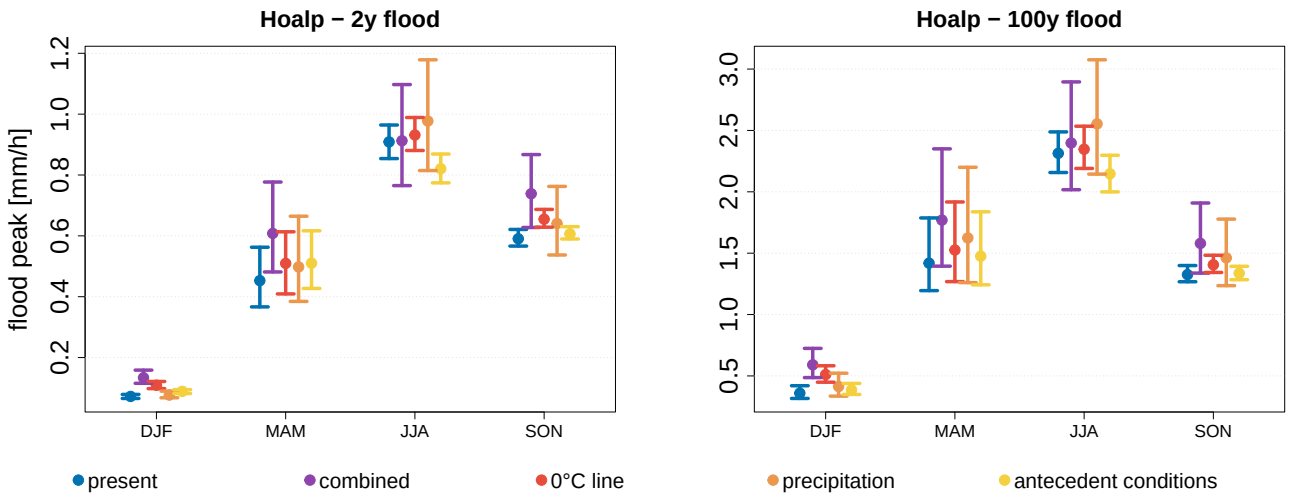

Figure 6. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.

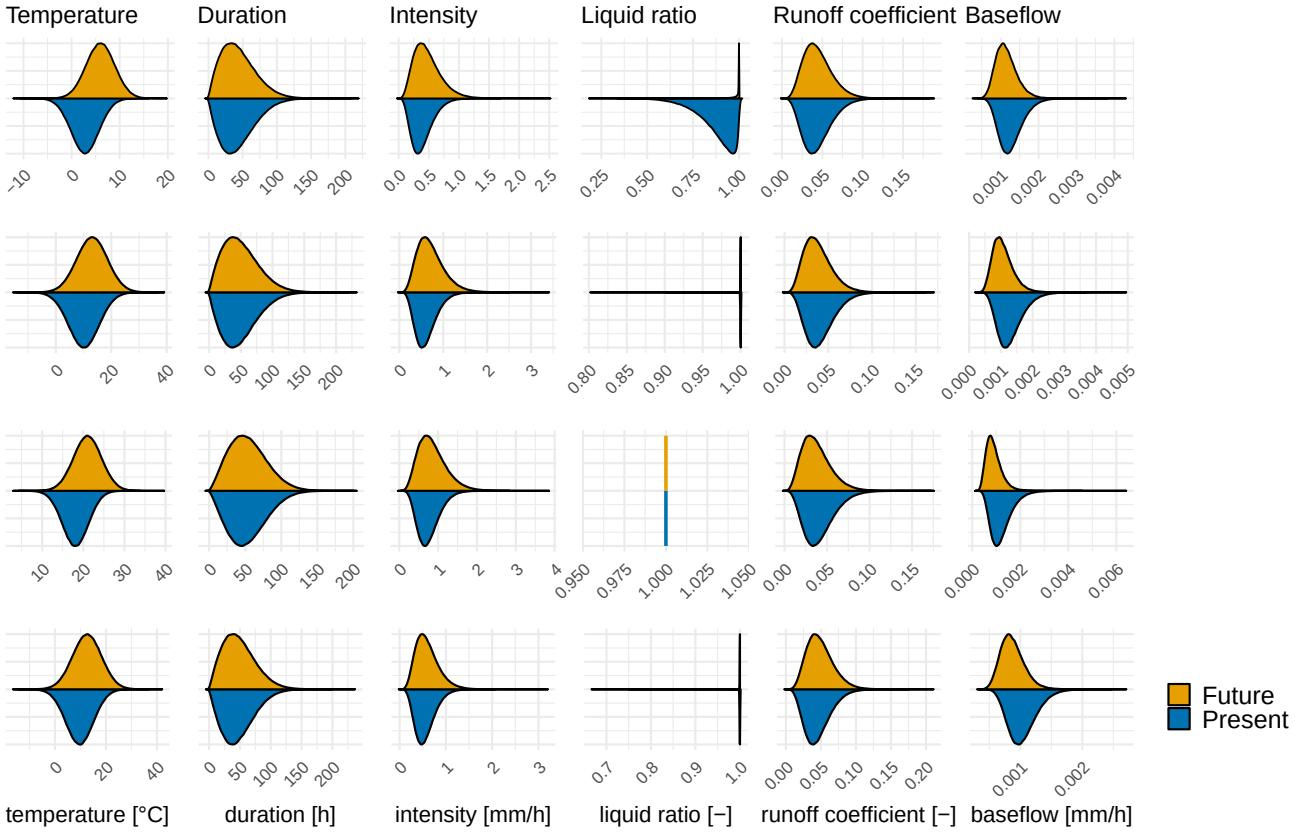

Figure 7. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

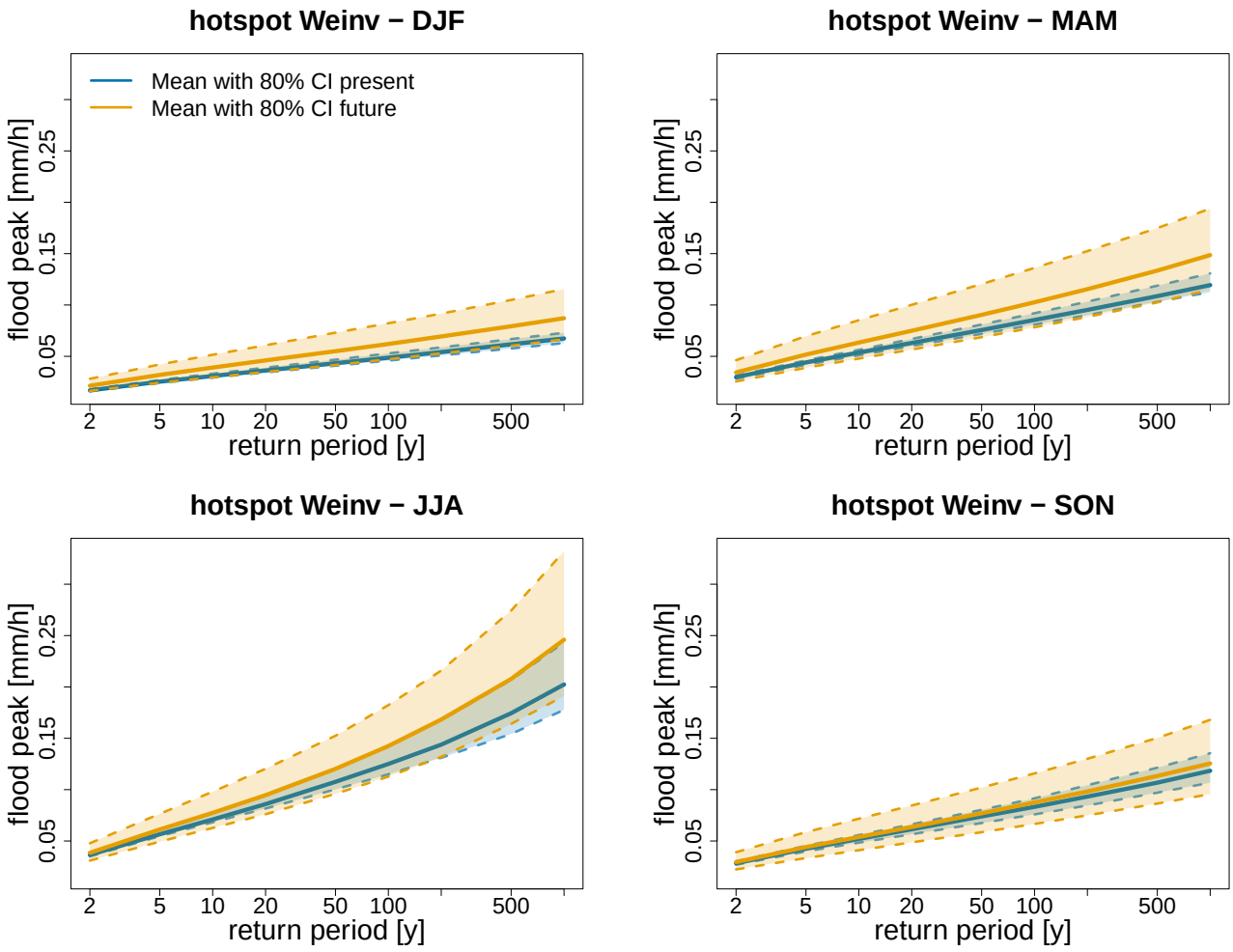

Figure 8. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

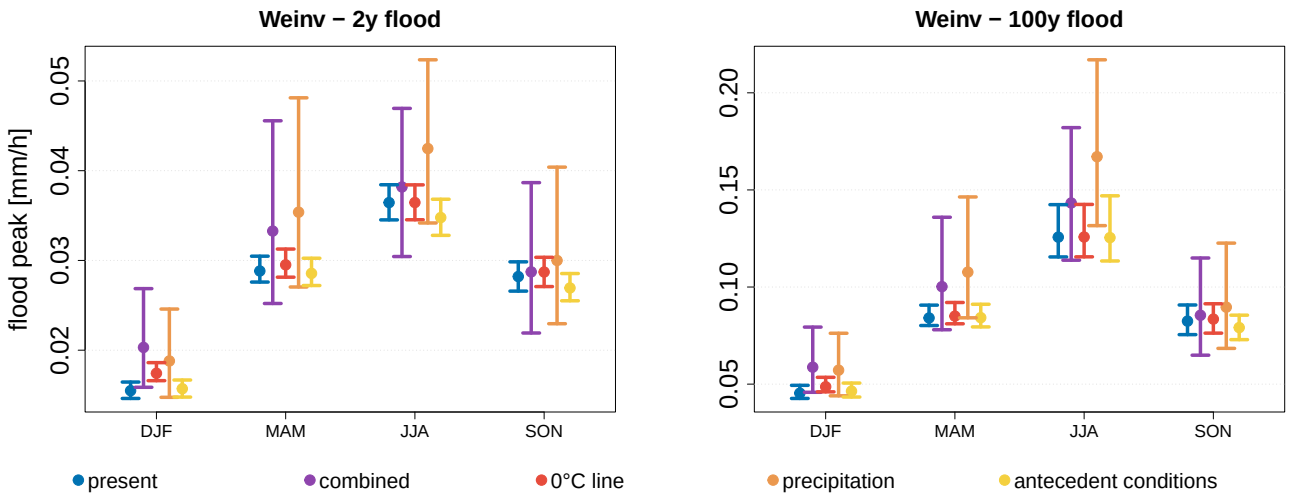

Figure 9. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.

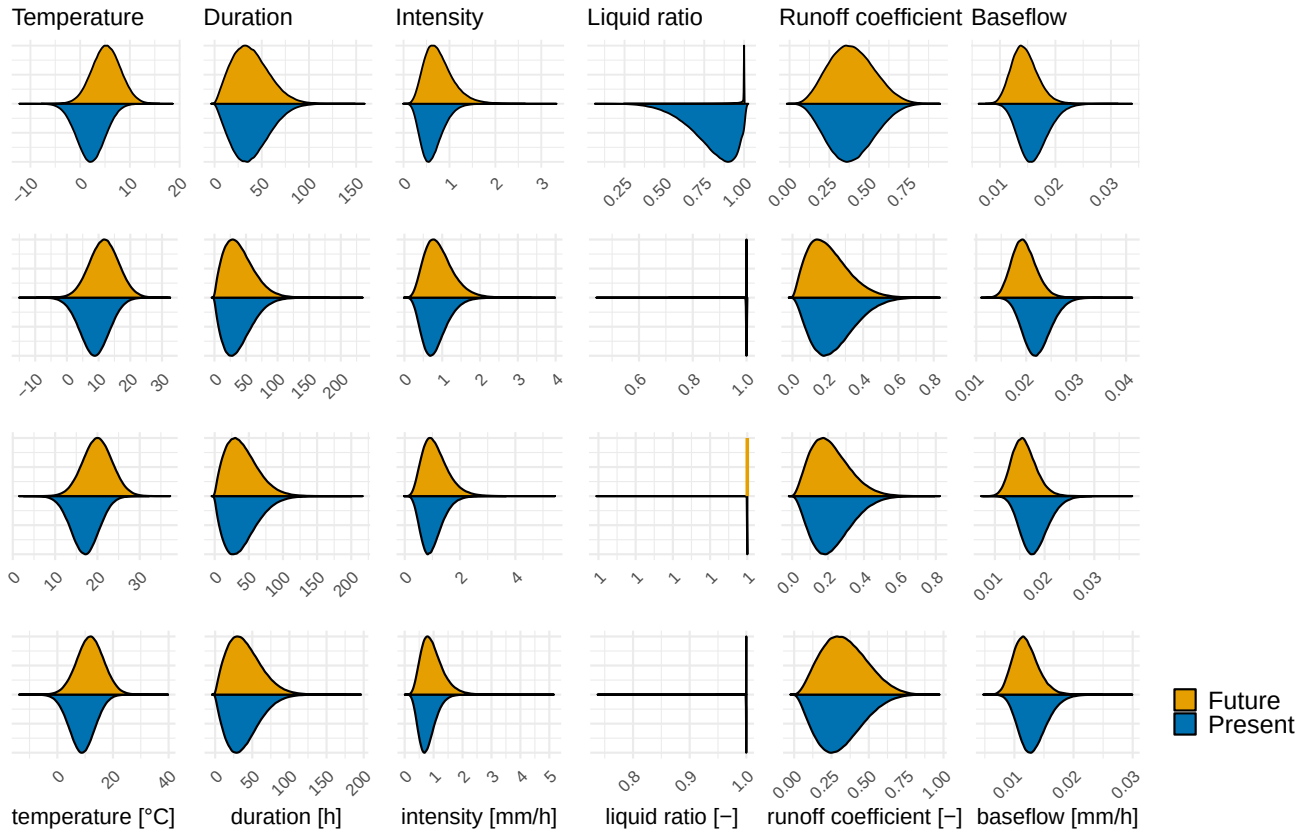

Figure 10. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

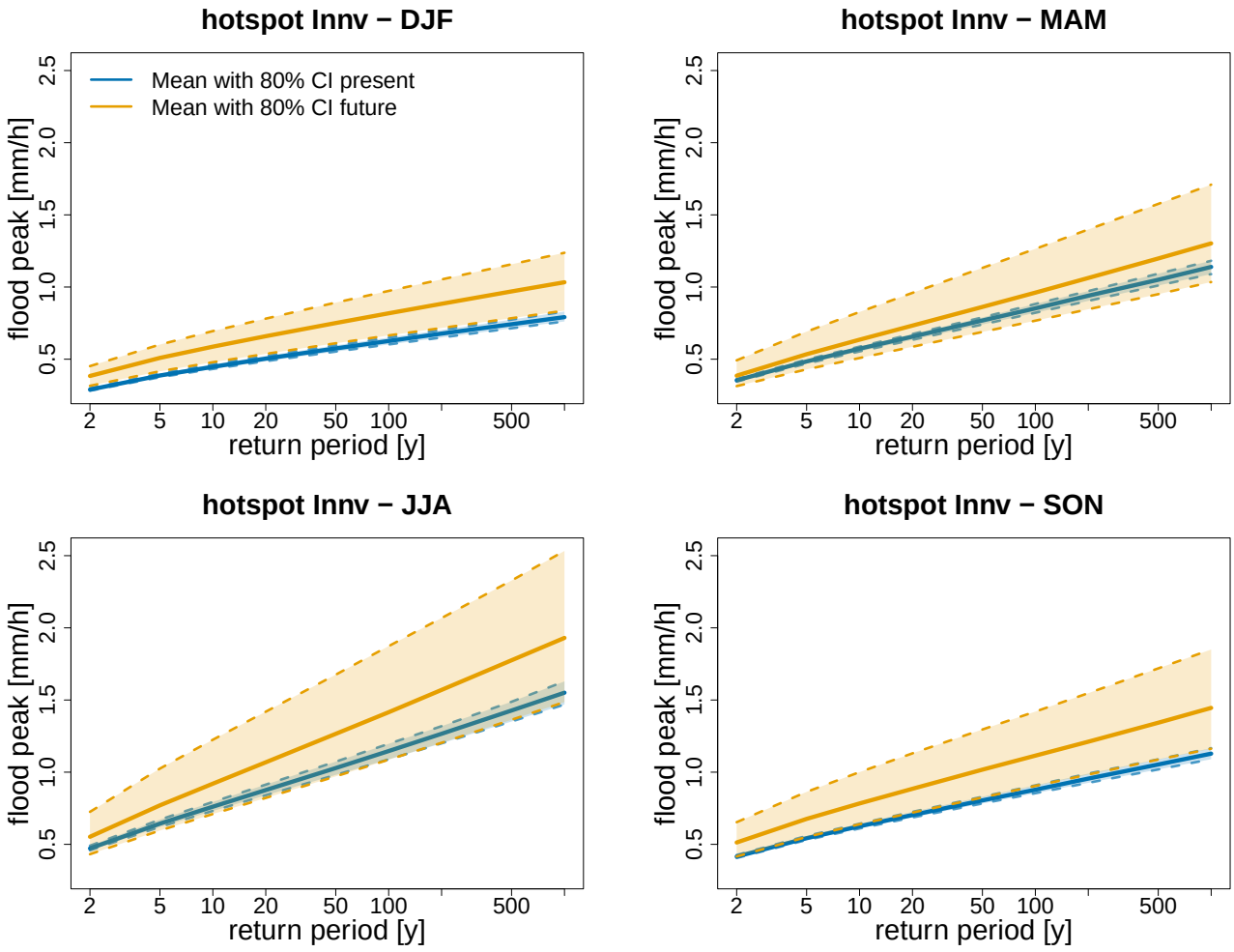

Figure 11. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

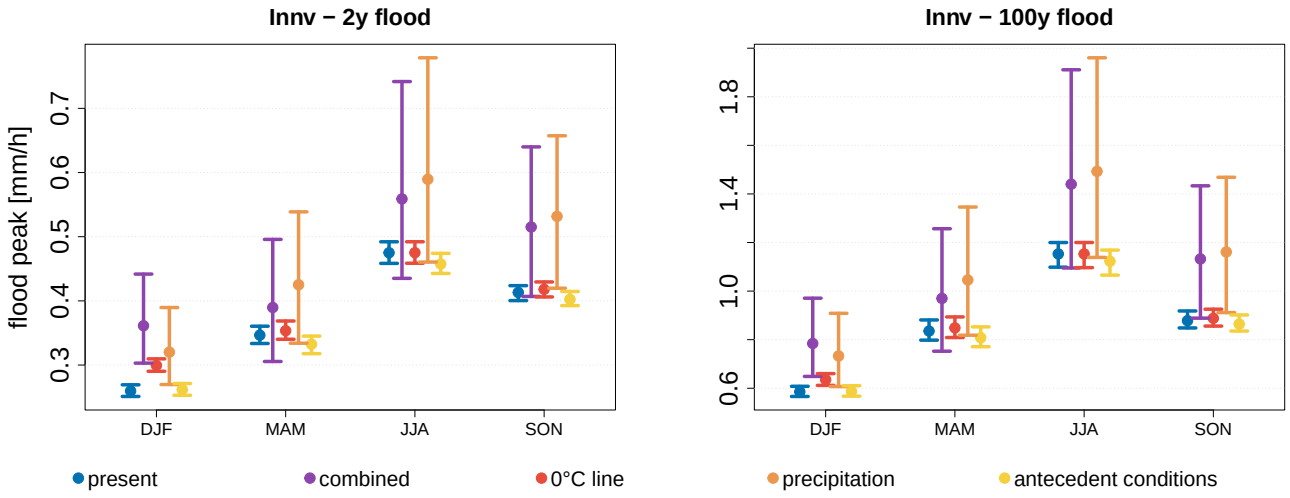

Figure 12. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.

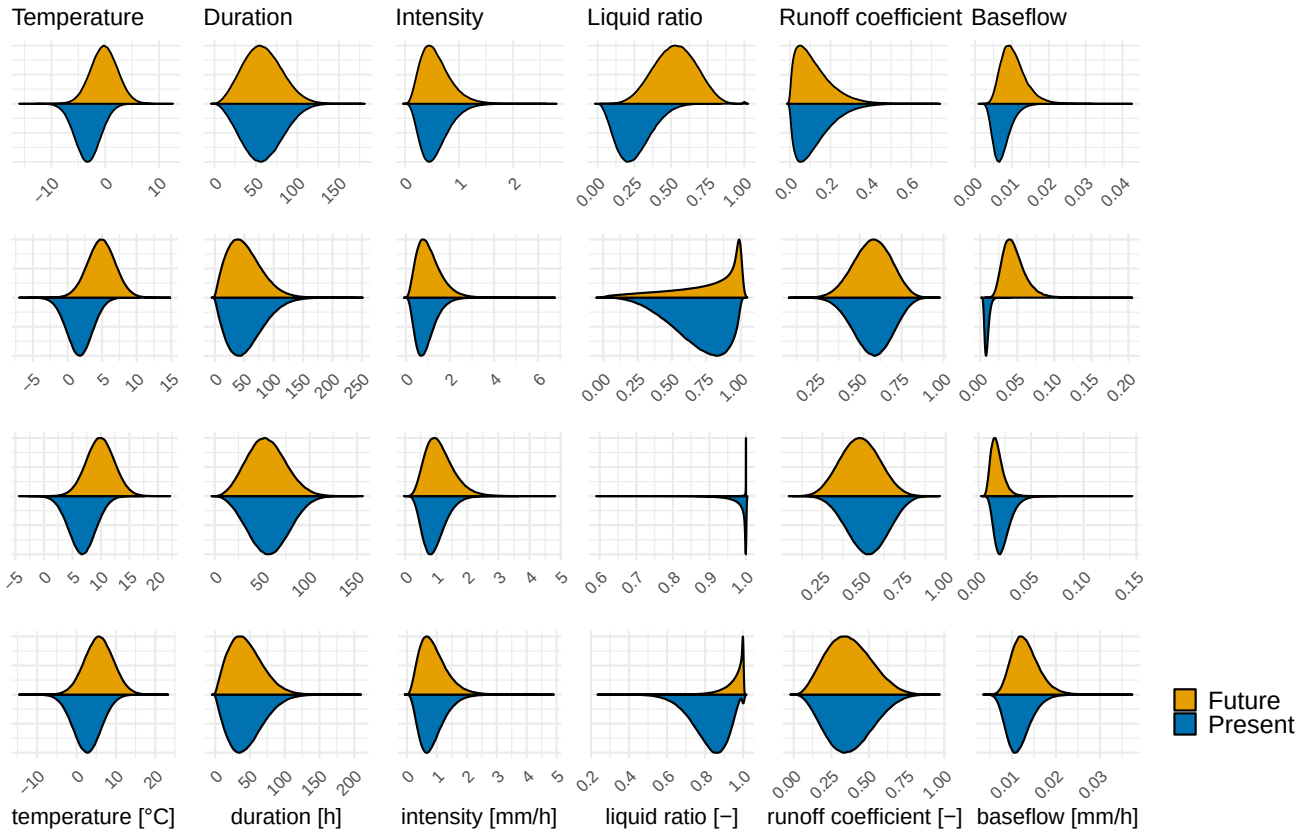

Figure 13. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

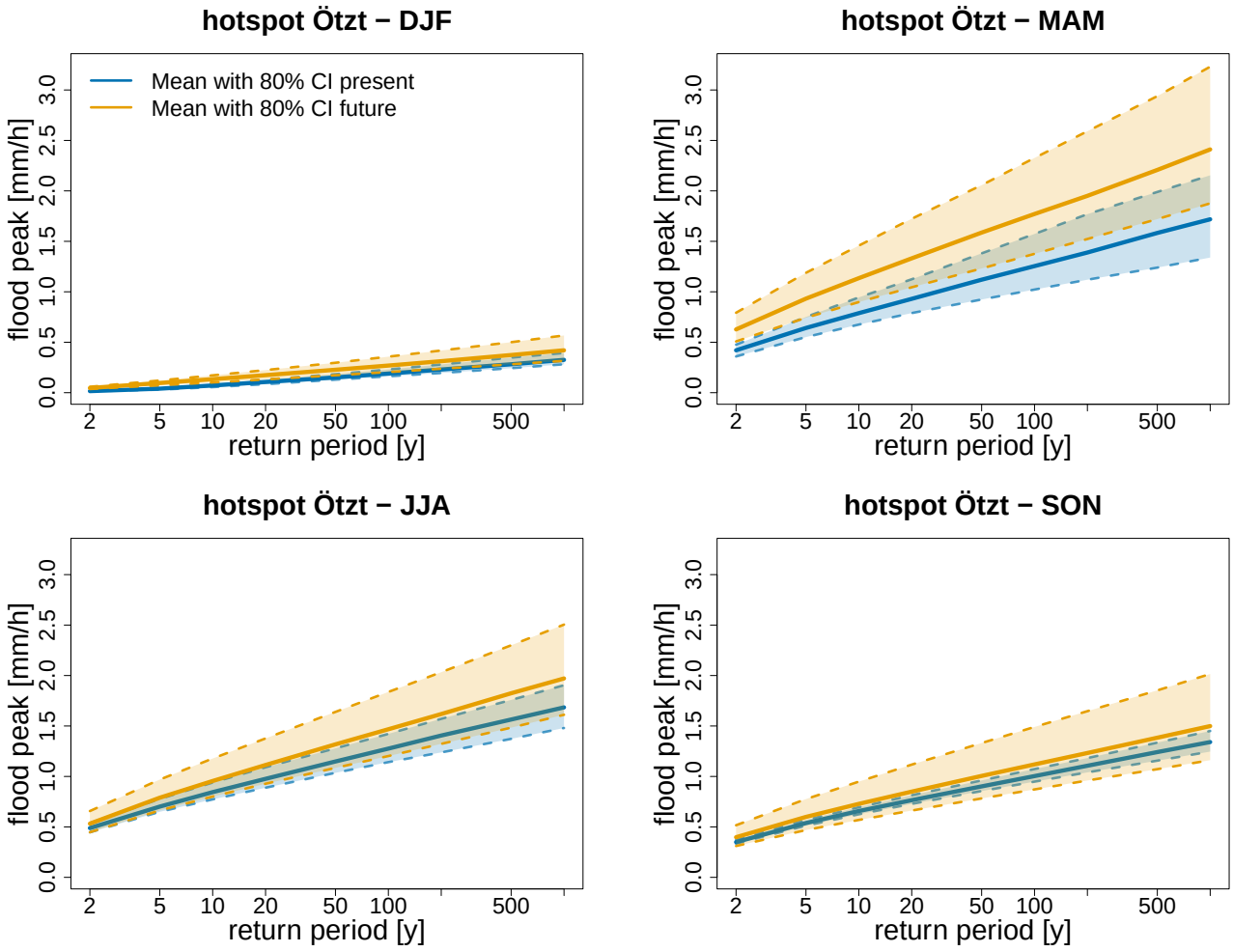

Figure 14. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

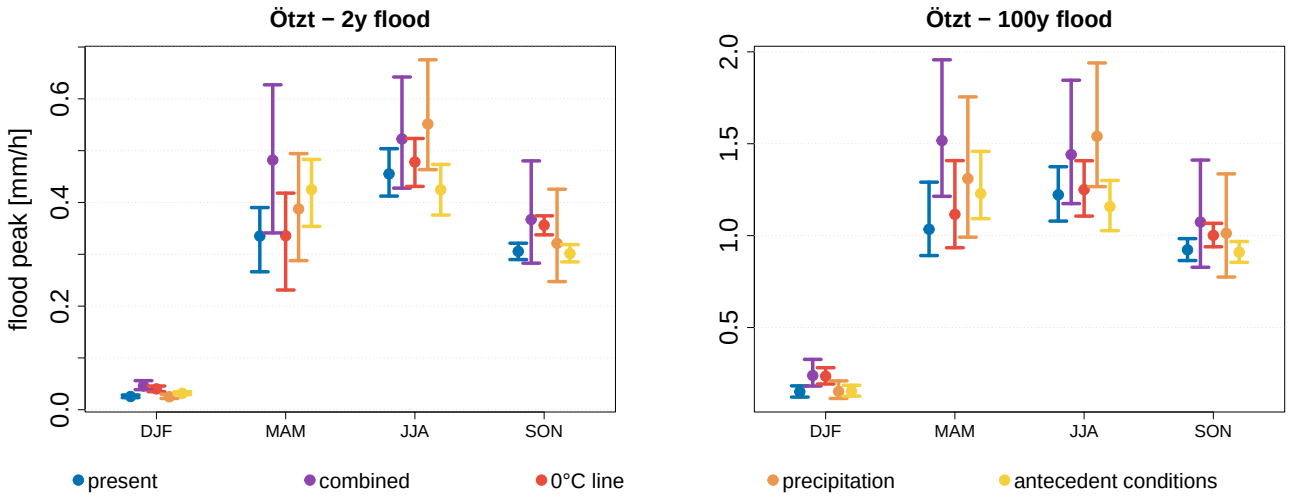

Figure 15. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.

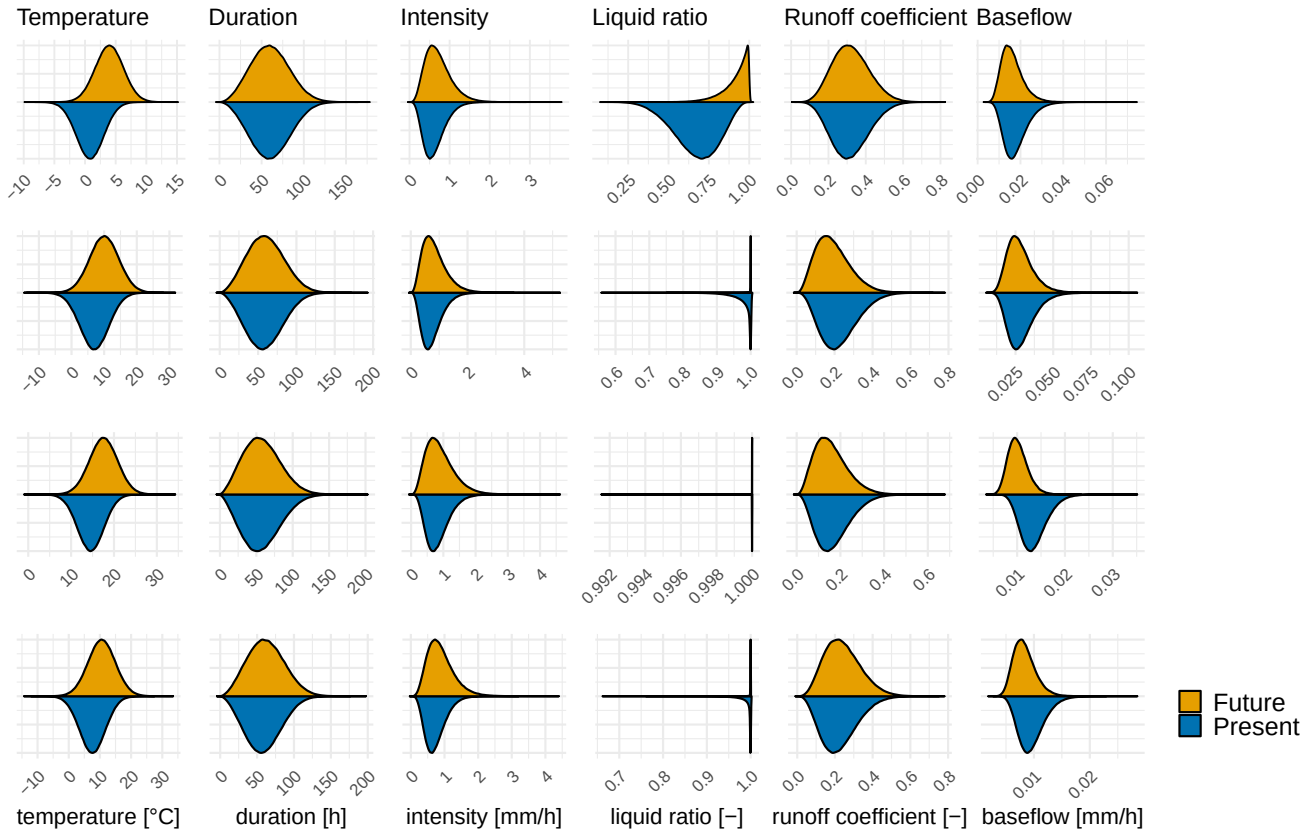

Figure 16. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

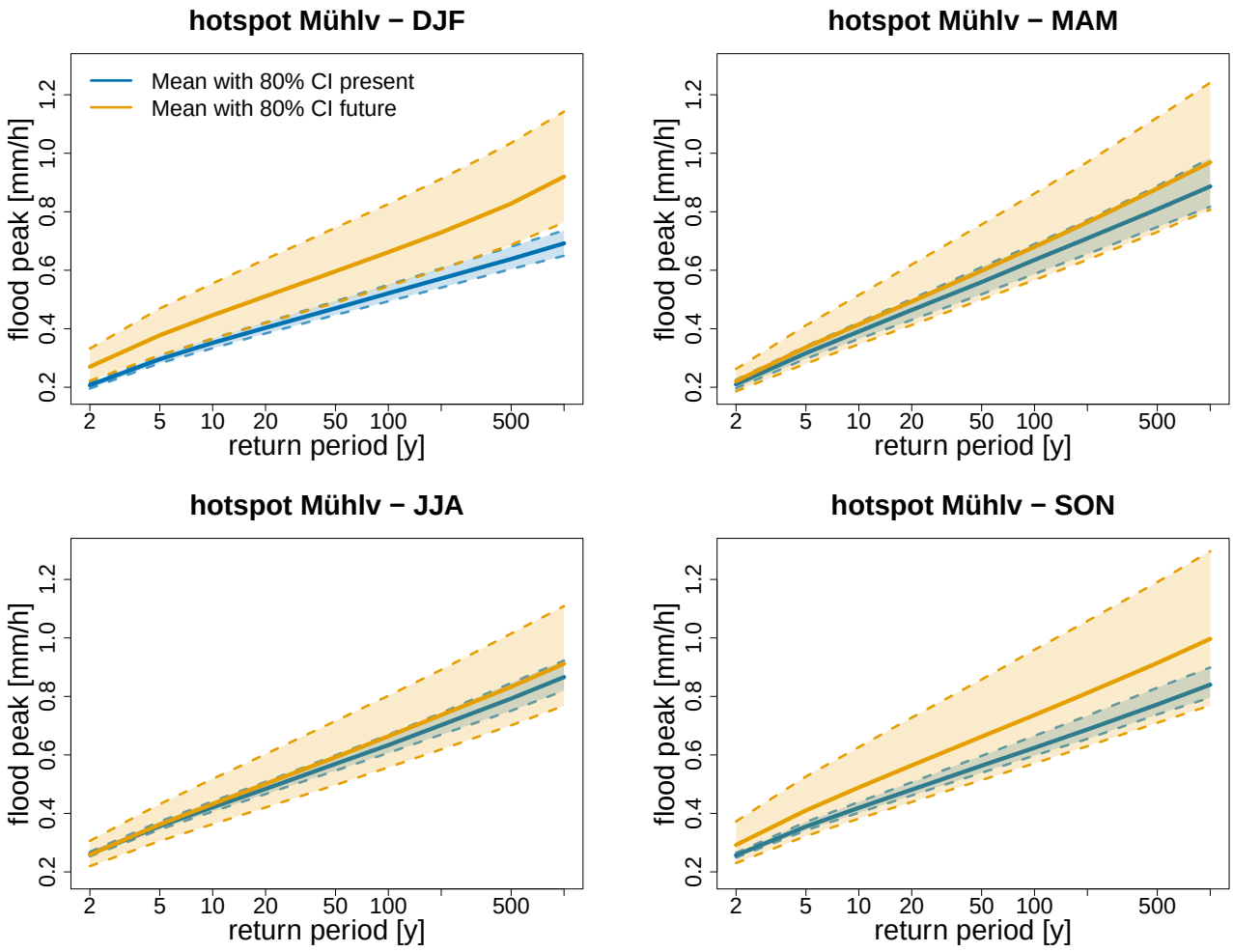

Figure 17. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

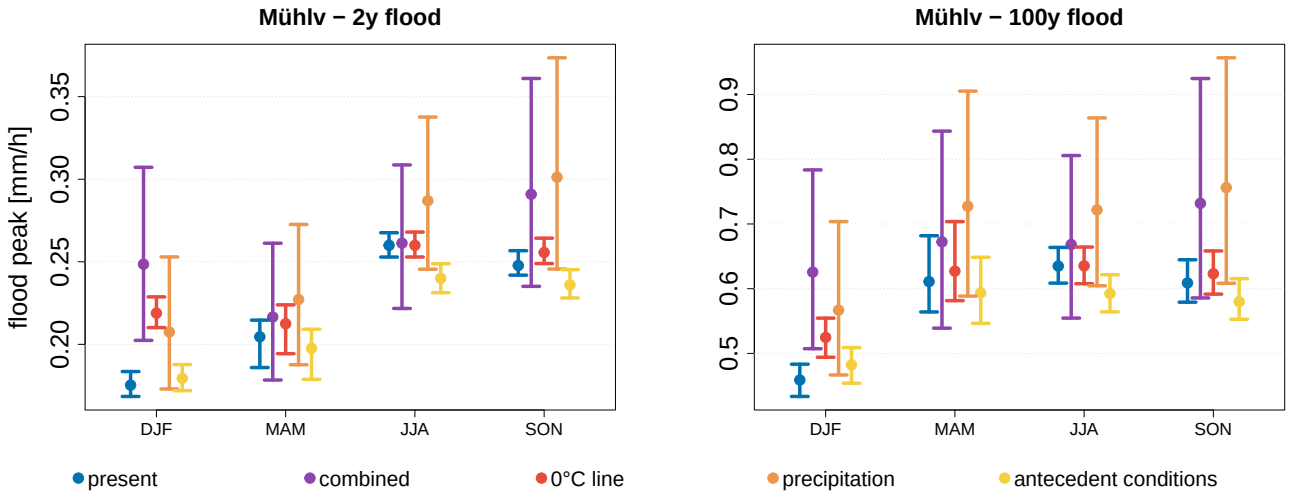

Figure 18. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.

7 Hotspot – *[Gail]*

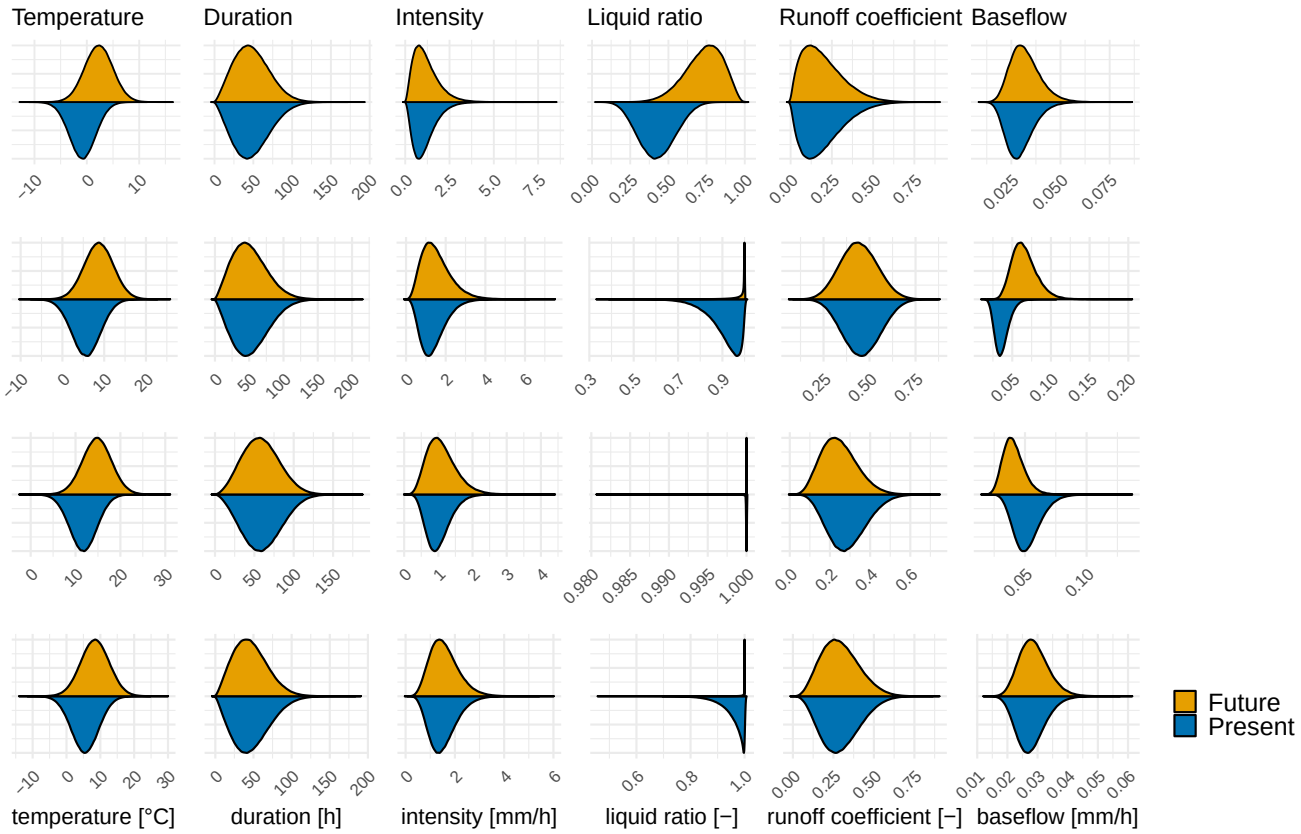

Figure 19. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

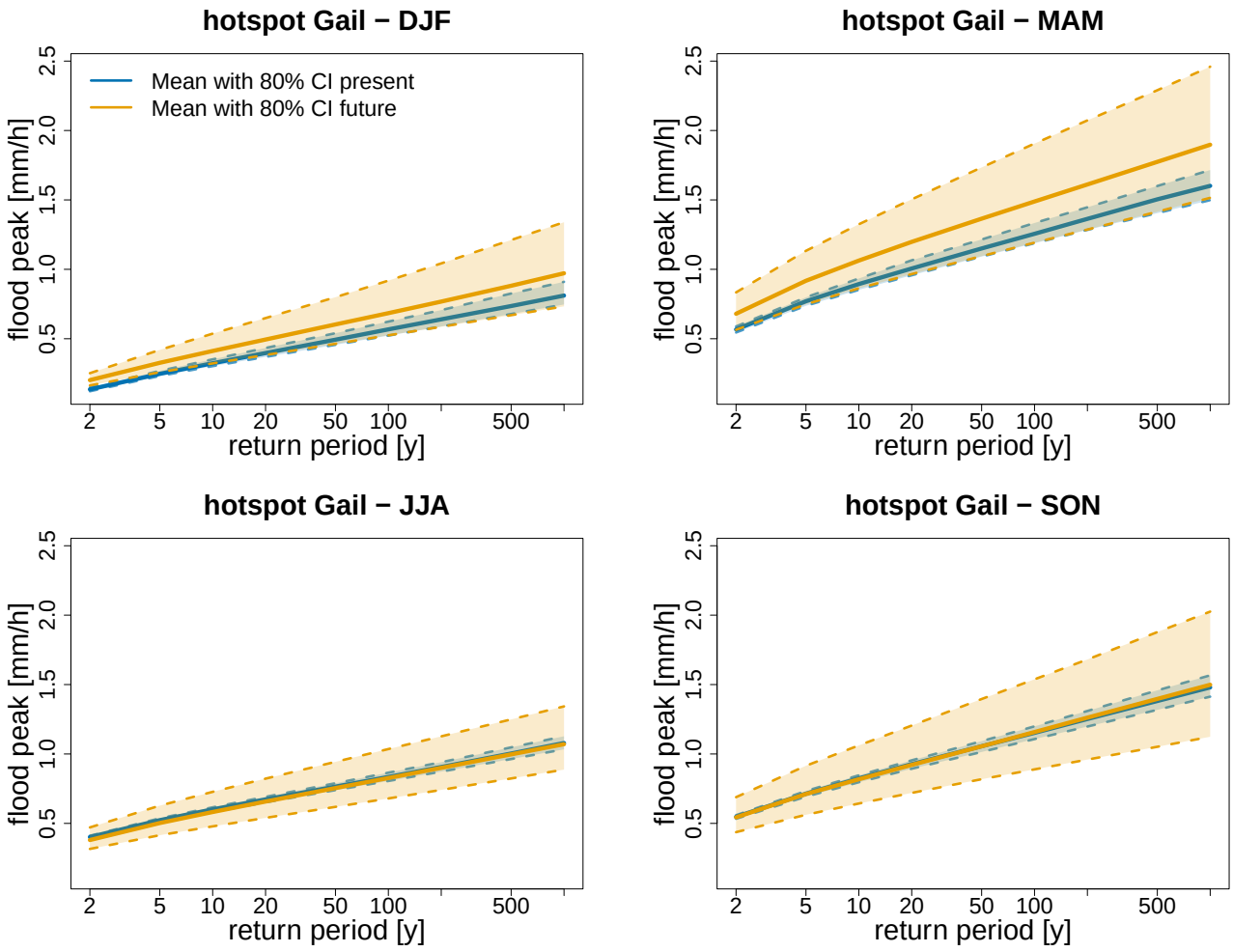

Figure 20. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

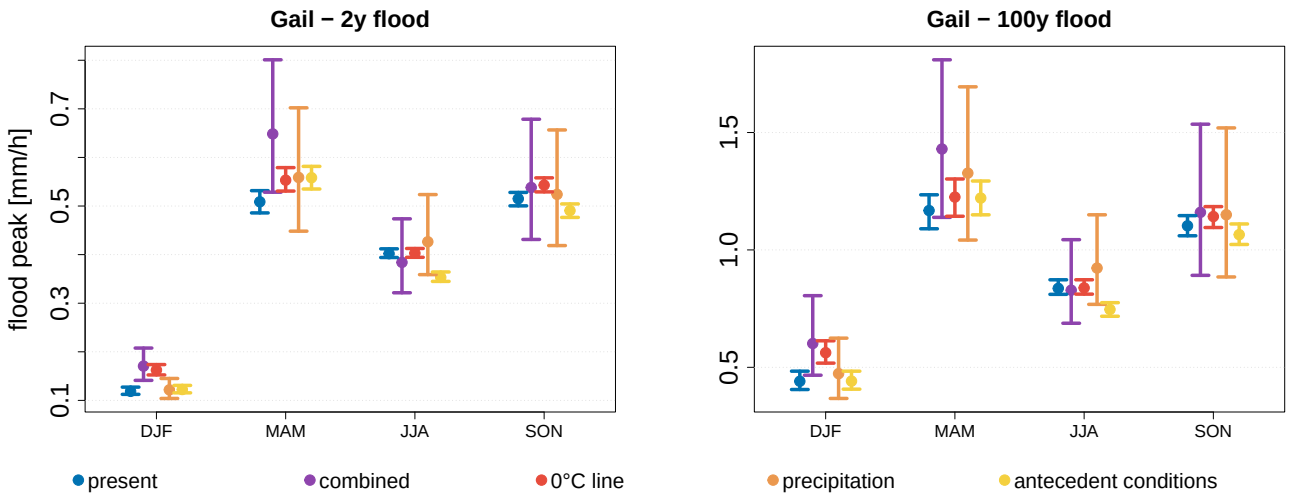

Figure 21. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.

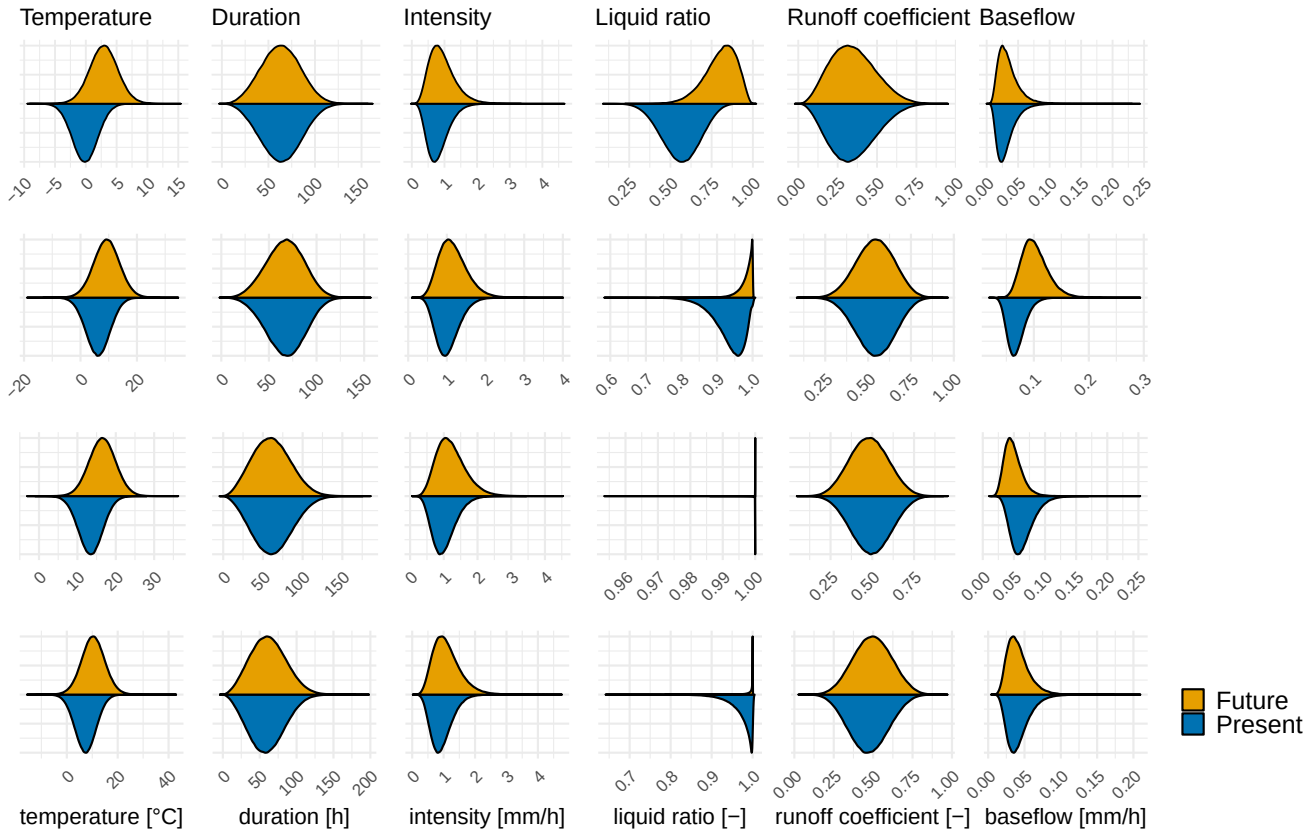

Figure 22. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

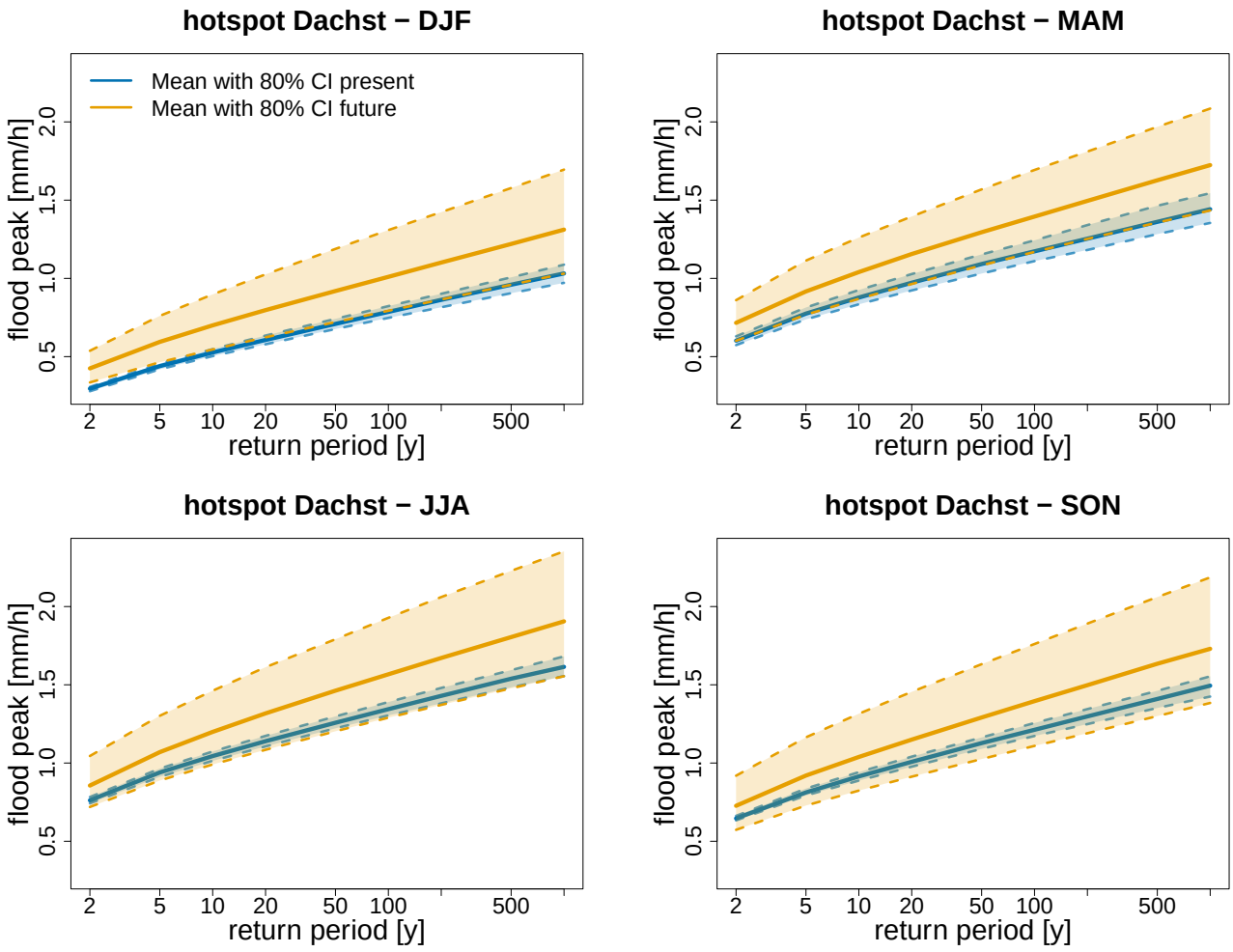

Figure 23. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

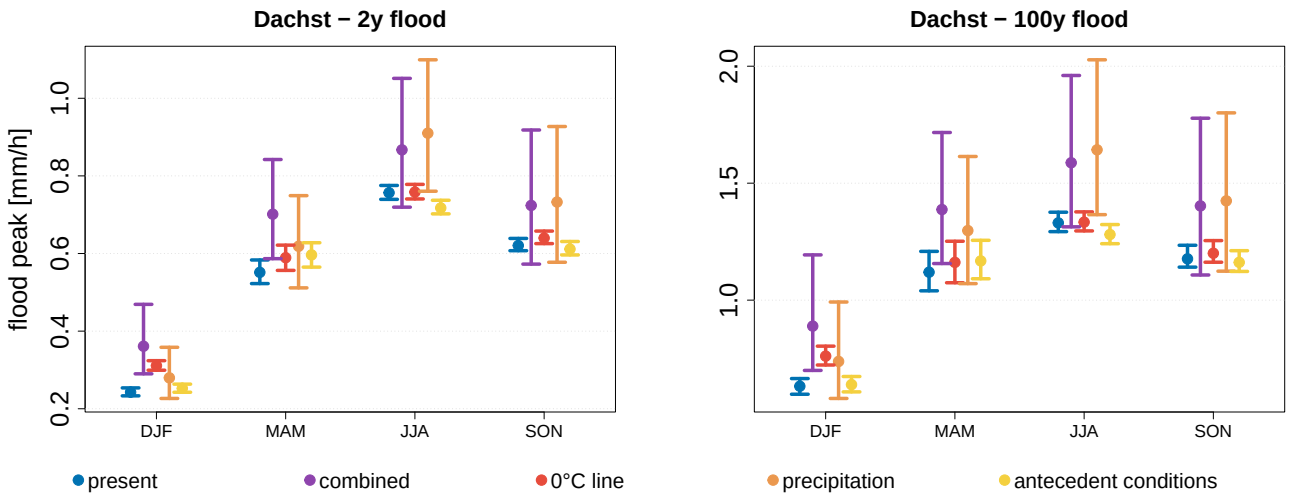

Figure 24. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.

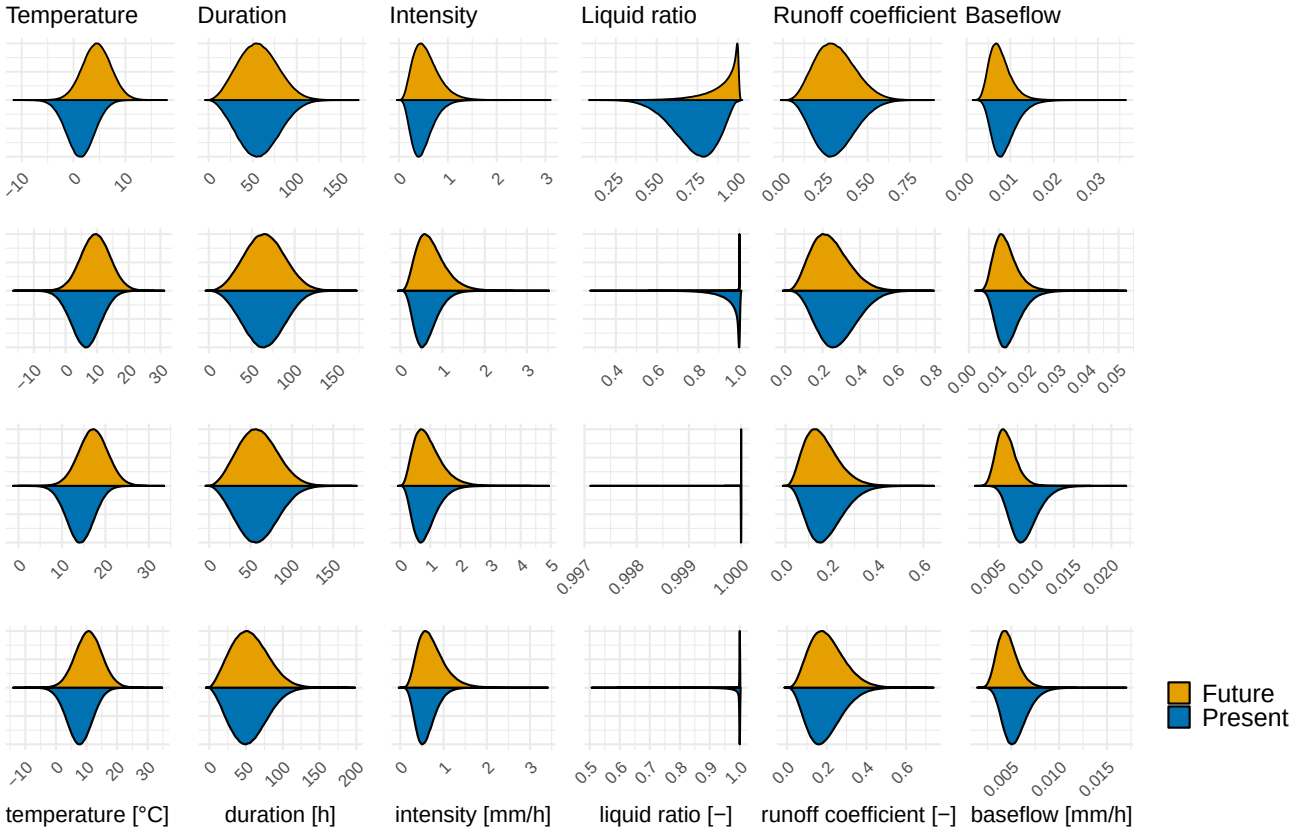

Figure 25. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

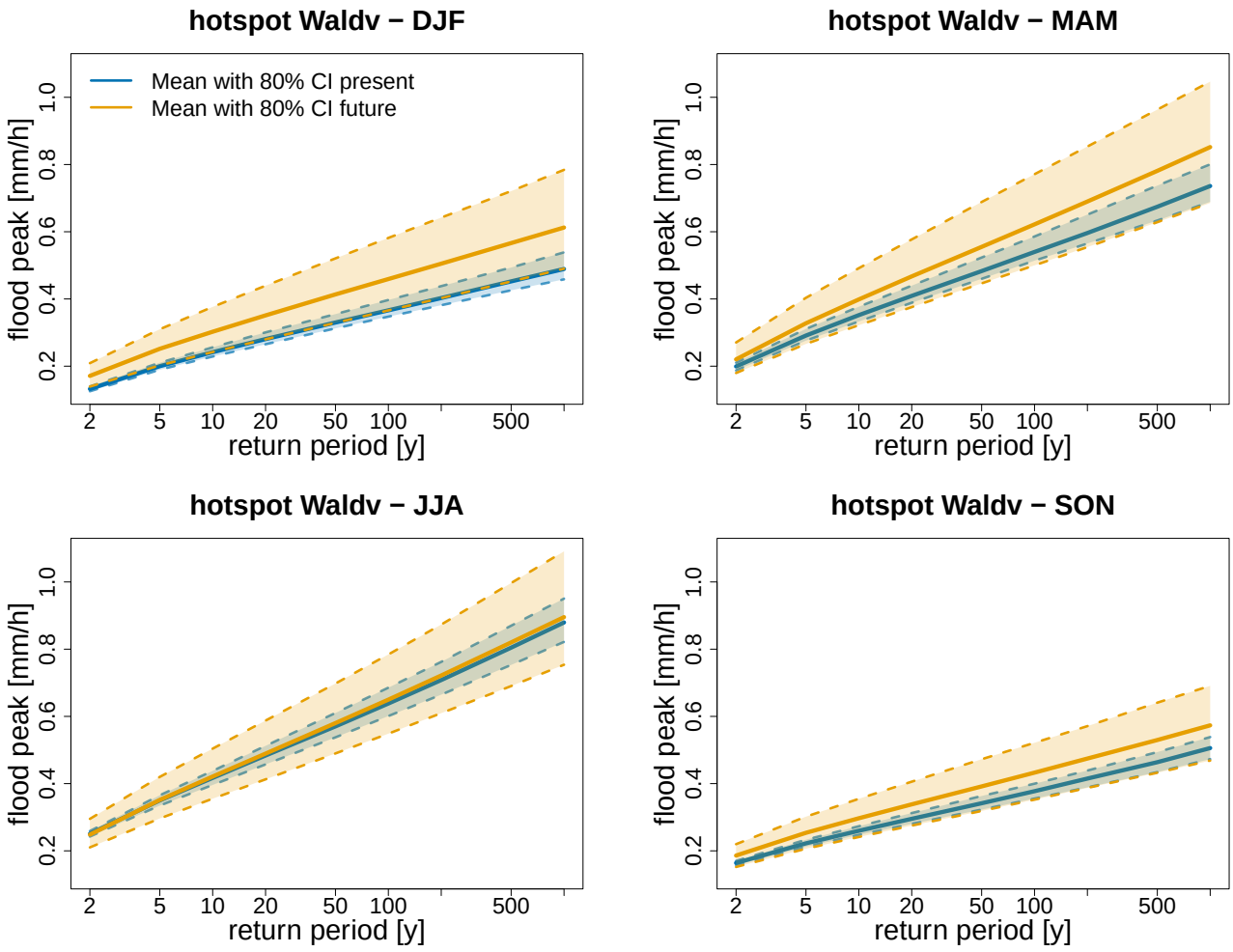

Figure 26. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

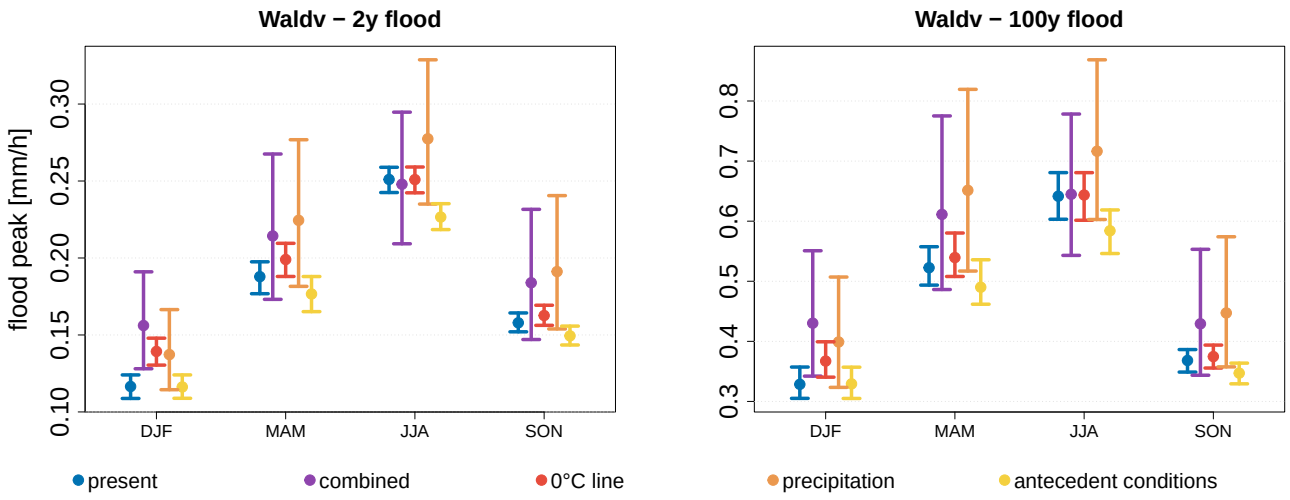

Figure 27. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.

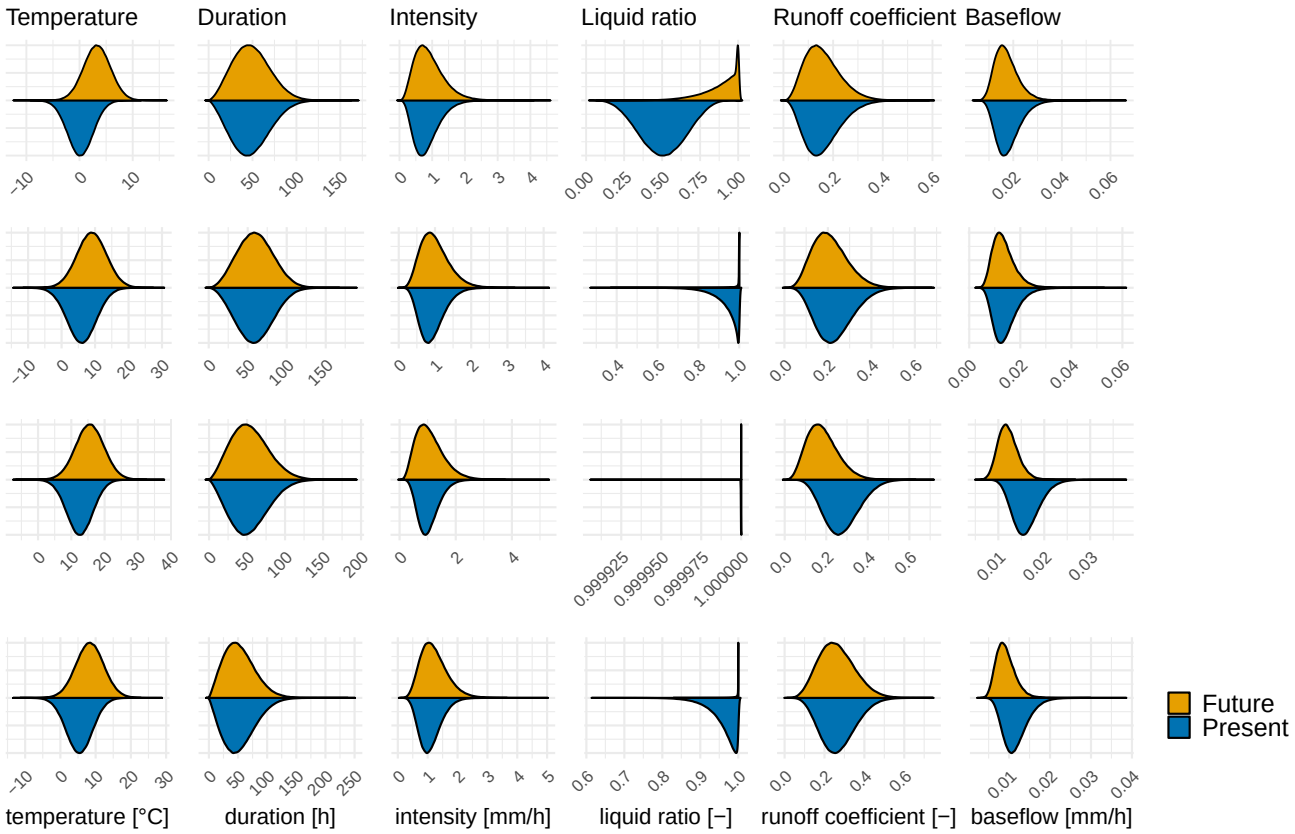

Figure 28. Probability density functions of the main hydrometeorological processes and their variation under climate change, shown for each season (rows: DJF, MAM, JJA, SON). Present period in blue, future period in orange.

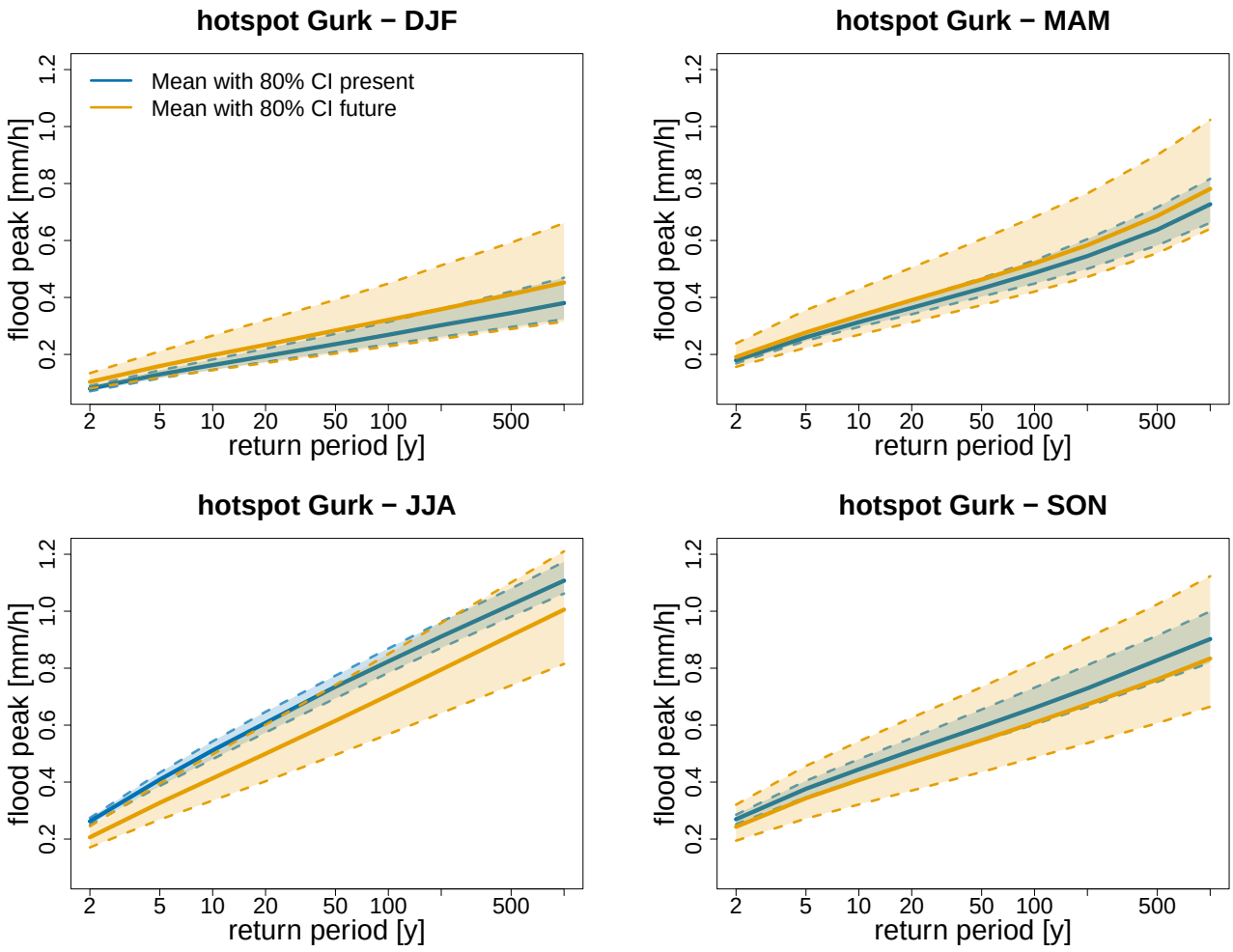

Figure 29. Seasonal flood frequency curves for the present (blue) and future (orange) periods with 80% confidence intervals.

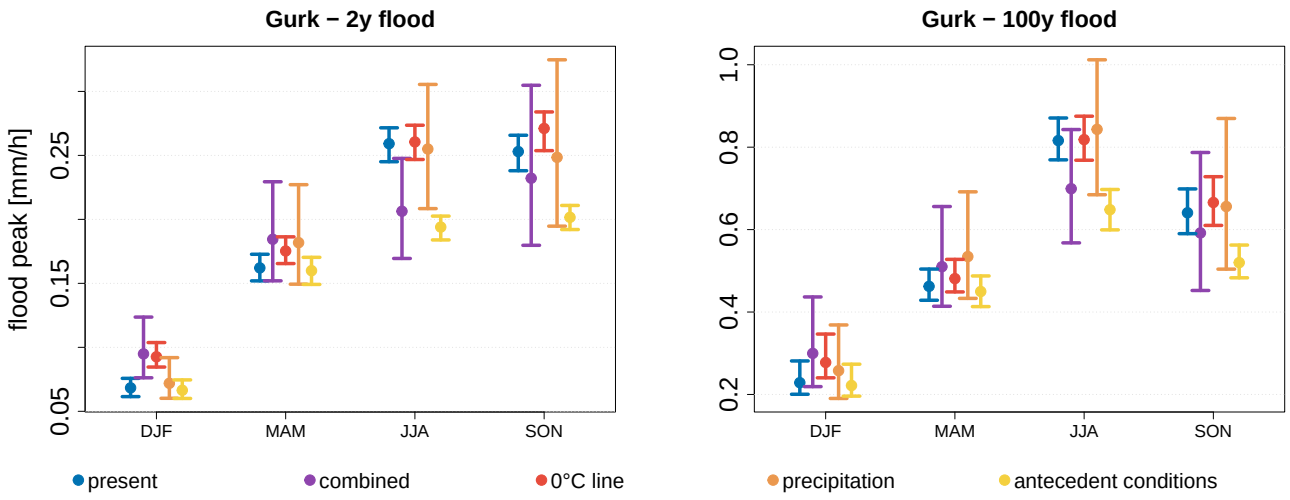

Figure 30. Projected variation of the 2-year (left) and 100-year (right) flood quantile with 80% confidence intervals. Scenarios isolate the contribution of distinct flood-generating mechanisms.