

Supplementary Material

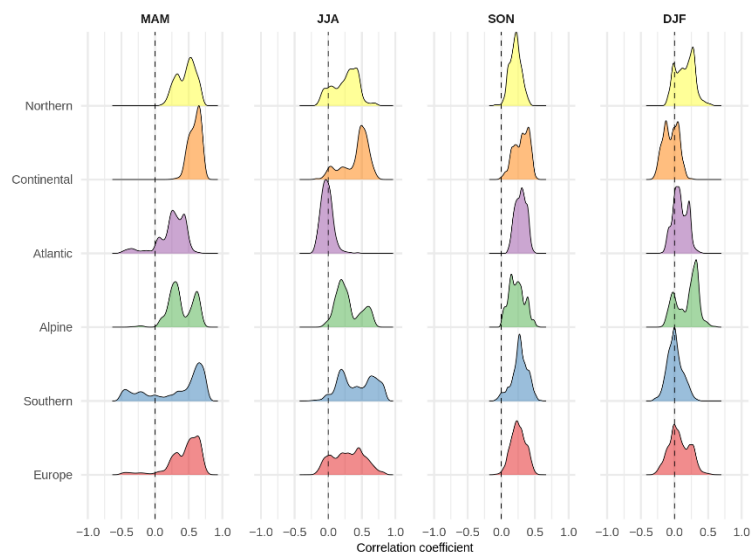


Figure S1. CORR distribution of unadjusted ECMWF SEAS5 ensemble seasonal forecasts of 2-m mean air temperature (one-month lead time) for European sub-regions and whole domain (bottom row). CORR was computed with respect to ERA5 over 1993 – 2016.

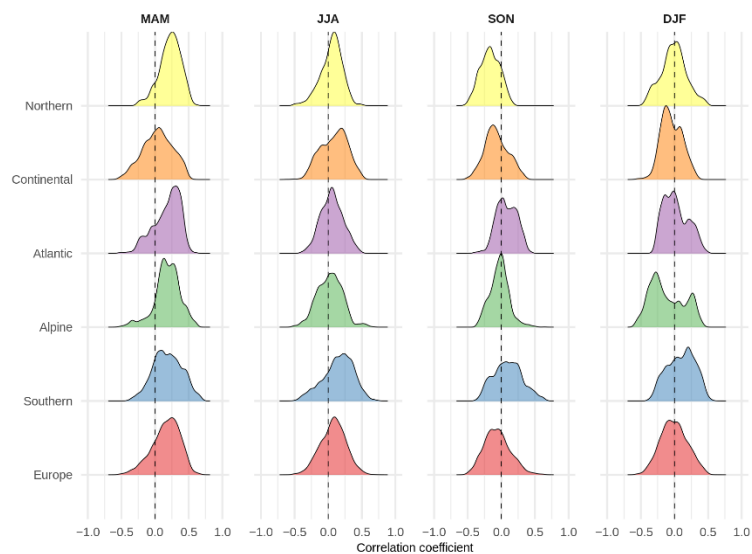


Figure S2. CORR distribution of unadjusted ECMWF SEAS5 ensemble seasonal forecasts of precipitation (one-month lead time) for European sub-regions and whole domain (bottom row). CORR was computed with respect to ERA5 over 1993 – 2016.

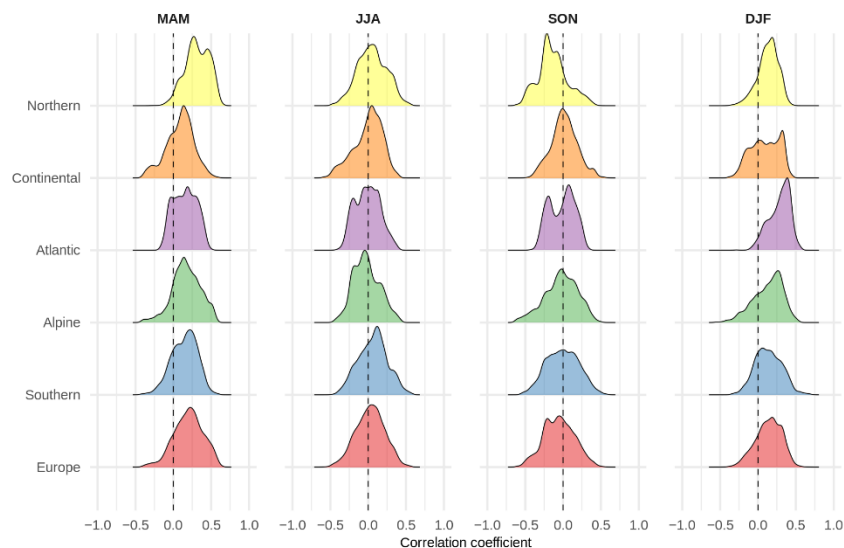


Figure S3. CORR distribution of unadjusted ECMWF SEAS5 ensemble seasonal forecasts of 10-m wind speed (one-month lead time) for European sub-regions and whole domain (bottom row). CORR was computed with respect to ERA5 over 1993 – 2016.

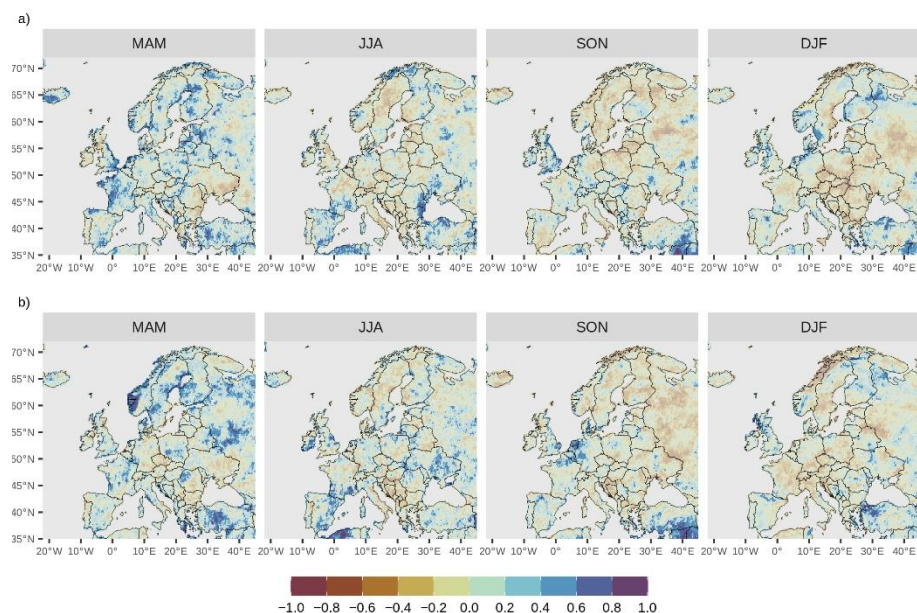


Figure S4. Spatial distribution of ROCSS for a) first and b) third tercile for unadjusted ECMWF SEAS5 ensemble seasonal forecasts of precipitation (one-month lead time) over Europe (land only) with respect to the climatological forecast over 1993 – 2016. Unshaded colors indicate grid cells with significant positive scores.

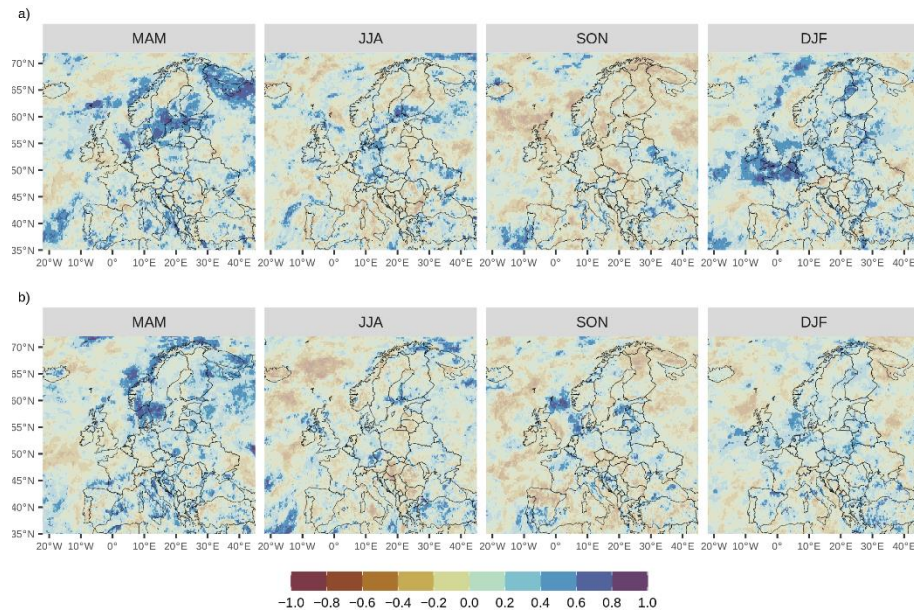


Figure S5. Spatial distribution of ROCSS for a) first and b) third tercile for unadjusted ECMWF SEAS5 ensemble seasonal forecasts of 10-m wind speed (one-month lead time) over Europe with respect to climatological forecast over 1993 – 2016. Unshaded colors indicate grid cells with significant positive scores.

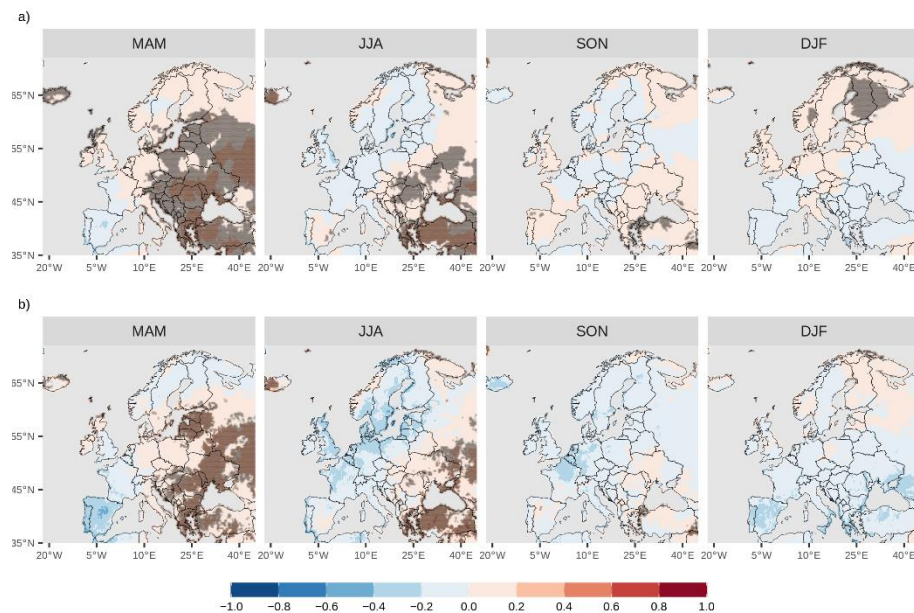


Figure S6. Spatial distribution of a) CRPSS and b) RPSS for calibrated ECMWF SEAS5 ensemble seasonal forecasts of 2-m mean air temperature (one-month lead time) over Europe (land only) with respect to the climatological forecast over 1993 – 2016. Points indicate grid cells with significant positive scores.

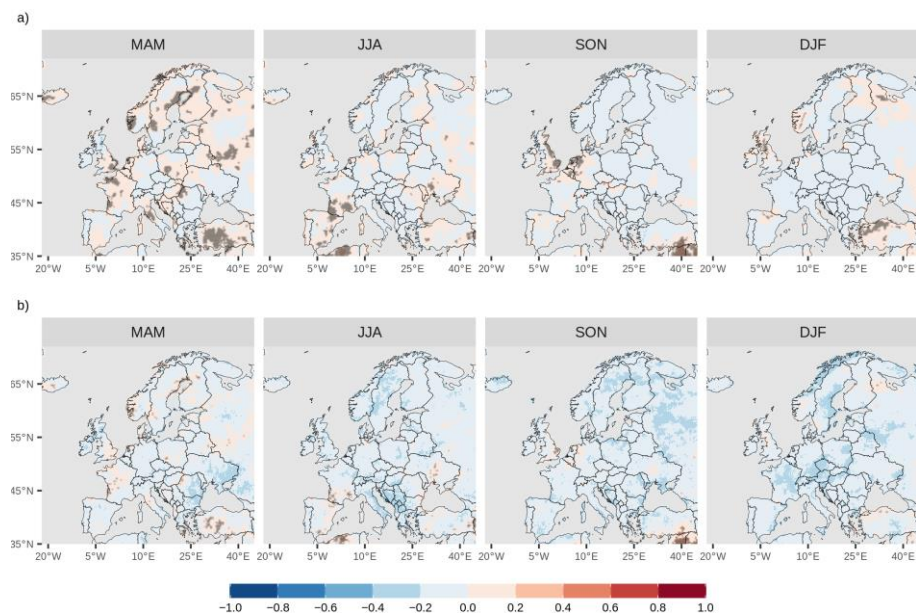


Figure S7. Spatial distribution of a) CRPSS and b) RPSS for calibrated ECMWF SEAS5 ensemble seasonal forecasts of precipitation (one-month lead time) over Europe (land only) with respect to the climatological forecast over 1993 – 2016. Points indicate grid cells with significant positive scores.

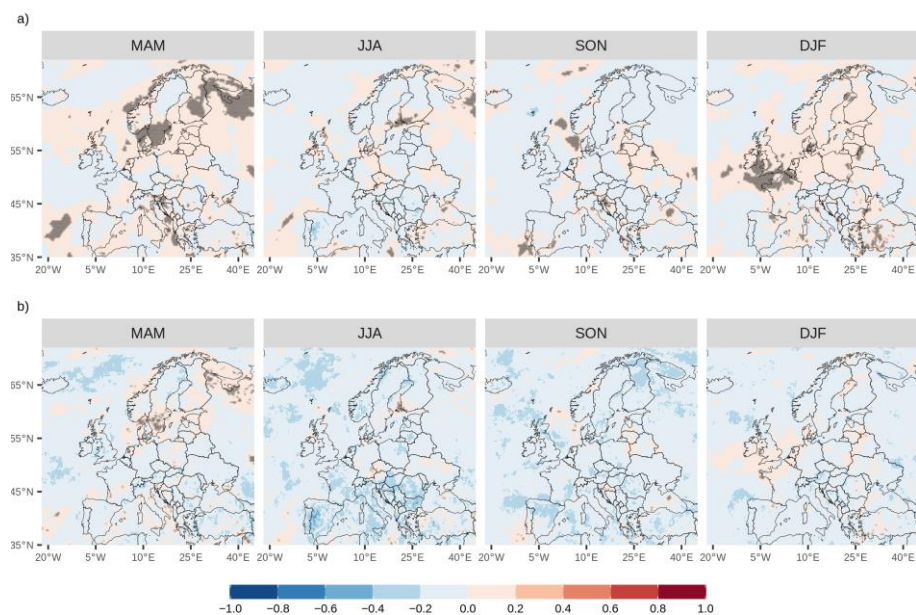


Figure S8. Spatial distribution of a) CRPSS and b) RPSS for calibrated ECMWF SEAS5 ensemble seasonal forecasts of 10-m wind speed (one-month lead time) over Europe with respect to climatological forecast over 1993 – 2016. Points indicate grid cells with significant positive scores.

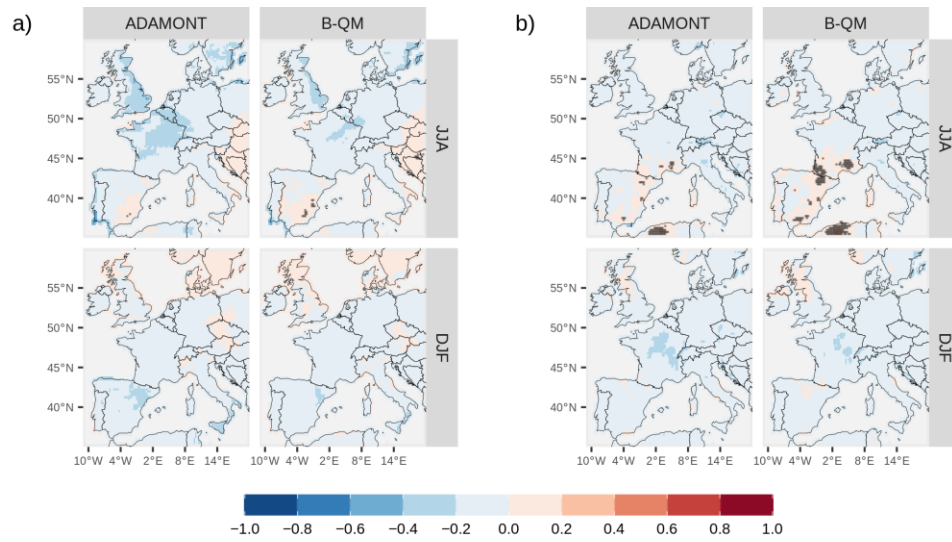


Figure S9. Spatial distribution of CRPSS for a) mean air temperature and b) precipitation in JJA and DJF for calibrated seasonal forecasts (one-month lead time) by ADAMONT and B-QM over 1993 – 2016 compared to the climatological forecast. Points indicate grid cells with significant positive scores.