Supplementary Material
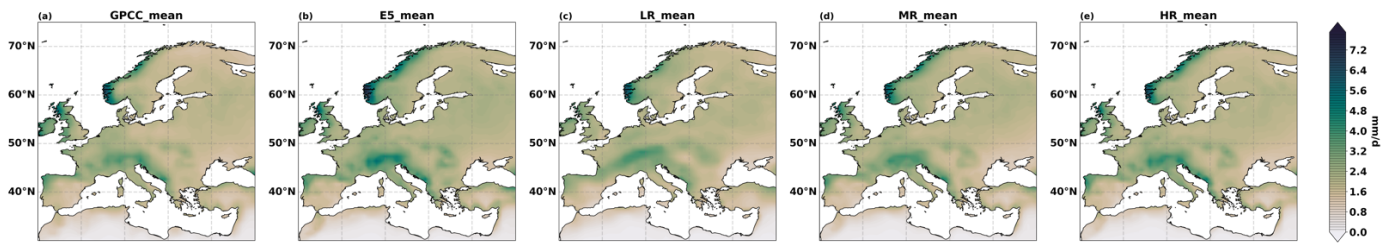
Fig. S1 Annual mean precipitation over Europe during 1982-2019 from (a) GPCC, (b) ERA5, (c) LR, (d) MR, (e) HR. Unit is mm/d.
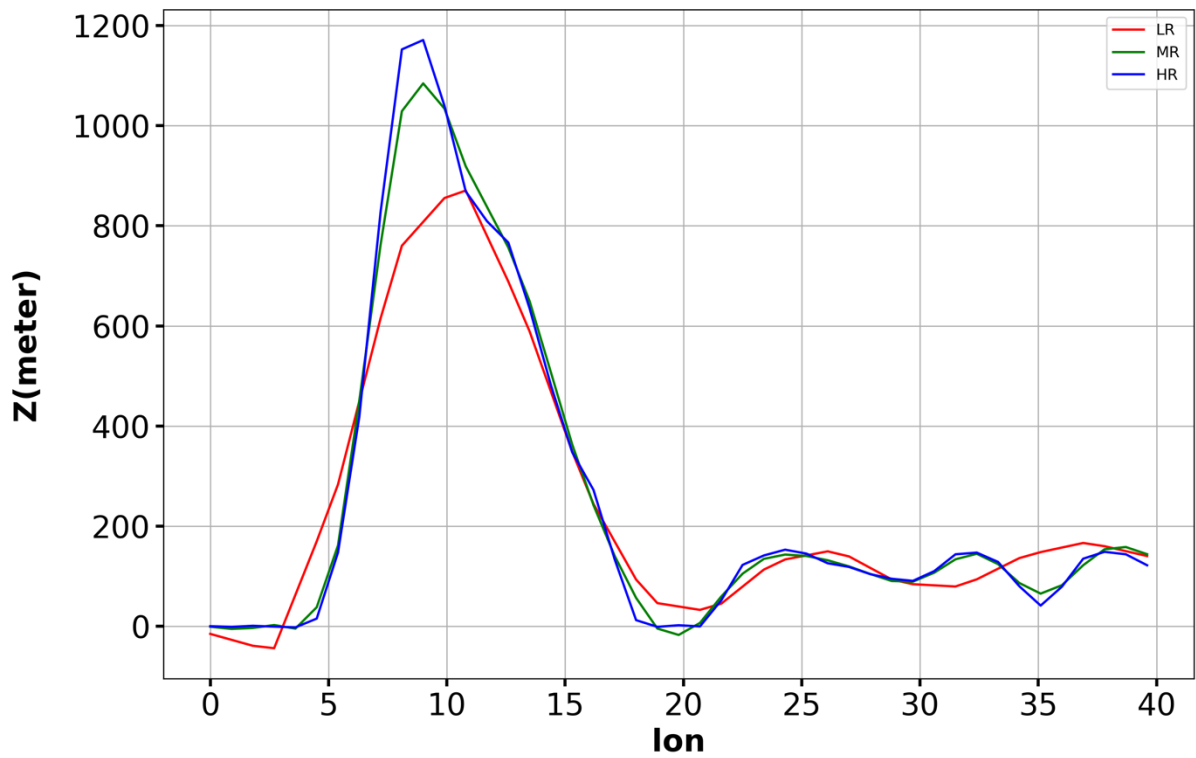
Fig. S2 The surface height (0 – 40° E, 62° N) in OpenIFS LR (red), MR (green) and HR (blue). Unit is meter.

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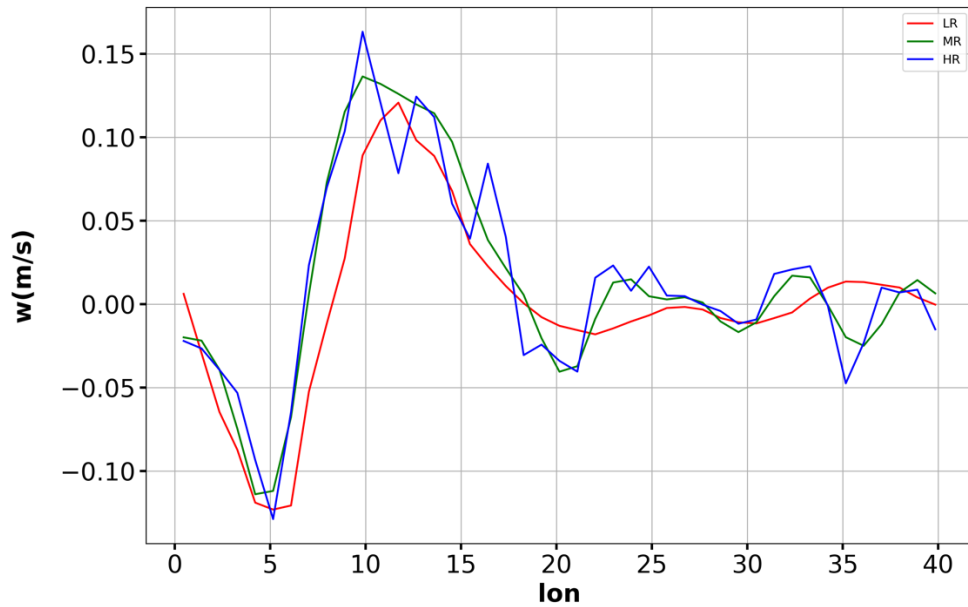
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27 Fig. S3 The annual mean vertical velocity (0 – 40° E, 62° N) at 850 hPa in OpenIFS LR (red),

28 MR (green) and HR (blue). Unit is m/s.

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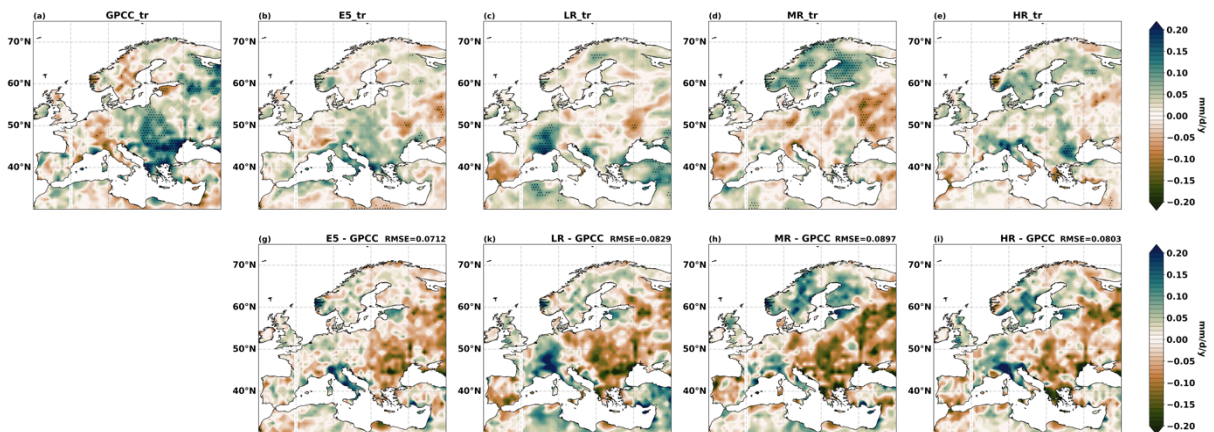
34 Fig. S4 The linear trends of annual 99th percentile precipitation over Europe during 1982-2019

35 from (a) GPCC observations, (b) ERA5 reanalysis, (c) LR, (d) MR, (e) HR, and the

36 corresponding biases and RMSEs in (f) ERA5, (g) LR, (h) MR, (i) HR. The shadings are trends

37 at 95 % significance levels.

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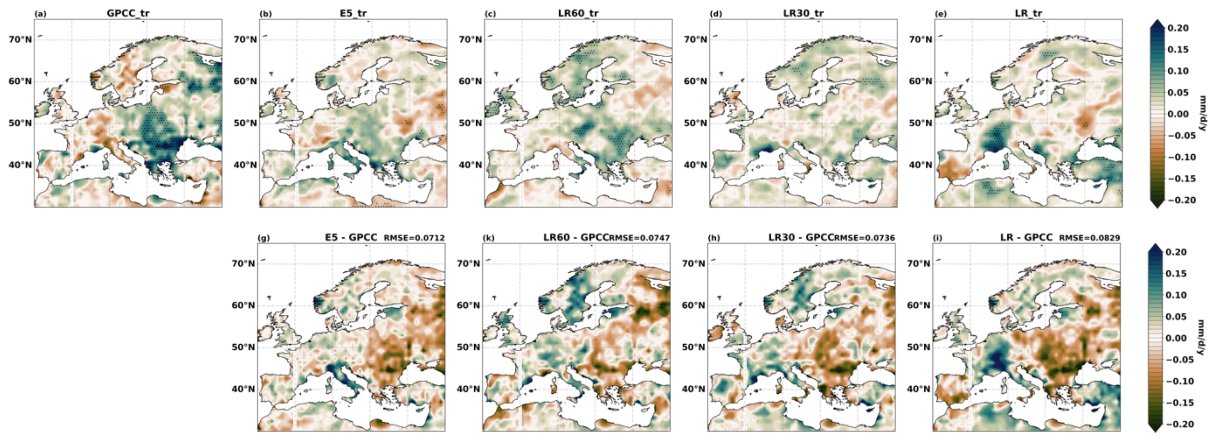
42 Fig. S5 The linear trends of annual 99th percentile precipitation over Europe during 1982-2019

43 from (a) GPCC observations, (b) ERA5 reanalysis, (c) LR60m, (d) LR30m, (e) LR, and the

44 corresponding biases and RMSEs in (f) ERA5, (g) LR60m, (h) LR30m, (i) LR. The shadings

45 are trends at 95 % significance levels.

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