

Which reanalysis dataset should we use for renewable energy analysis in Ireland?

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S1 Spatial Distribution

Figures S1, S2 and S3 shows the mean temperature, wind speed and shortwave radiation (SW) aggregated from the data used in this study (1982-2007) for each reanalysis and for the observation stations.

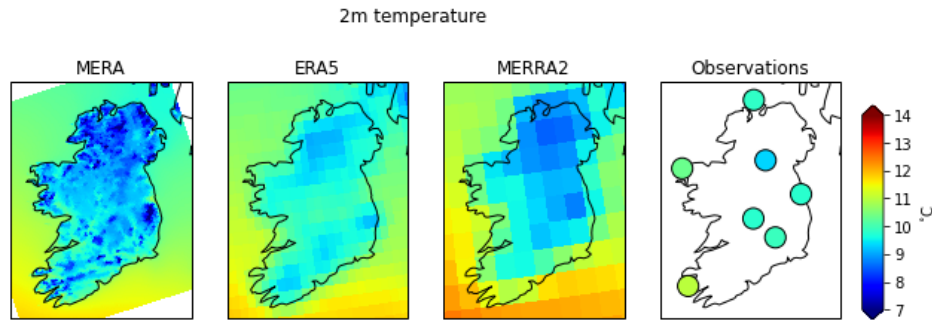


Figure S1: The spatial distribution of 2m temperature for each reanalysis and the weather observation stations.

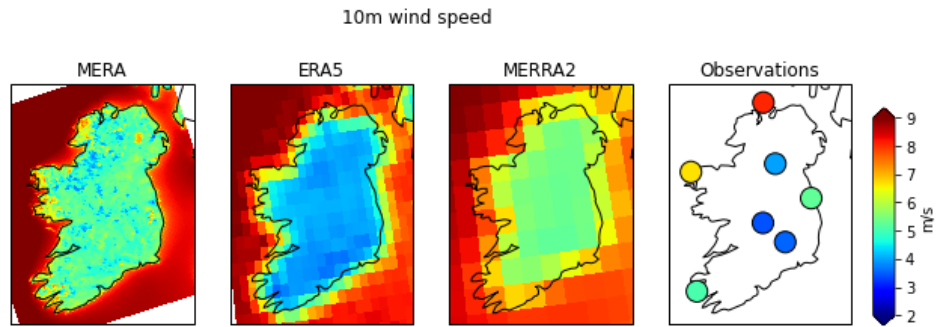


Figure S2: The spatial distribution of 10m wind speed for each reanalysis and the weather observation stations.

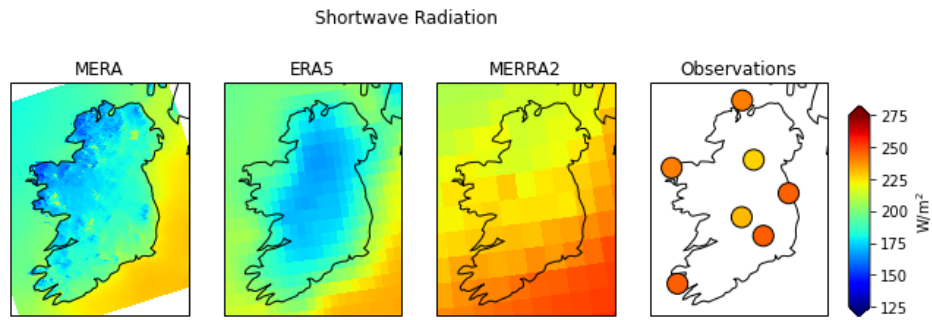


Figure S3: The spatial distribution of summer (JJA) shortwave radiation for each reanalysis and the weather observation stations.

S2 Diurnal variability

S2.1 Temperature

Figures S4 to S9 show the diurnal 2m temperature mean error at all stations, similar to Figure 3 in the main text.

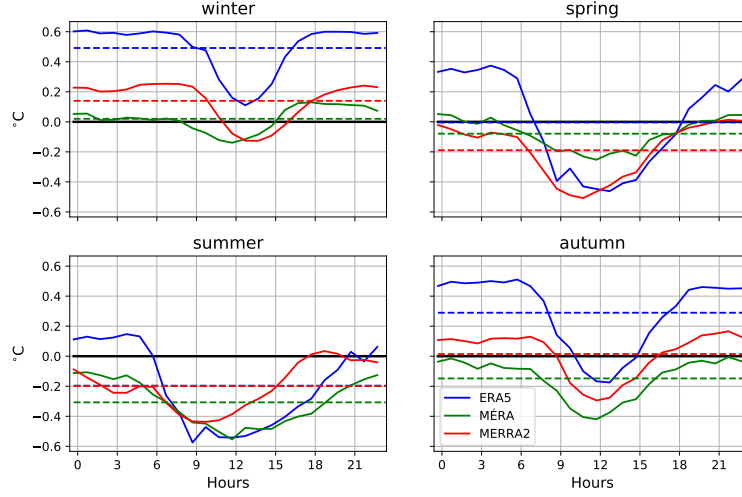


Figure S4: Diurnal mean error (ME) for 2m temperature at the Malin Head in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MERA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

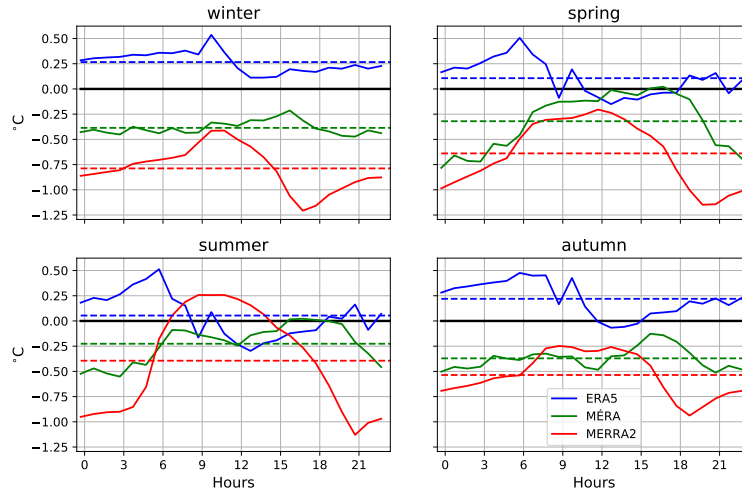


Figure S5: Diurnal mean error (ME) for 2m temperature at the Clones in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MERA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

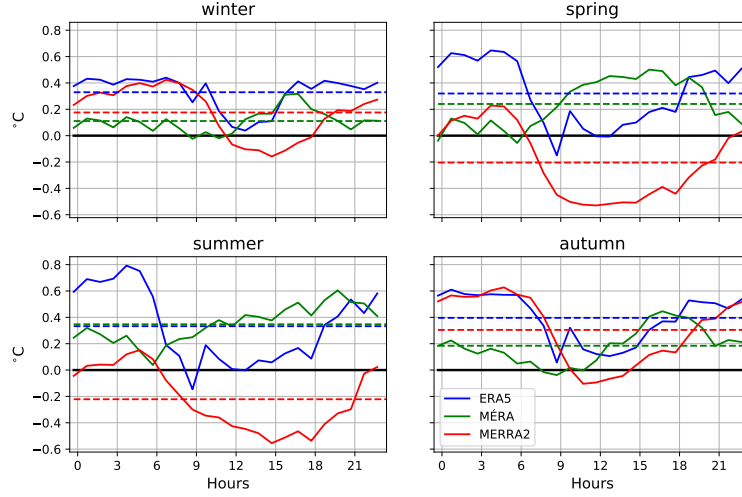


Figure S6: Diurnal mean error (ME) for 2m temperature at the Dublin Airport in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MERA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

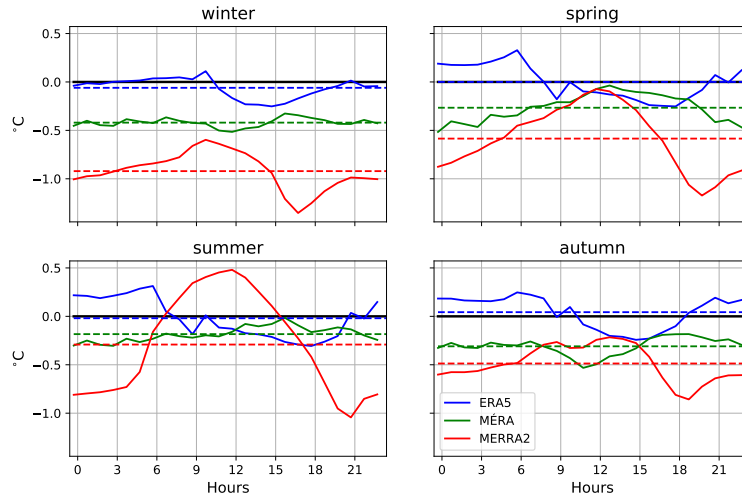


Figure S7: Diurnal mean error (ME) for 2m temperature at the Birr in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MERA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

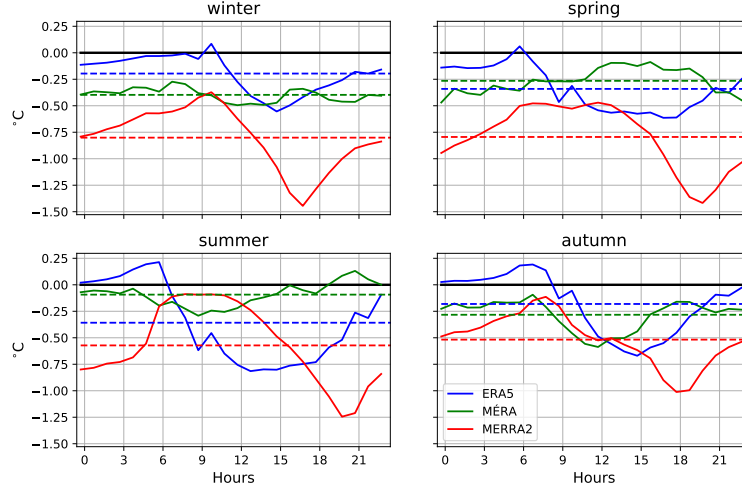


Figure S8: Diurnal mean error (ME) for 2m temperature at the Kilkenny in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MERA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

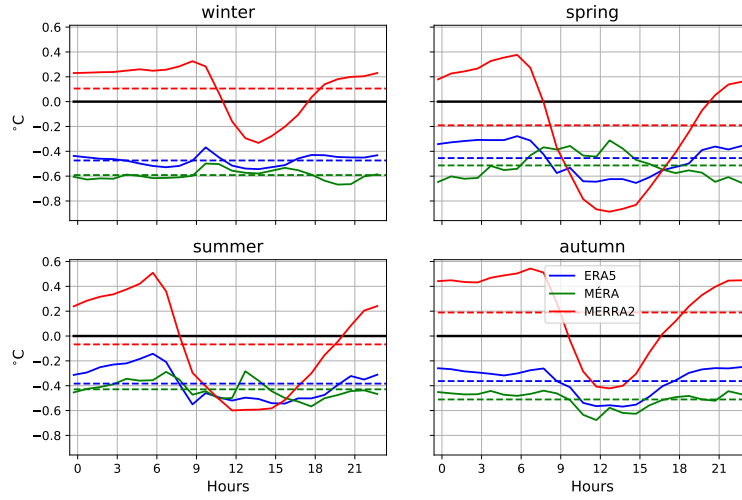


Figure S9: Diurnal mean error (ME) for 2m temperature at the Valentia Observatory in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MERA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

S2.2 Wind Speed

Figures S10 to S15 show the diurnal mean 10m wind speed at all stations, similar to Figure 5 in the main text.

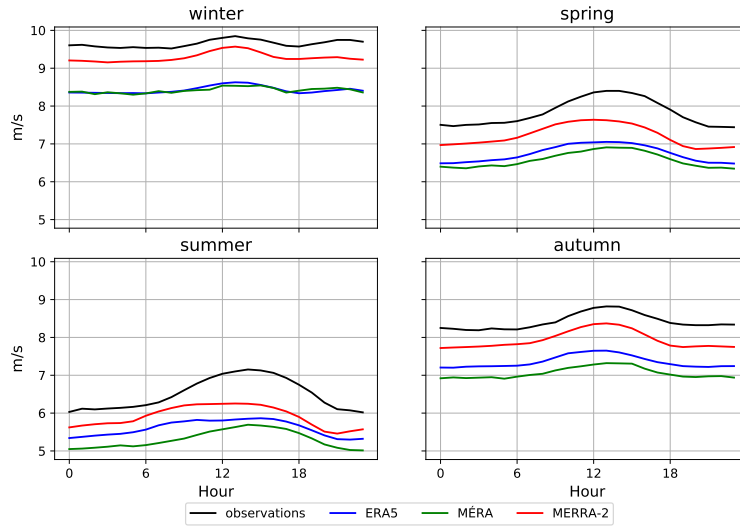


Figure S10: Diurnal mean 10m wind speed at the Malin Head in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

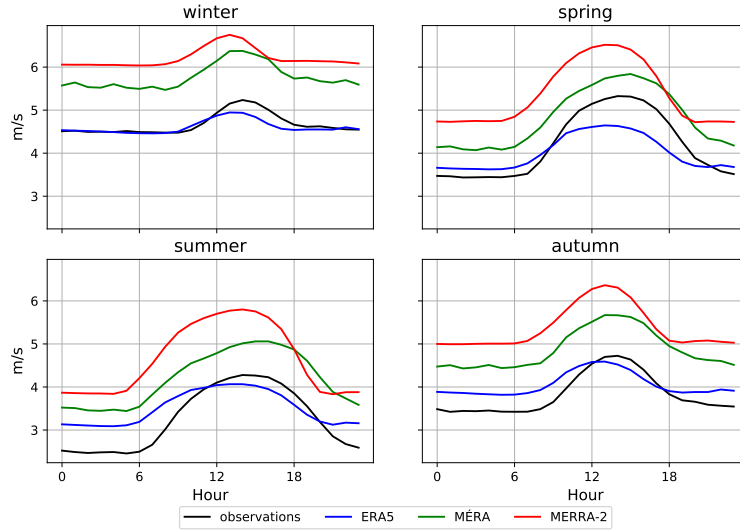


Figure S11: Diurnal mean 10m wind speed at the Clones in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

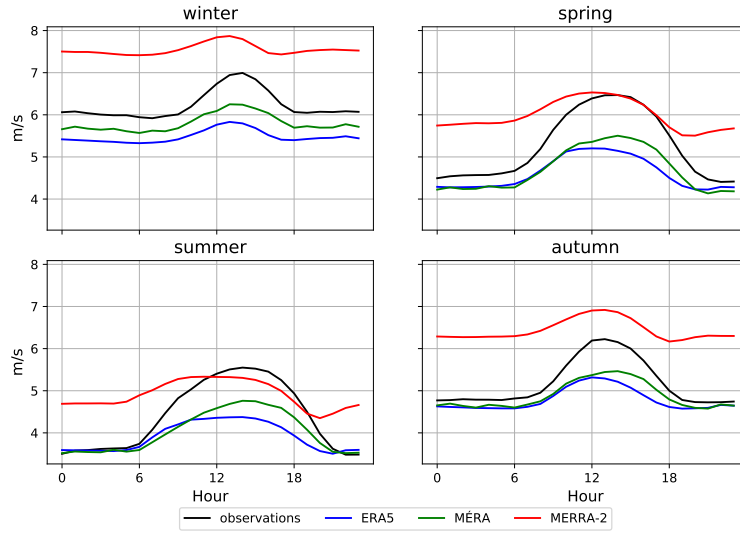


Figure S12: Diurnal mean 10m wind speed at the Dublin Airport in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

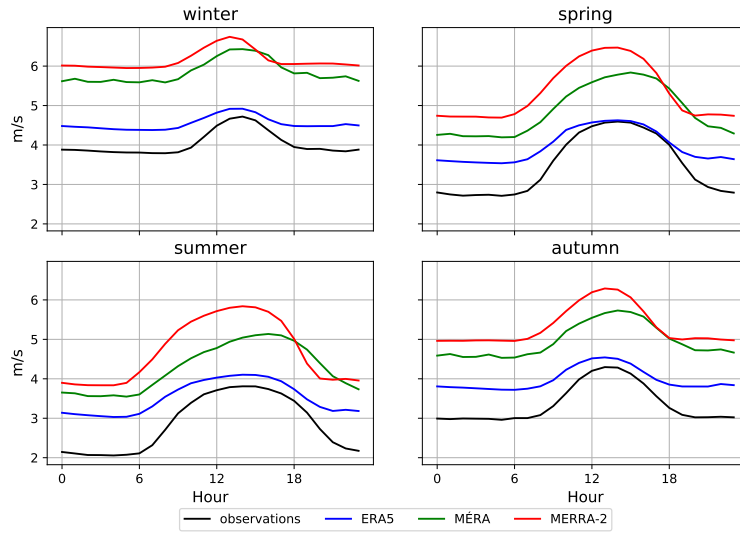


Figure S13: Diurnal mean 10m wind speed at the Birr in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

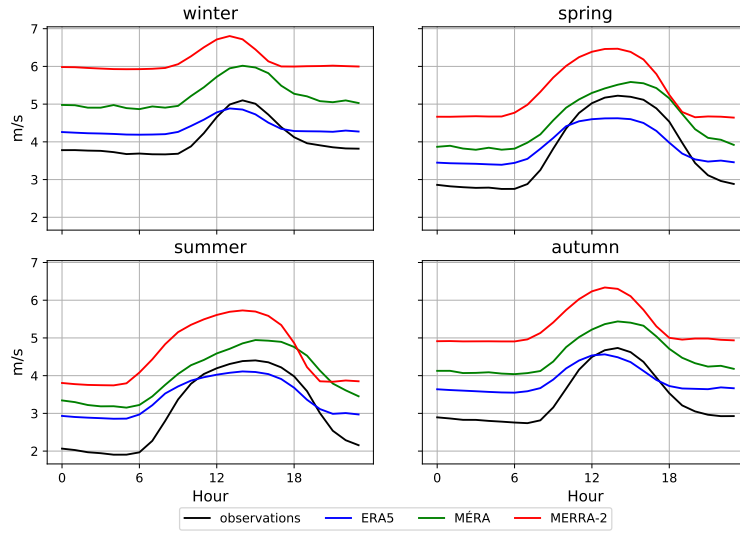


Figure S14: Diurnal mean 10m wind speed at the Kilkenny in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

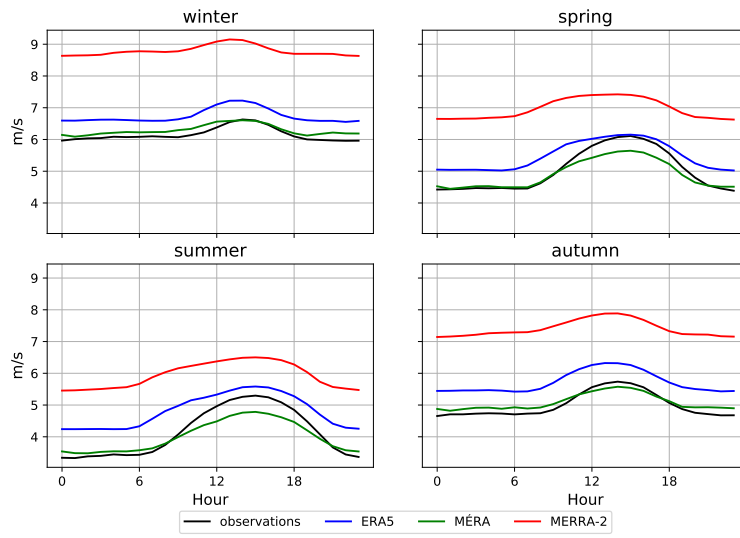


Figure S15: Diurnal mean 10m wind speed at the Valentia Observatory in winter (DJF), spring (MAM), summer (JJA) and autumn (SON) for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed lines represent the overall average seasonal ME.

S2.3 Shortwave Radiation

Figures S16 to S20 show the diurnal SW mean error at all stations, similar to Figure 8 in the main text.

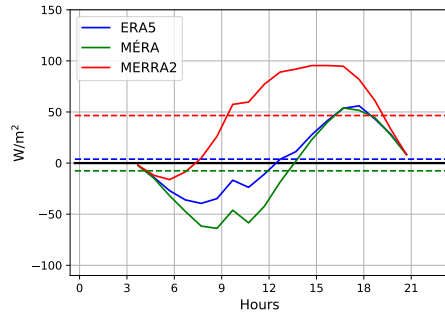


Figure S16: Diurnal mean SW error (ME) in summer (JJA) at Malin Head, for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed line represents the overall average seasonal ME.

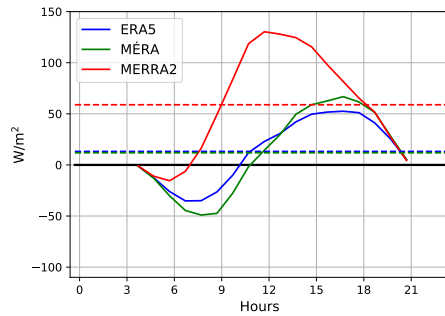


Figure S17: Diurnal mean SW error (ME) in summer (JJA) at Dublin Airport, for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed line represents the overall average seasonal ME.

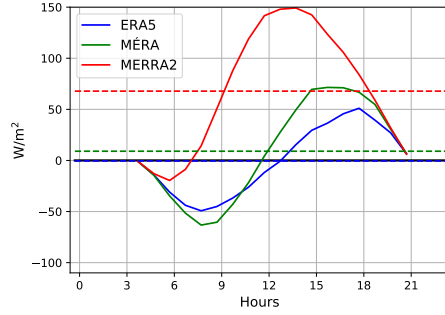


Figure S18: Diurnal mean SW error (ME) in summer (JJA) at Birr, for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed line represents the overall average seasonal ME.

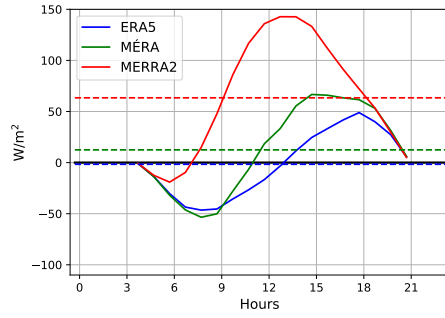


Figure S19: Diurnal mean SW error (ME) in summer (JJA) at Kilkenny, for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed line represents the overall average seasonal ME.

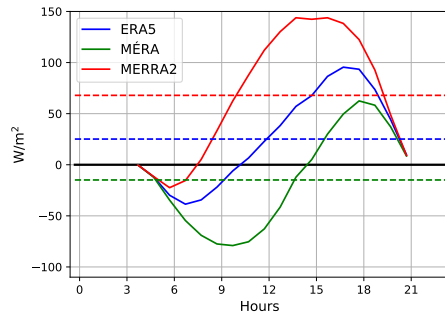


Figure S20: Diurnal mean SW error (ME) in summer (JJA) at Valentia Observatory, for ERA5 (blue), MÉRA (green) and MERRA-2 (red). The horizontal dashed line represents the overall average seasonal ME.