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Contrasting responses of vegetation productivity to intraseasonal rainfall in Earth system models

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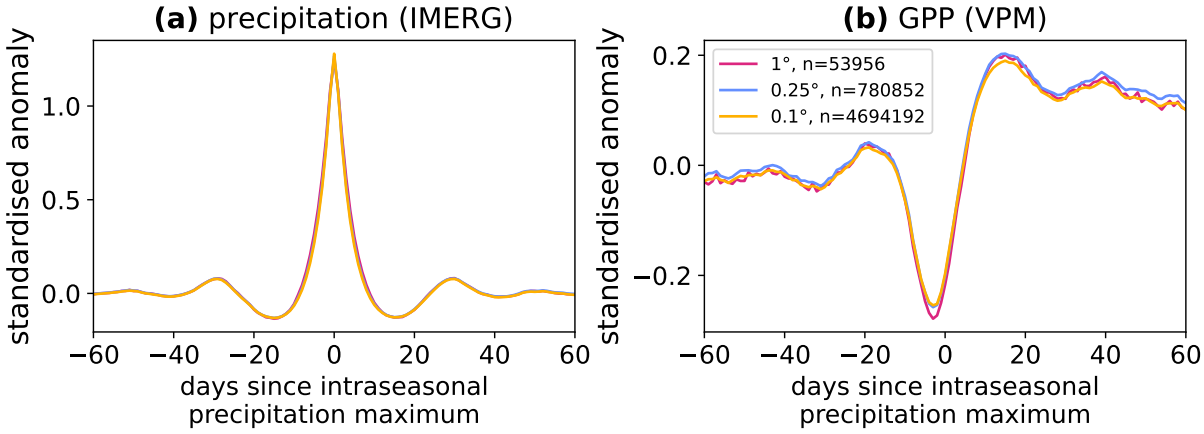

Figure S1: Response of VPM GPP to intraseasonal wet events at varying spatial resolutions, composited over 60°S–60°N. The legend in (b) shows the spatial resolution of data used and n, the maximum number of GPP observations being composited on any particular day around the intraseasonal maximum.

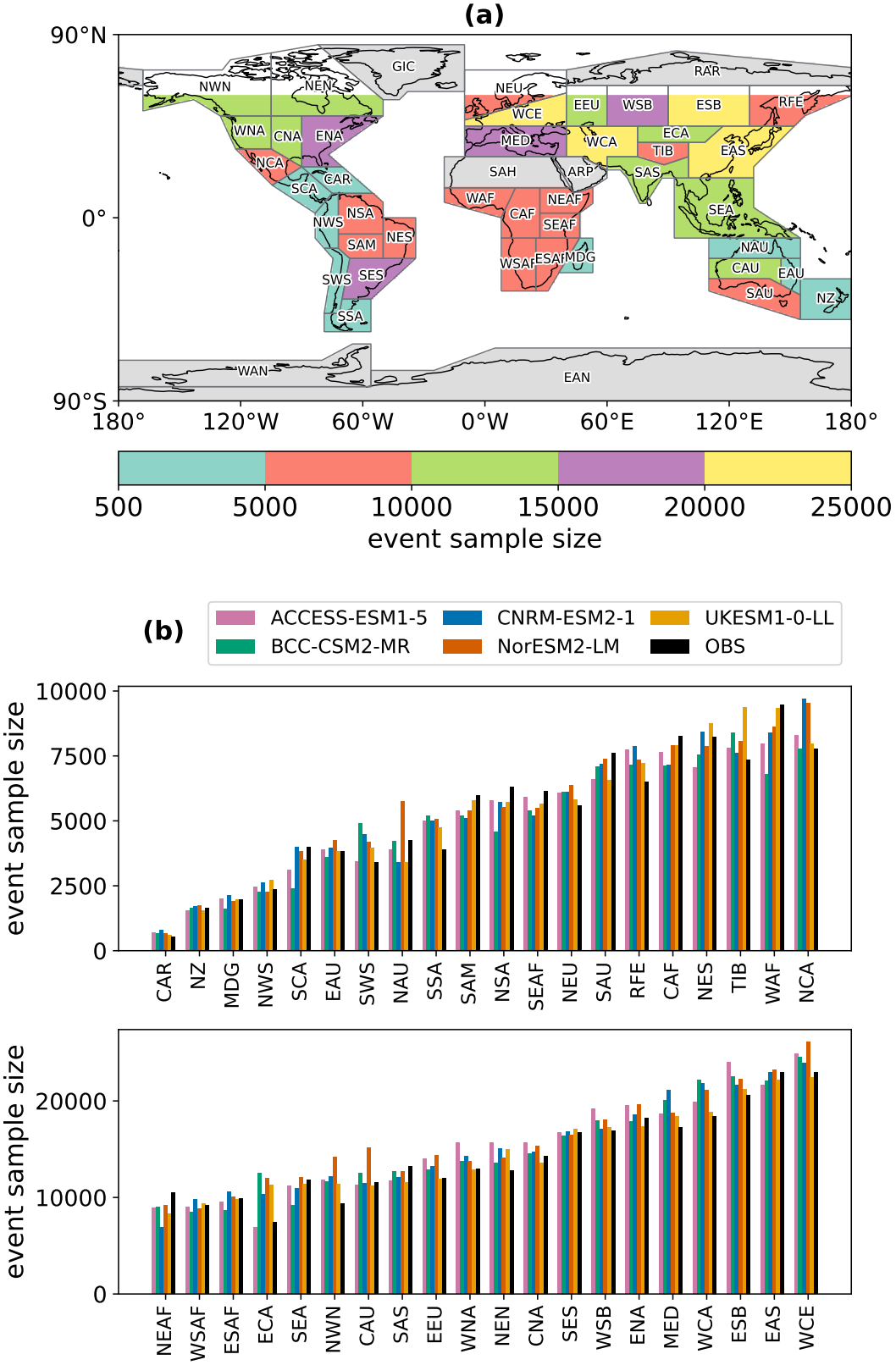

Figure S2: Sample size of intraseasonal precipitation events in each IPCC AR6 region (Iturbide et al., 2020). (a) Mean number of events in each region across all 5 models and observations. Regions that are excluded from the analysis entirely are marked in grey. Note that in regions crossing the 60°N latitude line, only events south of 60°N are included. (b) Comparison of event sample sizes between models and observations for each region. The regions are in ascending order according to the mean number of events as shown in (a). Note the change of y-axis scale between the two panels.

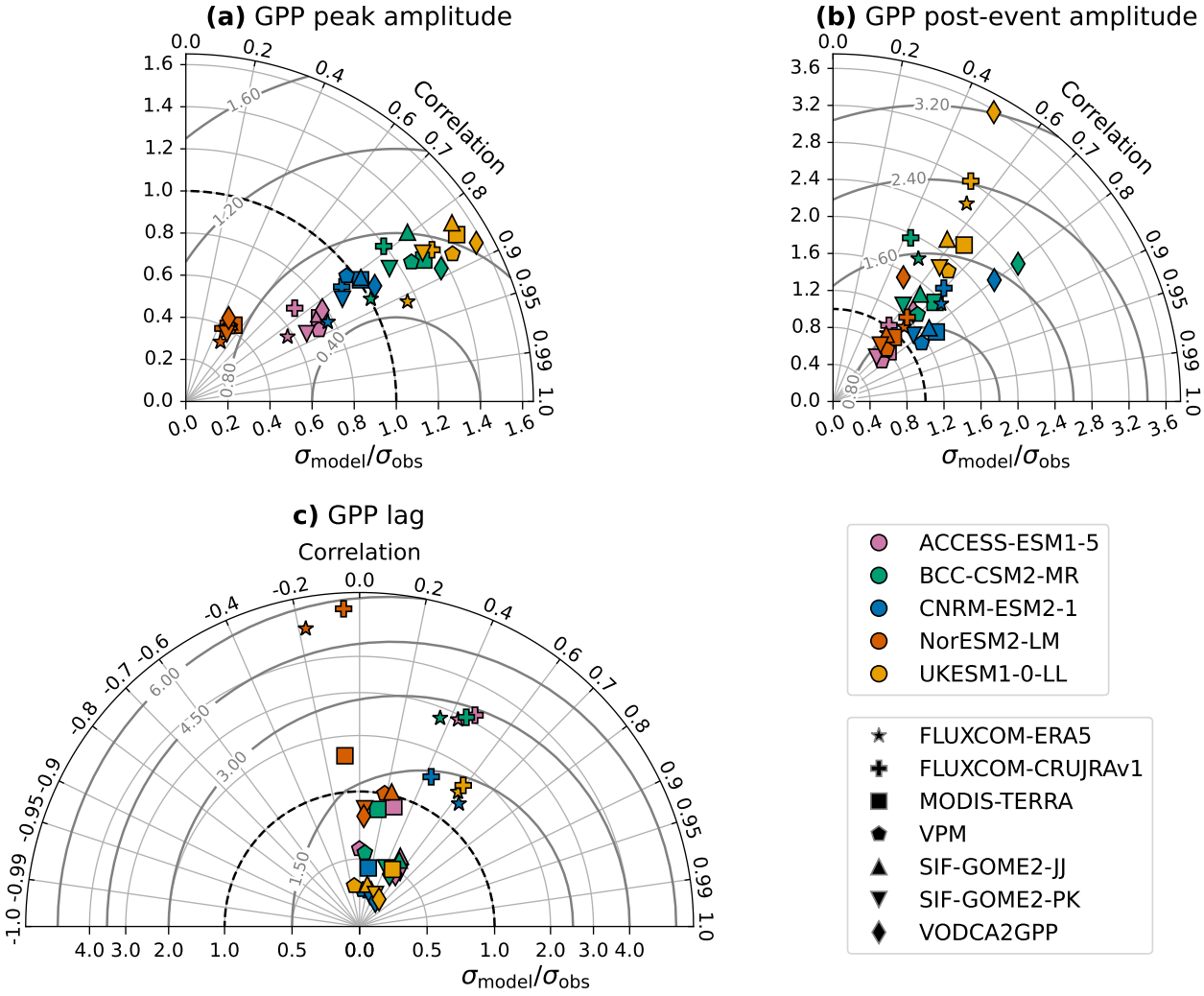

Figure S3: Taylor diagrams of regional relationships between modelled and observed GPP responses to intraseasonal wet events, as in Figure 3 of main paper but using GLEAM surface soil moisture to scale peak and post-event amplitudes (whereas Figure 3 uses ESA CCI).

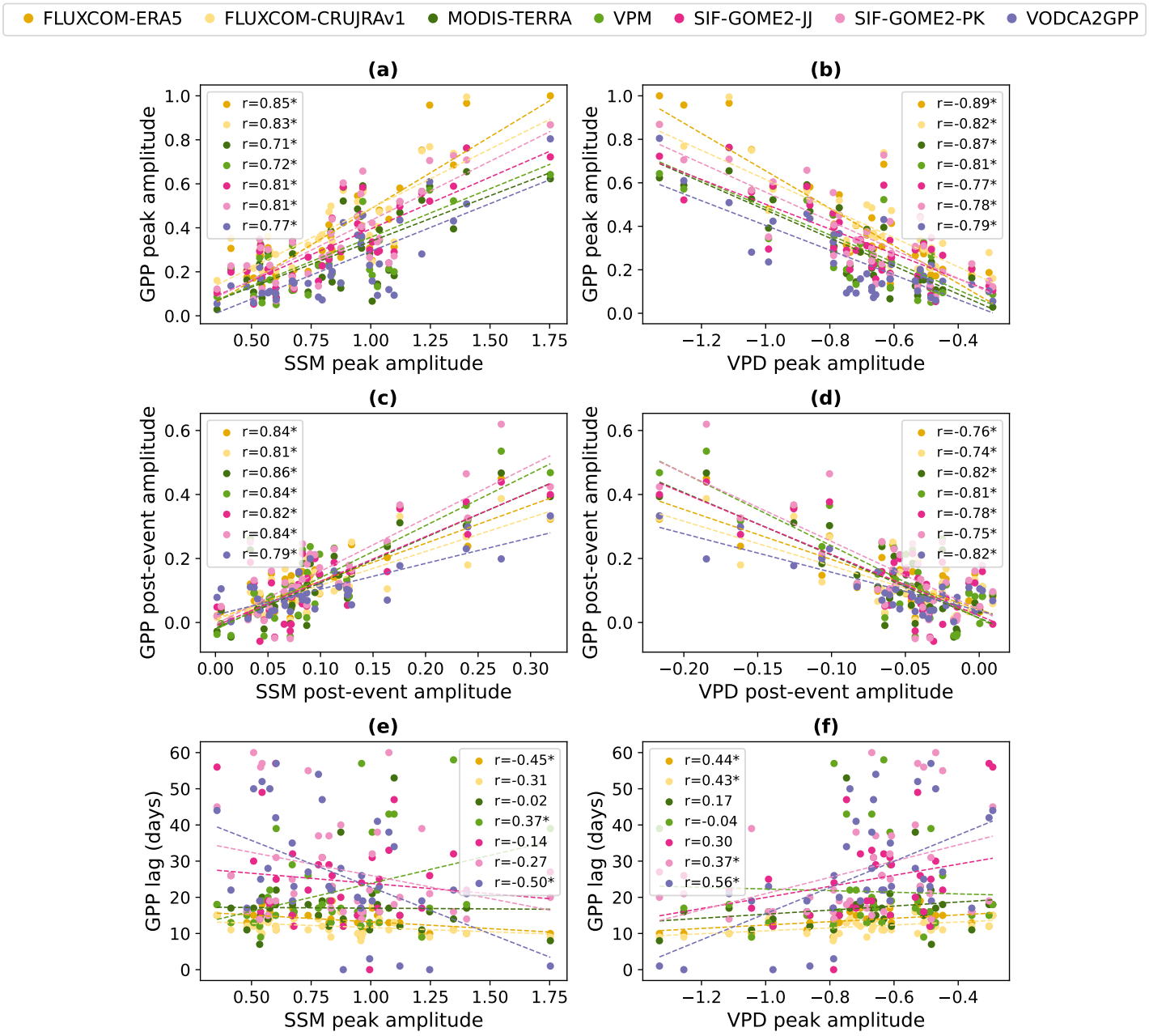

Figure S4: Regional GPP responses to intraseasonal wet events compared to the driving perturbations in surface soil moisture (SSM: a, c, e) and vapour pressure deficit (VPD: b, d, f), using GPP observation-based products. As in Figure 4, each scatter point represents an IPCC AR6 region and dashed lines show linear best fits. The legend for each panel indicates the linear correlation coefficient between the driving perturbation and the GPP response for each product. Asterisks after correlation coefficients denote significance at the 95% level. Surface soil moisture data is taken from ESA CCI and VPD data from ERA5.

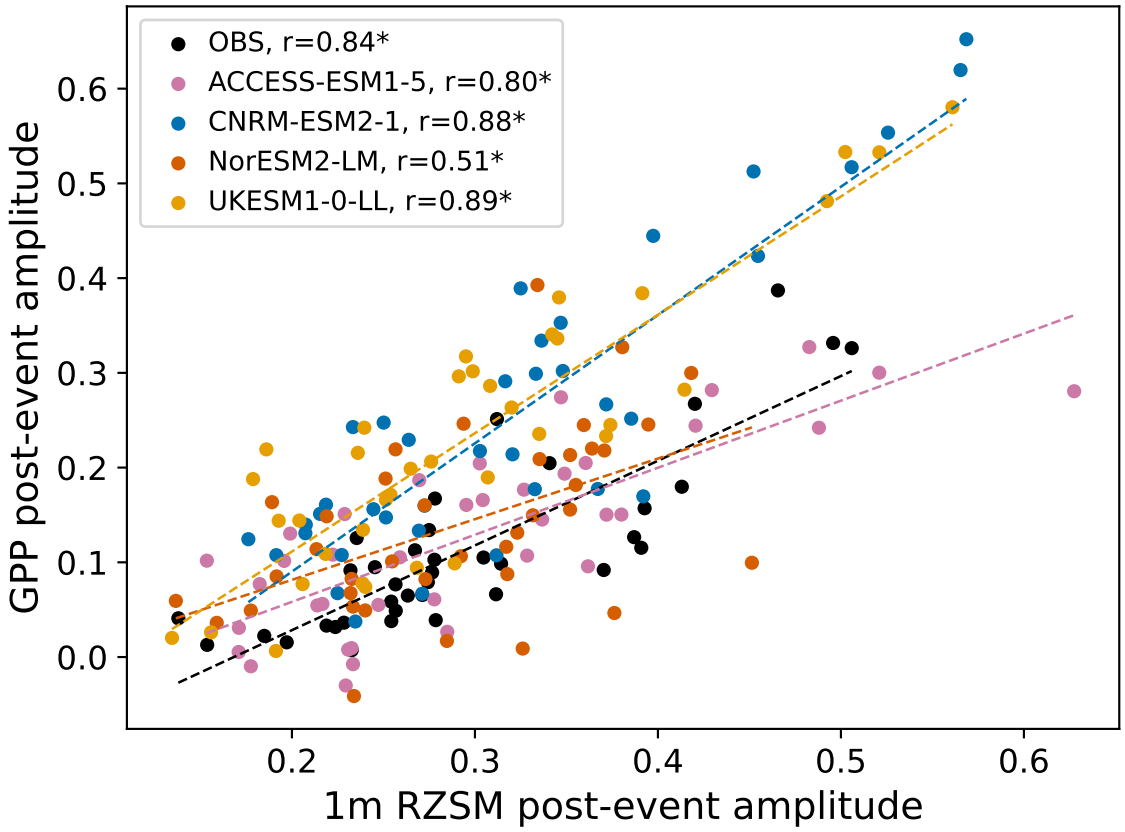

Figure S5: Regional post-event amplitudes in GPP response to intraseasonal wet events compared to the driving post-event perturbations in 1m root-zone soil moisture (RZSM). The observational products (OBS) are FLUXCOM-CRUJRAv1 GPP and GLEAM root-zone soil moisture [note that the root-zone depth of this product is 1m only in areas with "low vegetation" (Martens et al., 2017)].

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