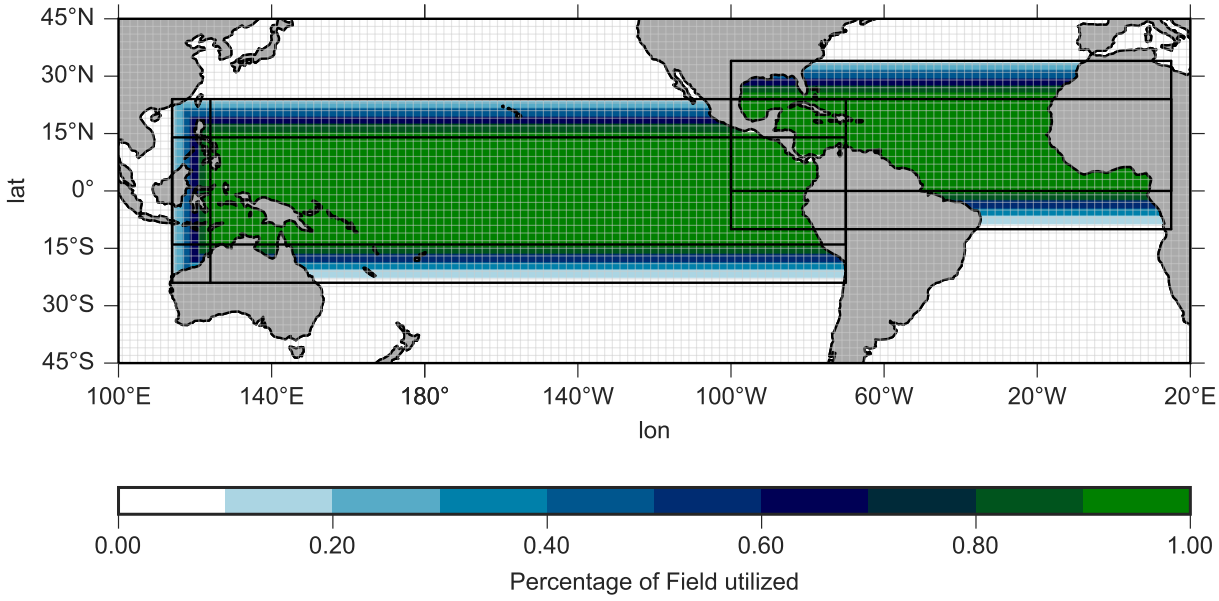

FIG. S1. Forcing area for the Pacific and Atlantic, in percentage of the regression field.

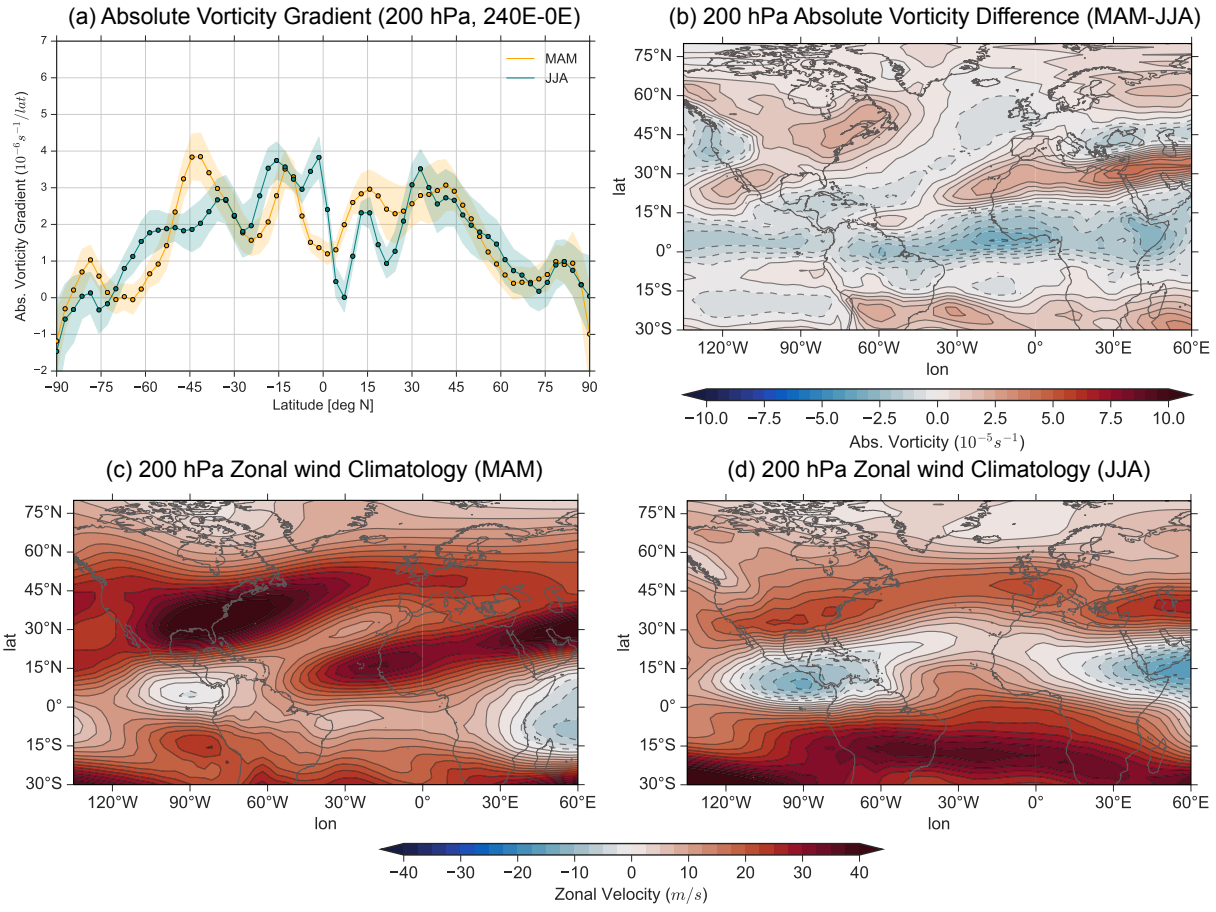

FIG. S2. Vorticity analysis for the ISCA climatological run between boreal spring and boreal summer. (a) shows the absolute vorticity gradient between 90°N/S and averaged between 240-0°. (b) shows the difference in 200 hPa absolute vorticity between MAM and JJA (MAM minus JJA), while (c-d) shows the 200 hPa zonal wind climatology for MAM and JJA, respectively.

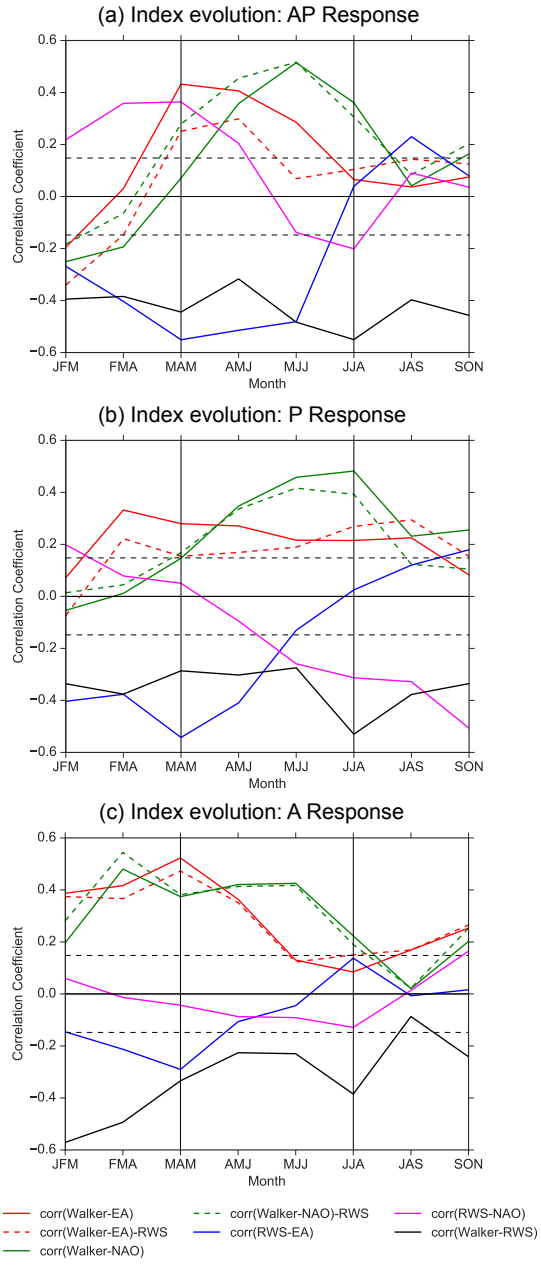

FIG. S3. 0 lead/lag correlation of major indices with different forcing areas. Correlation uses results from the forced model runs, including AP (a), P (b), and A (c) responses. Bivariant correlations include the Walker index vs. East Atlantic index (solid red), Walker index vs. NAO index (solid green), RWS index vs. East Atlantic index (solid blue), and Walker index vs. RWS index. We also utilized a partial correlation to remove the RWS influence from the Walker index vs. East Atlantic (dashed red), and Walker index vs. NAO (dashed green) relationships. Horizontal black dashed lines represent the 95% confidence level using a 2-tailed test.

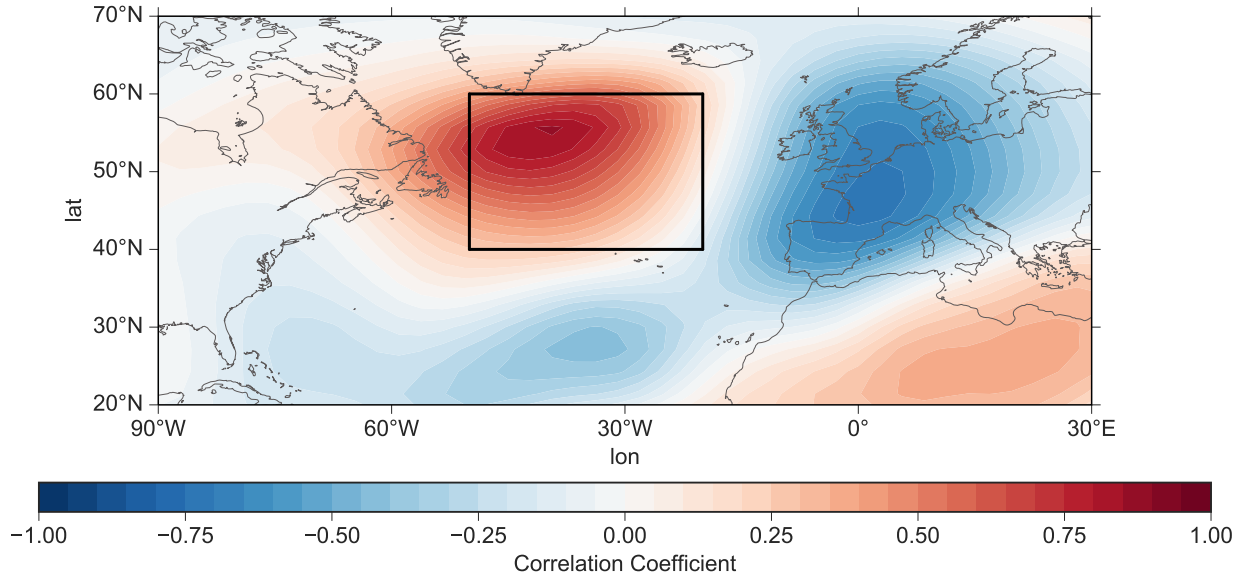

FIG. S4. EOF analysis of the second EOF for JJA 500 hPa geopotential height for the ISCA Climatological run. Black box represents the area average location for the East Atlantic pattern, and all time periods are used.

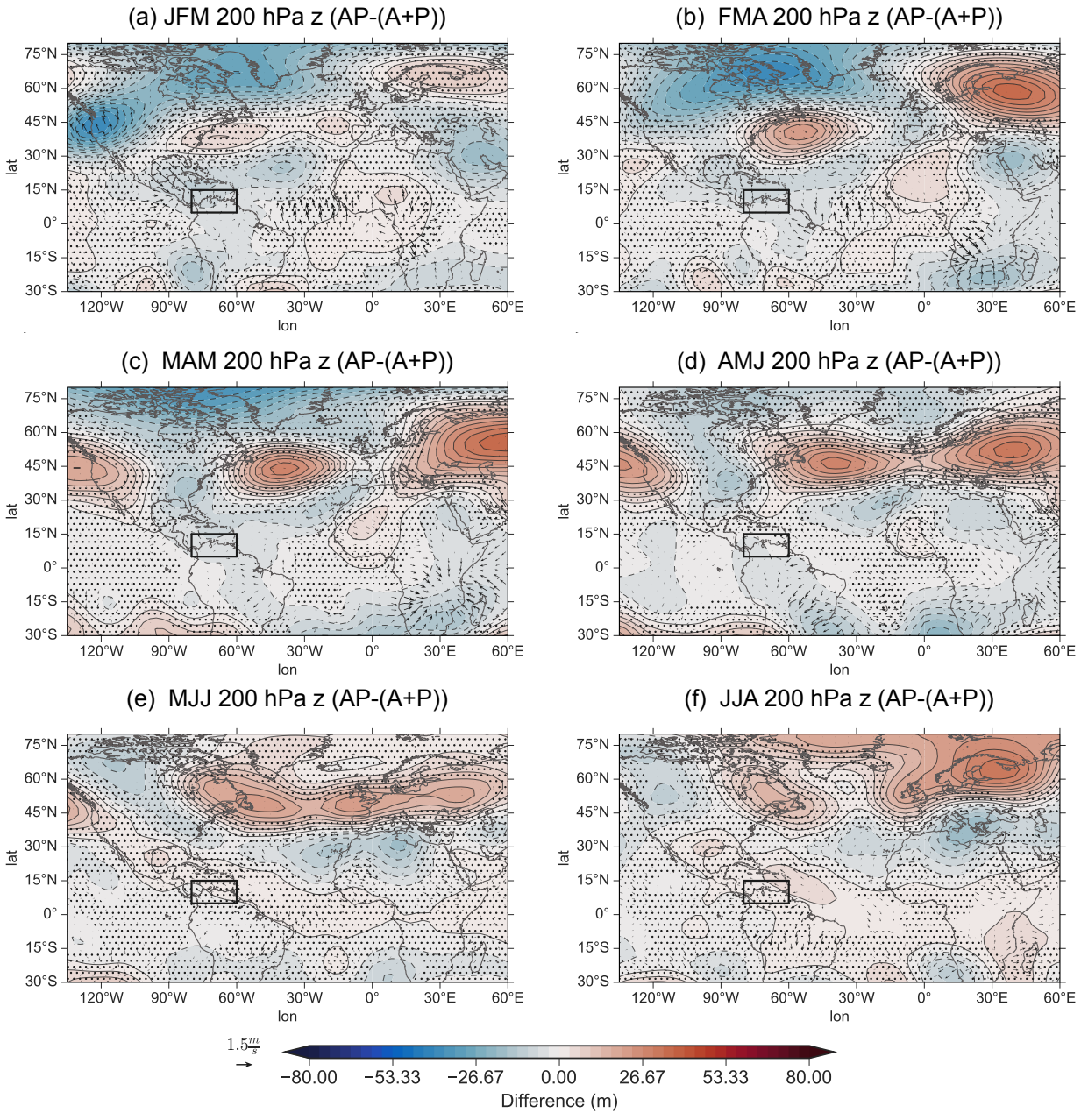

FIG. S5. JFM to JJA 200 hPa geopotential height and 200 hPa irrotational winds (vectors) difference between the linearly forced response (A+P) and the combined response (AP). Stippling in represents differences that are not statistically significantly different between the AP response and the linear combination of the Atlantic and Pacific (A+P), at the 95% level using a two-tailed Monte Carlo test. The rectangular boxes represents the Caribbean RWS index.