Supplementary

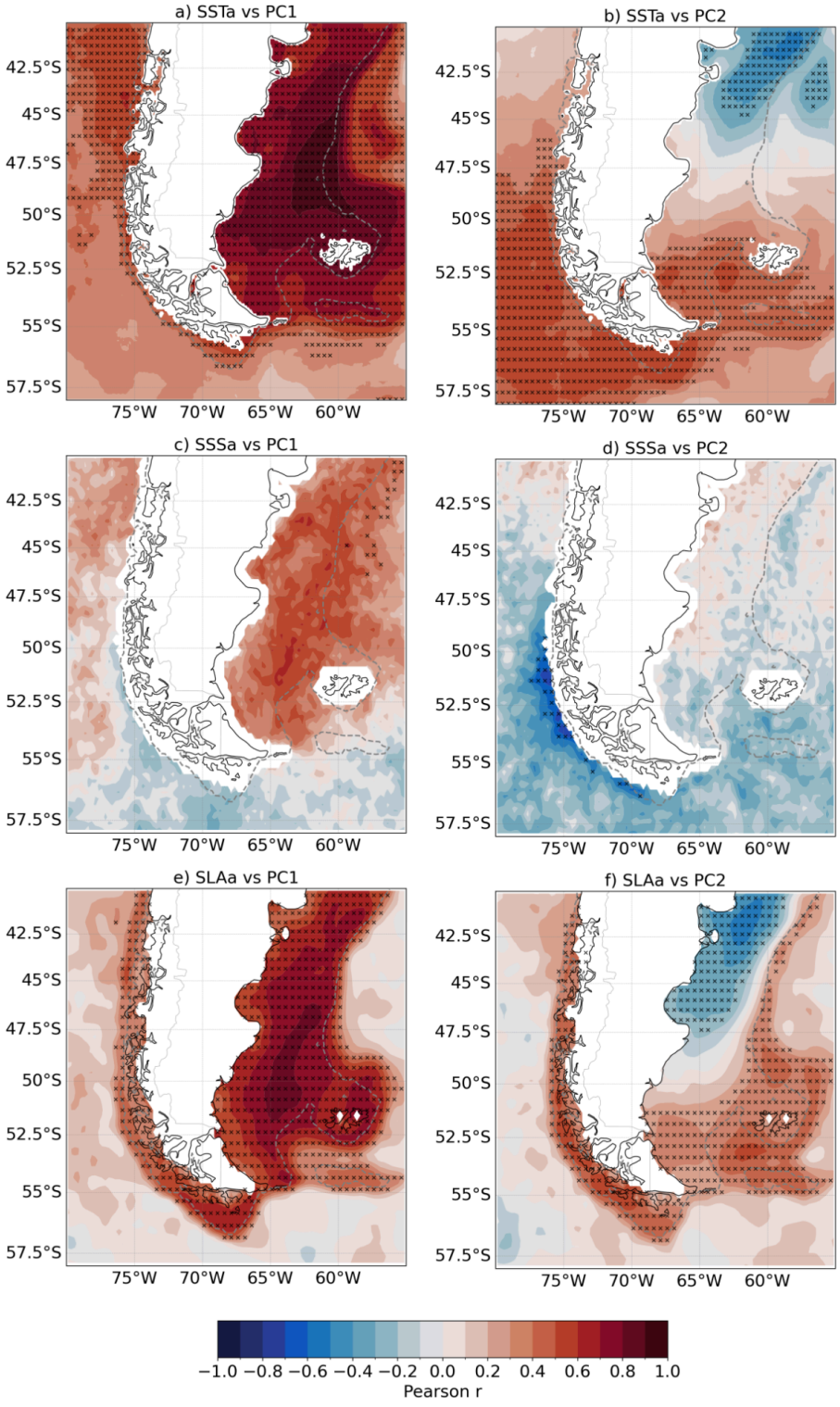

Figure S1: Correlation maps between the principal component time series and the anomalies of each variable for SSTa (panels a and b), SSSa (panels c and d), and SLAa (panels e and f). Crosses indicate regions where the correlations are statistically significant. The gray dashed line corresponds to the 200-m isobath.

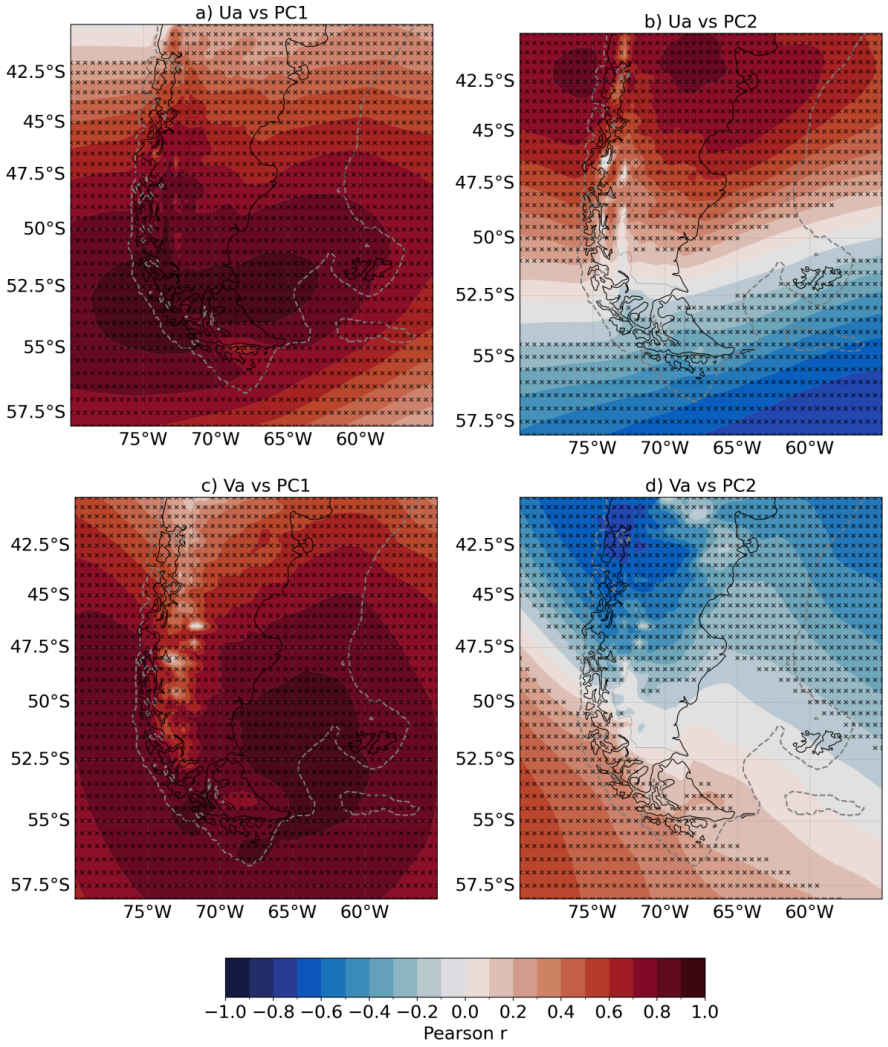

Figure S2: Correlation maps between the principal component time series and the anomalies of zonal wind component (panels a and b) and meridional wind component (panels c and d). Crosses indicate regions where the correlations are statistically significant. The gray dashed line corresponds to the 200-m isobath.

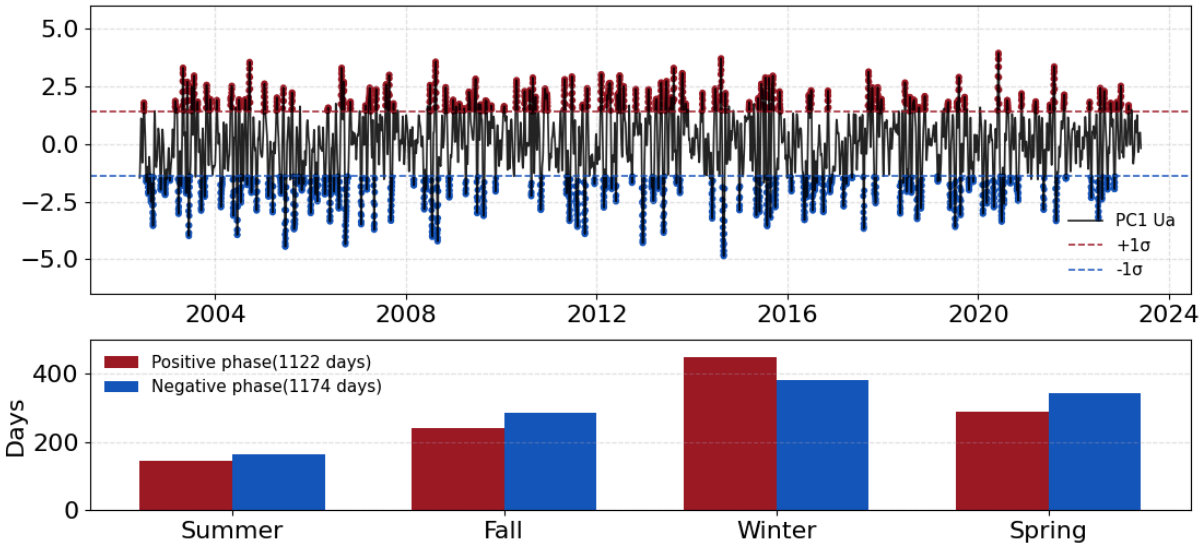

Figure S3: Top: Time series of the first principal component of the leading mode of zonal wind variability, showing the positive (red dots) and negative (blue dots) phases of this mode. Bottom: Seasonal distribution of the days corresponding to the positive and negative phases of the first mode of zonal wind variability. Red bars: positive phase (increased westerlies). Blue bars: negative phase (decreased westerlies).

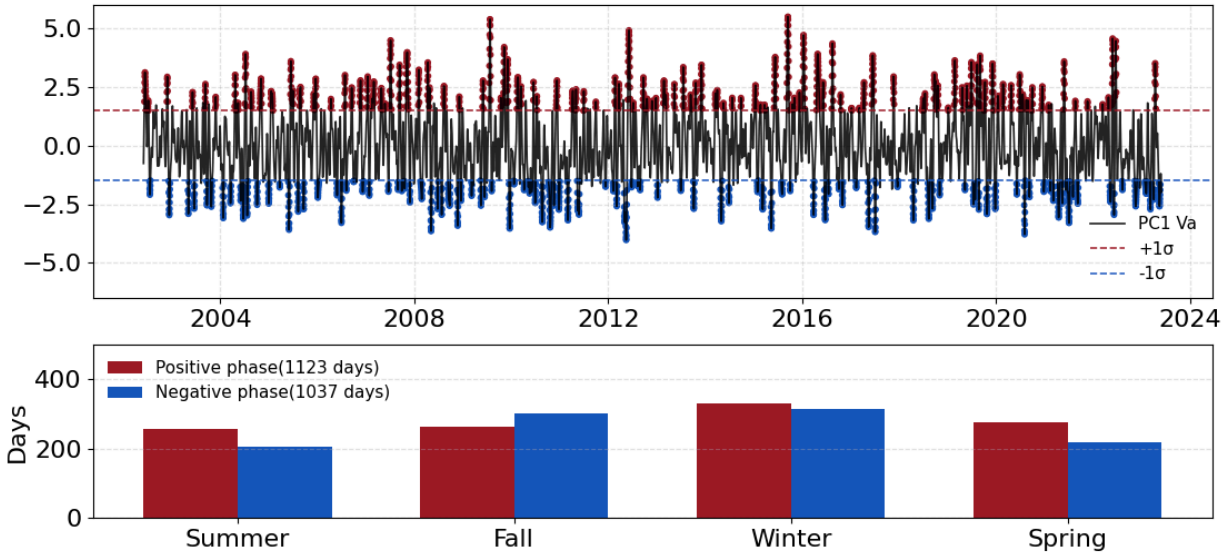

Figure S4: Top: Time series of the first principal component of the leading mode of meridional wind variability, showing the positive (red dots) and negative (blue dots) phases of this mode. Bottom: Seasonal distribution of the days corresponding to the positive and negative phases of the first mode of meridional wind variability. Red bars: positive phase (southerly wind). Blue bars: negative phase (northerly wind).

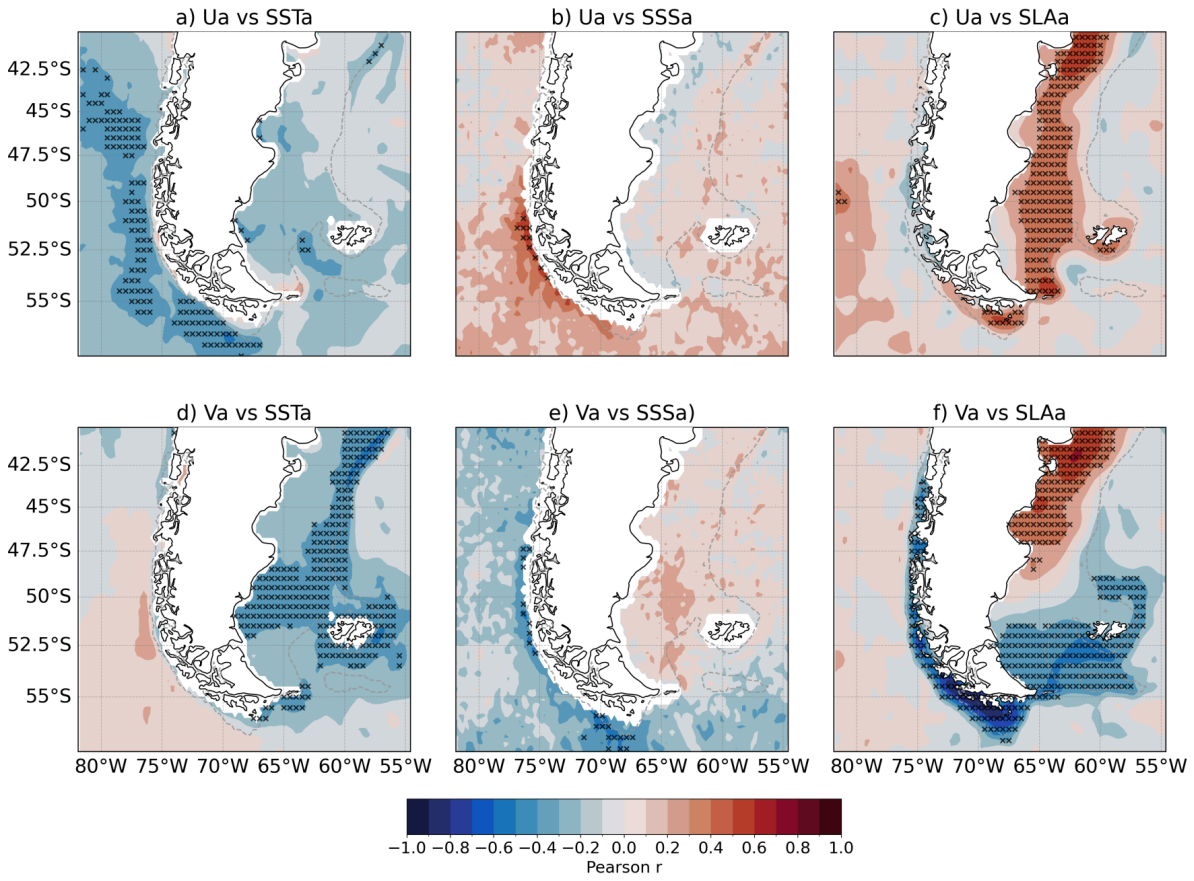

Figure S5: Maps of the Pearson correlation coefficient between anomalies of wind components (Ua and Va) and SSTa, SSSa, and SLAa. The black dashed line indicates the 200-m isobath.

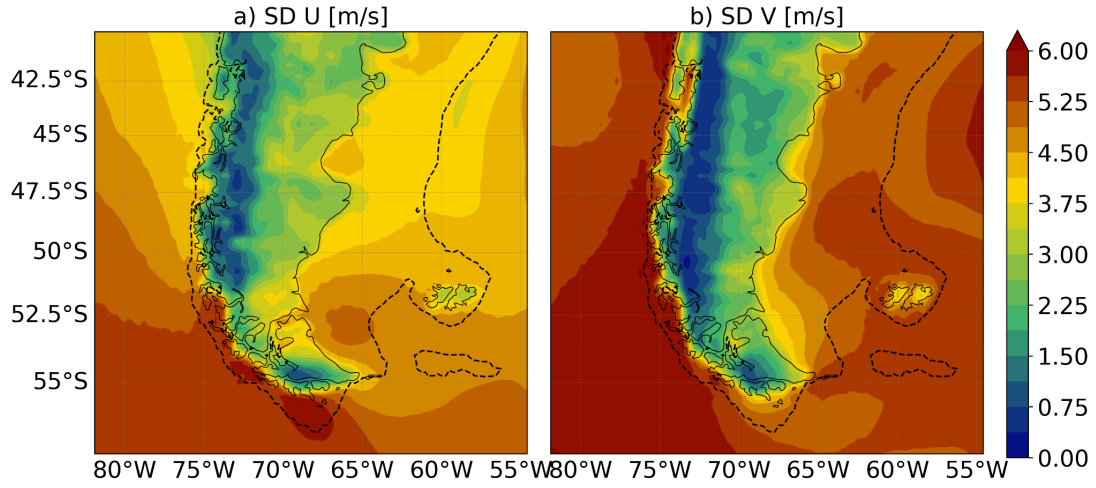

Figure S6: Standard deviation of zonal wind (panel a) and meridional wind (panel b) components with high frequency variability included.

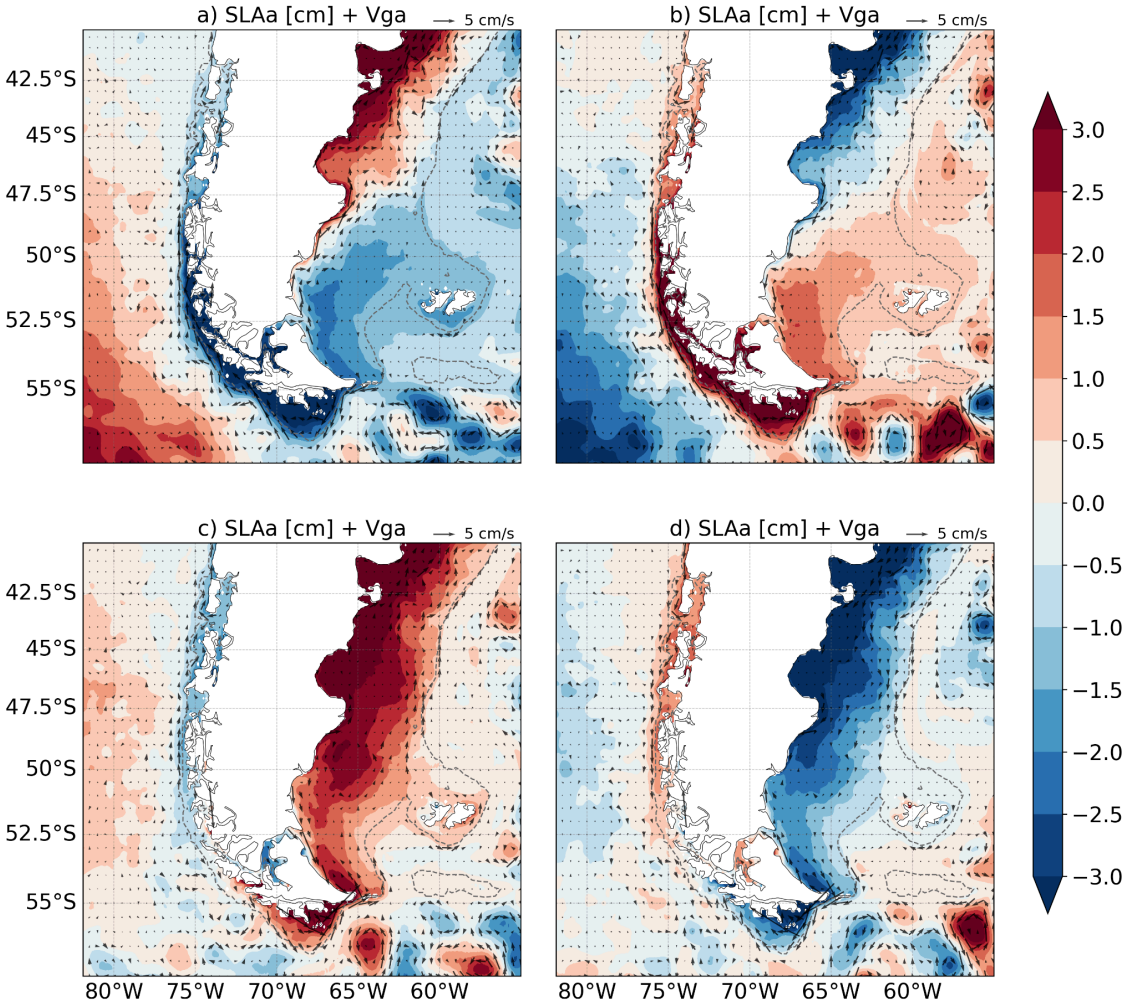

Figure S7: Composites of sea level anomaly (SLA) from GLORYS associated with the leading modes of meridional and zonal wind variability. Panels a and b correspond to the positive (southerly winds) and negative (northerly winds) phases of the leading mode of meridional wind, respectively. Panels c and d show the positive (enhanced westerlies) and negative (weakened westerlies) phases of the leading mode of zonal wind. Arrows indicate geostrophic velocity anomalies, and gray dashed lines mark the 200 m isobath.