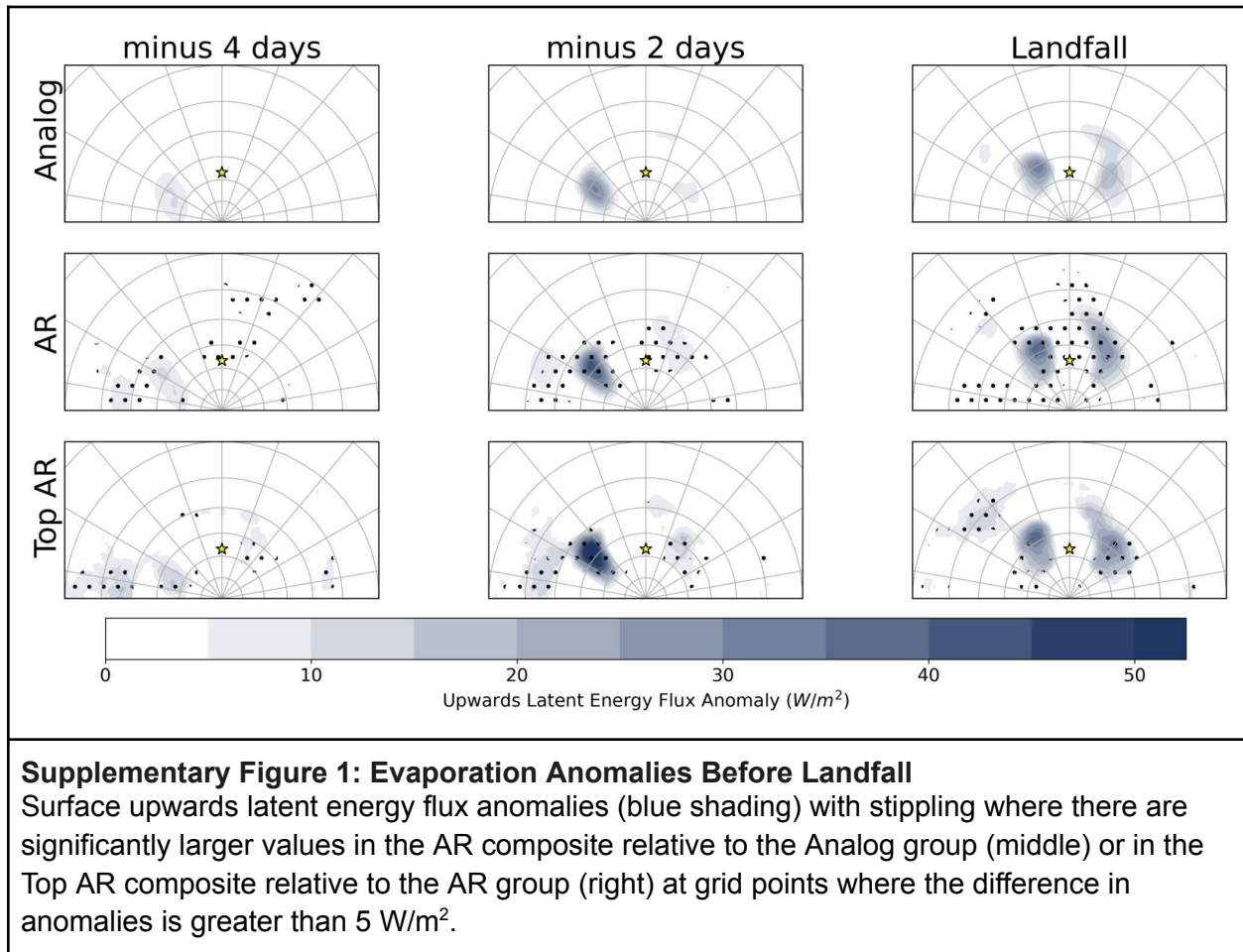
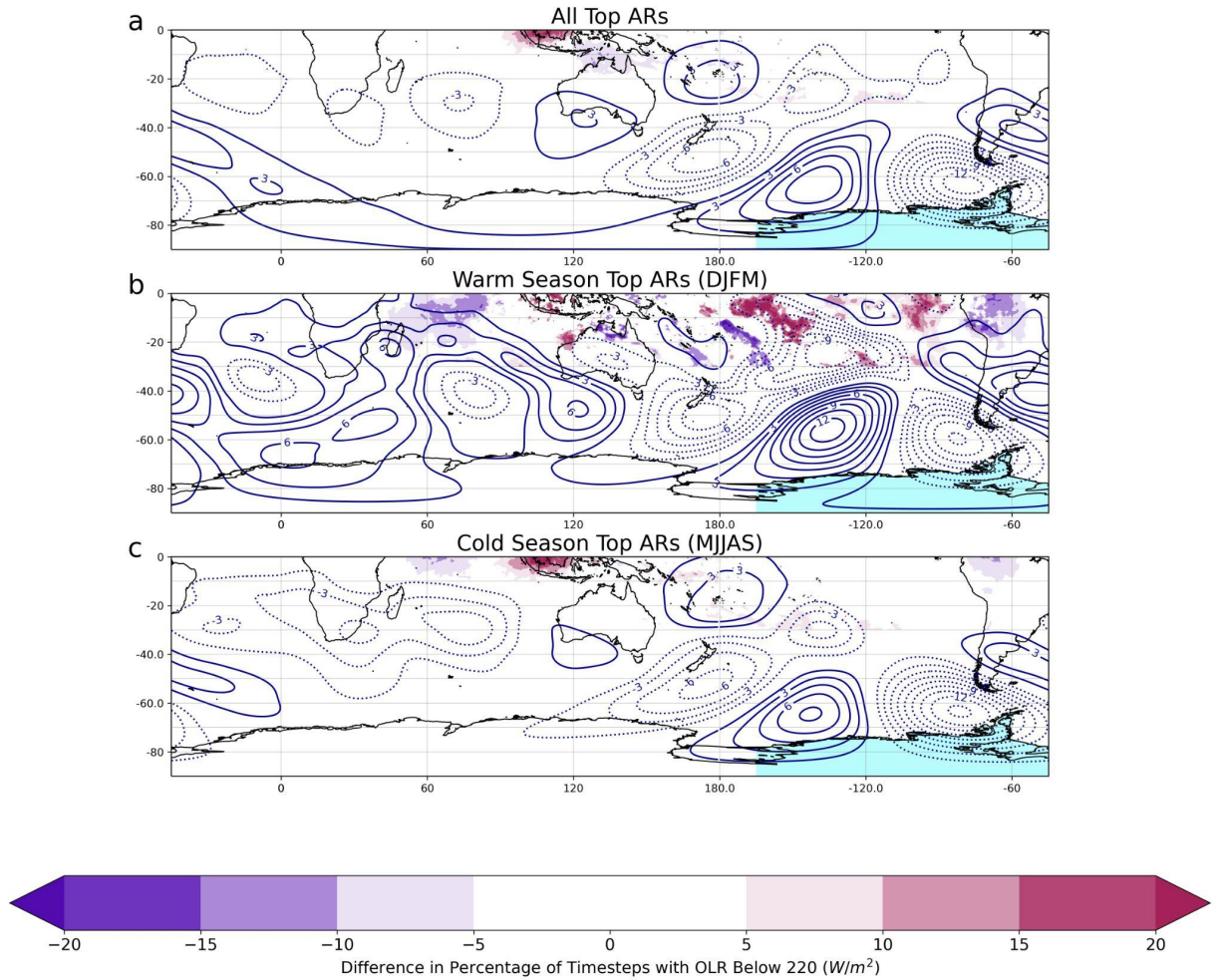


Supplementary Figures

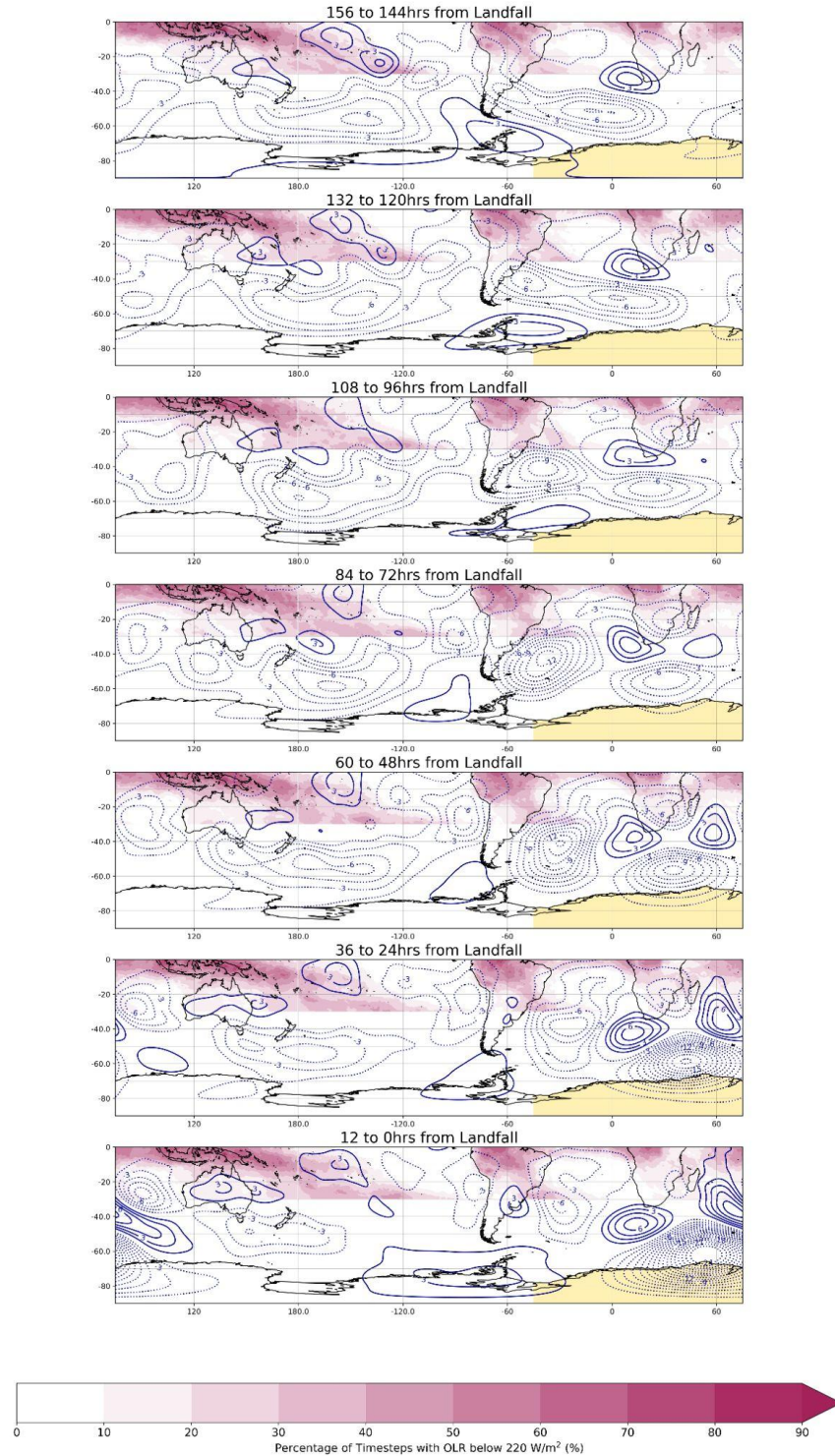


Top ARs in West Region



Supplementary Figure 2: West Sector Planetary-Scale Dynamics - Seasonal

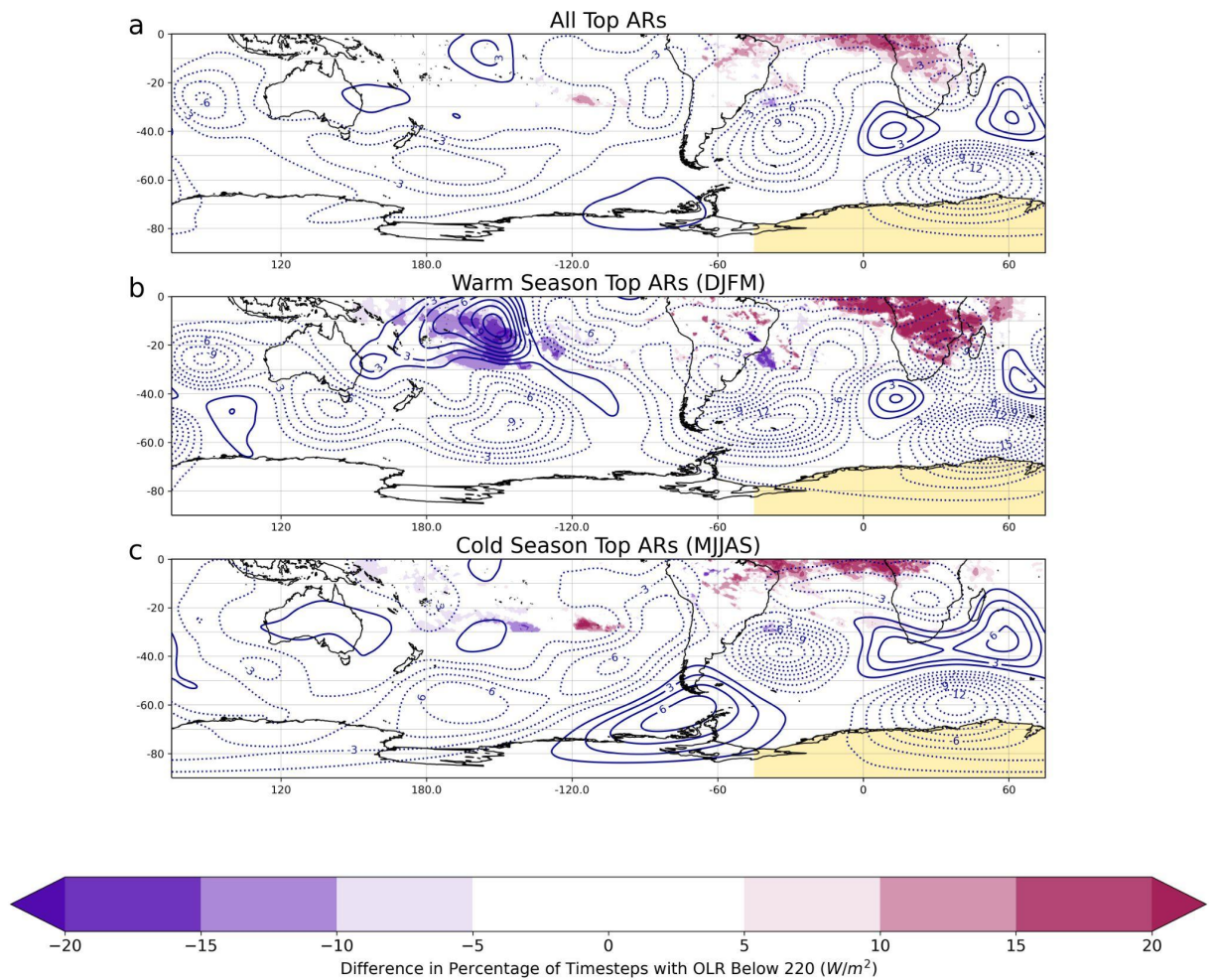
a West sector longitudes (light blue shading). 200-hPa streamfunction anomaly composites in $10^6 m^2/s$ for all Top AR timesteps averaged over the four-day period prior to AR landfall (dark blue contours). Statistically significant differences in the percentage of timesteps with OLR below $220 W/m^2$ from 0° to $30^\circ S$ between Top AR and AR timesteps (purple and pink shading) four days prior to AR landfall. **b** Same as **a** but only including West sector Top AR timesteps that occur in December, January, February, March. **c** Same as **a** but only including West sector Top AR timesteps that occur in May, June, July, August, and September.



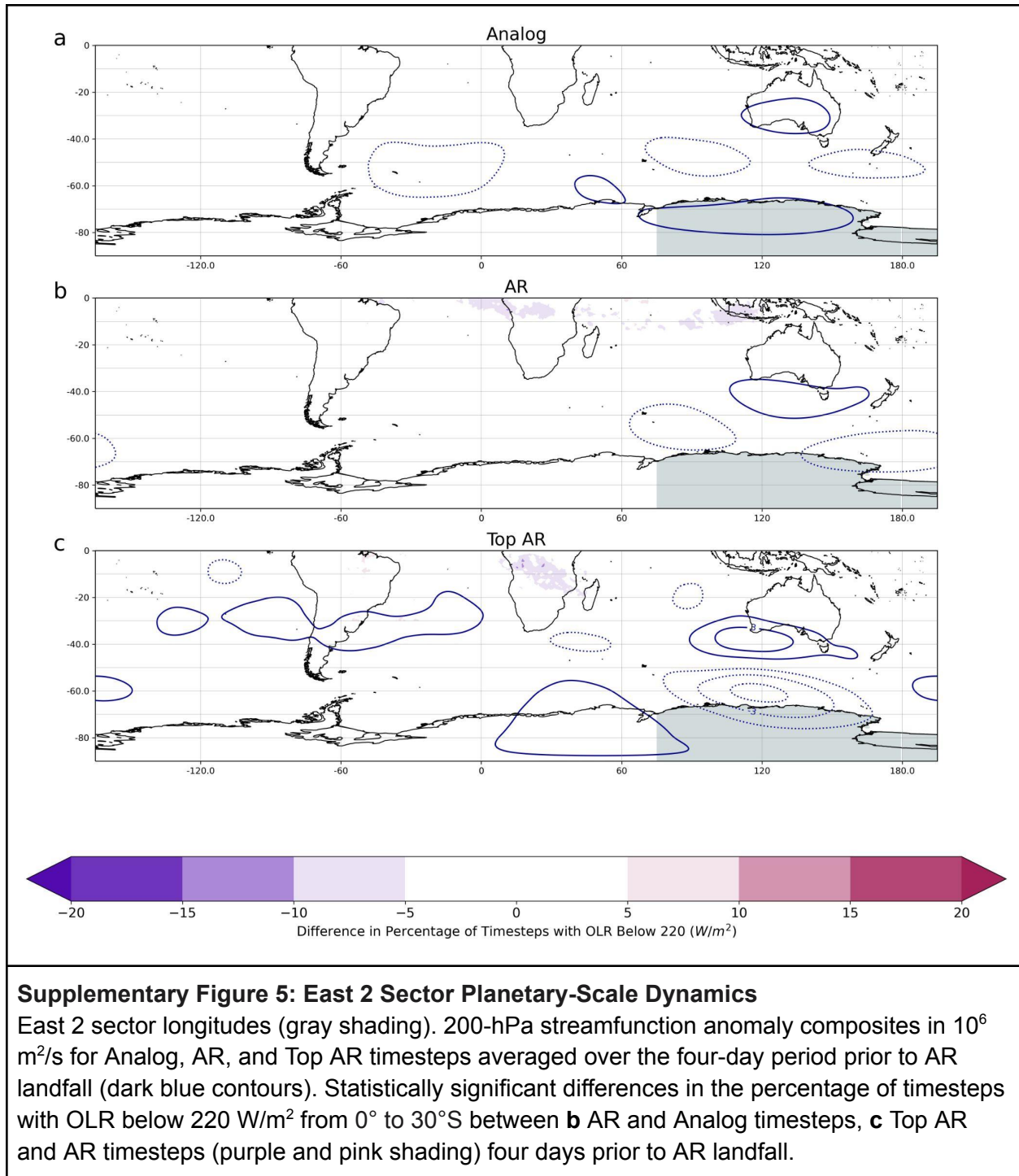
Supplementary Figure 3: East 1 Top AR Planetary-Scale Evolution

East 1 sector longitudes (yellow shading). 200-hPa streamfunction anomaly composites in $10^6 \text{ m}^2/\text{s}$ for all Top AR timesteps averaged over 12-hour periods starting with 156 hours prior to AR landfall (dark blue contours). Mean percentage of East 1 Top AR timesteps with OLR below 220 W/m^2 from 0° to 30°S (purple and pink shading) during each 12-hour period.

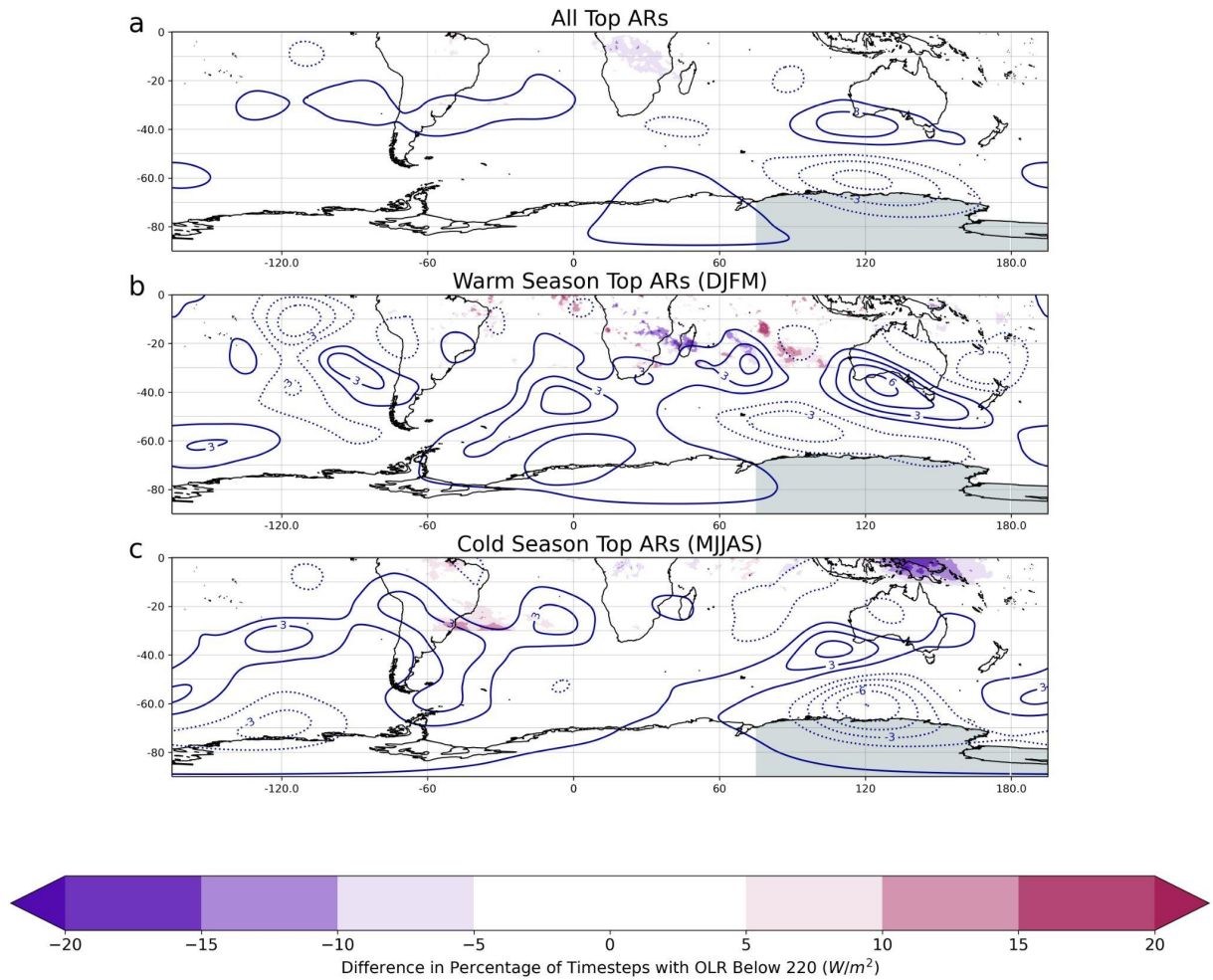
Top ARs in East 1 Region



Supplementary Figure 4: East 1 Sector Planetary-Scale Dynamics - Seasonal
Same conventions as in Supplementary Figure 1, except for East 1 (yellow shading) sector Top ARs.



Top ARs in East 2 Region



Supplementary Figure 6: East 2 Sector Planetary-Scale Dynamics - Seasonal
Same conventions as in Supplementary Figure 1, except for East 2 (gray shading) sector Top ARs.

