*Supplement of*

# River discharge impacts coastal Southeastern Tropical Atlantic sea surface temperature and circulation: a model-based analysis

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10

The content of this file is:

-   Supplementary Figures S1 to S7

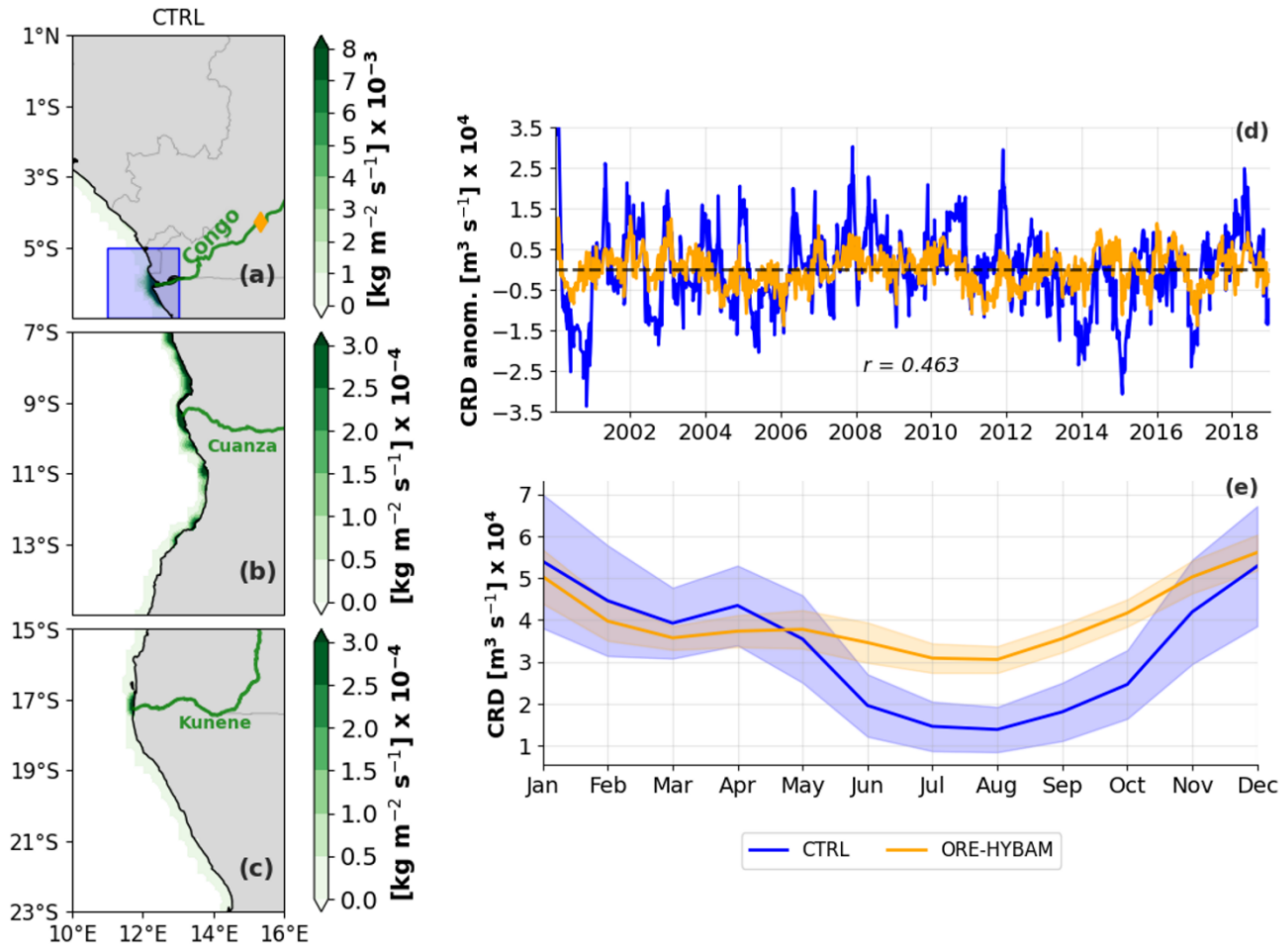



**Figure S1.** Freshwater input from CTRL (blue) vs Congo River discharge from Kinshasha-Brazzaville station (orange). **(a)** Freshwater input from CTRL run. Blue box (5ºS – 7ºS, 11ºE – 13ºE) in (a) represents the area where CTRL freshwater input was averaged. Orange diamond shows location of Kinshasha-Brazzaville station. **(b)** and **(c)** same as (a). Note that colorbar scales change from (a)-(b). **(d)** Daily anomalies of both box-averaged CTRL freshwater input and ORE-HYBAM river discharge. **(e)** Seasonal climatology from 2000-2018 of both products. Shading in (e) indicates monthly standard deviations.

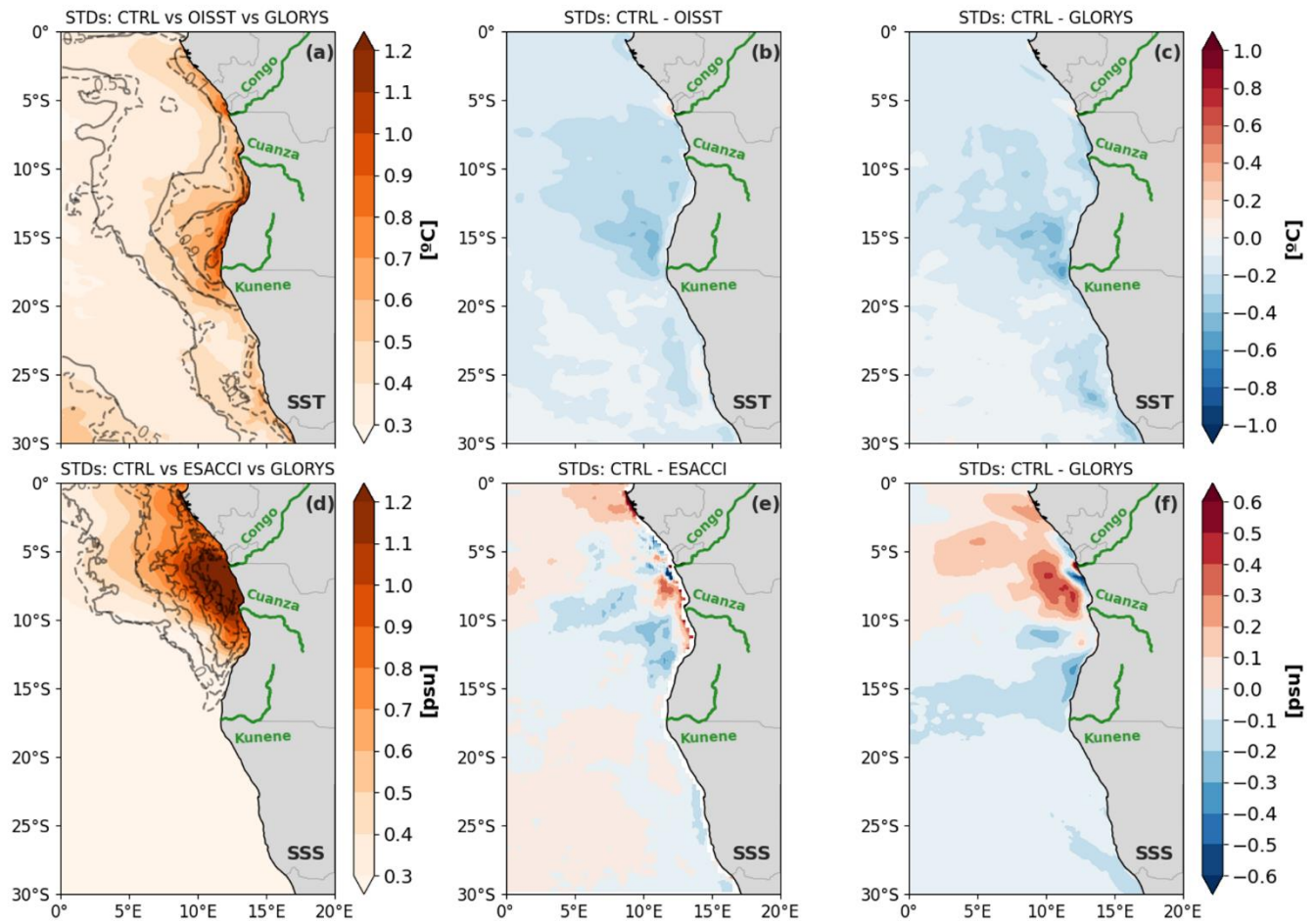
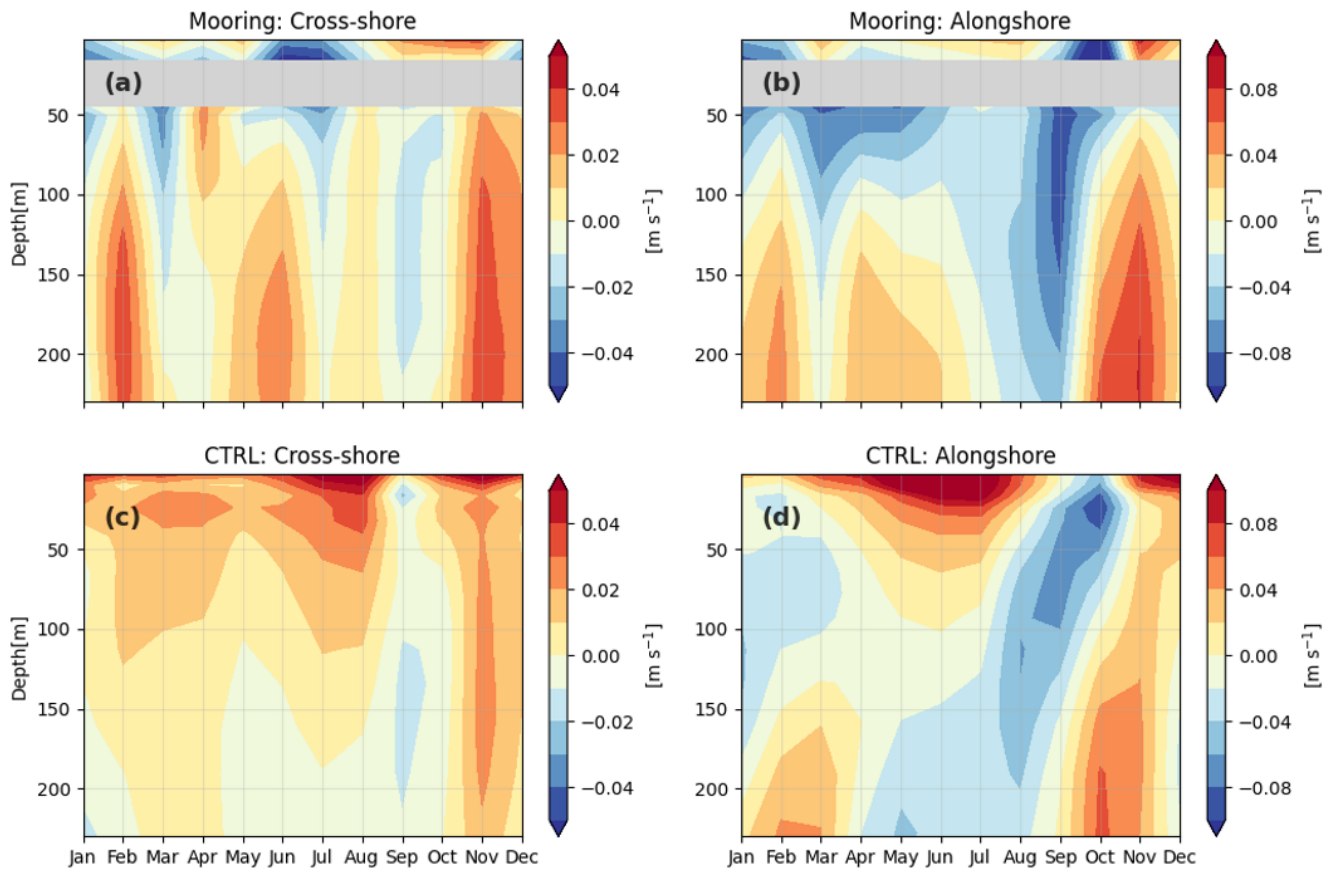



**Figure S2.** Comparison of simulated SST variability against observations and reanalysis. **(a)** Mean SST anomalies monthly standard deviation (STD) from CTRL (shading), OISST (solid contours), and GLORYS (dashed contours) from 2000-2018. **(b)** Mean difference in SST anomalies STD between CTRL and OISST. **(c)** Same as (b) but difference between CTRL and GLORYS12. **(d)** Same as (a) but for CTRL SSS anomalies STD, compared to ESACCI (solid contours, from 2010-2018) and GLORYS12 (dashed contours, 2000-2018). **(e)** Same as (b) but for ESACCI SSS and anomalies from 2010-2018 **(f)** Same as (c) but for SSS.

30    **Figure S3.** Cross-shore **(a, c)** and along-shore **(b, d)** current velocity climatology (rotated by -34° with respect to true north) recorded by the moored ADCP located at 10°50'S, 13°00'E combined to surface velocities from GLOBCURRENT (a, b); and taken from CTRL run (c, d) at nearest grid position from mooring location and -34° rotation. Climatologies were calculated over the period 2014 – 2018.

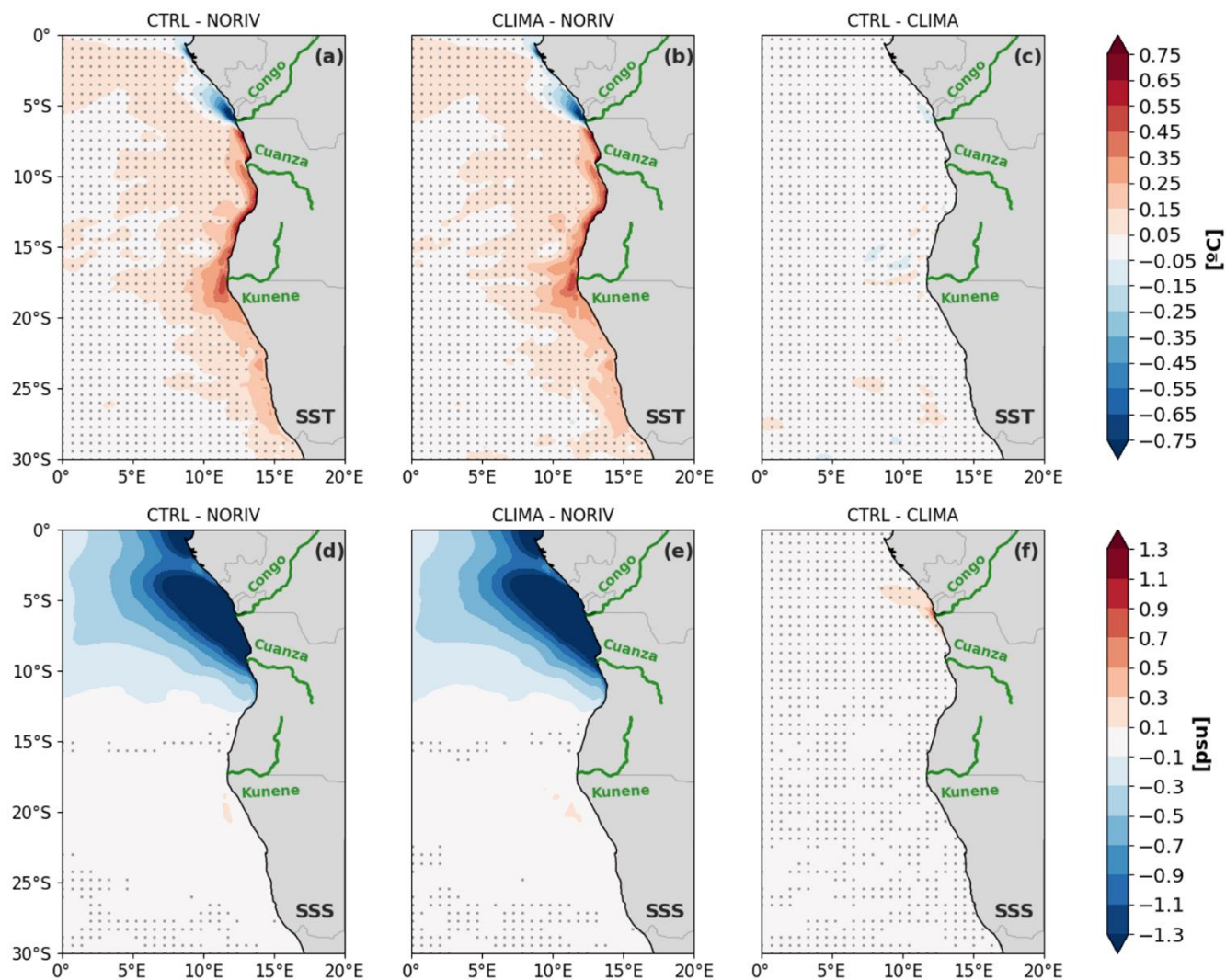



**Figure S4.** Mean state difference between runs. **(a)** Mean SST CTRL – Mean SST NORIV. **(b)** Mean SST CLIMA – Mean SST NORIV. **(c)** Mean SST CTRL – Mean SST CLIMA. **(d), (e), (f)** same as (a), (b), (c), respectively, but for SSS. Stippled grey areas indicate where difference is not significant in a 95% confidence level.

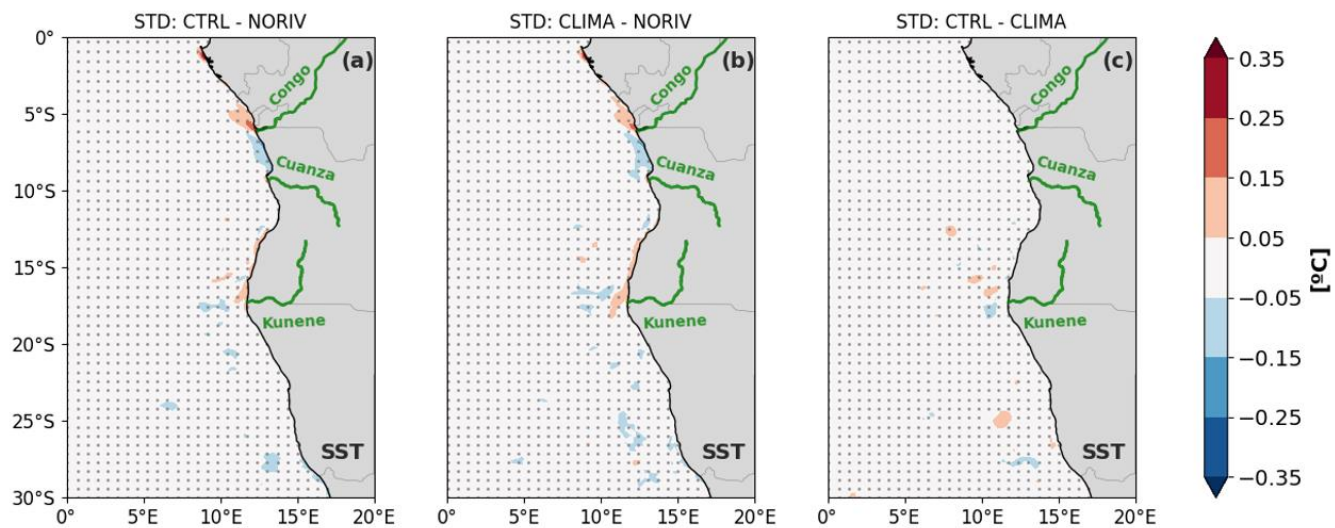



**Figure S5.** Monthly SST anomalies standard deviation (STD) mean difference between runs. **(a)** Mean SST anomalies STD CTRL – Mean SST anomalies STD NORIV **(b)** Mean SST anomalies STD CLIMA – Mean SST anomalies STD NORIV. **(c)** Mean SST anomalies STD CTRL – Mean SST anomalies STD CLIMA. Stippled grey areas indicate where difference is not significant in a 95% confidence level.

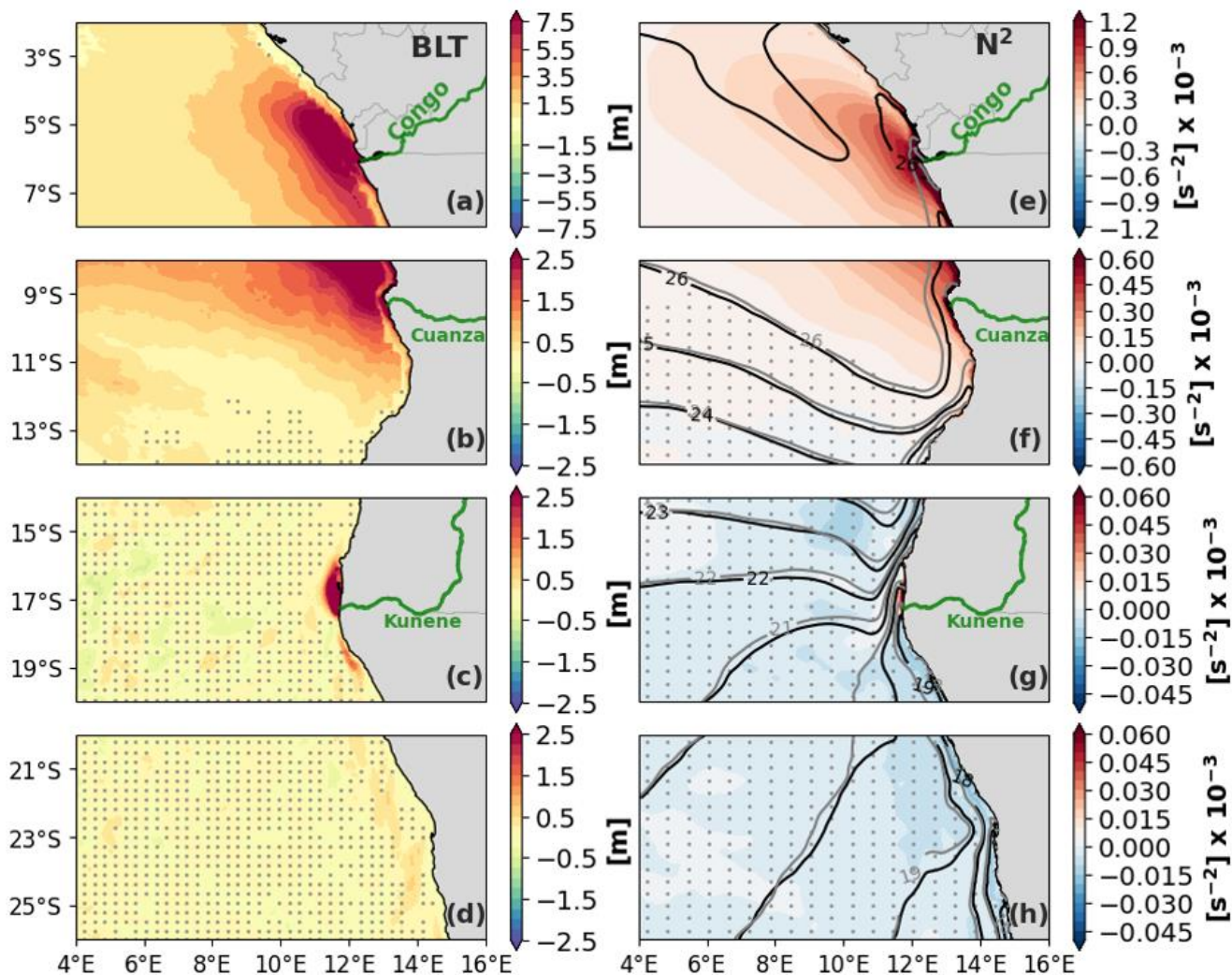



**Figure S6.** Difference between CLIMA and NORIV mean states (CLIMA-NORIV) for BLT (**a-d**); $N^2$ averaged from surface to 50m depth (**e-h**). Stippled grey areas indicate where difference is not significant in a 95% confidence level. Black (grey) lines from e-h depicts isotherms from CLIMA (NORIV) run. Note that colorscales change for a (e) in relation to b-d (f-h).

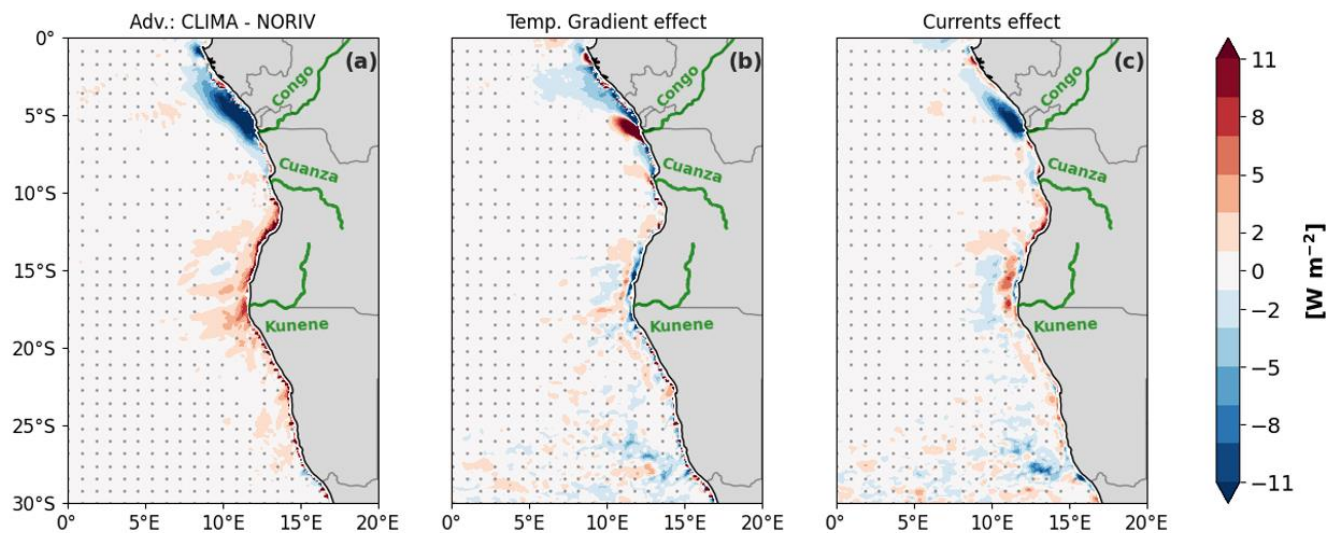



**Figure S7.** Difference between CLIMA and NORIV mean states (CLIMA-NORIV) for horizontal advection. In **(a)** both temperature gradient and horizontal currents are from the different runs; in **(b)** only temperature gradient is different (currents from CLIMA); in **(c)** only horizontal current is different (temperature gradient from CLIMA). Stippled grey areas indicate where difference is not significant in a 95% confidence level.