Supplement of

Non-linear Climatic Response to the Weakening of the Atlantic Meridional Overturning Circulation During Glacial Times

Yanxuan Du, Josephine R. Brown, Lauire Menviel, Himadri Saini, Russell N. Drysdale, David K. Hutchinson, and Calla N. Gould-Whaley

Correspondence to: Yanxuan Du (yanxuand@student.unimelb.edu.au)

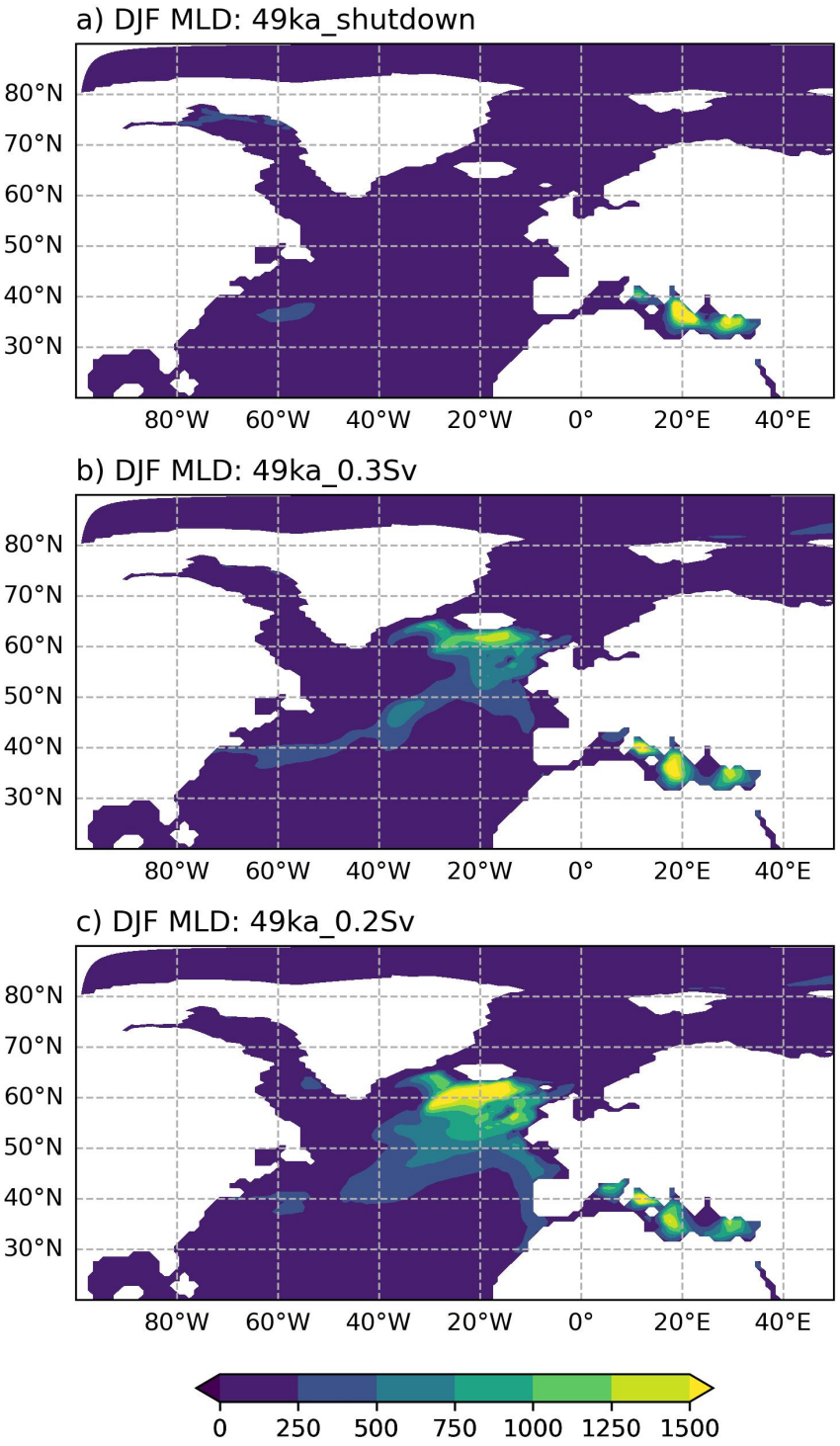

Figure S1: Full field mixed layer depth (MLD; in m) in the North Atlantic in DJF season for Heinrich stadial (a) 49ka_shutdown, and D-O stadial simulations (b) 49ka_0.3Sv, (c) 49ka_0.2Sv.

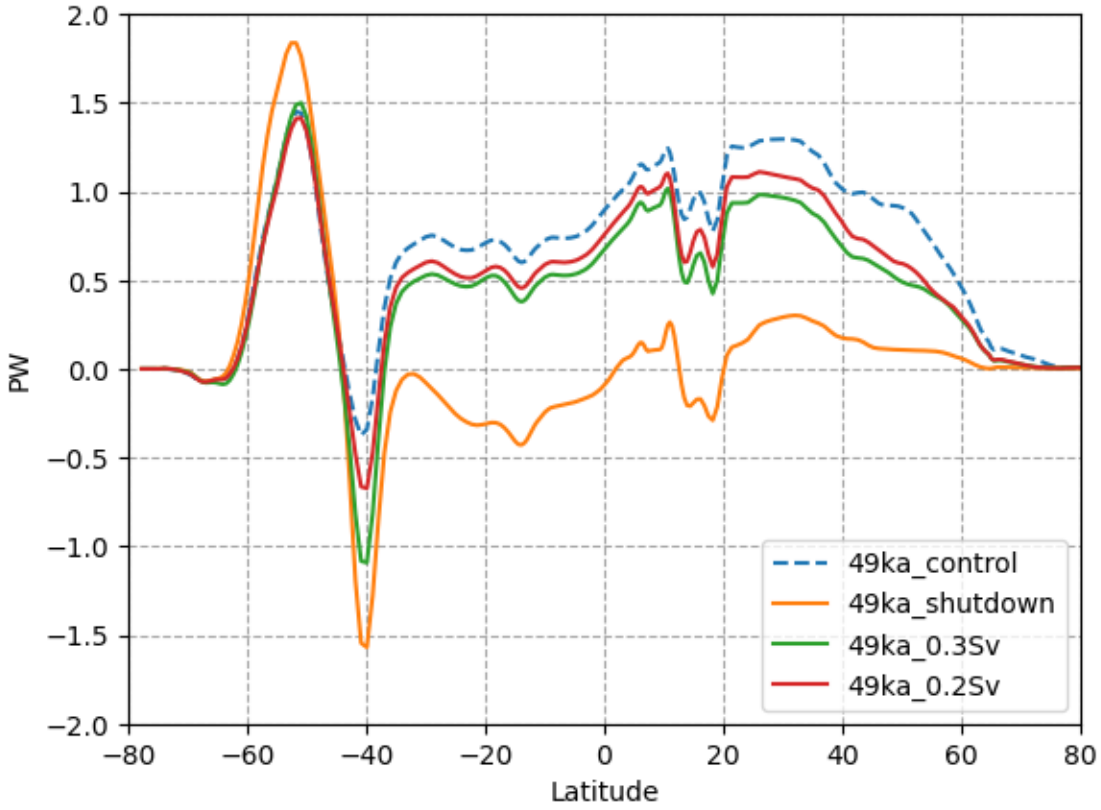

Figure S2: Meridional oceanic heat transport (PW) over the Atlantic Ocean in 49ka_control, 49ka_shutdown, 49ka_0.3Sv and 49ka_0.2Sv simulations.

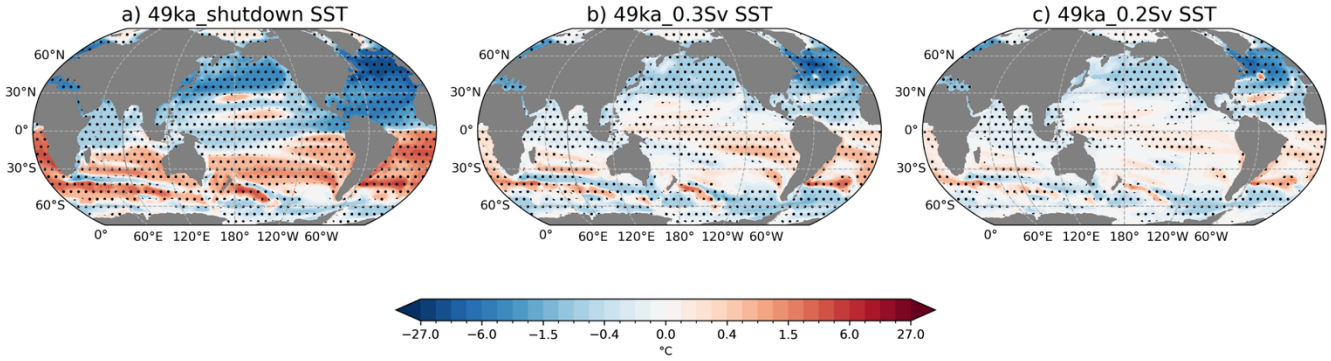

Figure S3: Annual sea surface temperature anomalies (SST; ºC) relative to 49ka_control in each simulation. Stippling indicates statically significant differences from the control at the 95 % confidence level according to the Student's t-test.

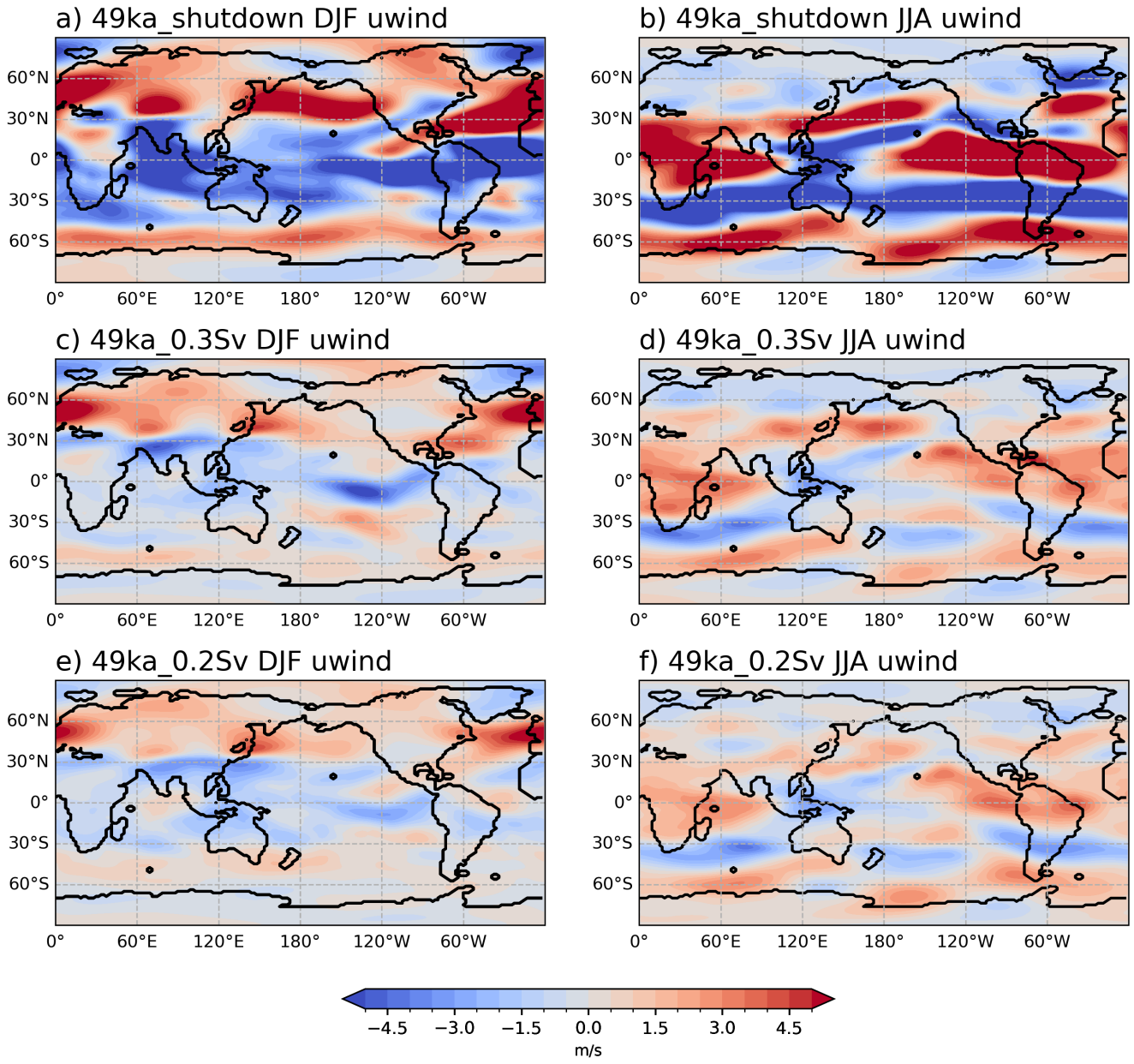

Figure S4: DJF and JJA 200 hPa zonal wind speed anomalies (m/s) relative to 49ka_control in each simulation.

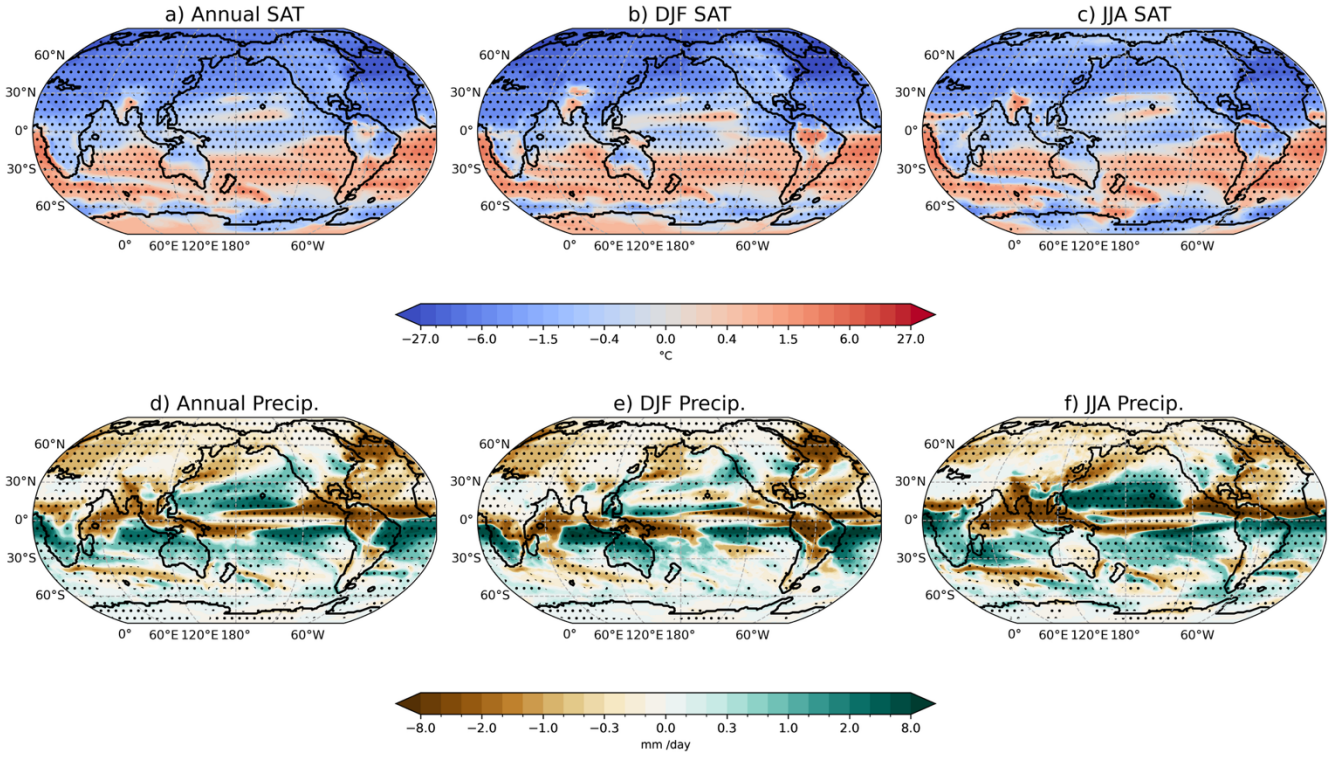

Figure S5: 49ka_shutdown annual, DJF and JJA surface air temperature anomalies (SAT; ºC), and precipitation anomalies (mm/day) relative to 49ka_control. Stippling indicates statically significant differences from the control at the 95 % level according to the Student's t-test.

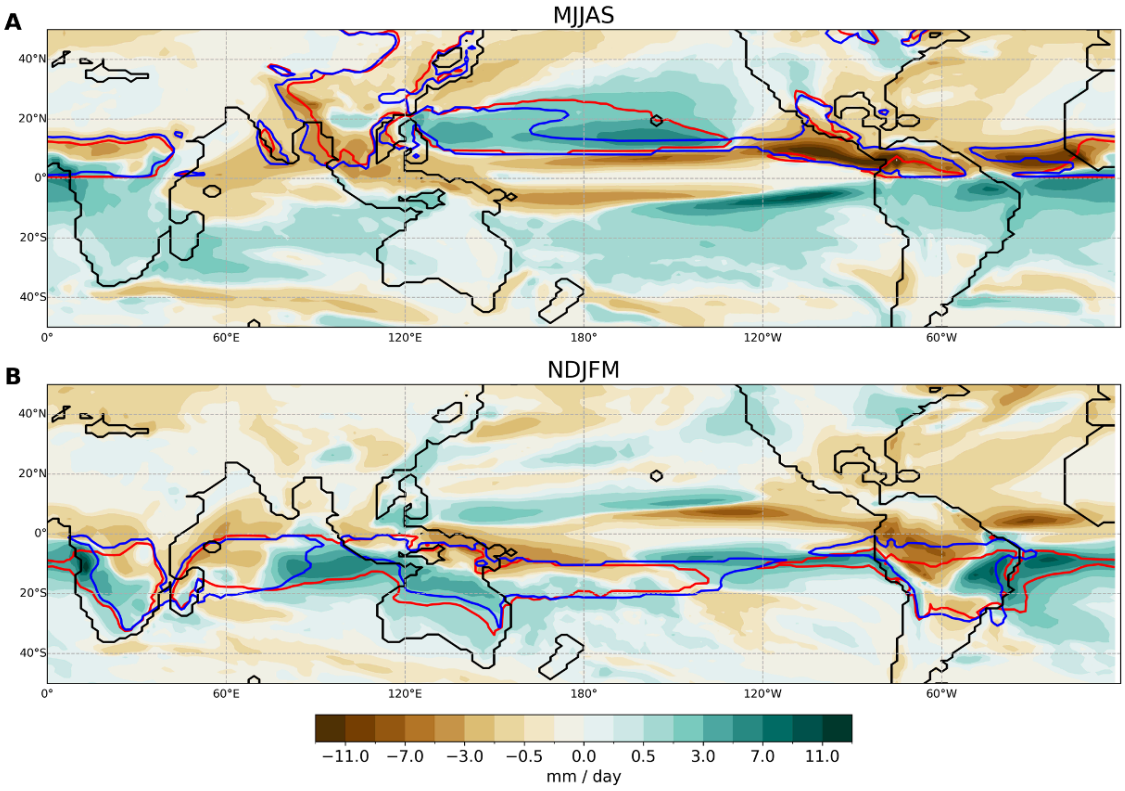

Figure S6: 49ka_shutdown (Heinrich stadial) – 49ka_control precipitation anomaly (mm/day) and monsoon domains in (a) Northern Hemisphere monsoon season: MJJAS, and (b) Southern Hemisphere monsoon season: NDJFM. Contours indicate monsoon domains for Heinrich stadial (in red) and for control (in blue) experiments.

Table S1. Area-weighted normalized annual mean surface air temperature (SAT) and precipitation anomalies per 1 Sv AMOC decrease in each experiment relative to 49ka_control. This includes global, NH, SH (0-55º S) temperature changes, and global, NH, and SH (0-90º S) precipitation changes.

Experiment	**Global SAT (ºC/Sv)**	**NH SAT (ºC/Sv)**	**SH SAT (0-55º S) (ºC/Sv)**	**Global precip (mm day^{-1}/Sv)**	**NH precip (mm day^{-1}/Sv)**	**SH precip (mm day^{-1}/Sv)**
49ka_0.2Sv	-0.046	-0.08	-0.0023	-0.0029	-0.0094	0.0036
49ka_0.3Sv	-0.046	-0.08	-0.0026	-0.0027	-0.009	0.0037
49ka_shutdown	-0.061	-0.13	0.015	-0.0036	-0.018	0.011

Table S2. Wintertime northern (DJF) and southern (JJA) HC mean latitudinal position (º), strength (Sv), and positions (º) of its ascending and descending branches at 500 hPa in each experiments, interpolated to 0.5º latitude resolution using the calculation methods described in Section 2.4.

Experiment	**Northern HC in DJF**				**Southern HC in JJA**			
	Mean position (º)	Strength (Sv)	Ascending branch (º)	Descending branch (º)	Mean position (º)	Strength (Sv)	Ascending branch (º)	Descending branch (º)
49ka_control	8.125	476.8	-15.6	28.0	-0.375	-486.6	14.9	-27.2
49ka_0.2Sv	8.125	482.9	-15.7	27.9	-0.875	-473.0	14.7	-27.4
49ka_0.3Sv	8.125	487.1	-15.9	28.0	-0.875	-467.0	14.3	-27.2
49ka_shutdown	-1.875	572.5	-17.1	28.1	-8.375	-328.7	18.4	-28.7