Large-scale Atmospheric Forcing of Tropical North Atlantic Vertical Wind Shear



1 Introduction	
	JA H
 Vertical wind shear (VWS) is impacted by tropical, subtropical and extratropical dynamics such as ENSO (Aiyyer and Thorncroft, 2006) and anticyclonic wave breaking (AWB) (Papin, 2017; Zhang et al., 2017) 	20N 10N 90W
 Here, we examine the different modes of variability in tropical North Atlantic VWS due to potential vorticity streamer (PVS) activity and tropical large-scale oscillations. 	Fig. 1 2PVU Source
2. Data and Methodology	
 ERA Interim (0.75° x 0.75°), NOAA OISST version 2 	 AWE vorti 2PVI
• VWS defined as the difference between 200hPa and 850hPa zonal wind components: $VWS = U_{200} - U_{850}$	
3. VWS Composite Plots of ENSO vs PVS a	re Sim
a) JAS Warmest ENSO Years (1982,1987,1991,1992,1997,2002,200	15)
50°N 40°N 30°N 20°N 10°N 0°	
0° 30°E 60°E 90°E 120°E 150°E 180° 150°W 120°W 90°W 60°	W 30°W
0° 30°E 60°E 90°E 120°E 150°E 180° 150°W 120°W 90°W 60° C) JAS Coolest ENSO Years (1985,1988,1989,1999,2000,2008,201 $10^{\circ}N$	W 30°W .1)

4.2 1.4 2.8 -4.2 -1.4

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Fig. 3. High PVS activity versus low PVS activity composites of July-September 1981-2016 sea surface temperature anomalies. The same years used in Fig.1 are also used here. Units: °C.

Climate Index	PC1	PC2	PC3	PC4
Nino 1.2	0.54	0.10	0.38	-0.17
Nino 3	0.73	0.02	0.31	-0.09
Nino 3.4	0.78	-0.12	0.26	-0.05
Nino 4	0.68	-0.31	0.32	-0.03
Walker Circulation Index	-0.50	-0.06	-0.44	-0.02
Sahel Precipiation Index	-0.47	-0.13	-0.22	- 0.42

5. Summary and Conclusions

• First and third EOFs associated with large-scale ENSO forcing and Walker Circulation dynamics. Second EOF mode shows only a small correlation with ENSO and may be forced by North Atlantic midlatitude shear variability.

Fourth EOF mode correlates with Sahel precipitation and may be related to African Easterly Wave variability.

References

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n., 19, 2969-2983. <i>Sental Impacts, and</i> New York at Albany). Rossby Wave	This research was supported by the ONR Director of Research Early Career Grant N000141512601 and the Fulbright Foreign Student Program. Thanks also to Philippe Papin for his helpful insights and the use of his PVSI index.