ITCZ position follows the maximum SST & Oeb



ITCZ



Large-scale overturning circulations over land





Large-scale overturning circulations over land





Summer monsoon

Large-scale overturning circulations over land





Winter monsoon

Climatological 1000-hPa winds: January

NCEP/NCAR Reanalysis 1000mb Vector Wind (m/s) Climatology 1981-2010 climo





Climatological 1000-hPa winds: July

NCEP/NCAR Reanalysis 1000mb Vector Wind (m/s) Climatology 1981-2010 climo





Key features of the summer West African Monsoon



Parker et al. (2025)

West African overturning circulations



<u>Key</u>

AEJ: African Easterly Jet SAL: Saharan Air Layer TEJ: Tropical Easterly Jet ITF: Intertropical Front PBL: Planetary Boundary Layer Meridional and Vertical Circulations

θ: Potential Temperature

θ_e: Equivalent Potential Temperature

Janiga (2013)

Annual cycle of west African Oe and rainfall



Annual cycle of Oe from the ERA-40 (top) and rainfall from GPCP in pentads (mm; bottom)

Thorncroft (2022)

Annual cycle of west African O, rainfall, pressure, and meridional wind



Annual cycle of (K; shaded) and rainfall (mm; contours)

Annual cycle of MSLP (hPa; shaded) and v wind (m s⁻¹; contours)

Thorncroft (2022)

Is the North American Monsoon really a monsoon?

NCEP/NCAR Reanalysis 700mb Vector Wind (m/s) Climatology 1981—2010 climo



Is the North American Monsoon really a monsoon?

NCEP/NCAR Reanalysis 700mb Vector Wind (m/s) Climatology 1981-2010 climo



Is the North American Monsoon really a monsoon?



Annual cycle of precipitation over the Southwest U.S.



Corbosiero et al. (2009)

North American Monsoon moisture: Midlevel source is Gulf of Mexico

NCEP/NCAR Reanalysis 700mb Vector Wind (m/s) Climatology 1981-2010 climo



North American Monsoon moisture: Low-level source via Gulf of California surges



- ~ Low-level moisture comes from the Gulf of California in surges
- Surges of are initiated by clouds, and relatively higher pressure, passing by to the south
- Moist air surges north, arriving in Yuma (YUM) two to three days after it was initiated