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# The Angola Current at 11°S: Observations and Response to Tropical Atlantic Variability

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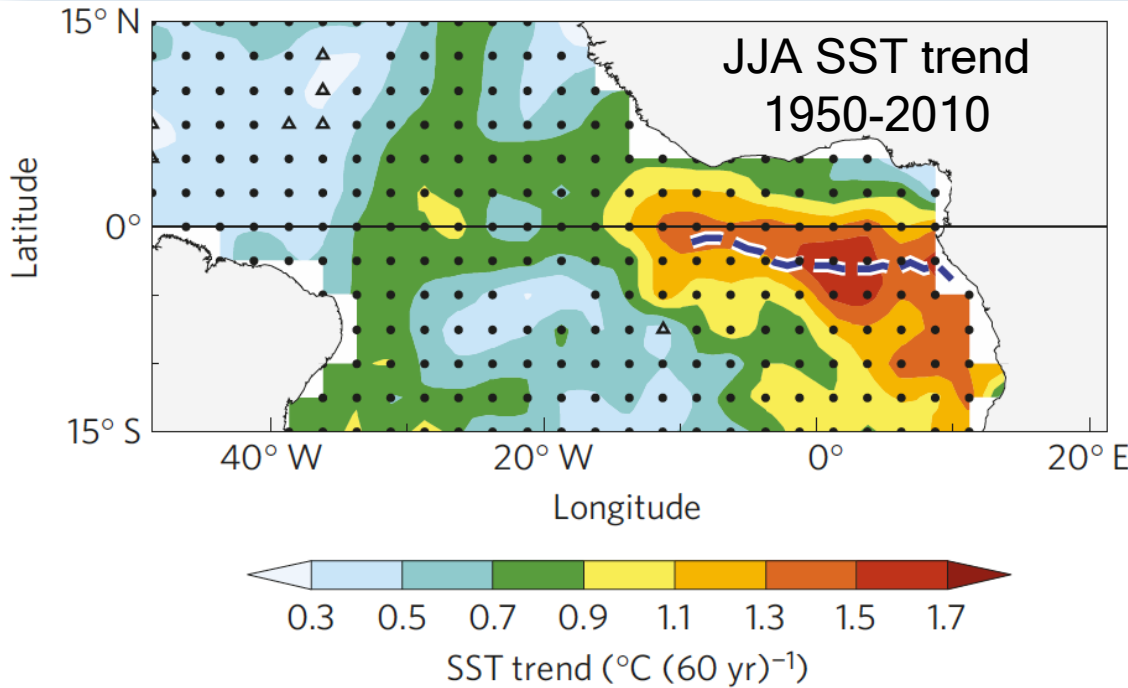
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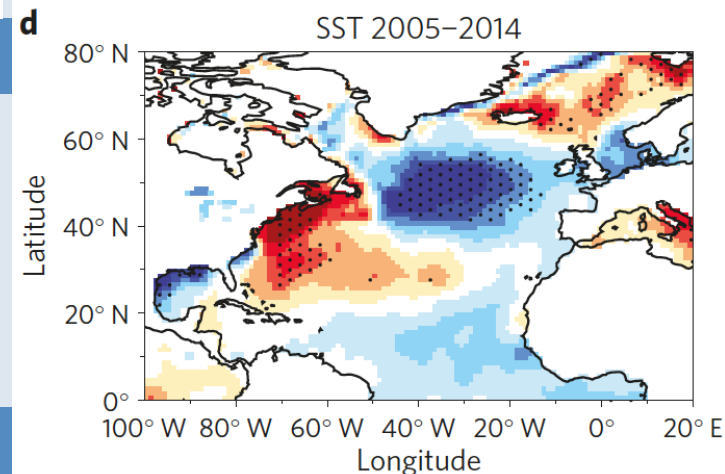
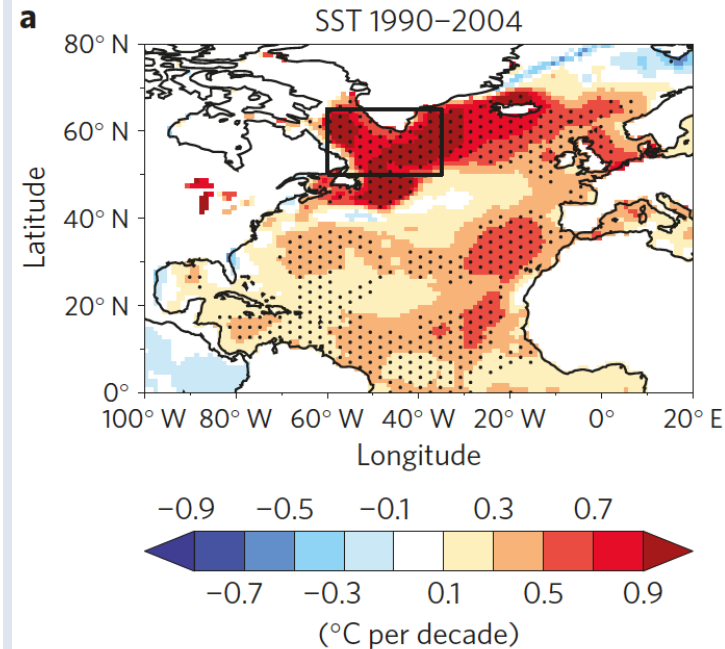
TAV during the last decade(s) and  
Angola Current variability since July 2013

# Long-term Tropical Atlantic Variability

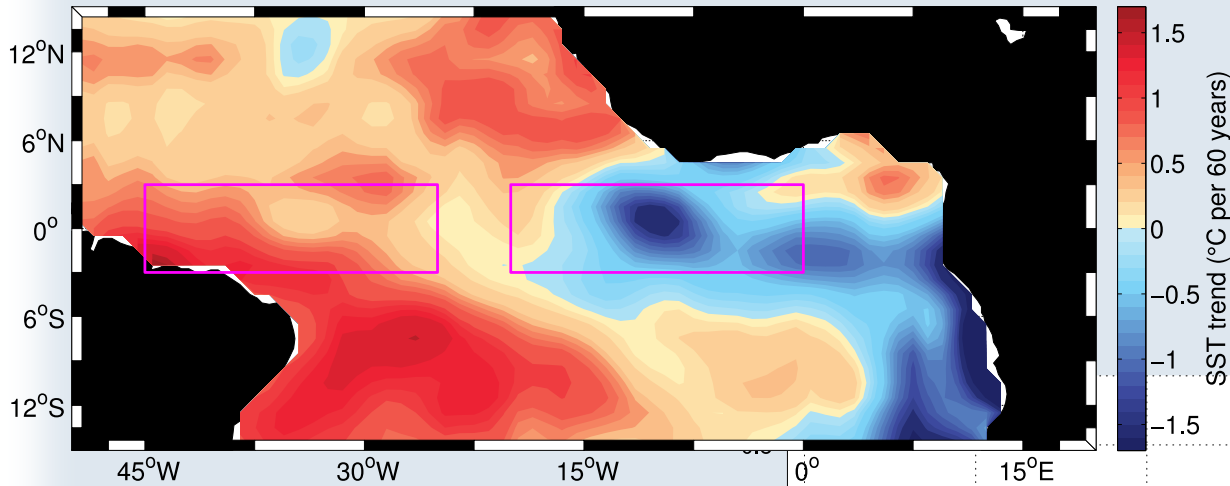


Tokenaga and Xie 2011

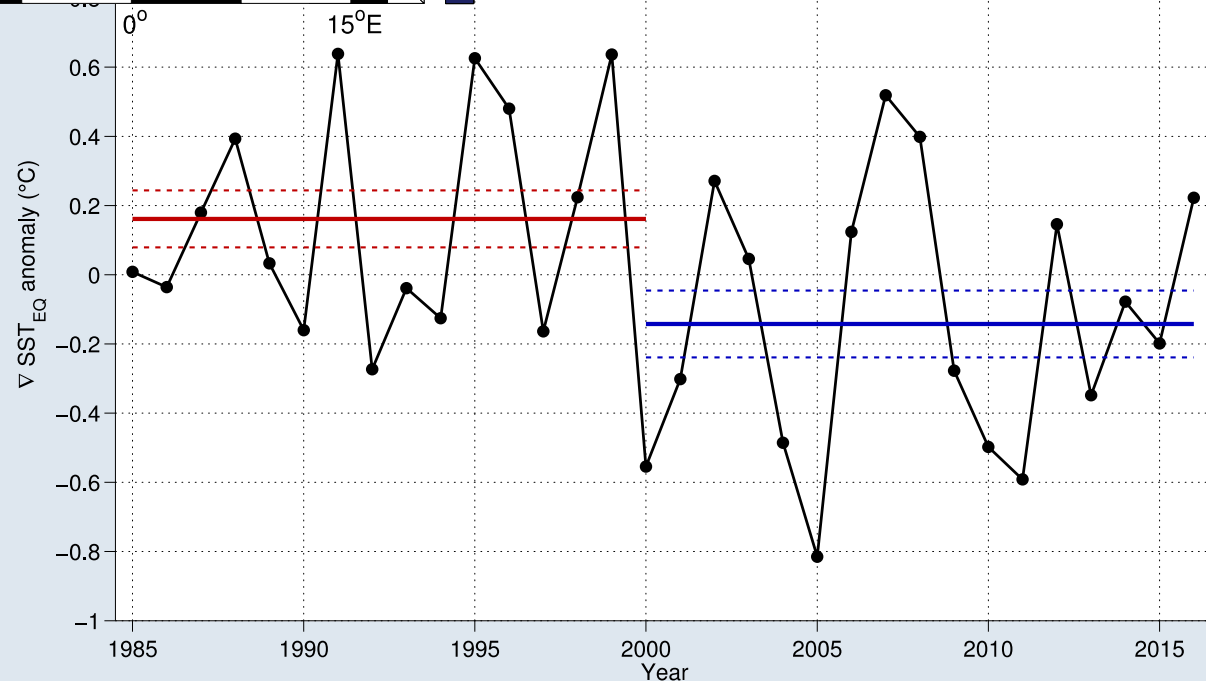
- ▶ Long-term warming trend in the equatorial and eastern tropical Atlantic
- ▶ Cooling during the last decade or so

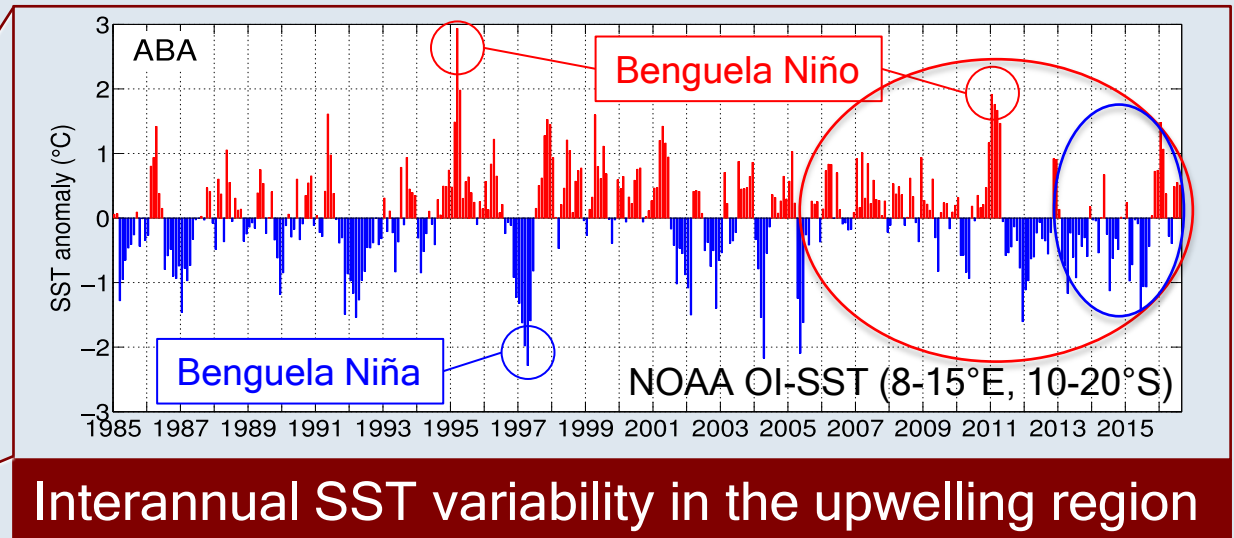
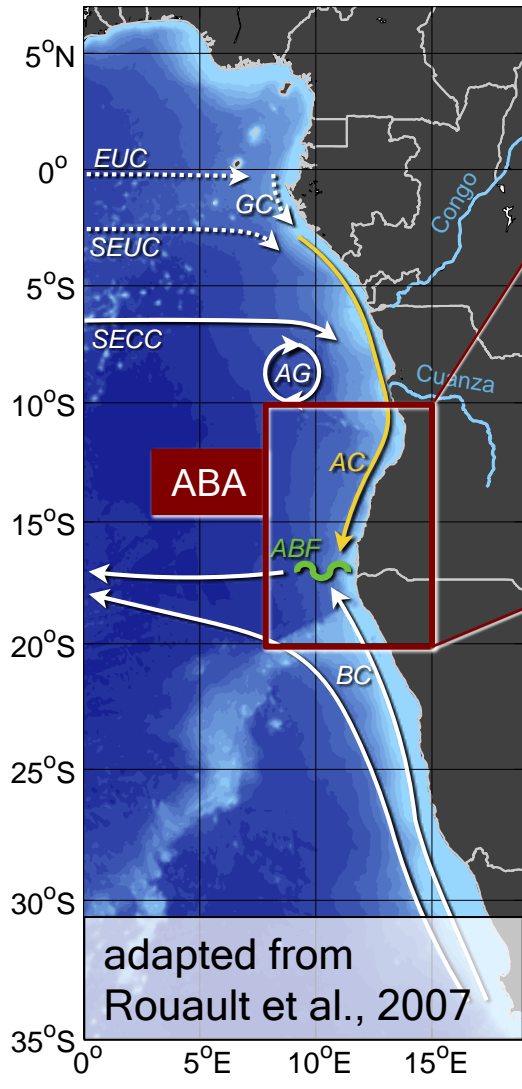


1995 – 2016



- ▶ Long-term JJA SST trend reversed since about 2000
- ▶ JJA SST difference between eastern and western box

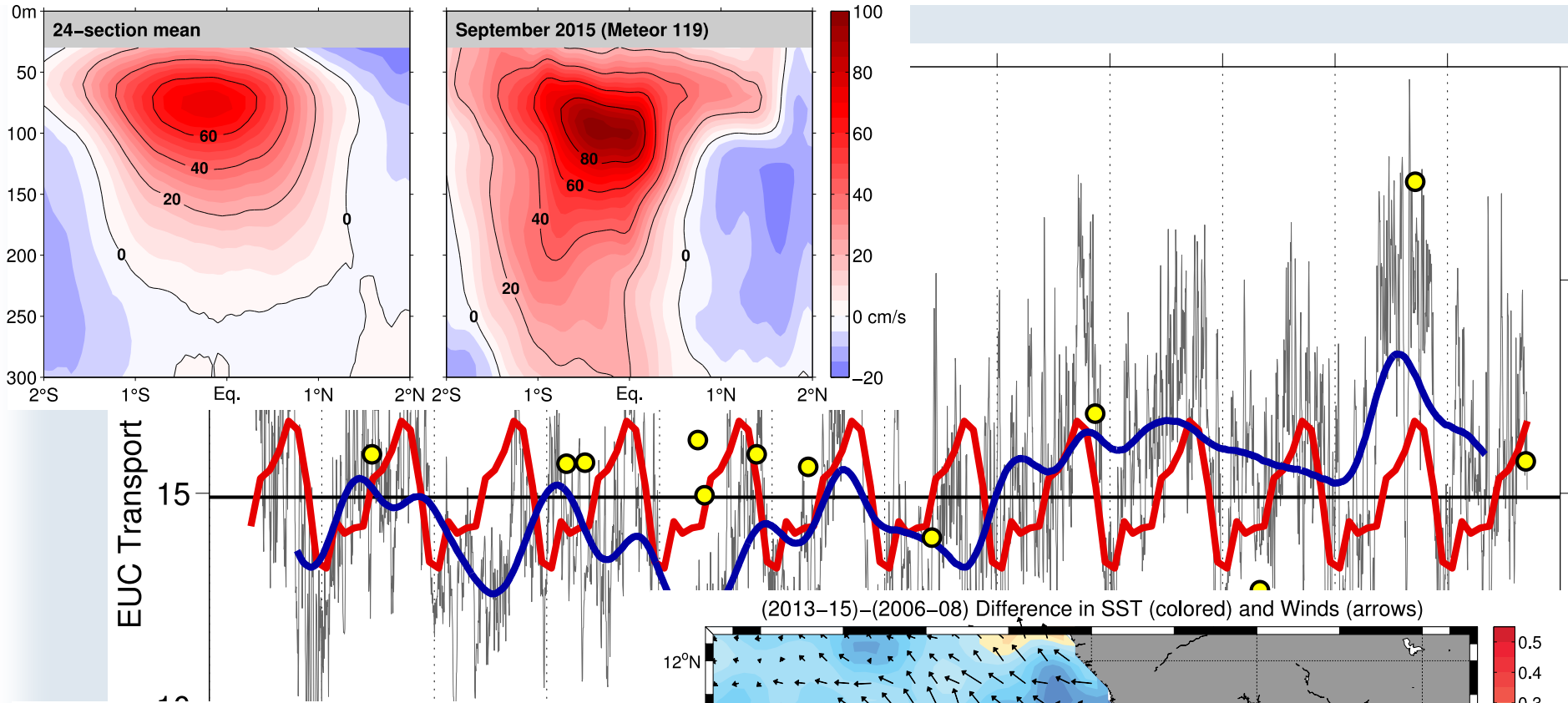




Interannual SST variability in the upwelling region

- ▶ Warm period in the late 1990ies
- ▶ Cold period after 2011 Benguela Niño
- ▶ Weaker warm event in 2015/2016

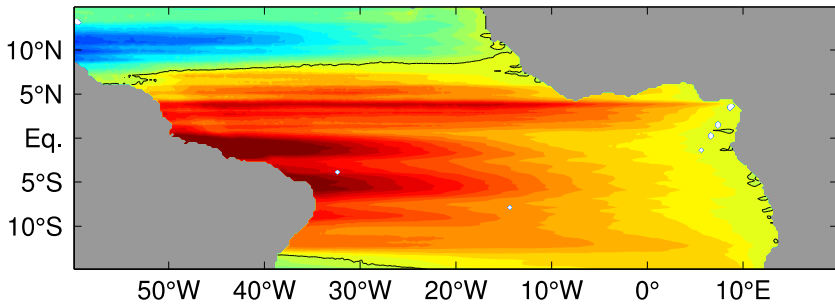
# Equatorial Undercurrent at 23°W



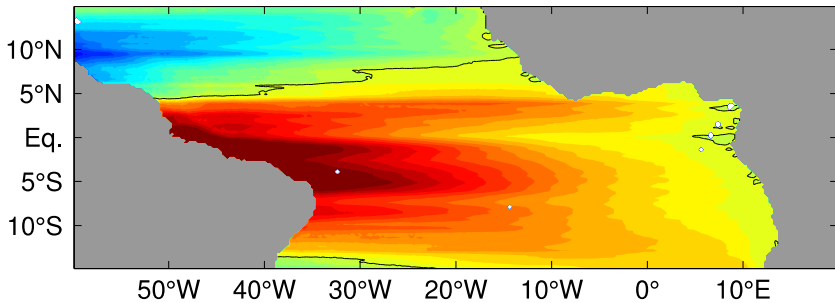
Rabe et al. (2008) showed Ekman divergence forcing of STC with impact on EUC

# Equatorial Undercurrent at 23°W

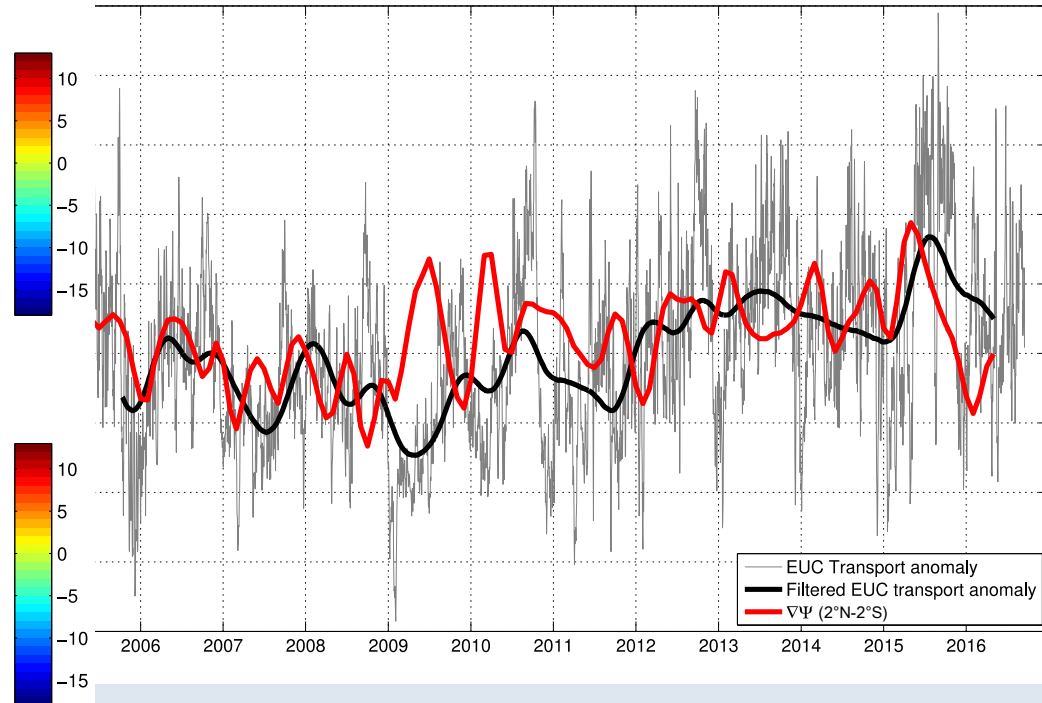
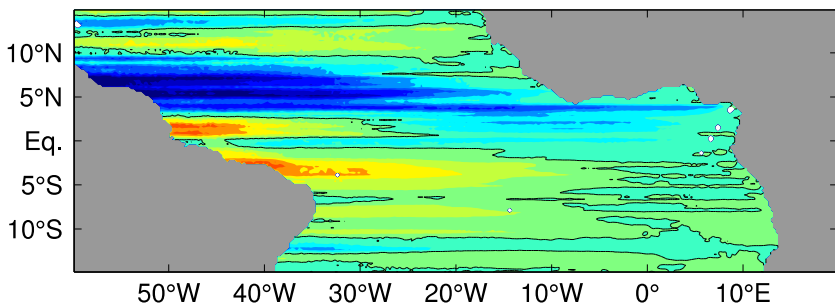
Mean  $\Psi$  2006–2008 (Sv)



Mean  $\Psi$  2013–2015 (Sv)



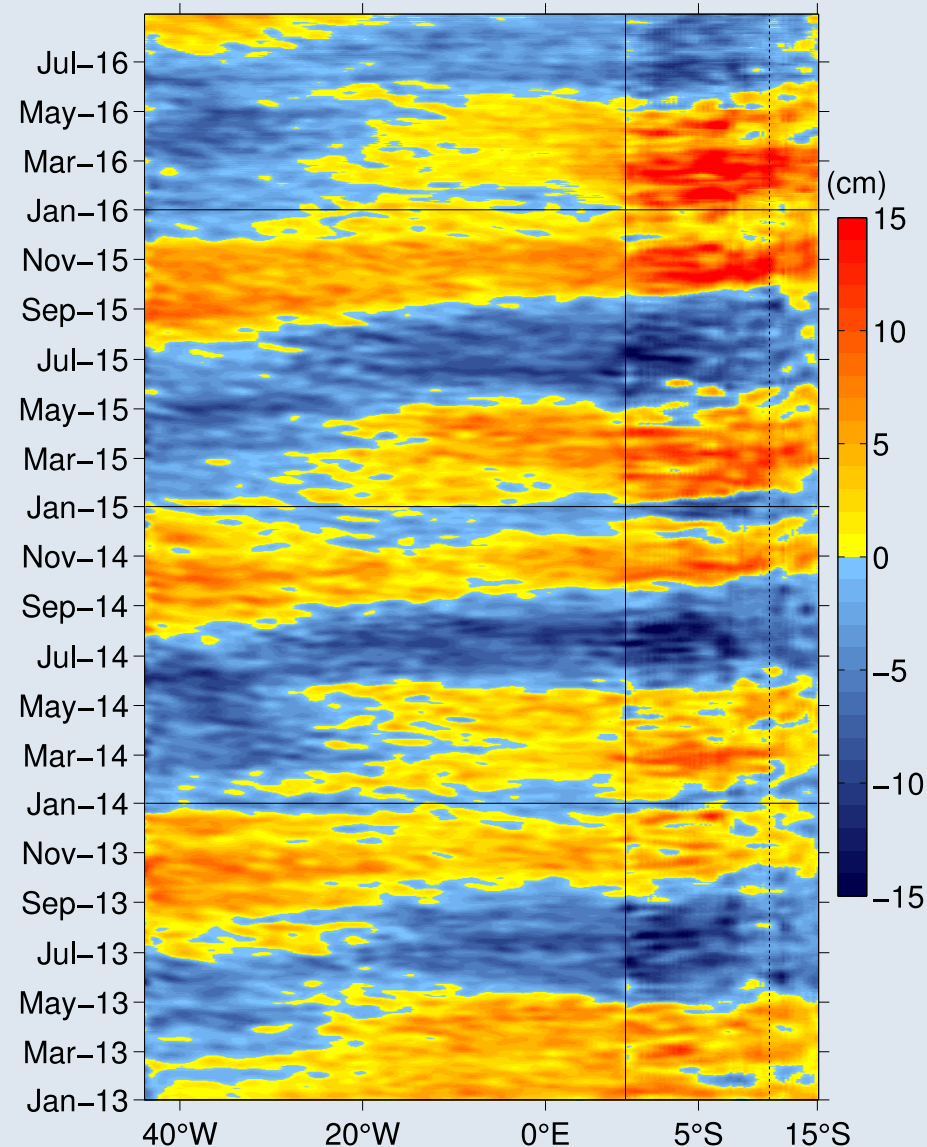
$\Psi_{(13-15)}$  MINUS  $\Psi_{(06-08)}$  (Sv)



- ▶ 5 yr to decadal changes of EUC strength are associated with changes of the Sverdrup streamfunction 2°N–2°S
- ▶ Strongest changes at the boundary between tropical and equatorial gyre

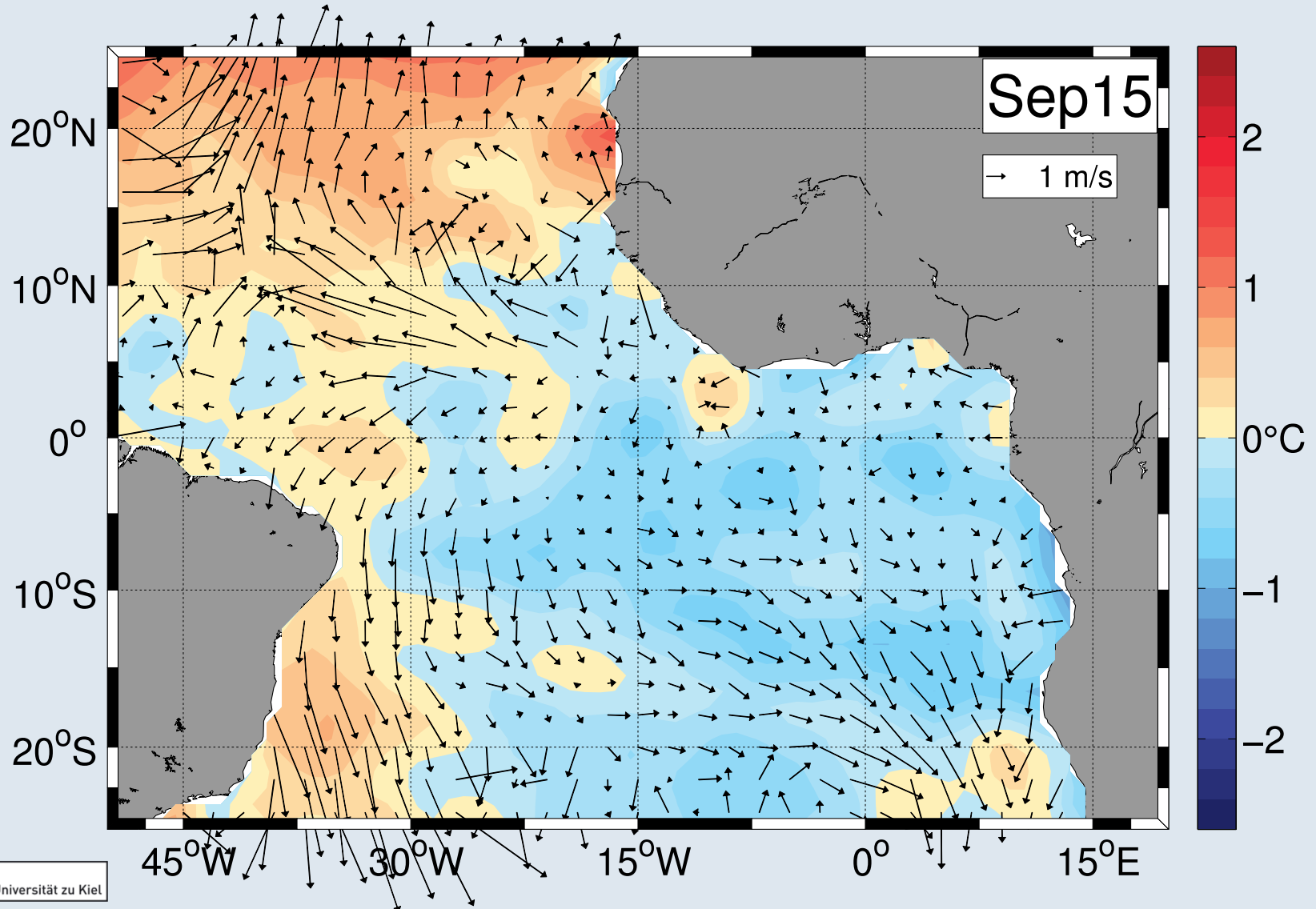


- ▶ SLA shows Kelvin wave propagation along the equator and further along the coast of Africa reaching ABA in Oct. 2015
- ▶ High SLA in Jan.-Mar. 2016 off West Africa seems not be related to equatorial dynamics

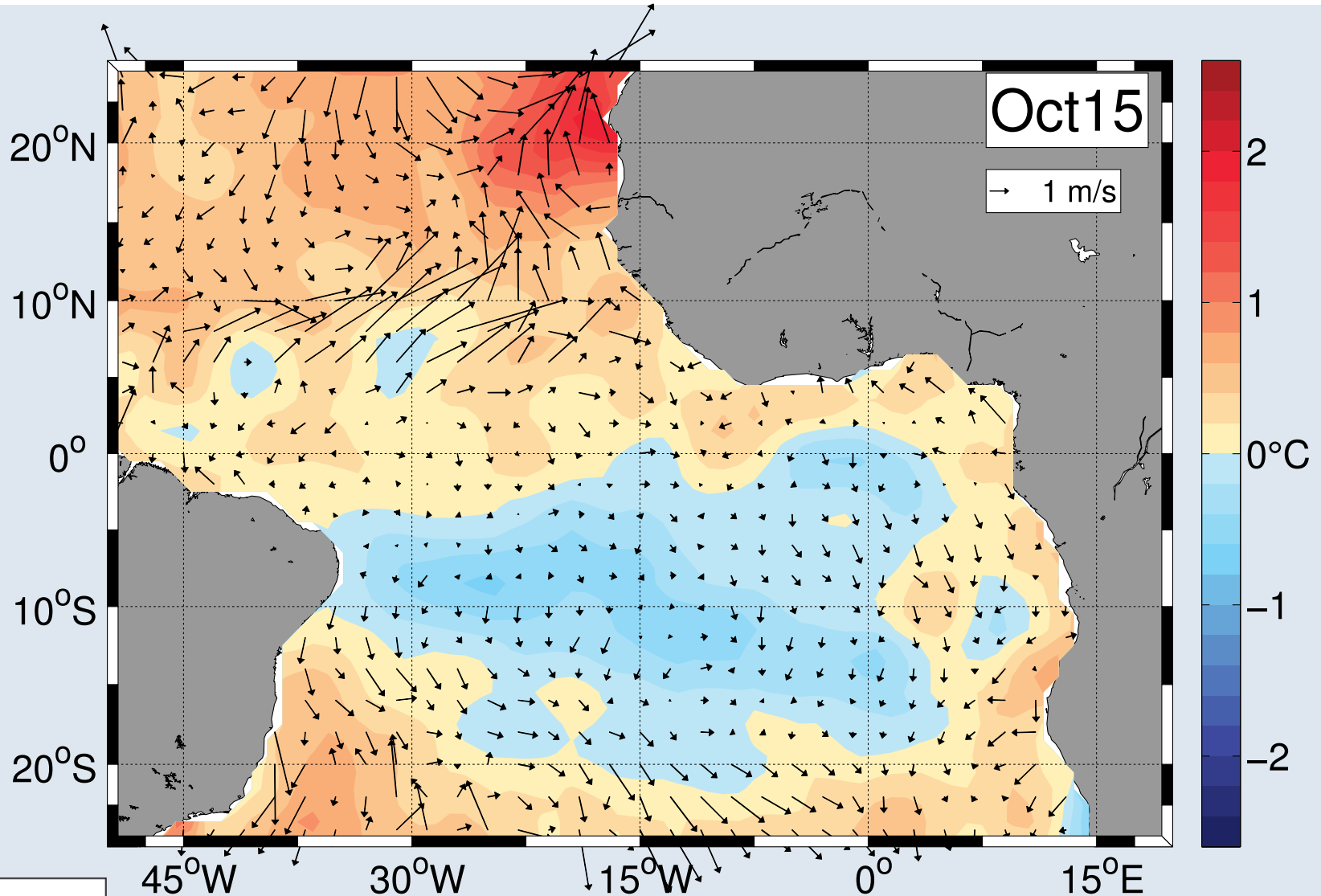




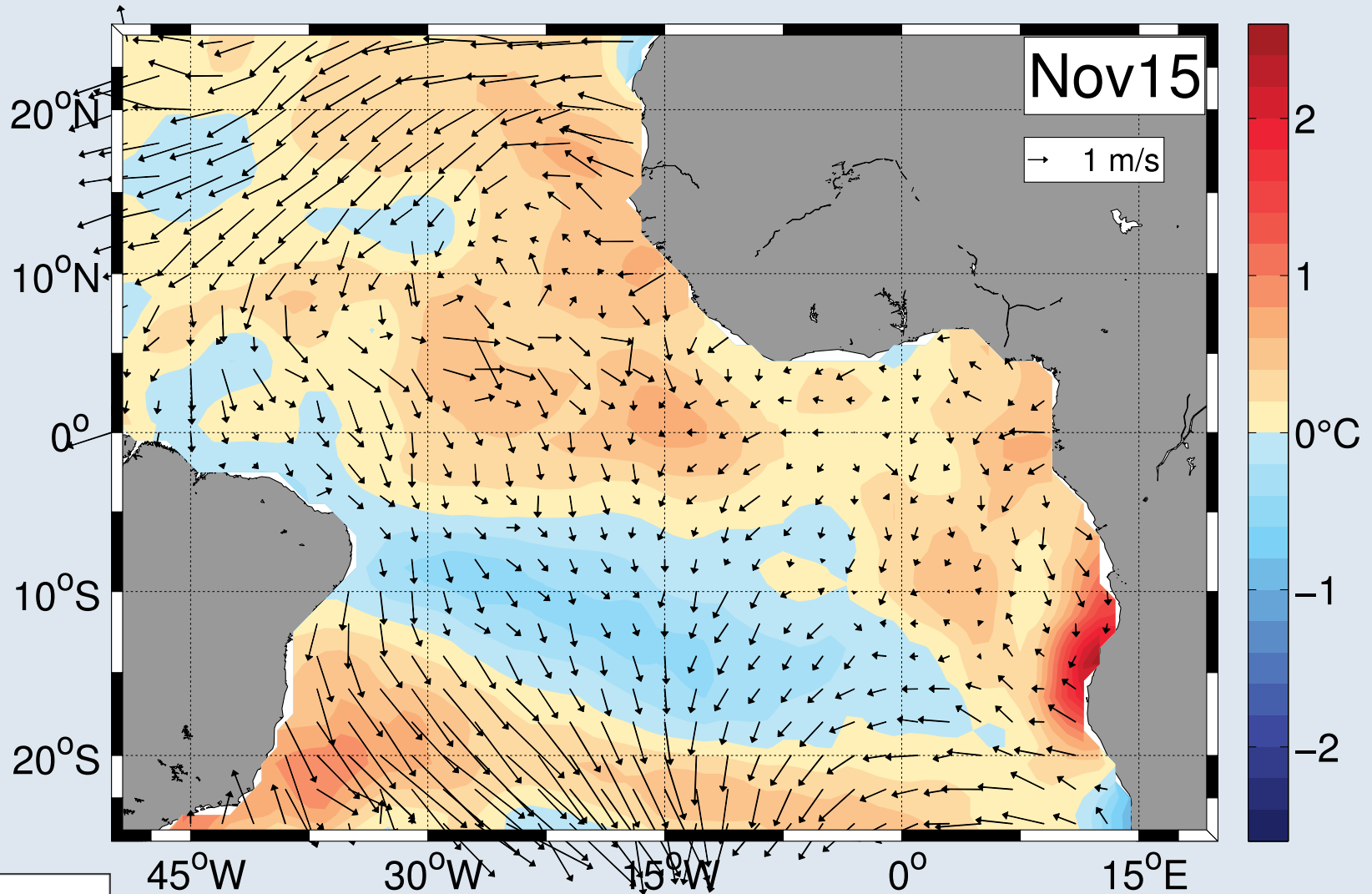
# SST & Wind during 2015/16



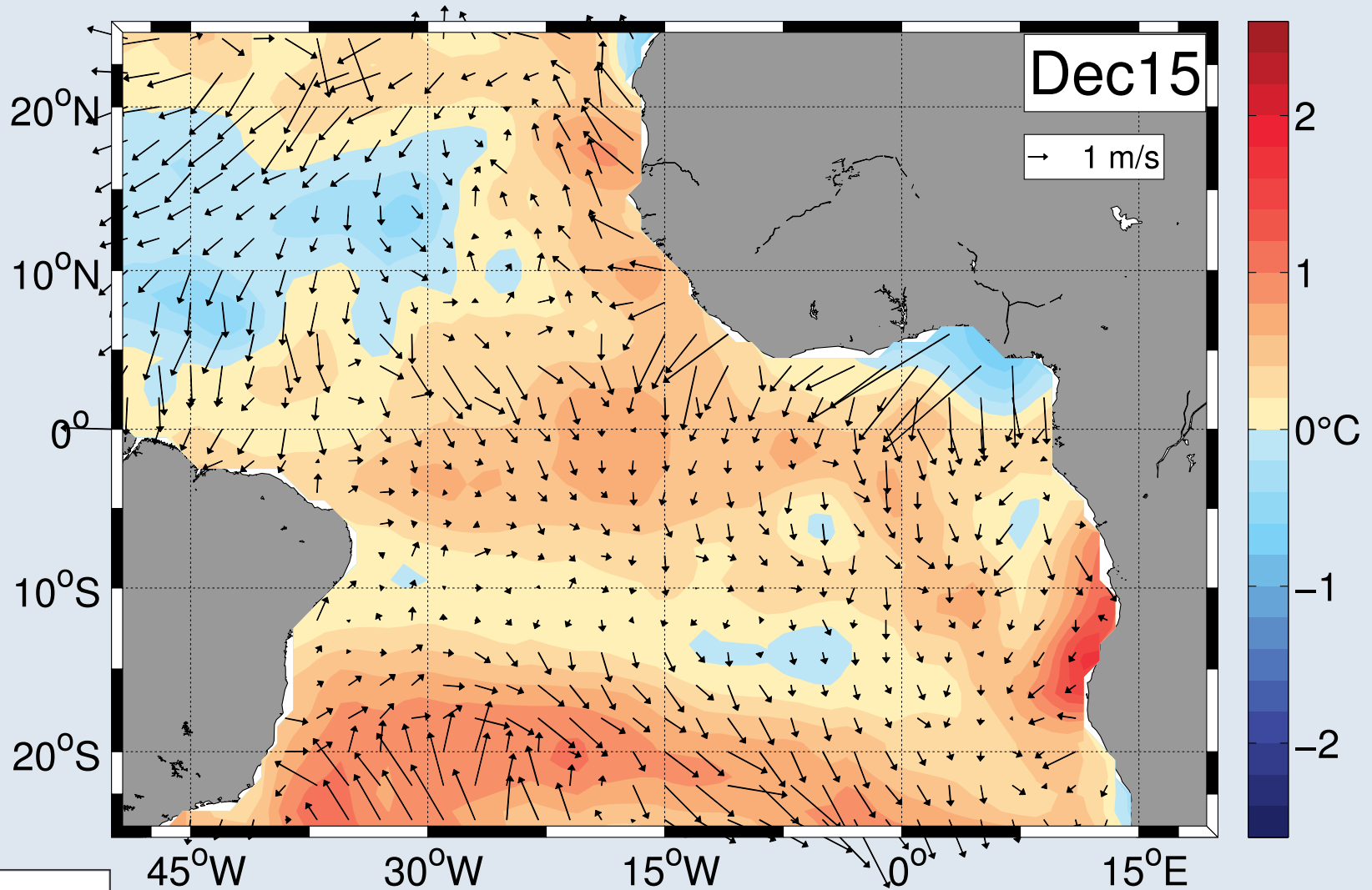
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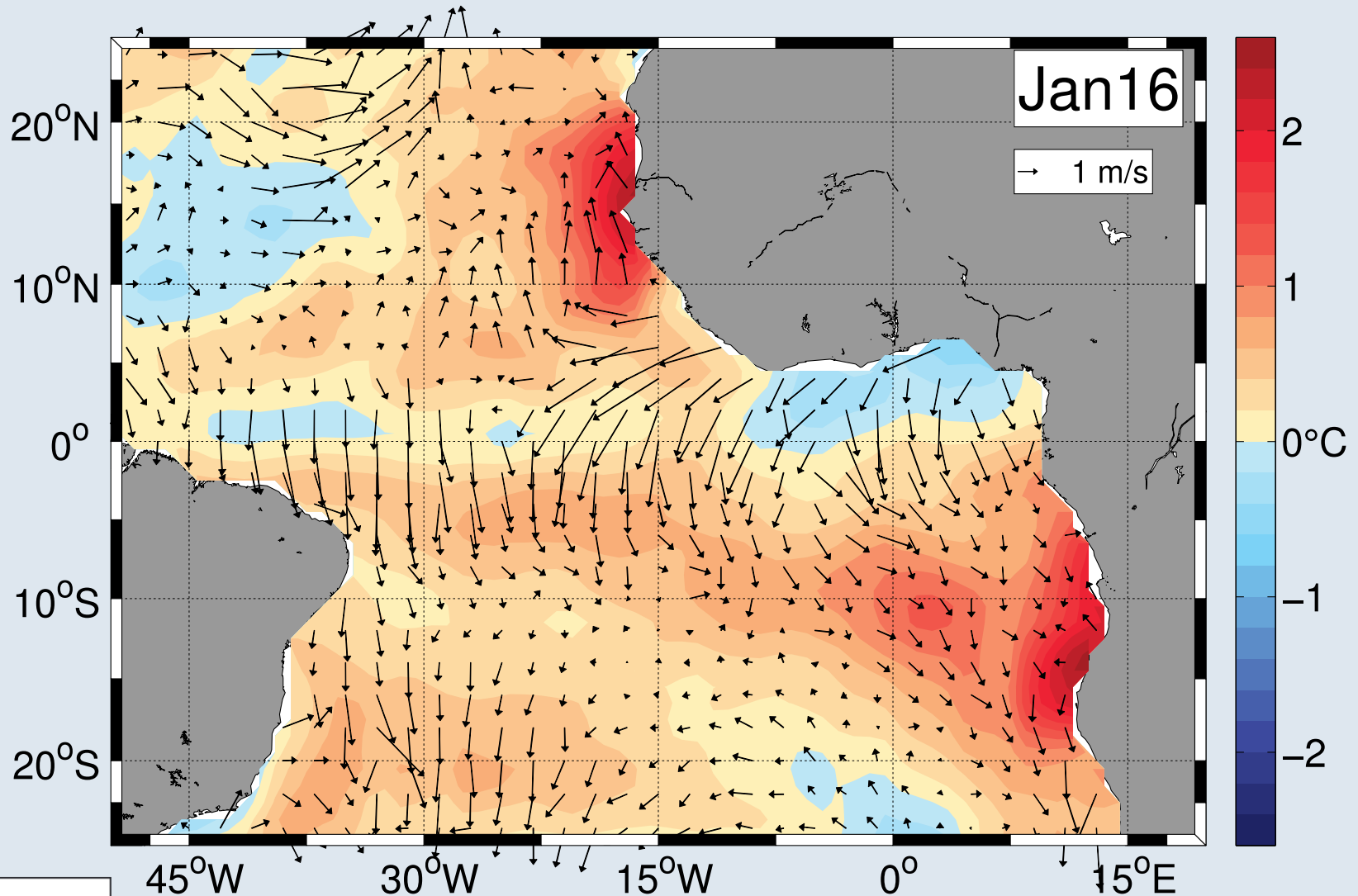
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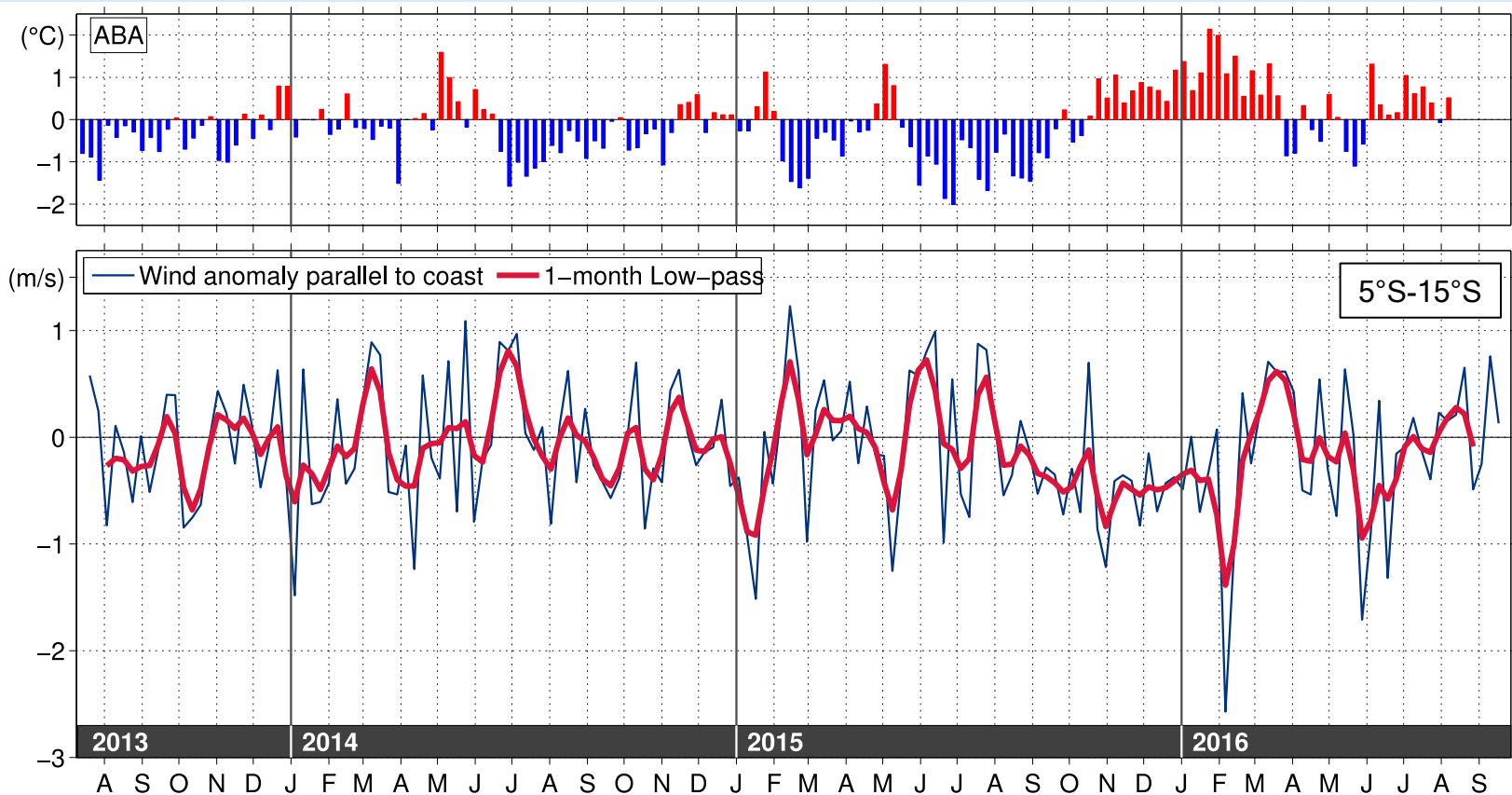


# SST & Wind during 2015/16



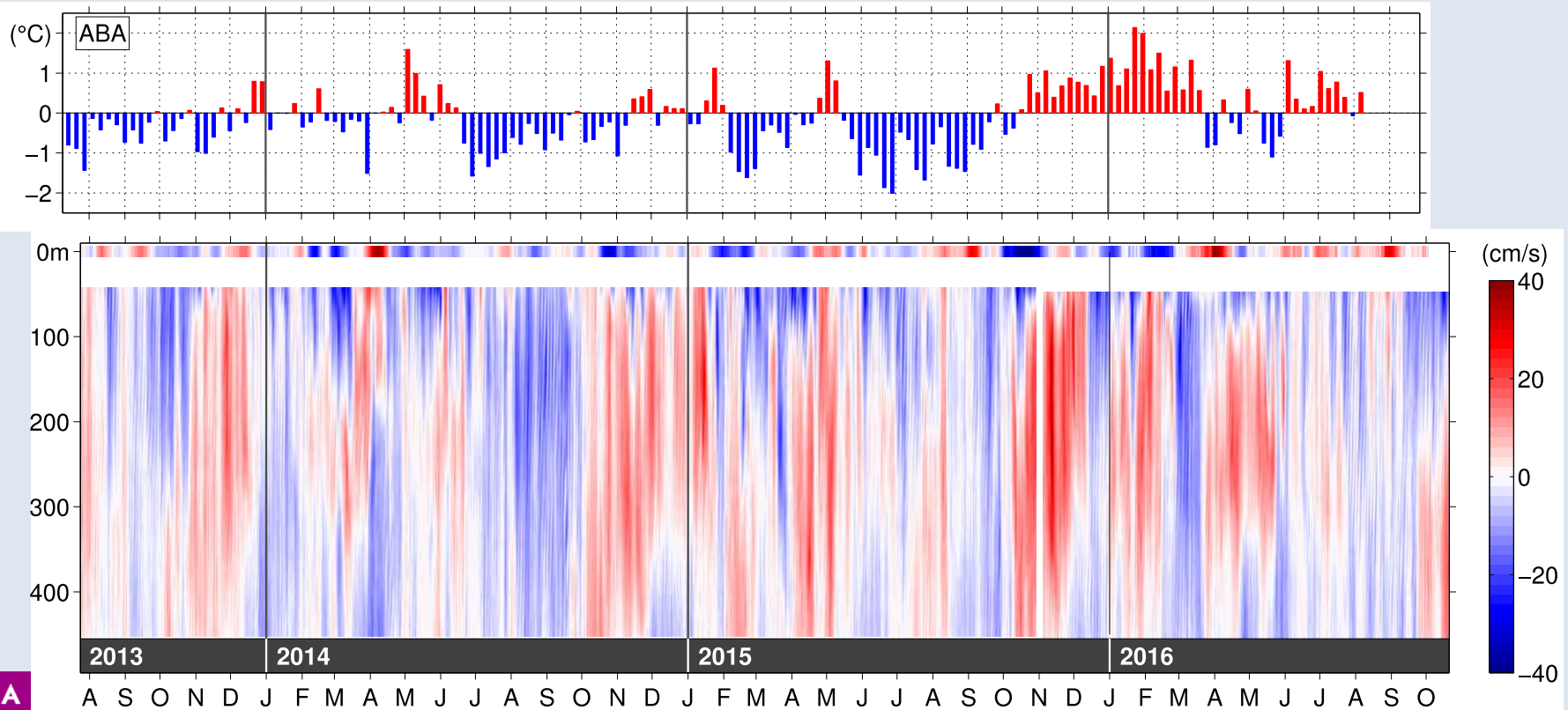
# Alongshore Wind Forcing

- ▶ With the onset of warm event persistent southward wind anomalies until Feb. 2016
- ▶ Wind reversal in Mar. 2016 terminates the event



# Angola Current at 11°S

- ▶ Dominantly southward geostrophic surface flow from Oct. 2015 to Feb. 2016
- ▶ Below strong intraseasonal fluctuations from mooring data



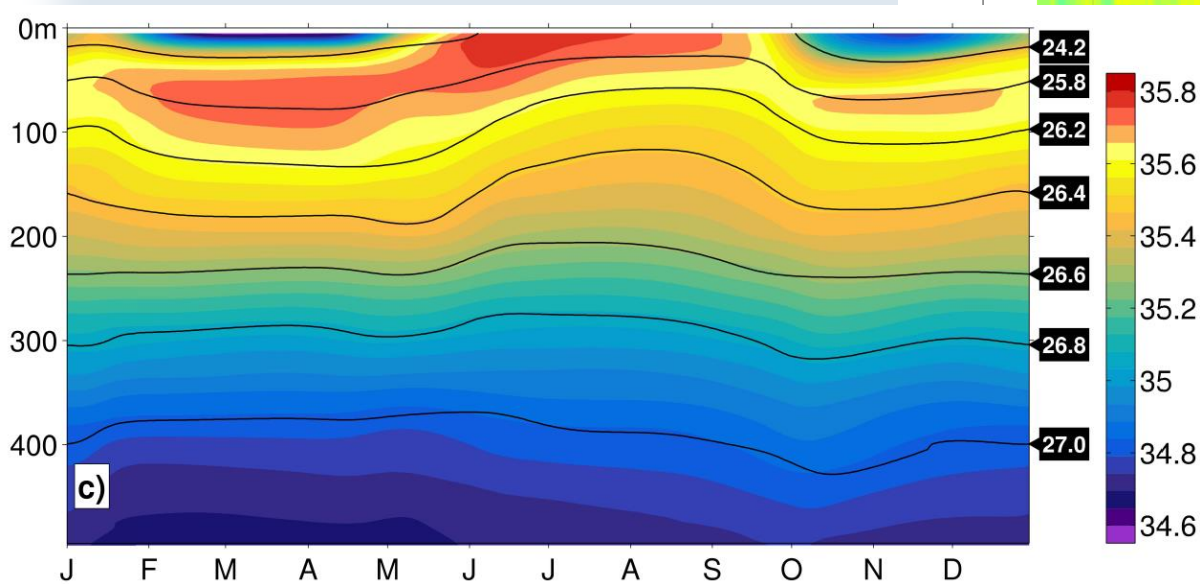
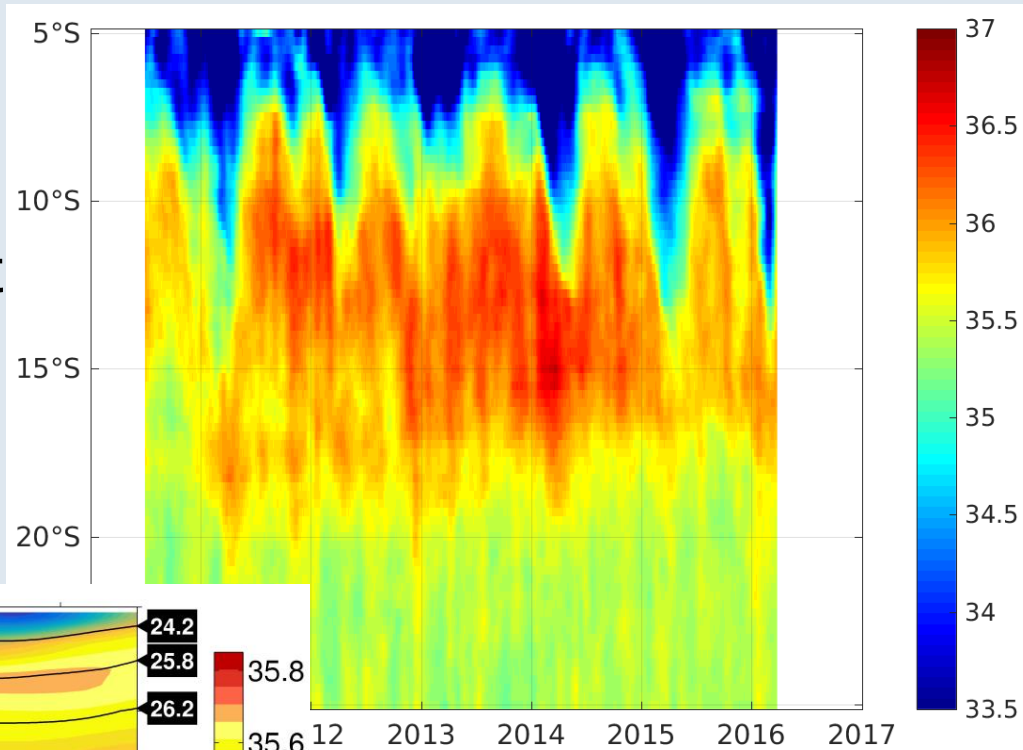


- ▶ Cooling of the equatorial and eastern South Atlantic during the last decade associated with wind stress changes (STC & Sverdrup)
- ▶ Warm event in Oct. 2015 to Feb. 2016 initiated by Kelvin wave propagation in Sep./Oct. 2015
- ▶ Southward wind anomalies along the Angolan coast enhanced warm anomaly
- ▶ Warm event terminated by wind reversal in March
- ▶ Surface flow at  $11^{\circ}\text{S}$  mostly southward; below strong intraseasonal variability

- ▶ What forces the strong equatorial Kelvin wave: weak wind anomalies along the equator, wind curl north of the equator?
- ▶ Does ocean-atmosphere interaction play a role in establishing the southward wind anomalies along the Angolan coast?
- ▶ What forces strong intraseasonal variability of the Angola Current and how is it related to the warm event?

# Sea Surface Salinity

- ▶ SMOS SSS east of 8°E: freshwater anomaly propagates farthest south during 2015/16 warm event
- ▶ Data provided by Meike Sena Martins, IfM, University Hamburg



- ▶ Climatological salinity distribution at 11°S from Kopte et al., submitted