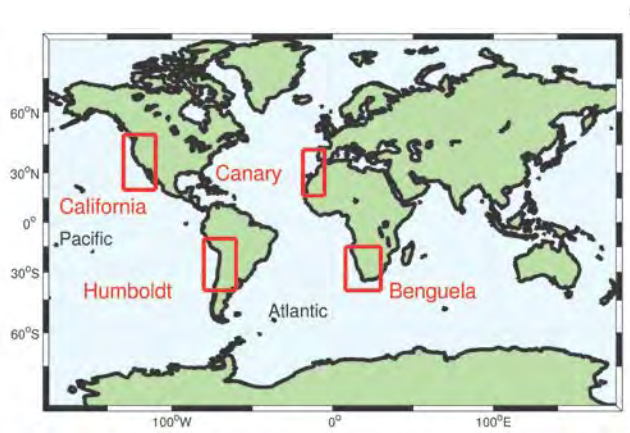
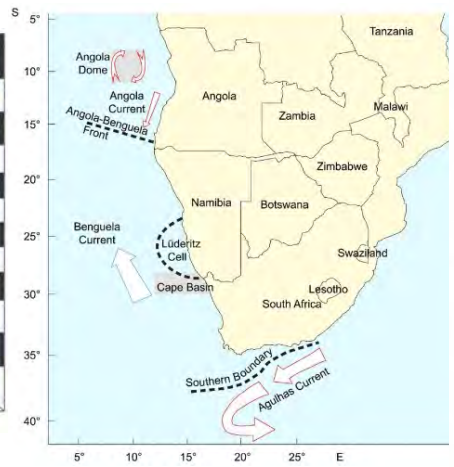
Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

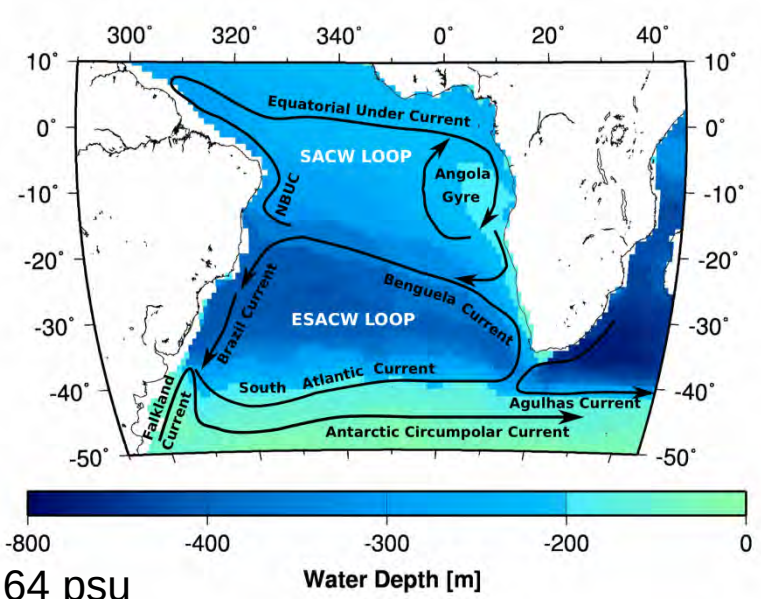
Nele Tim, E. Zorita, F. U. Schwarzkopf, S. Rühs, K.-C. Emeis, a. Biastoch

Origin and pathways of the central water masses in the Benguela upwelling system and the impact of the Agulhas leakage

Benguela Upwelling System





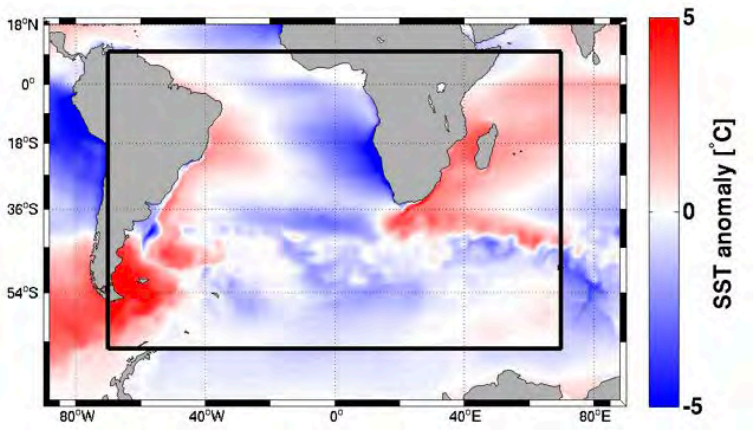


- South Atlantic Central Water (SACW):
  - Temperature: 8.0 – 16.0 °C, Salinity: 34.72 – 35.64 psu
- Eastern South Atlantic Central Water (ESACW):
  - Temperature: 5.95 – 14.41 °C, Salinity: 34.41 – 35.30 psu

Data and Method

Data: INALT20 (INALT20.L46-KFS044)

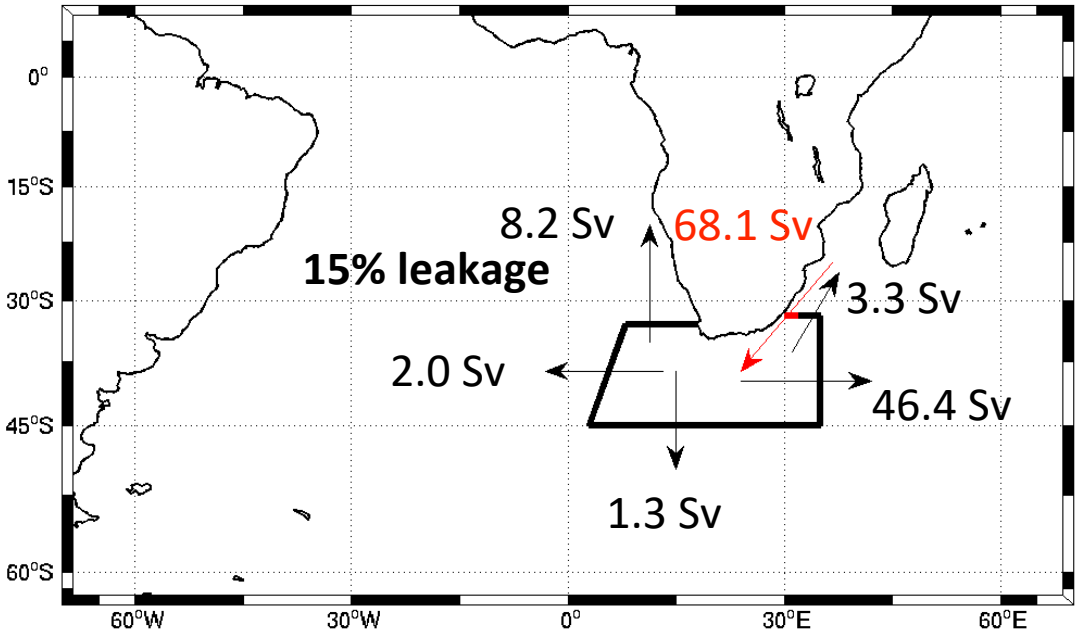
- Ocean-only NEMO model configuration
- 1/20° nest in 1/4° base model (ORCA025)
- 4.5 km resolution at 35°S
- Hindcast (1958-2009)
- COREv2 reanalysis as atmospheric forcing



Software: ARIANE

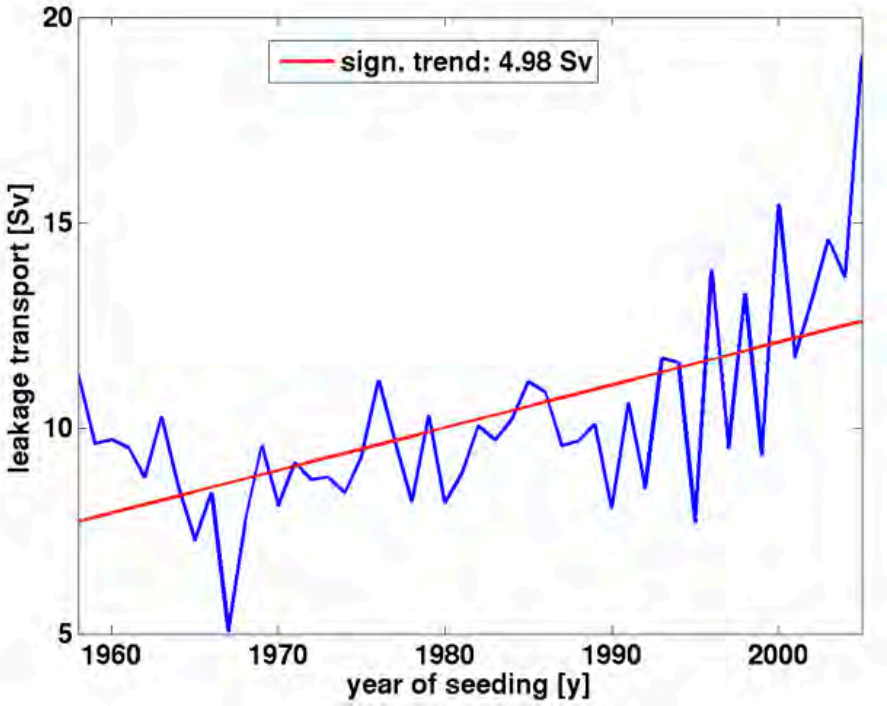
- Computational tool (FORTRAN 90/95) for offline calculation of 3D streamlines in the output velocity field of an OGCMs

Agulhas Current/Leakage

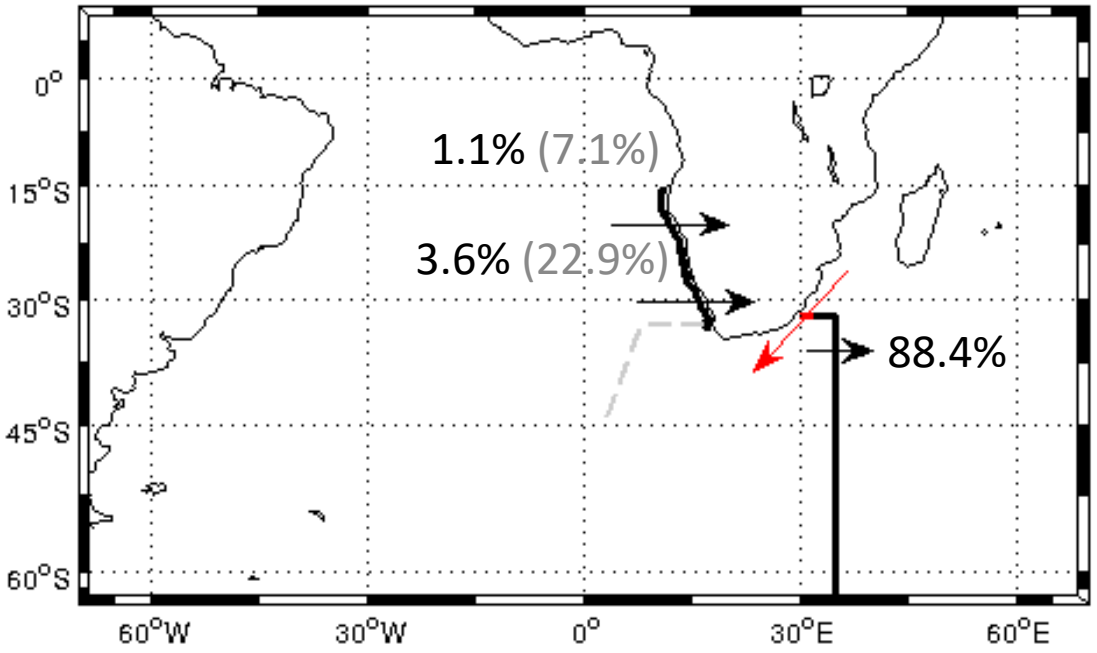


Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

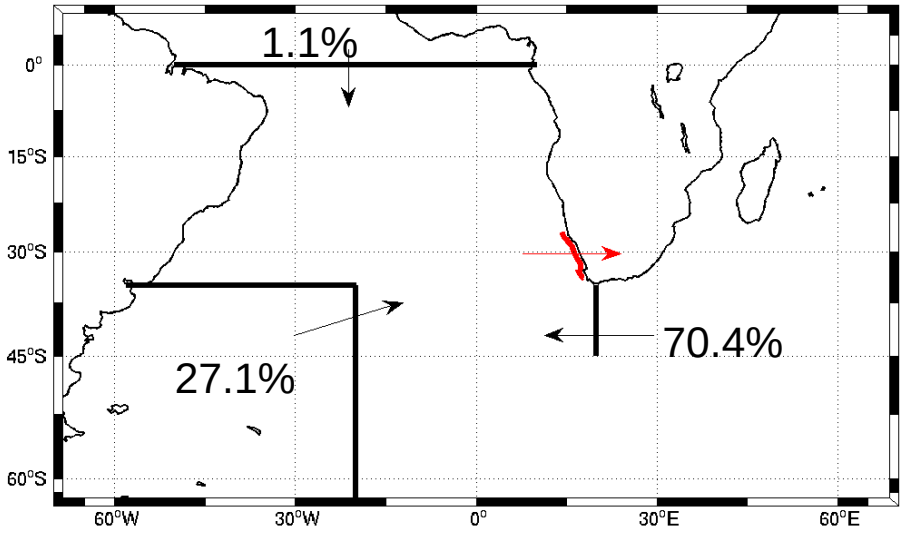
Agulhas Current/Leakage

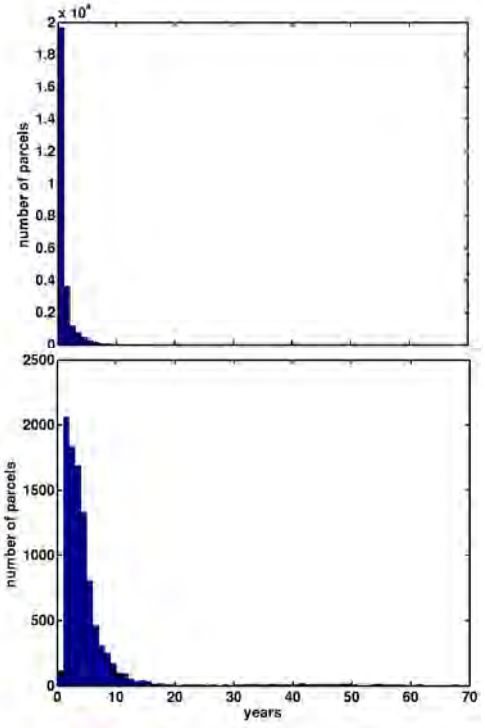


Agulhas Current/Leakage



South Benguela

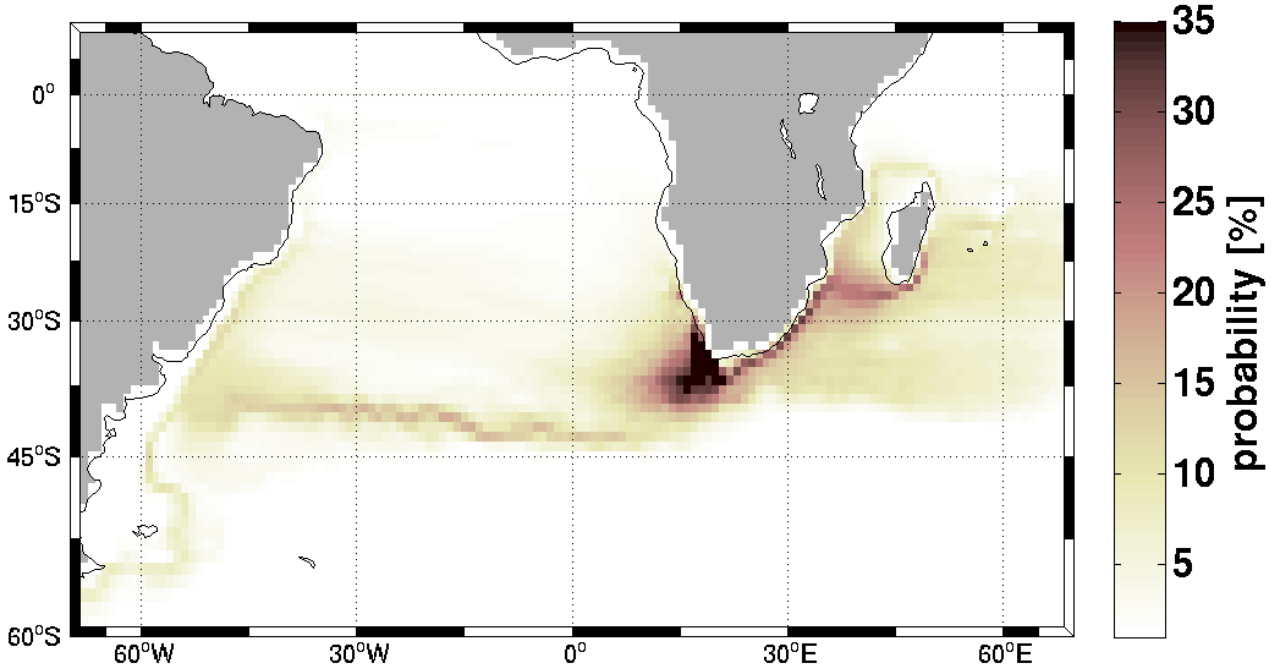




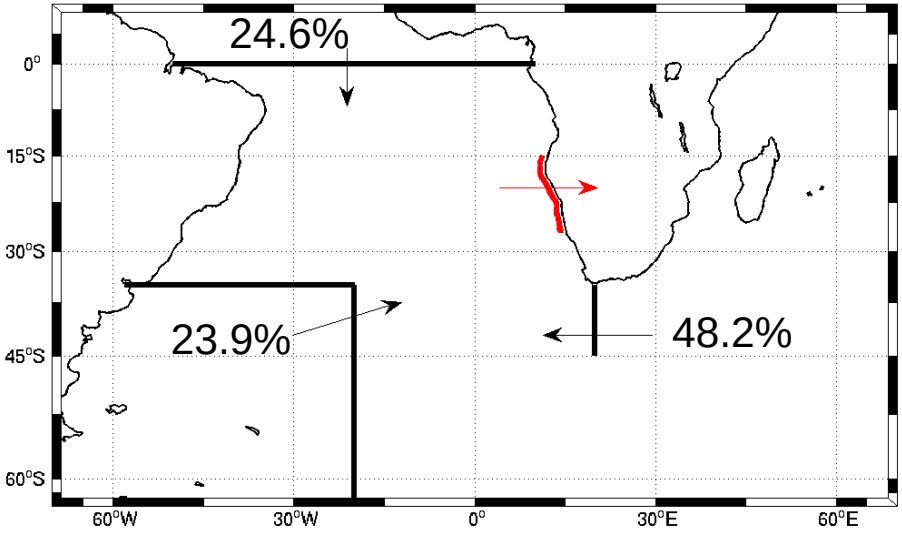
Leakage:
Ø 1.4 years

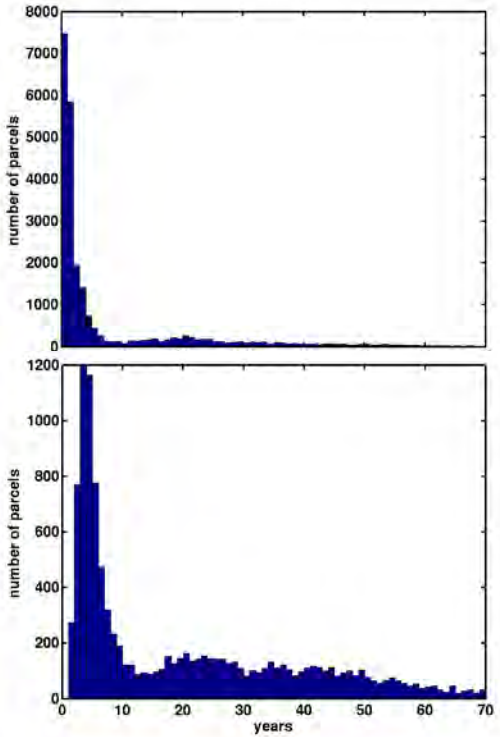
Formation:
Ø 6.4 years

South Benguela



North Benguela



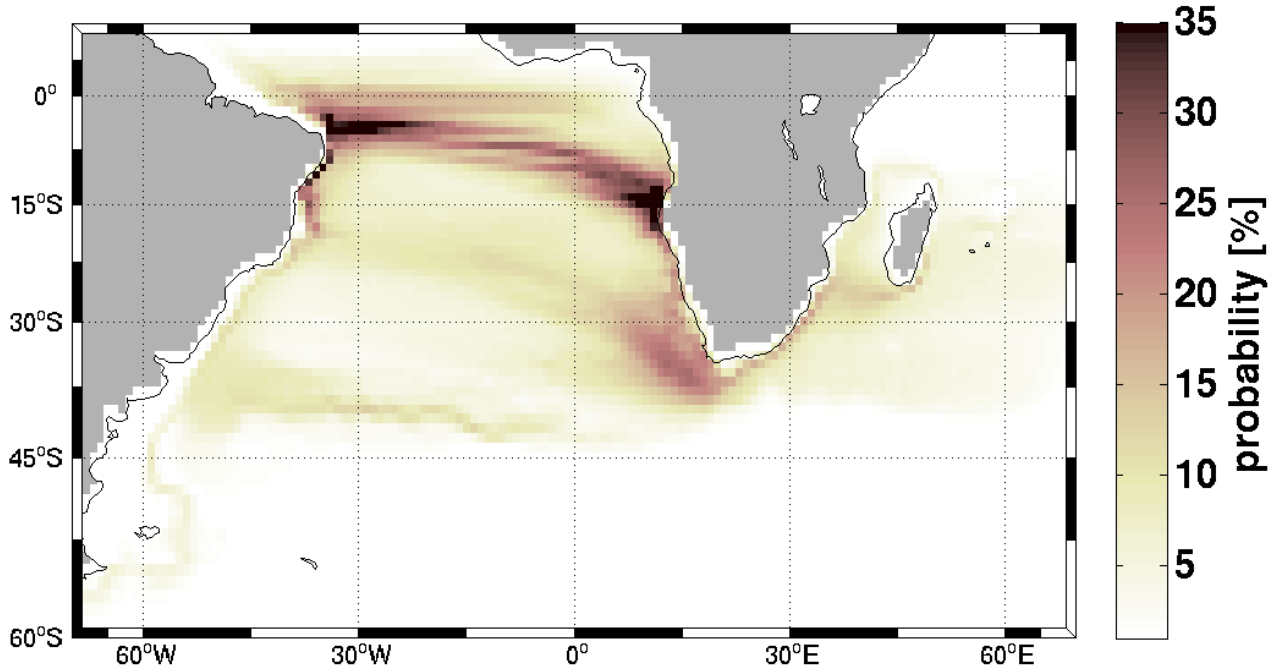


Leakage:
Ø 6.0 years

Formation:
Ø 16.4 years

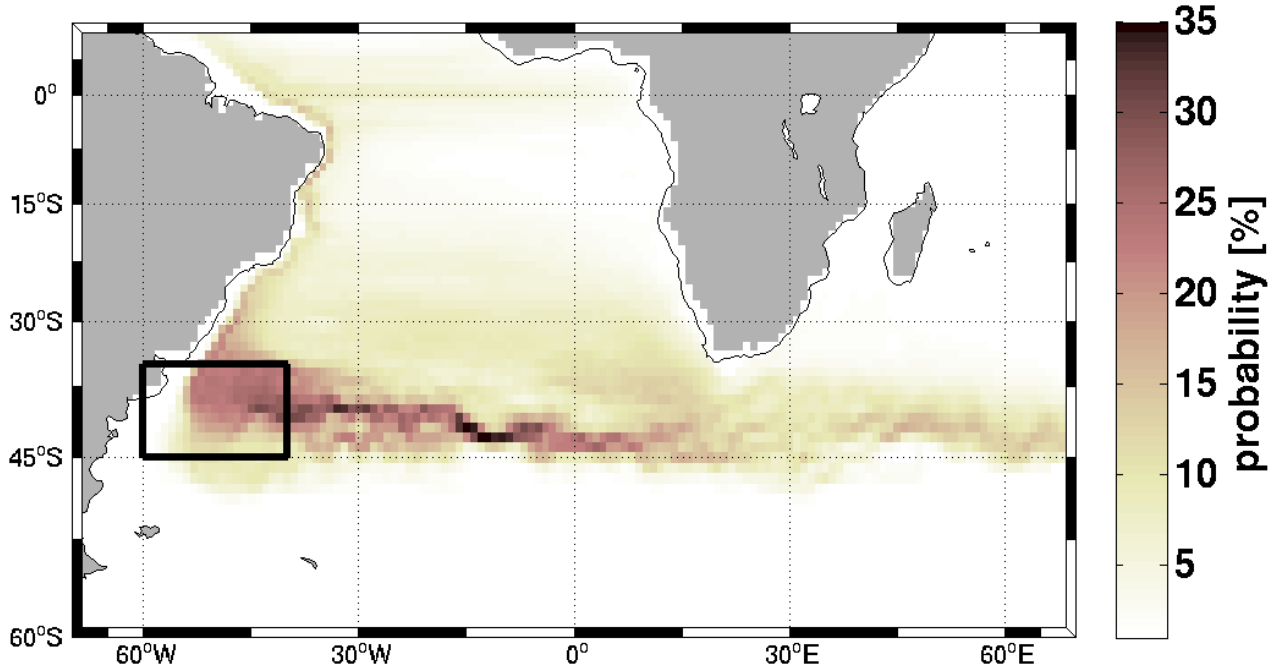
Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

North Benguela



Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

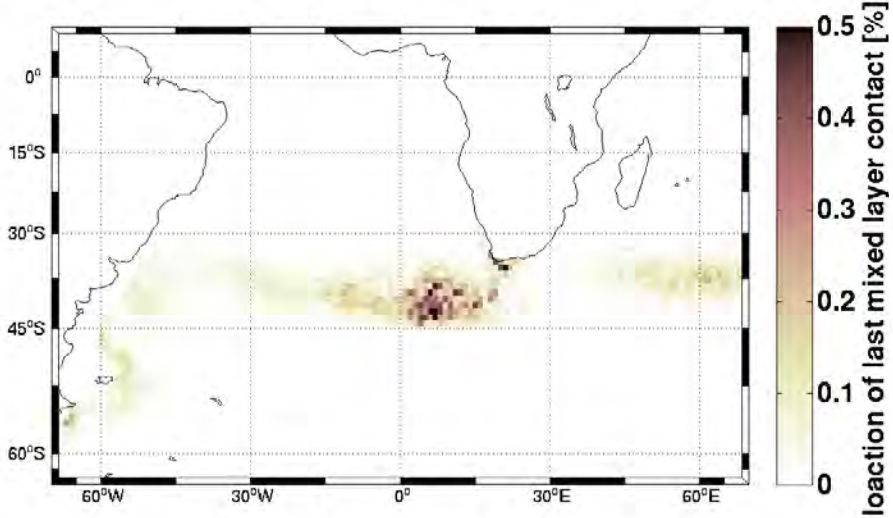
Brazil-Malvinas confluence



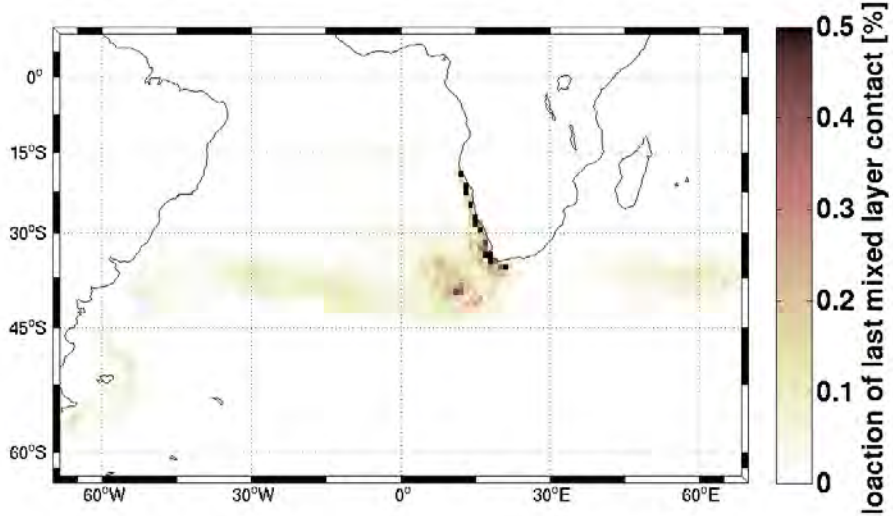
Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Age-last mixed layer contact

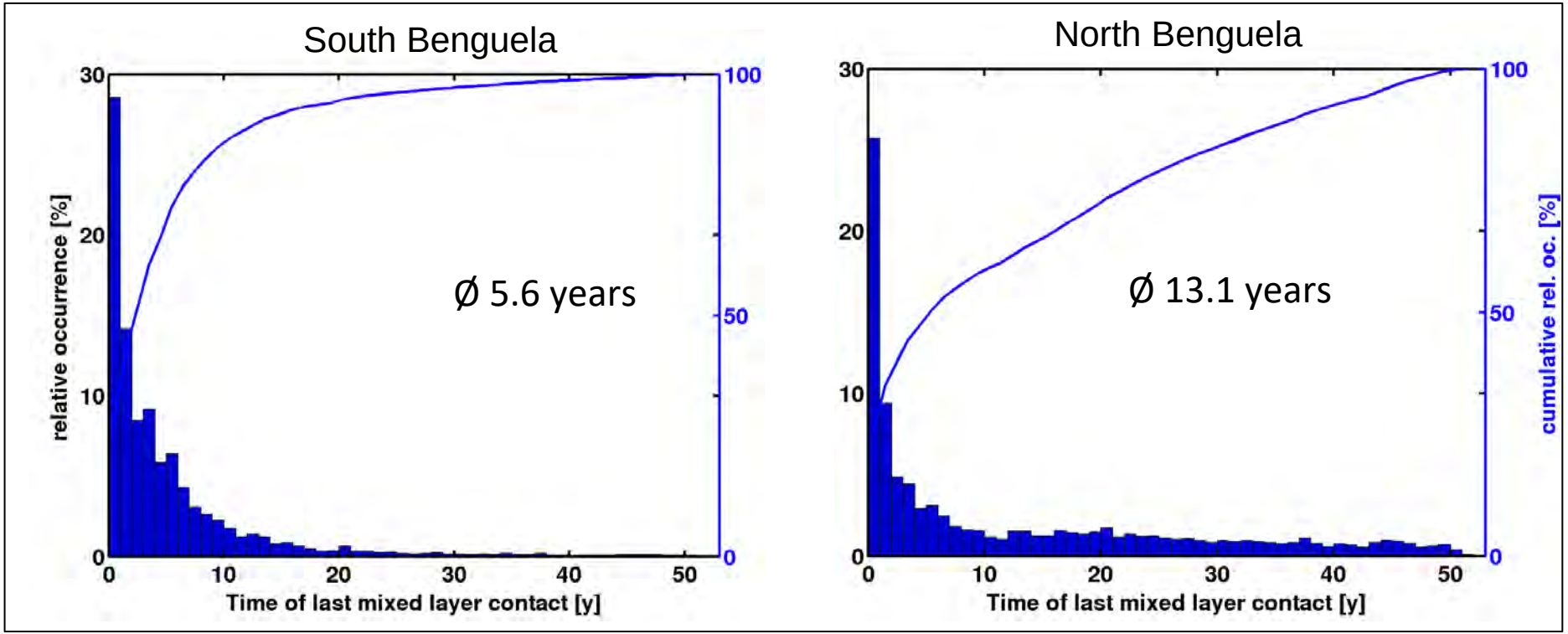
South Benguela



North Benguela



Age-last mixed layer contact



Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Summary

- 15% of the Agulhas Current continue in the Atlantic Ocean by passing the Agulhas leakage
- Large percentage of the Benguela water masses has its origin in the Agulhas Current
- A large fraction of the Formation water enters the Indian Ocean by the Antarctic Circumpolar Current, and only a smaller part flows directly equatorward with the Benguela Current
- North Benguela water mass takes a longer way from the Formation region and leakage through the equatorial current system
- North Benguela central water mass is older than South Benguela central water mass

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Thanks!

Paper submitted to Journal of Geophysical Research – Oceans:

N. Tim, E. Zorita, F. U. Schwarzkopf, S. Rühs, K.–C. Emeis, and A. Biastoch. *The impact of the Agulhas leakage on the central water masses in the Benguela upwelling system from a high–resolution ocean simulation.*