

NORTH TROPICAL ATLANTIC OCEAN CIRCULATION FROM ALTIMETRY AND ARAMIS DATA

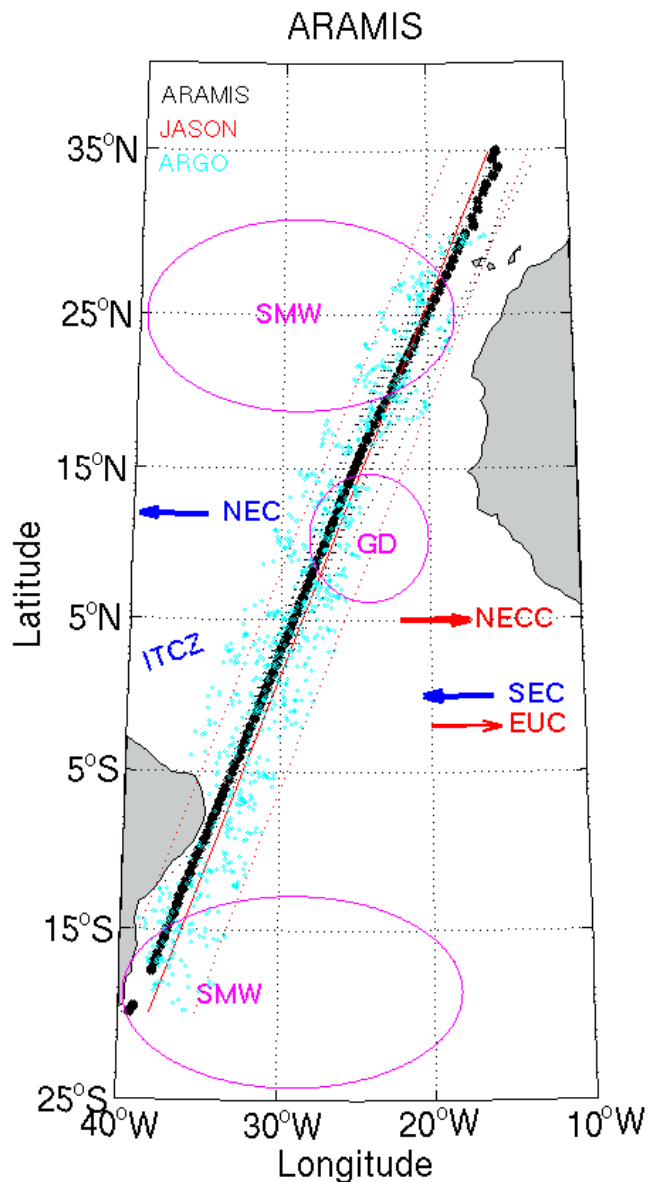
S. Arnault⁽¹⁾ and the ARAMIS Group

(1) LOCEAN/IPSL, Paris, France



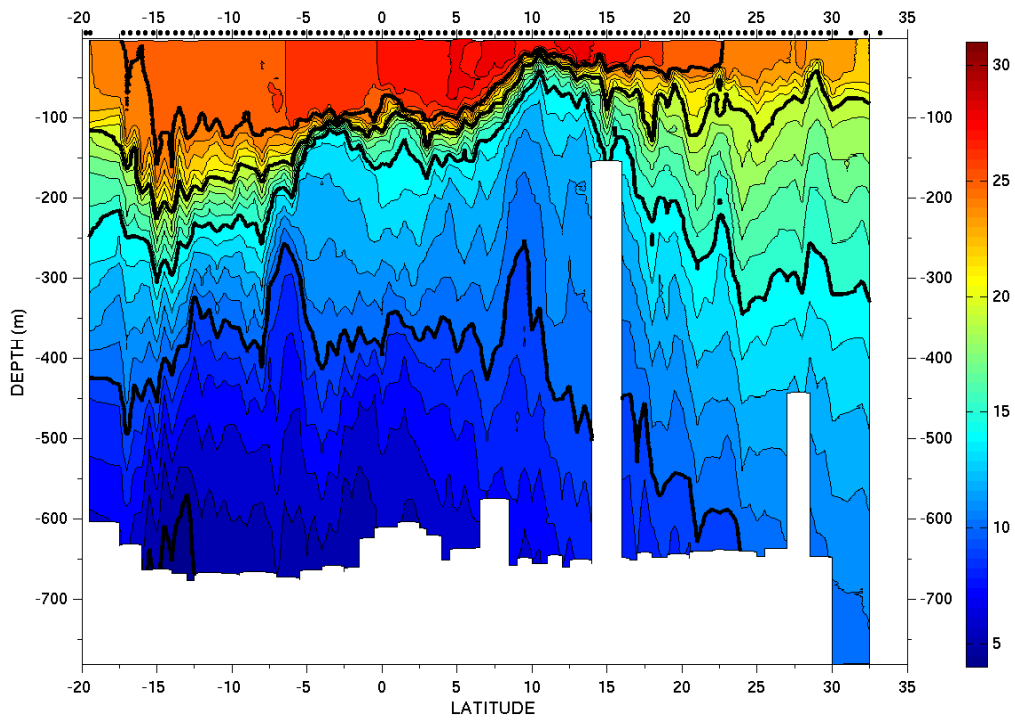
ARAMIS

Altimétrie sur un Rail Atlantique et Mesures In Situ

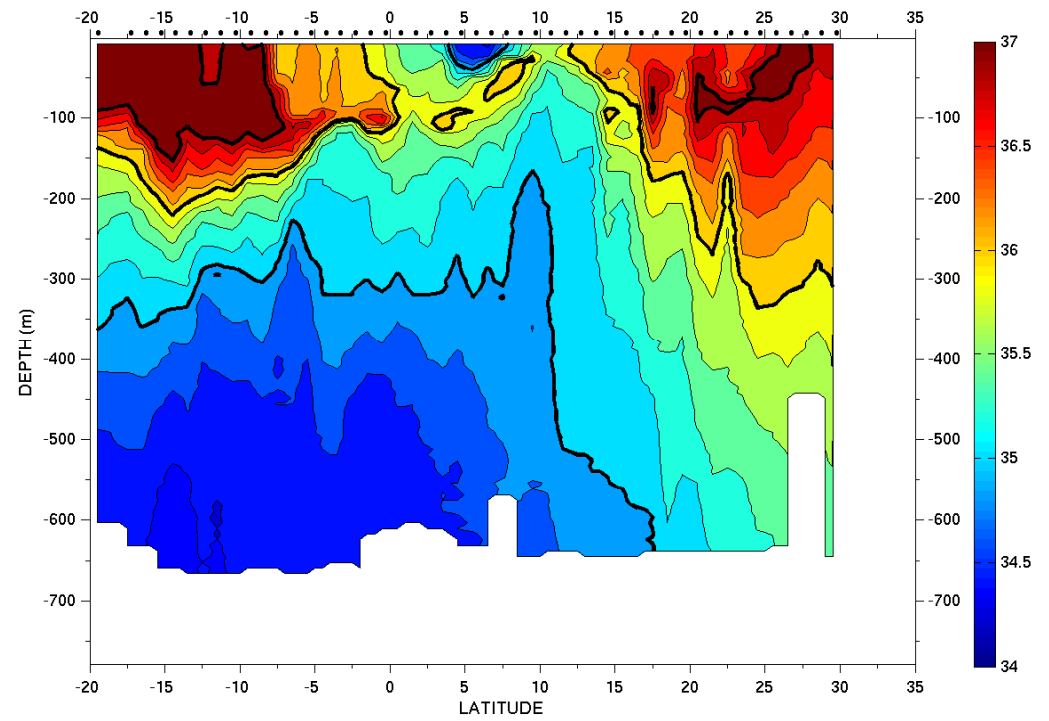


- CNES/IRD project to study the variability of
 - T, S, η in the Tropical Atlantic ocean
 - SMW
 - Barrier Layers
 - North Atlantic Circulation and Transports
- Shipline crossing main tropical Atlantic features: currents, ITCZ, SMW, GD
- Superimposed to a Jason1&2 track
- 2002-2008, boreal spring and fall
- T & S (XBT, XCTD, Argo), pCO₂

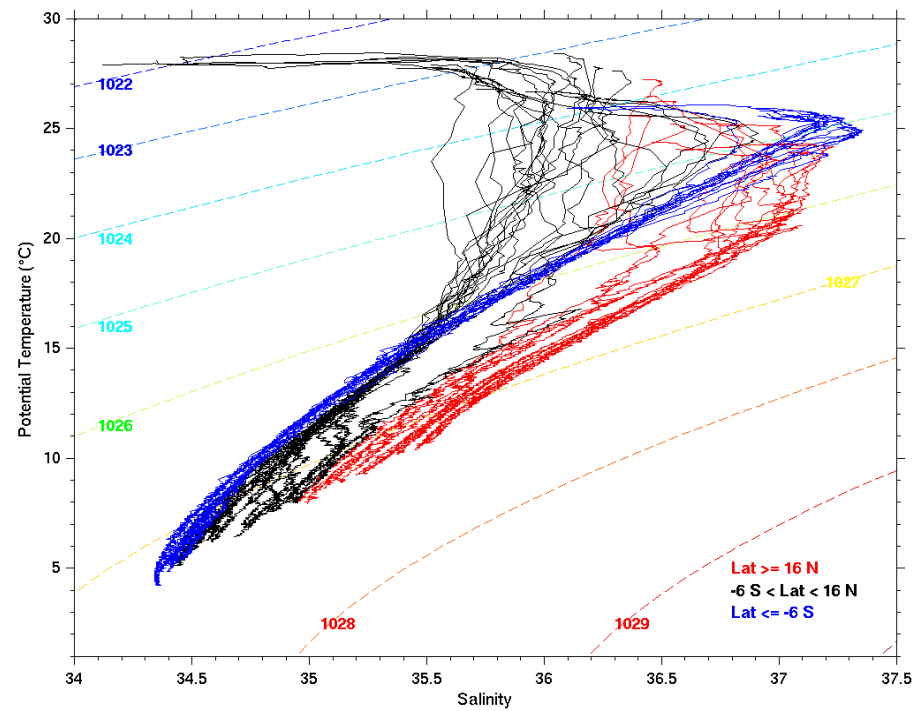
Temperature XBT XCTD ARAMIS11 September 2007



Salinity XCTD ARAMIS11 September 2007



Theta-S XCTD ARAMIS11 September 2007



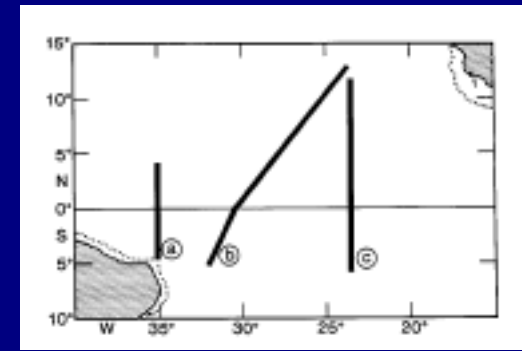
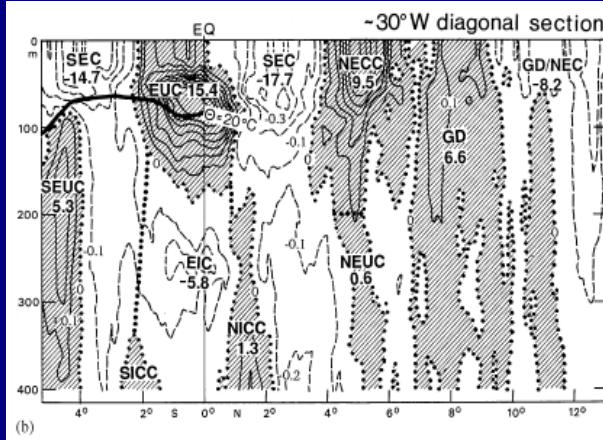
Picaut and Tournier, 1991; Lagerloef et al., 1999

$$f U_{\text{out}} = \delta h / dy \text{ off the Equator}$$

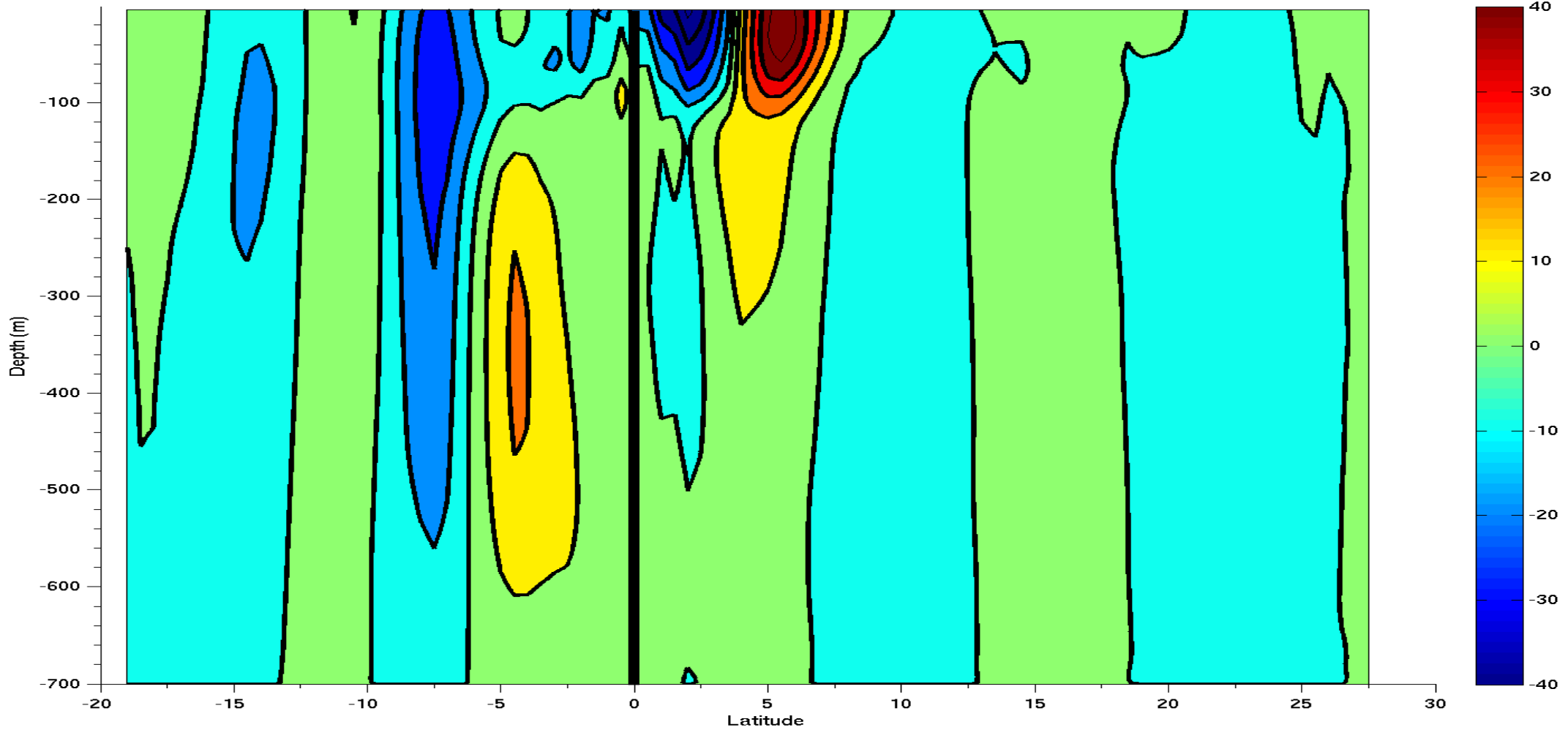
$$\beta U_{\text{eq}} = \delta^2 h / dy^2 \text{ for the equatorial region}$$

$$U = \alpha U_{\text{out}} + (1-\alpha) U_{\text{eq}} \quad \text{with a } 2.2^\circ \text{ latitudinal scale}$$

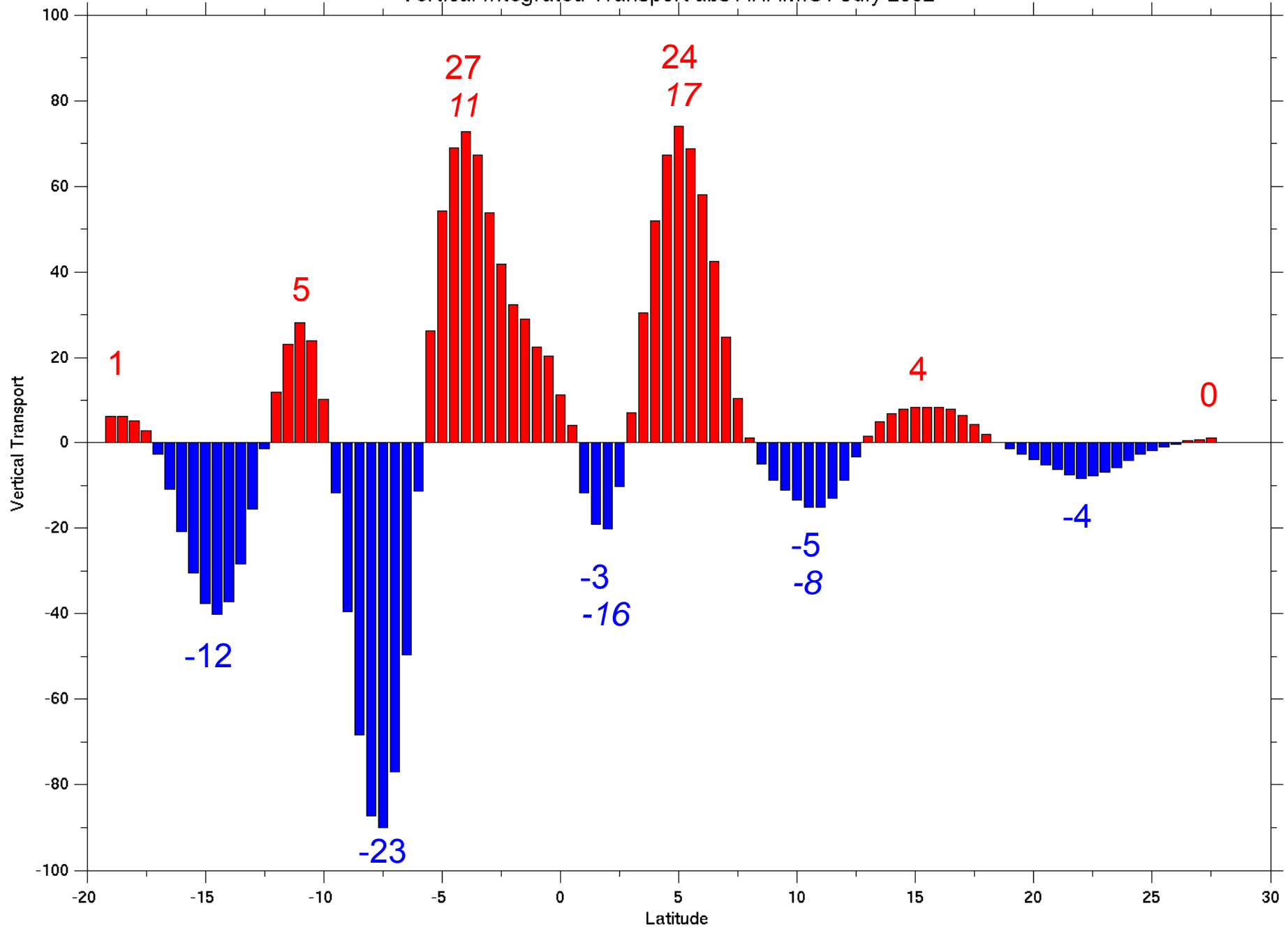
Stramma and Schott, 1999



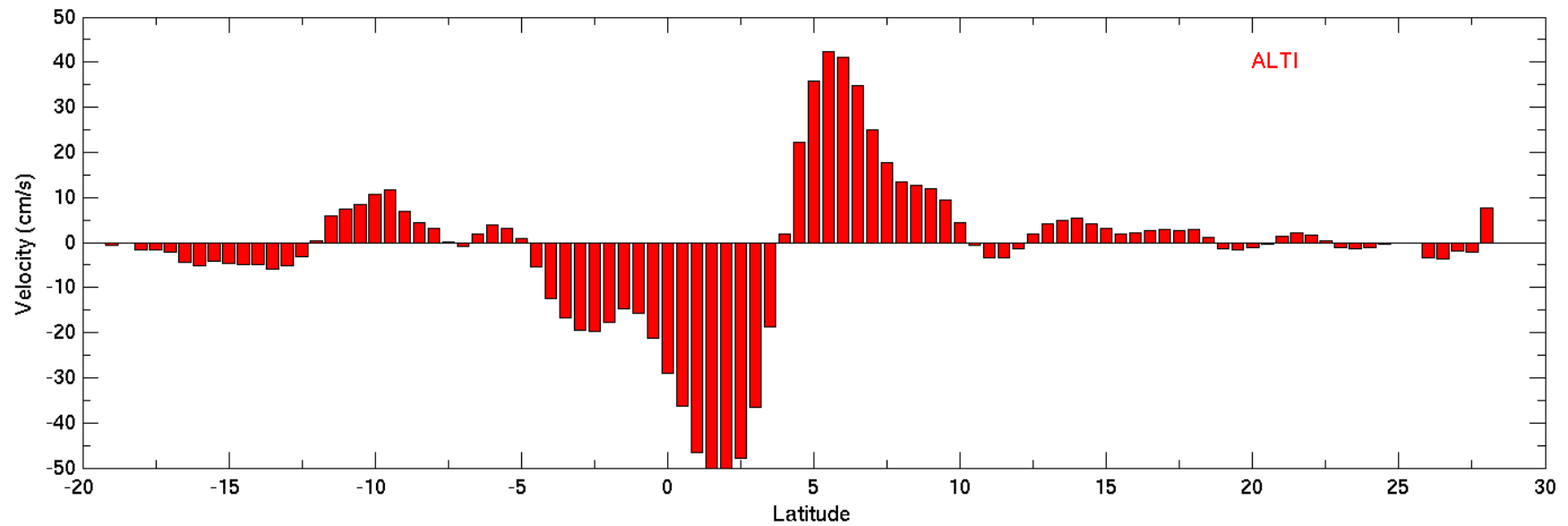
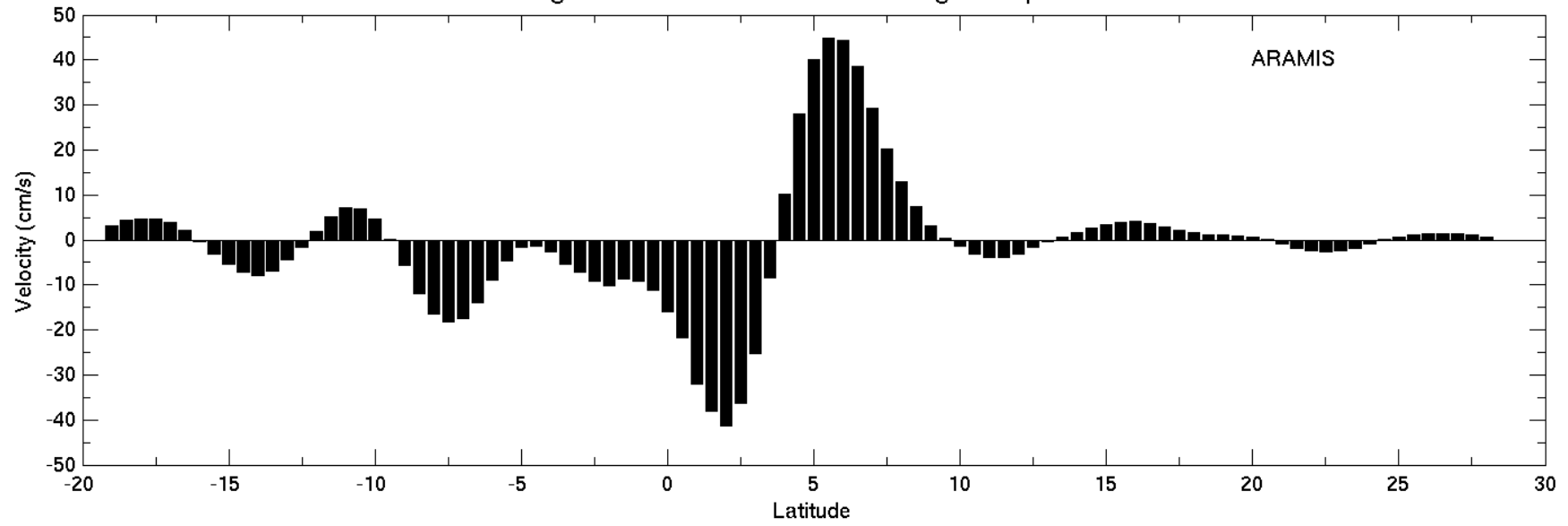
Ugeo abs (cm/s) ARAMIS1 July 2002



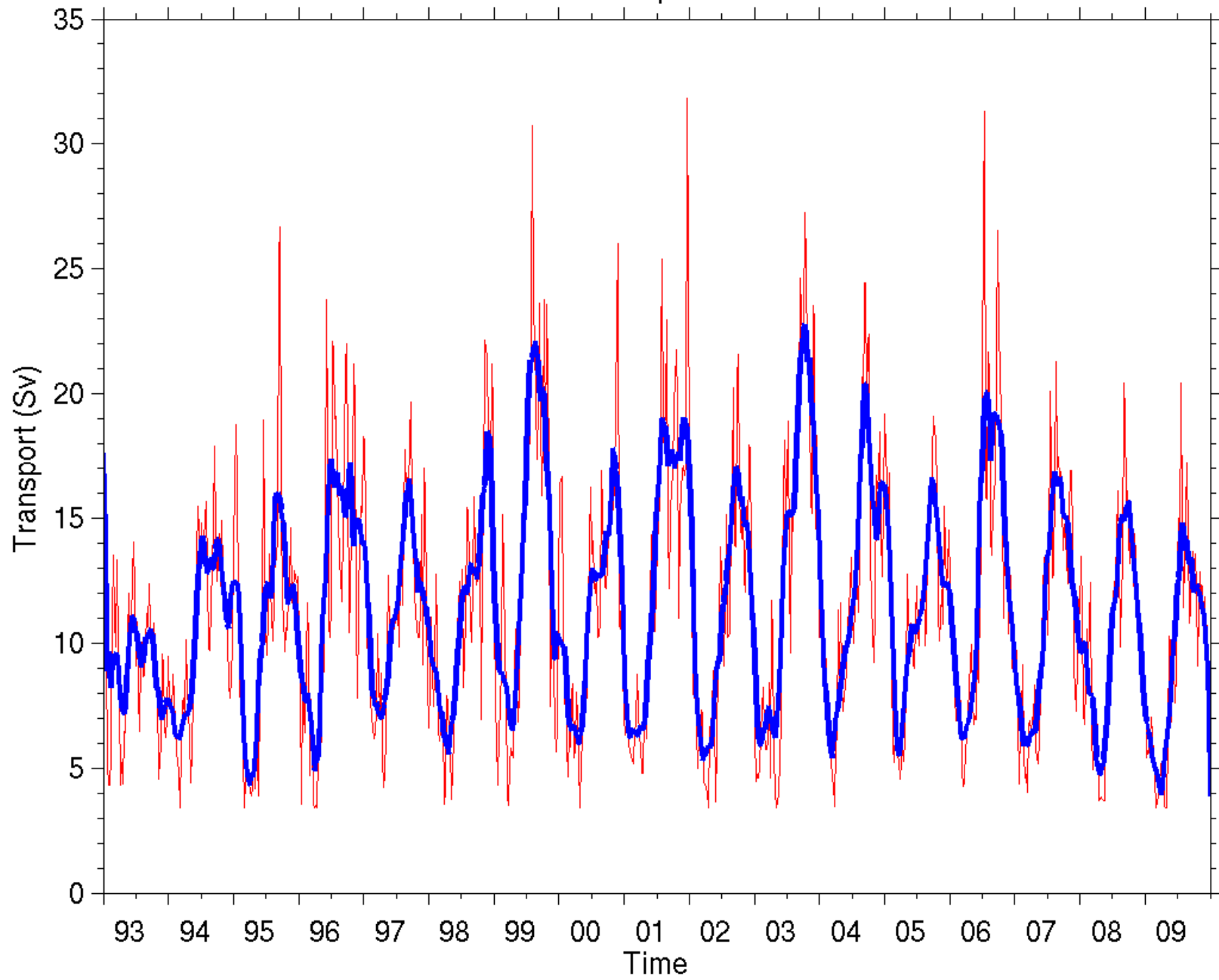
Vertical Integrated Transport abs ARAMIS1 July 2002



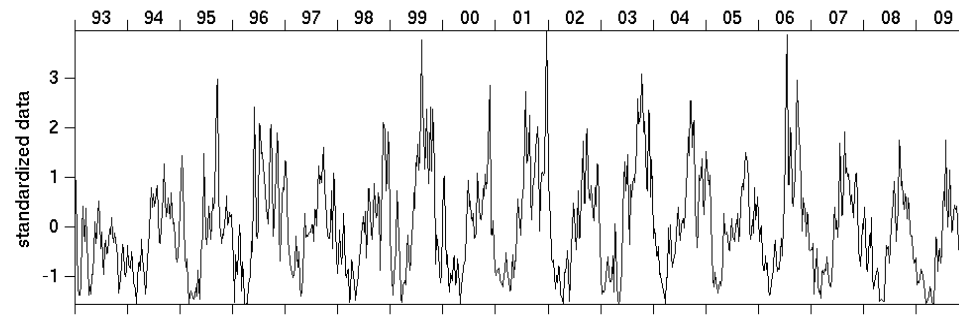
Ugeo abs. ARAMIS1 / Duacs merged maps Ref



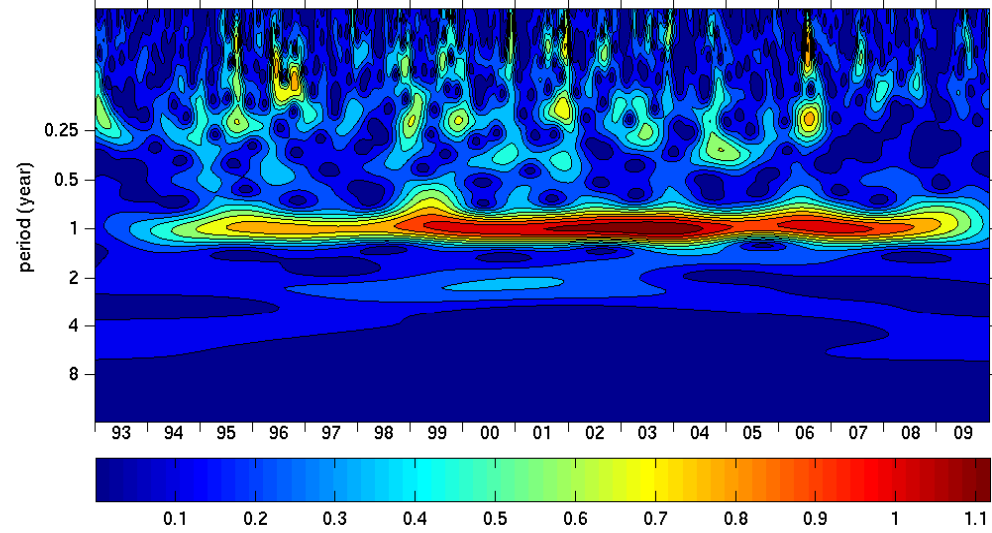
NECC transport 0-300m



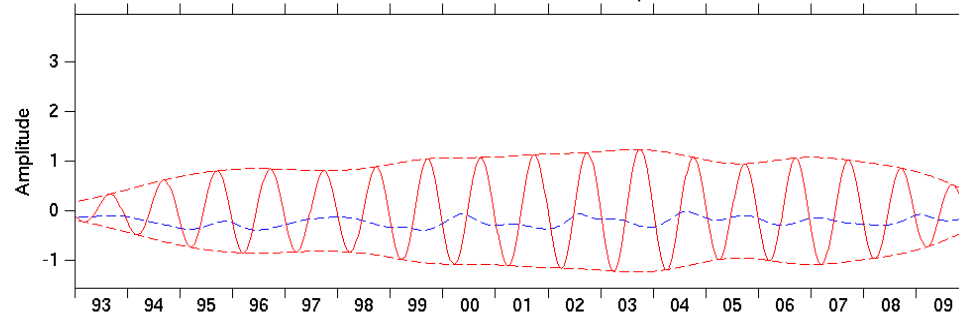
NECC transport



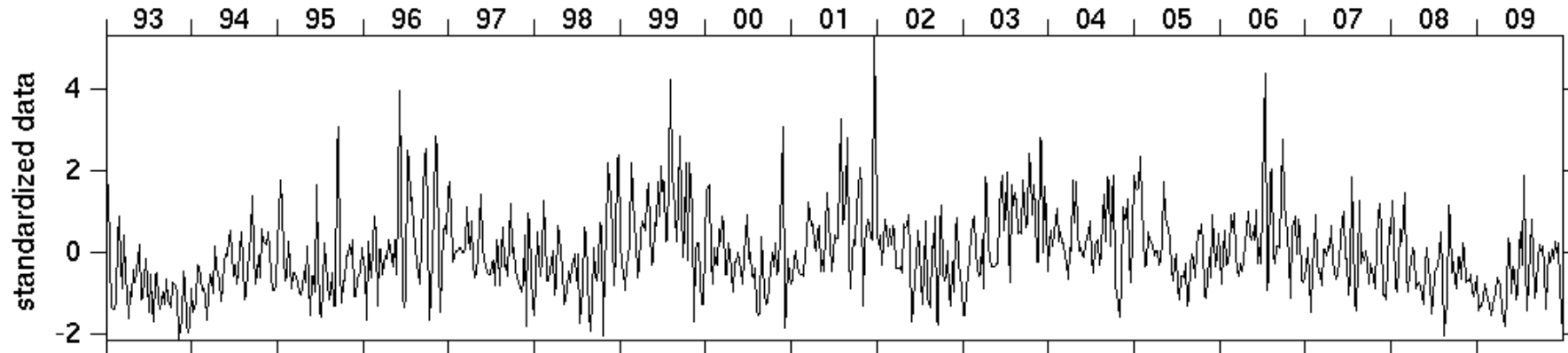
Wavelet transform modulus



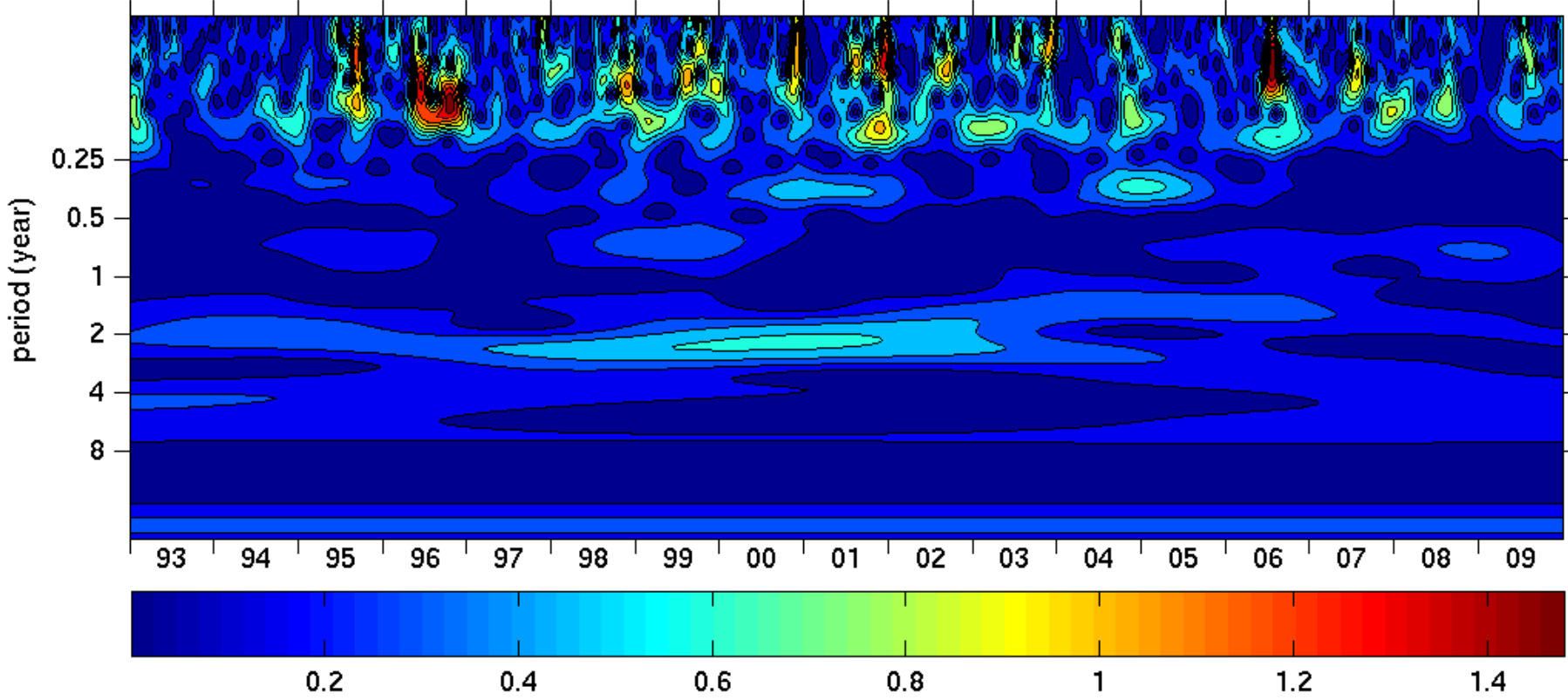
Annual and semi annual components



NECC Transport Anomaly



Wavelet transform modulus



CONCLUSIONS

- Realistic representation of Tropical Atlantic upper layers circulation from ARAMIS
- Very good agreement between ARAMIS and altimetric geostrophic currents
 - ↳ method to get oceanic transport from altimetry
- NECC transports from 1993 to 2009 reveals:
 - ▶ intense annual and semi annual cycles
 - ▶ year to year variability especially in 2000