

Fall rate equation experiments in the Southwestern Atlantic and the effect on the baroclinic transports across the NOAA/AOML-FURG section AX97

Authors: Caio Fonteles ¹

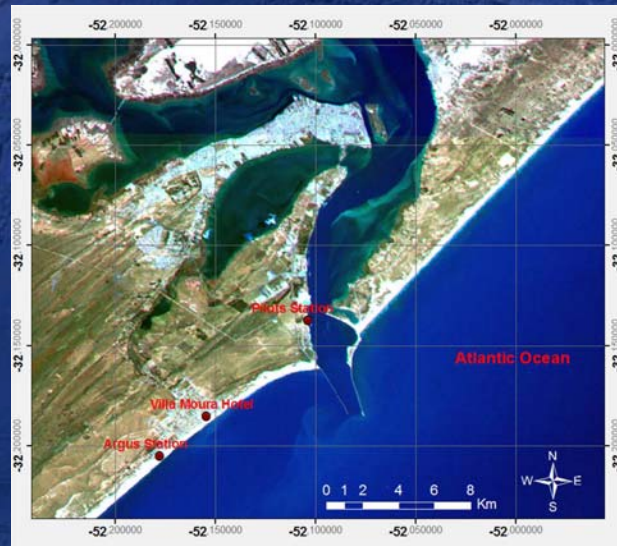
Mauricio Mata (PI) ²

Mathias van Caspel ^{3*}

Affiliation : 1, 2, 3: University of Rio Grande (FURG)

Where we are based

Salvador
Rio de Janeiro
Trindade Is.
Rio Grande
Buenos Aires



MOVAR

Monitoring the upper ocean transport variability in the western South Atlantic



MOVAR

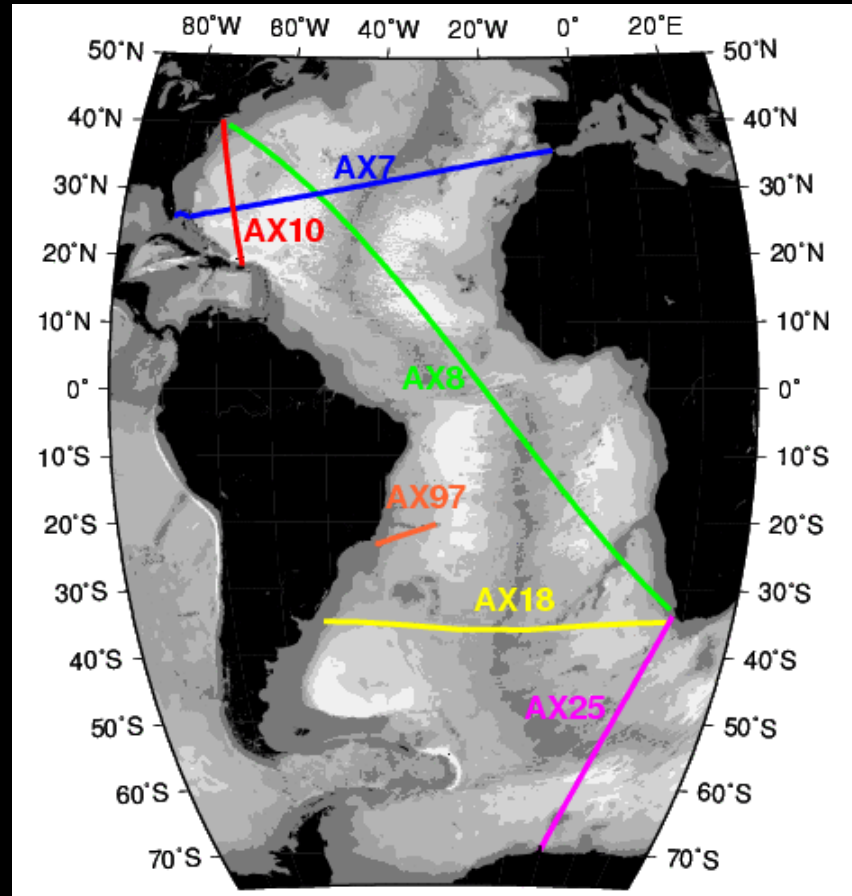
2004 – 2012 ...



MOVAR

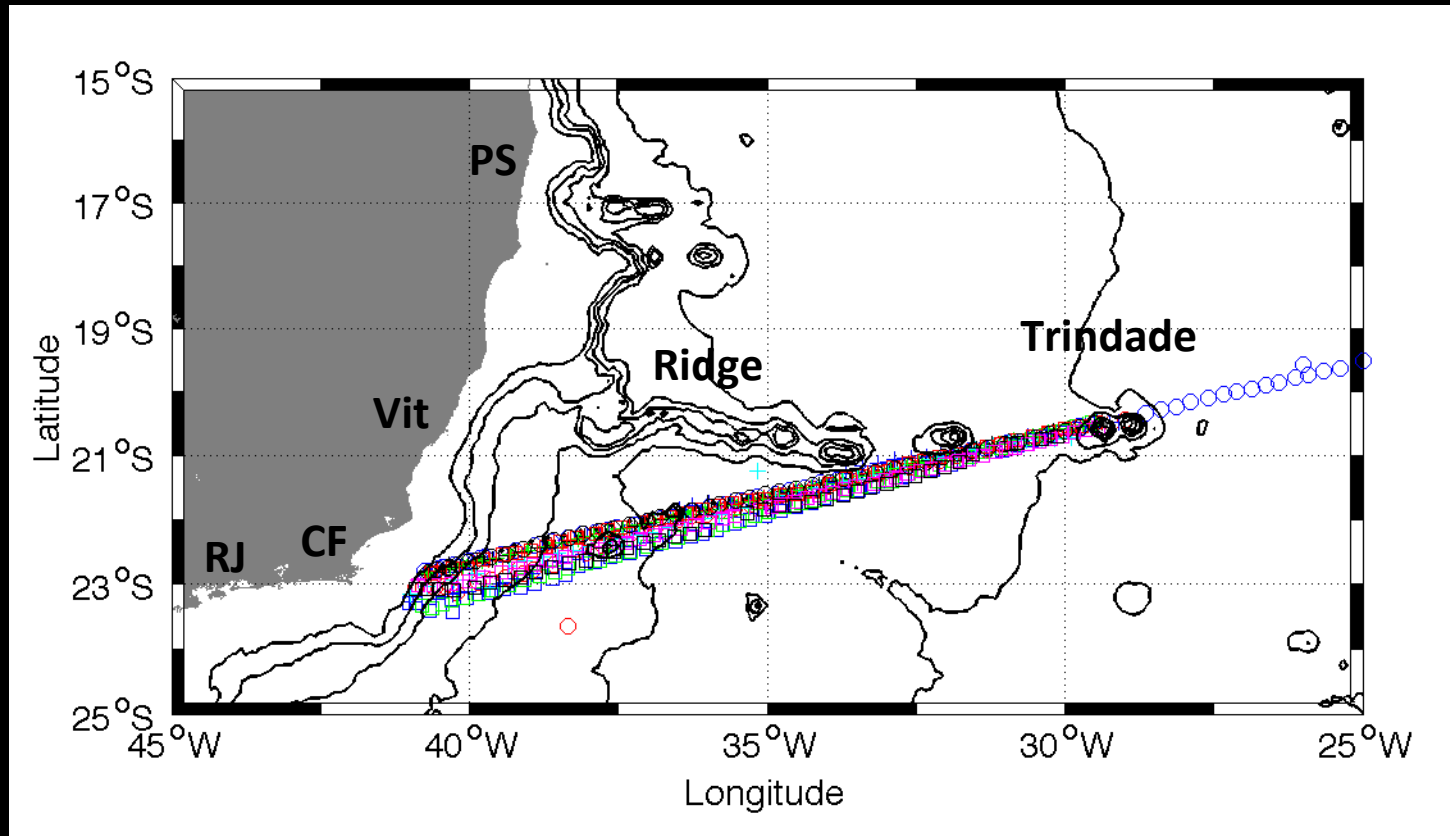
Monitoring the upper ocean transport variability in the western South Atlantic

High Density XBT Lines



MOVAR

Monitoring the upper ocean transport variability in the western South Atlantic

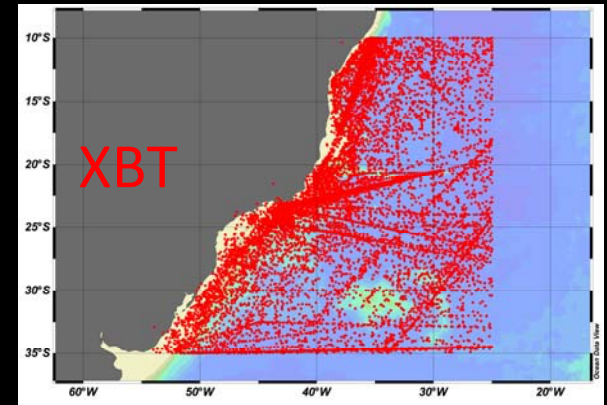
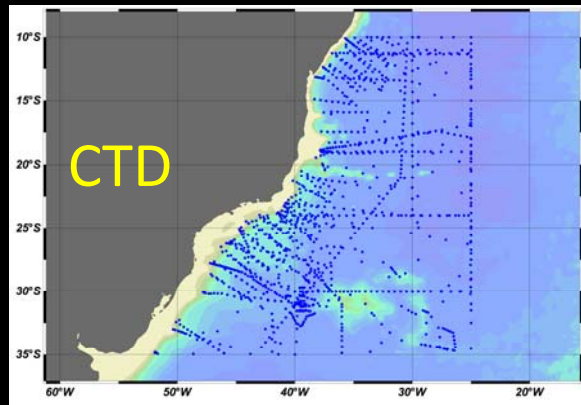


22 repetitions

Motivations

MOVAR

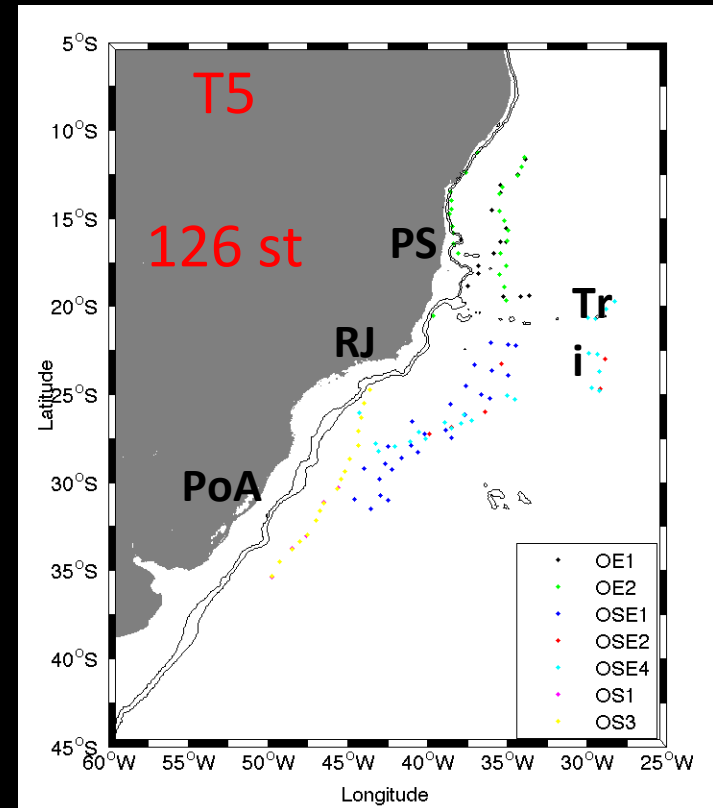
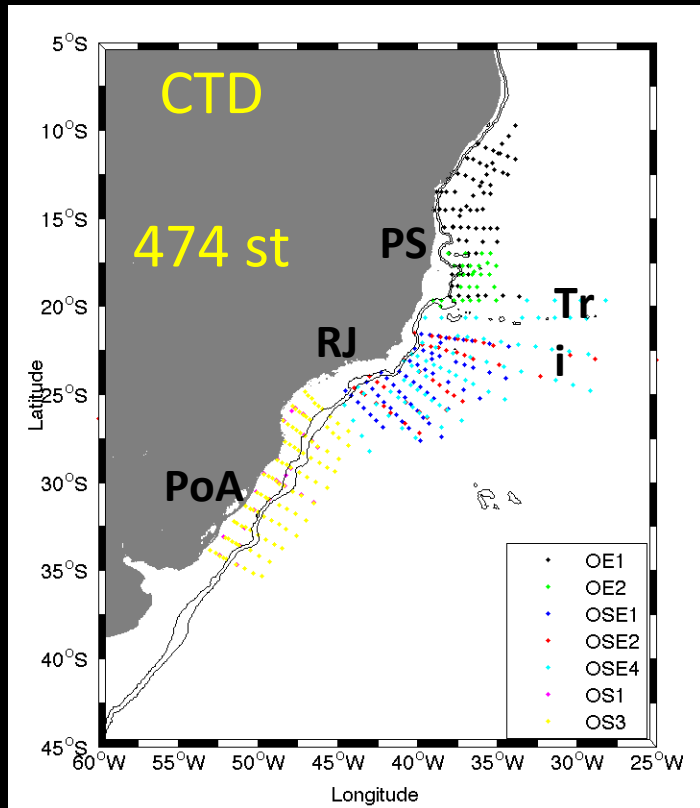
Abundance



Reported errors

Learn the error estimating technique and apply it in the Southwest Atlantic

Data from Brazilian Data Center (BNDO)



Methods

Based on:

Hanawa et al (1995)

Kizu et al (2005)

- **Match criteria used**
 - 0,2° of longitude and latitude
 - One day
- **Data interpolated**
 - Linear every meter (0 to 1000m)
- **Filters**
 - Median
 - Low pass

Methods

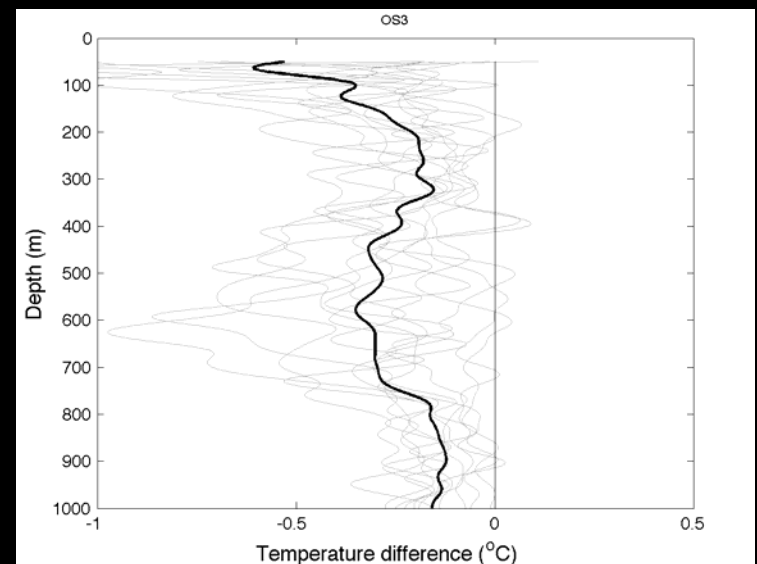
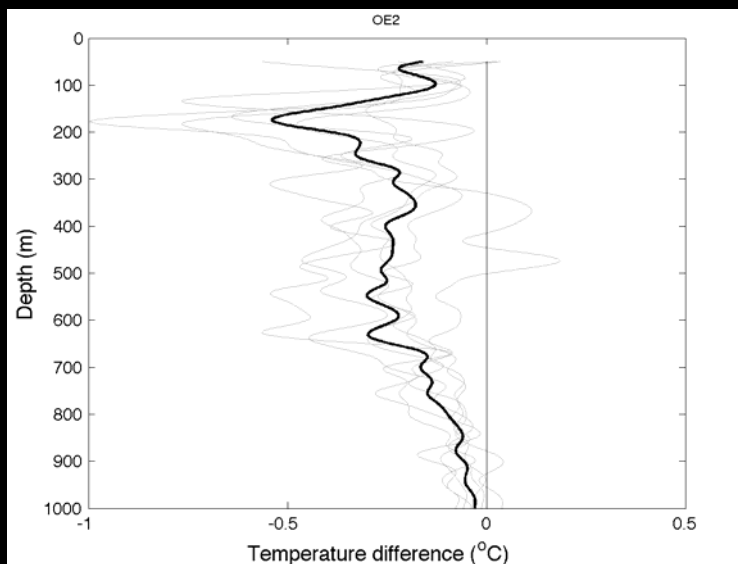
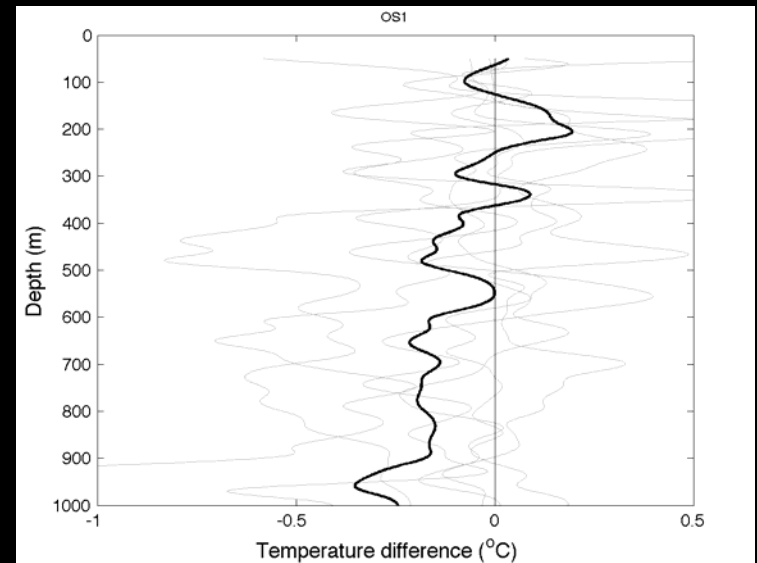
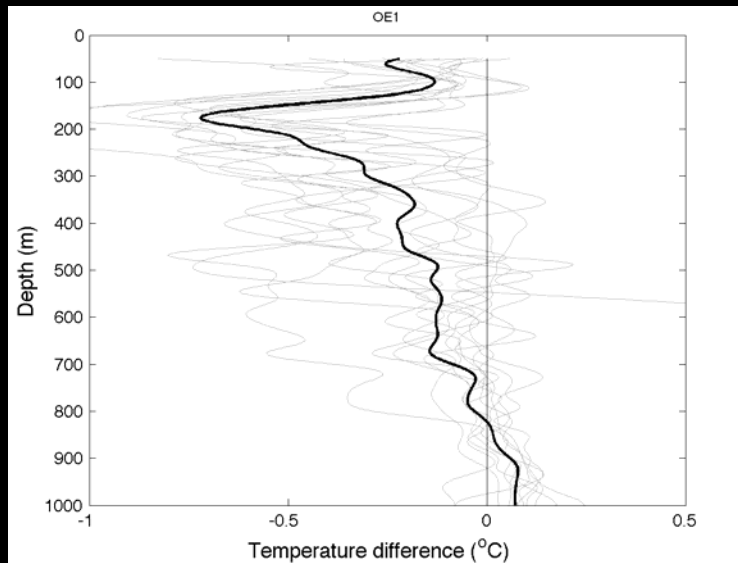
Based on:

Hanawa et al (1995)

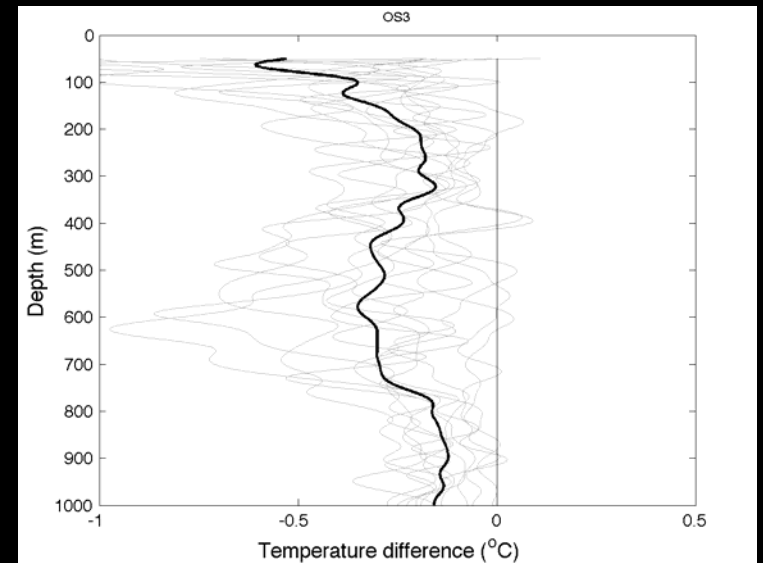
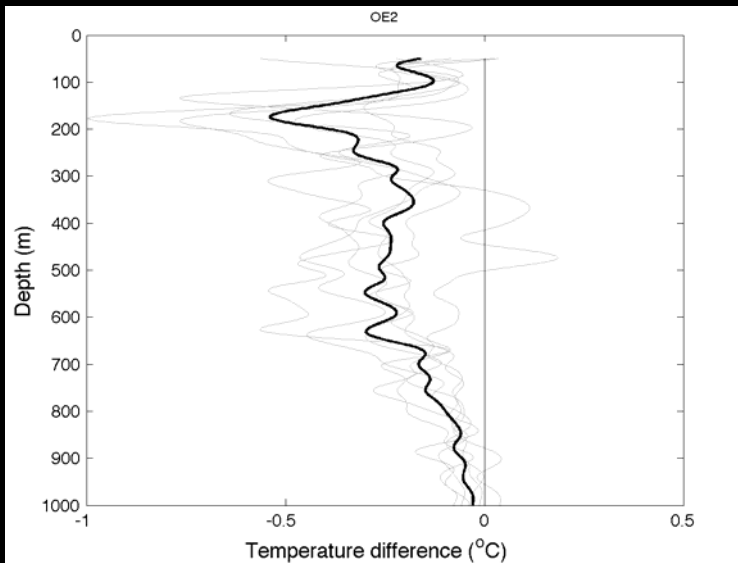
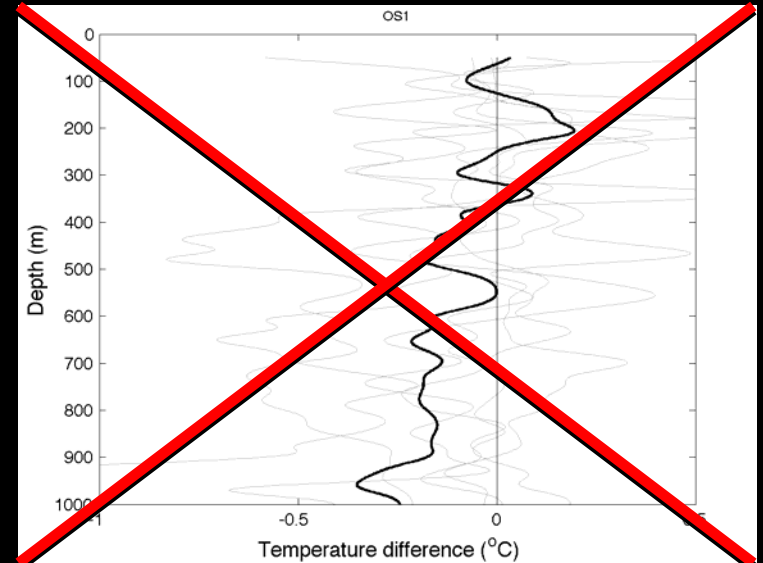
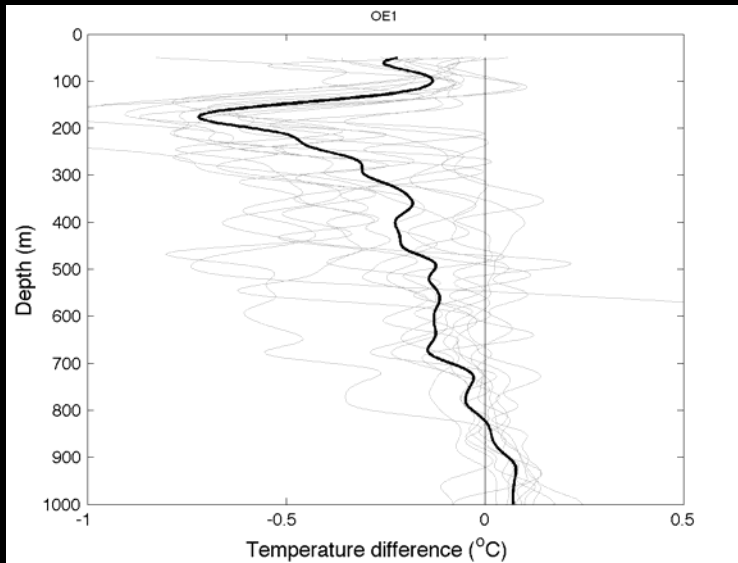
Kizu et al (2005)

- **Temperature gradient**
 - From 50 to 1000m
 - Subsets every 50m, centered
- **Corrections**
 - New time depth association
- **New fall rate**
 - One for each pair
 - Mean of “a” and “b”

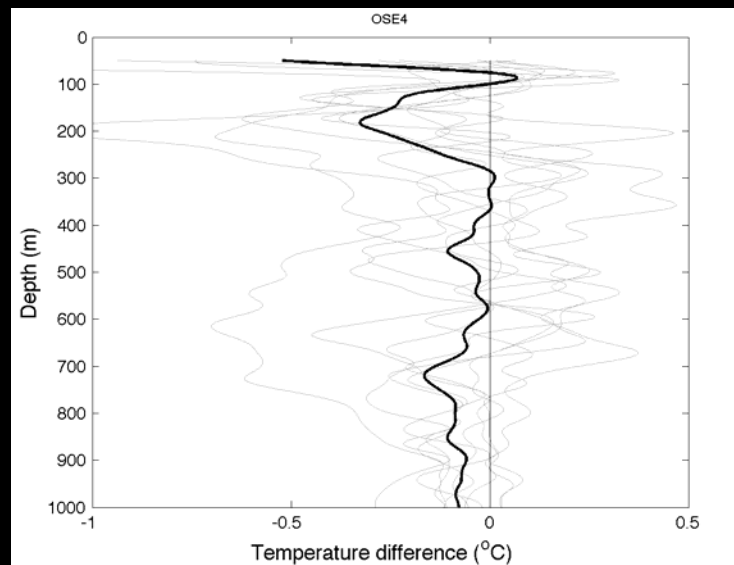
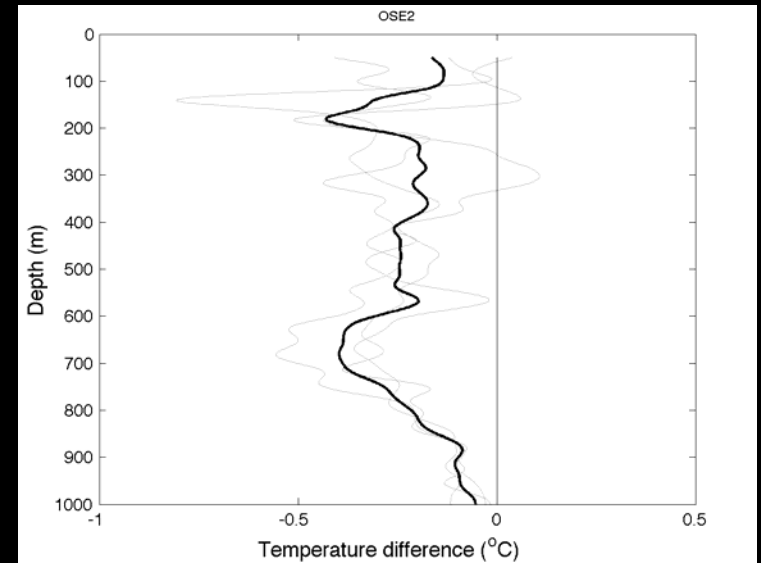
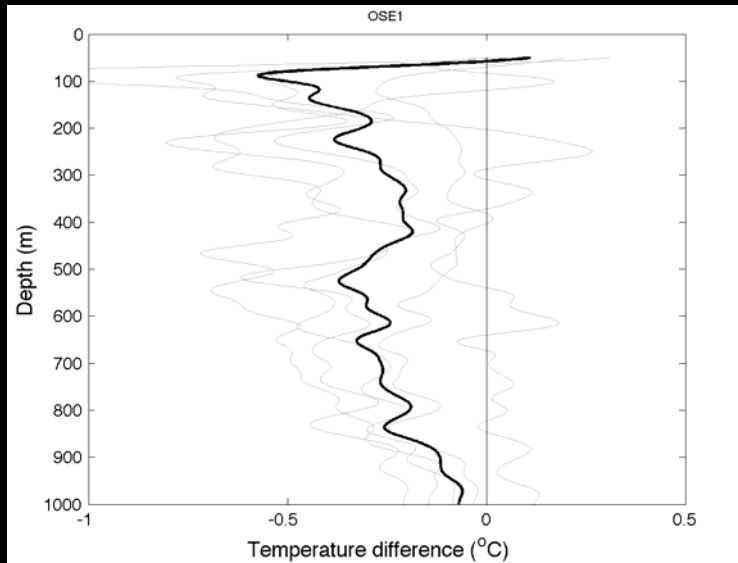
Results



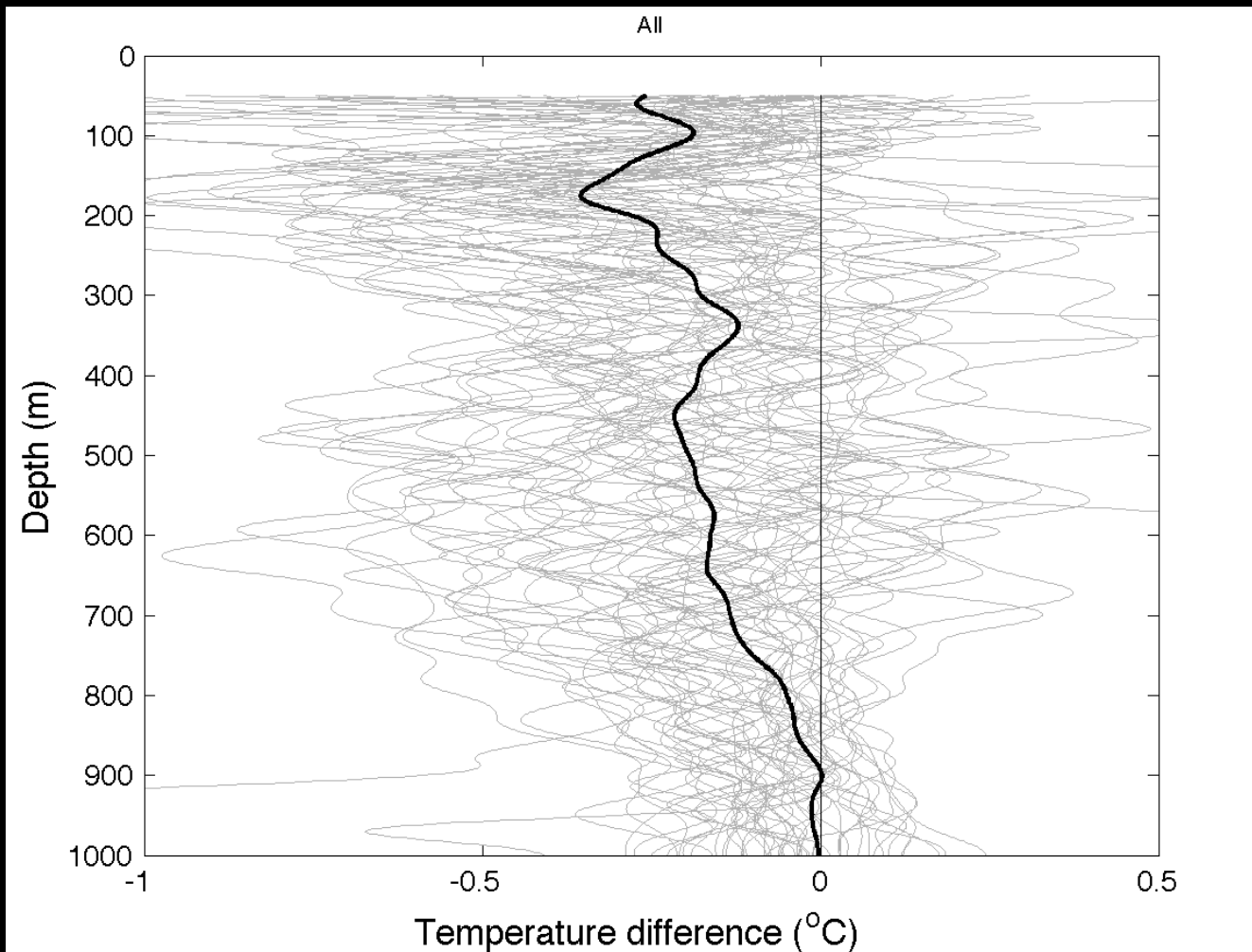
Results



Results



Results



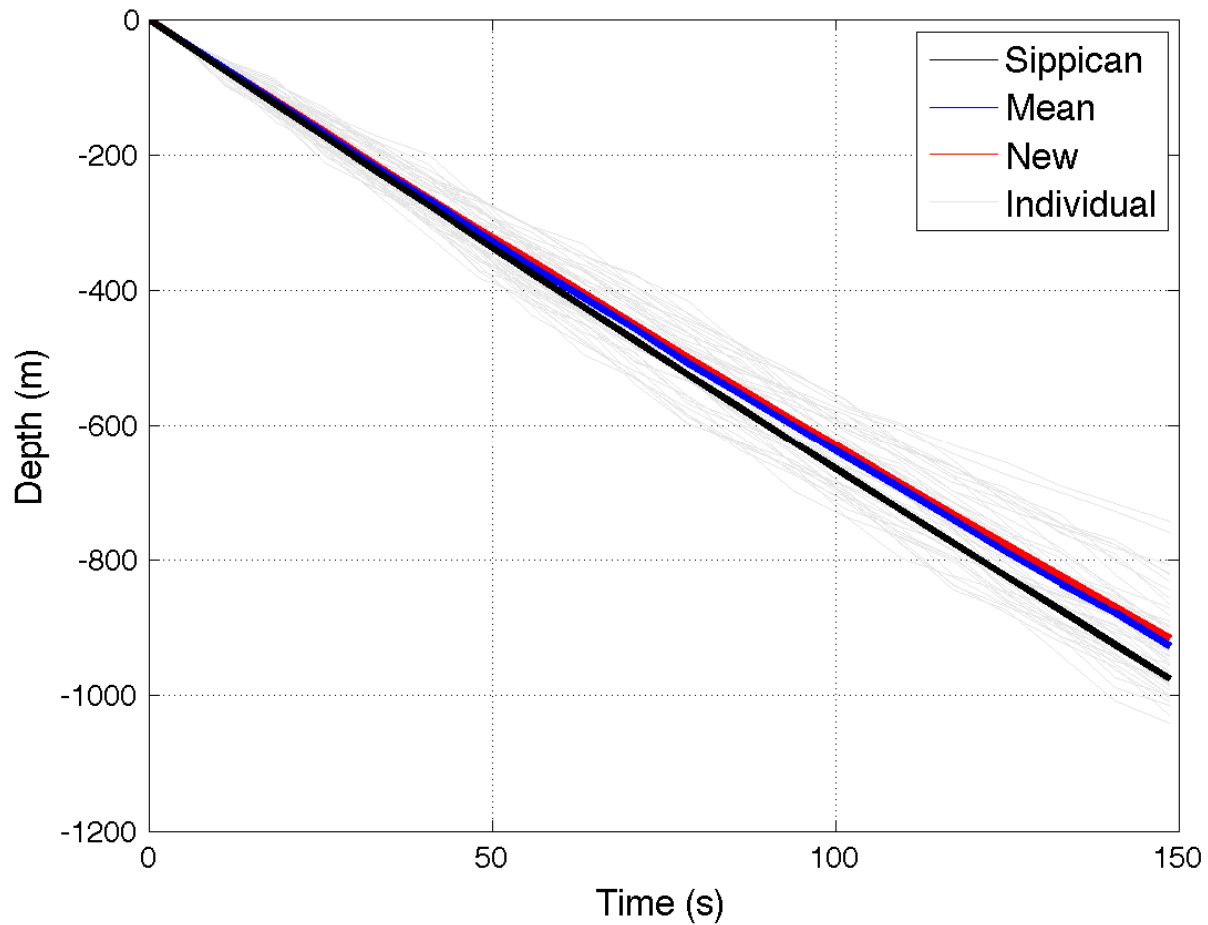
Results

- From the 45 pairs only 17 were used

Sippican : $Z(t) = 6.828*t - 0.00182*t^2$

New : $Z(t) = 6.5328*t - 0.0028*t^2$

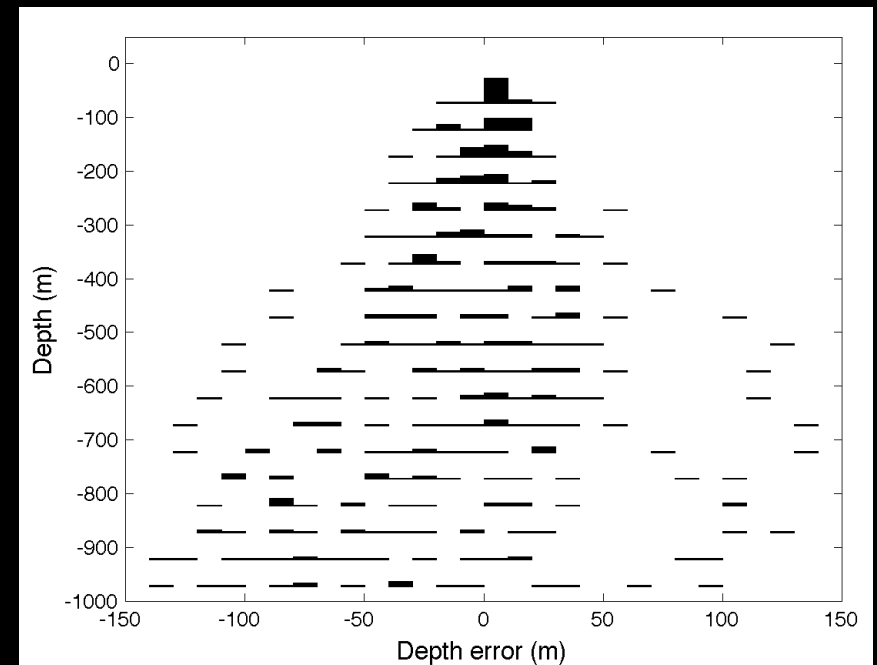
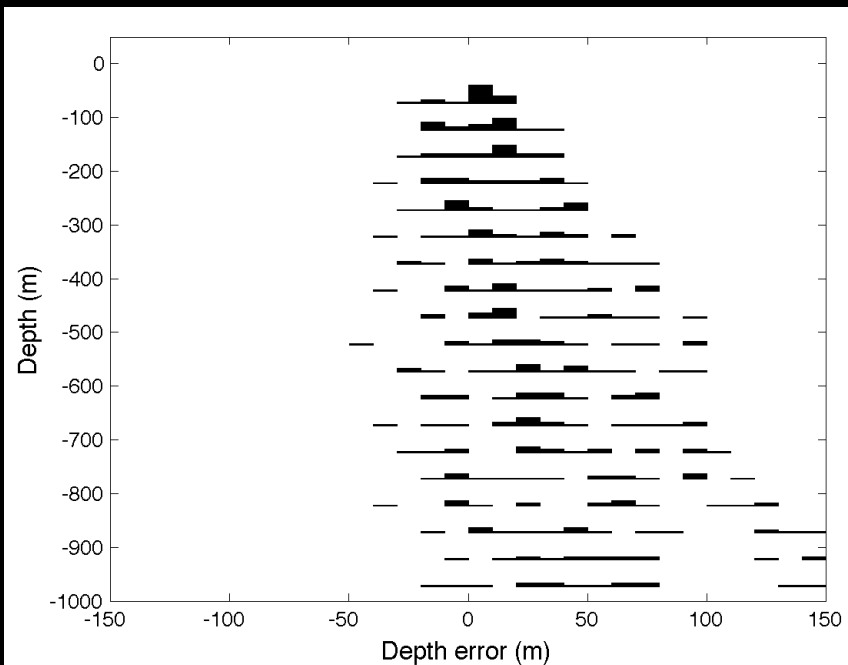
Results



Results

Sippican

New

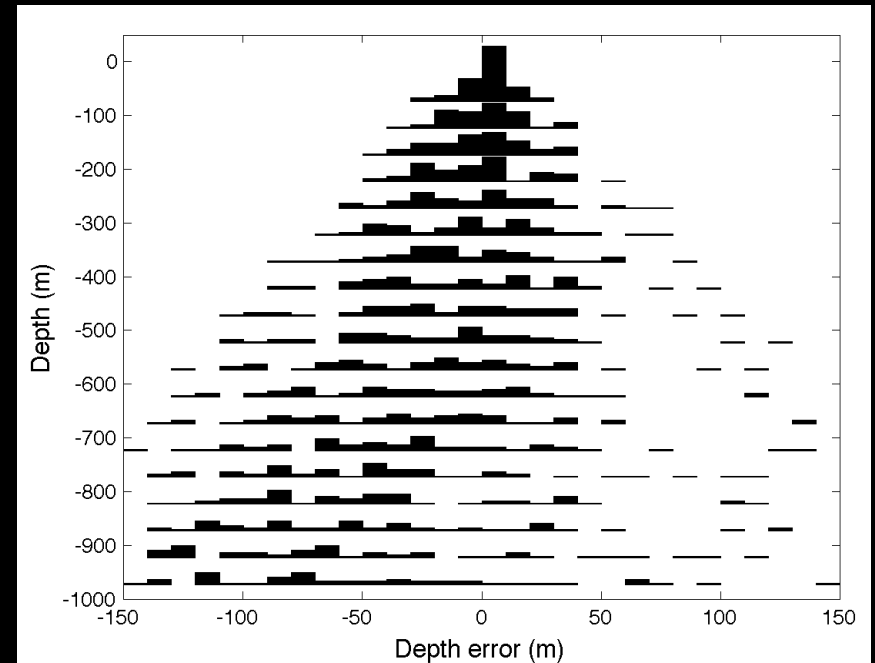
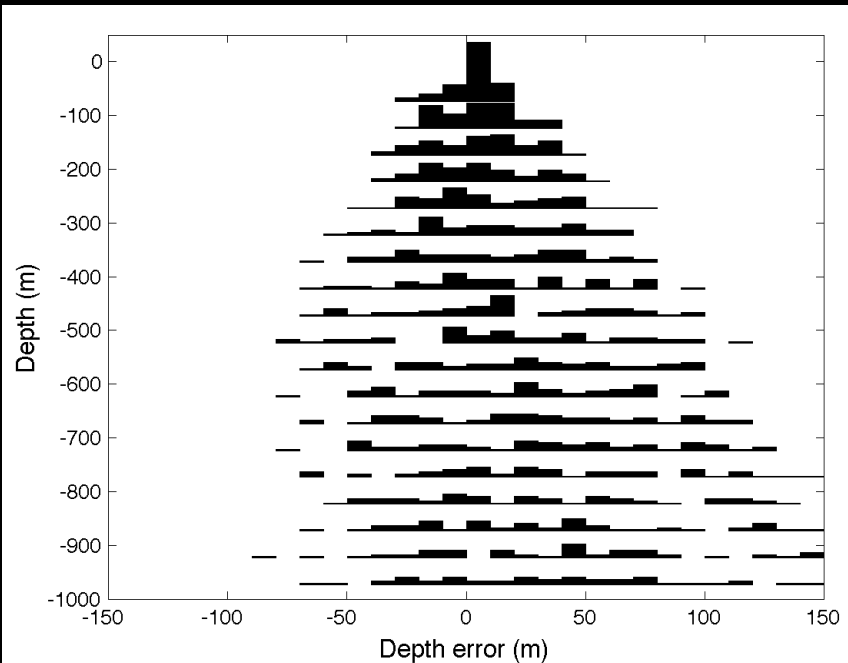


17 used stations

Results

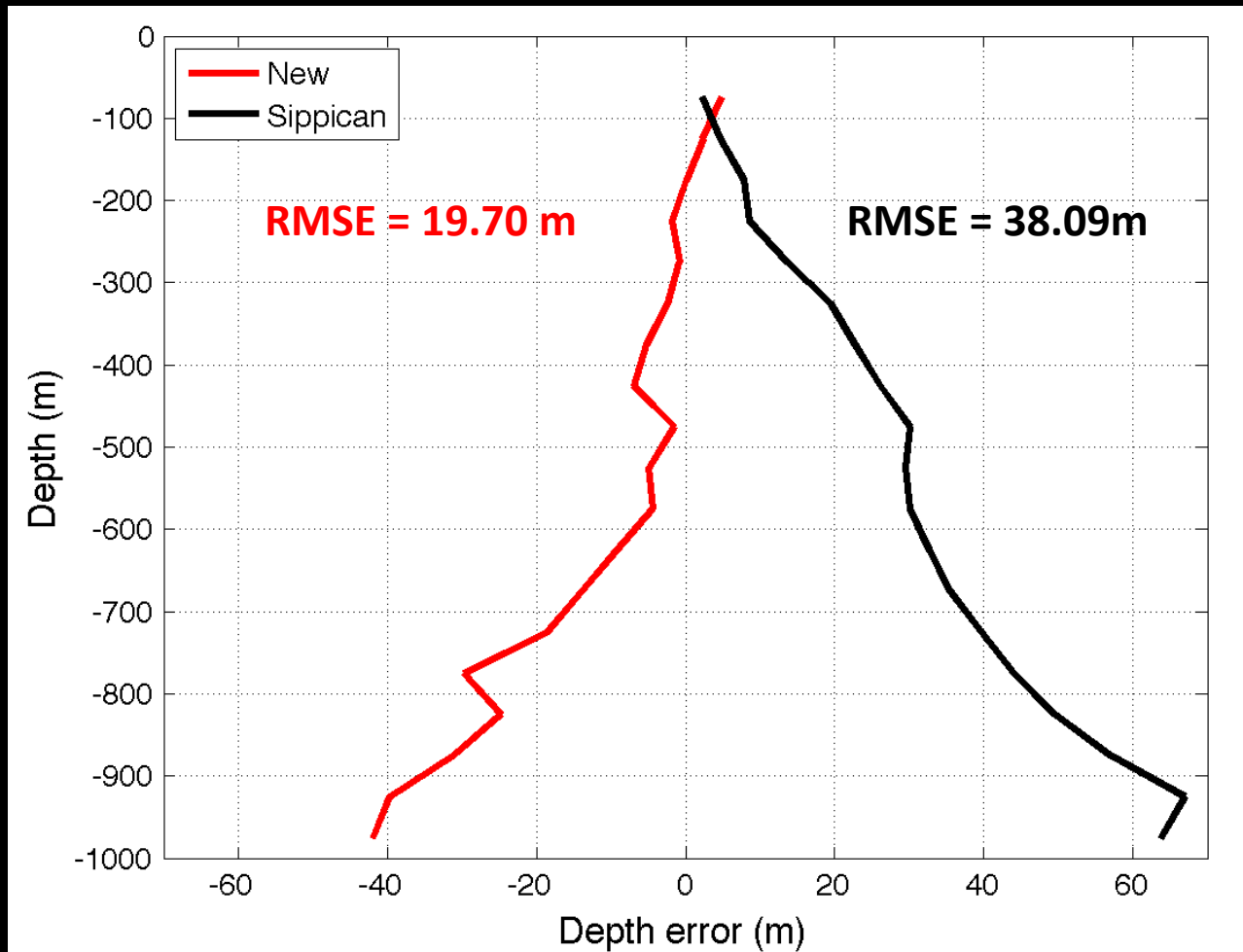
Sippican

New

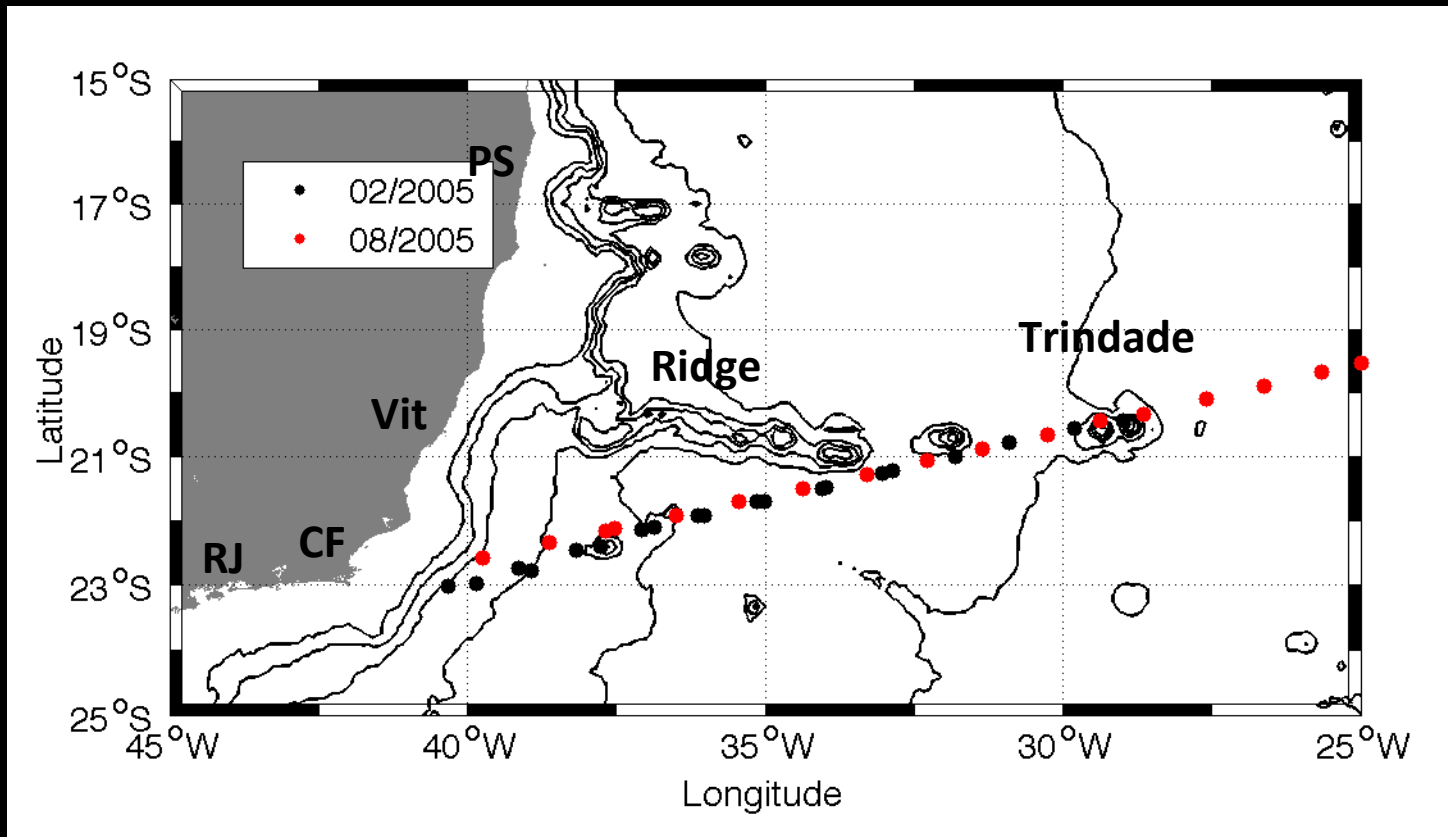


All stations

Results



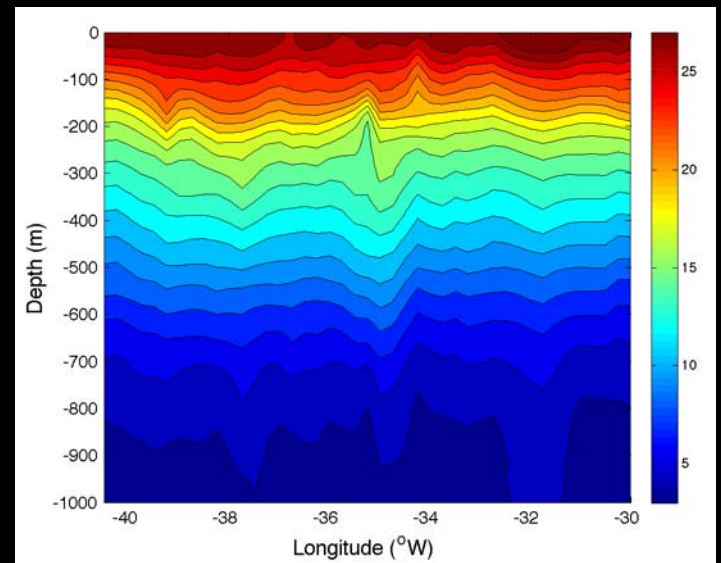
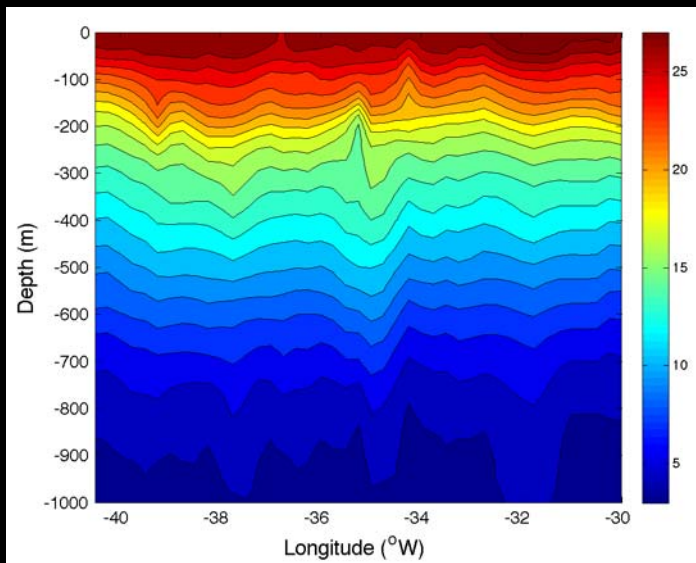
Results - MOVAR



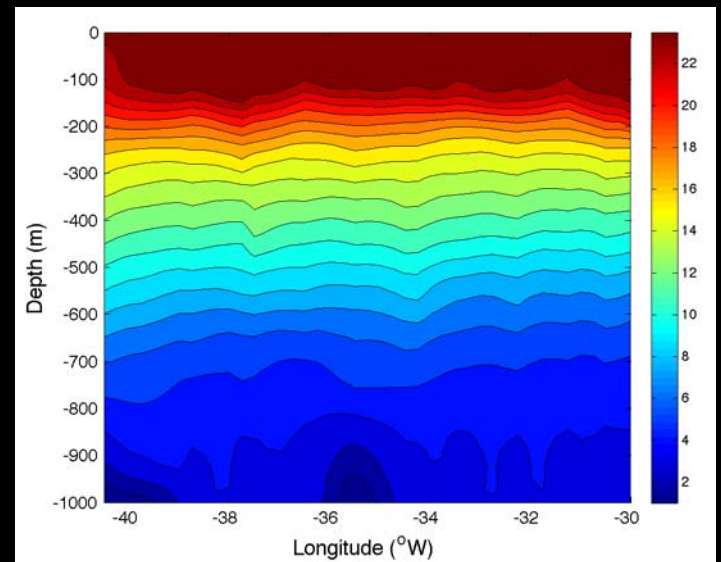
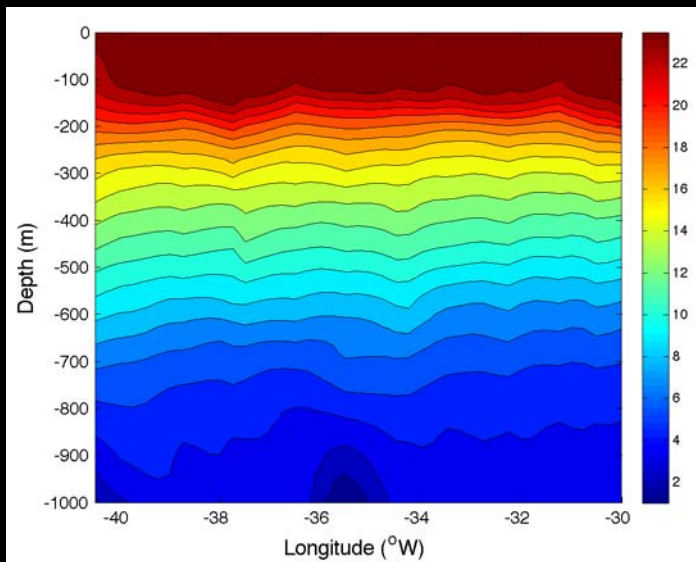
Sippican

New

02/2005



08/2005

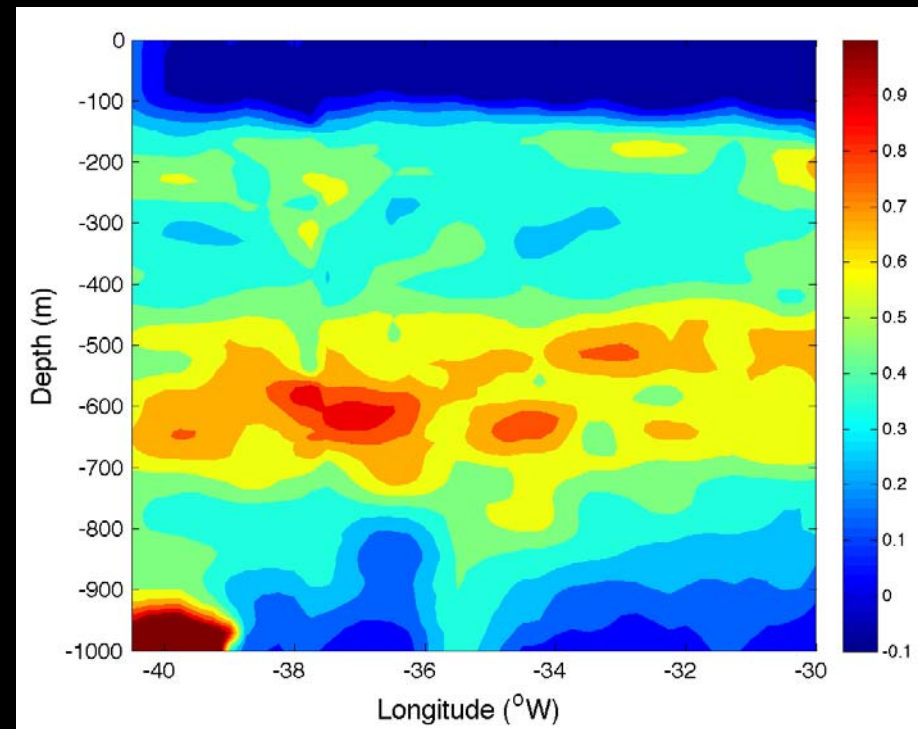
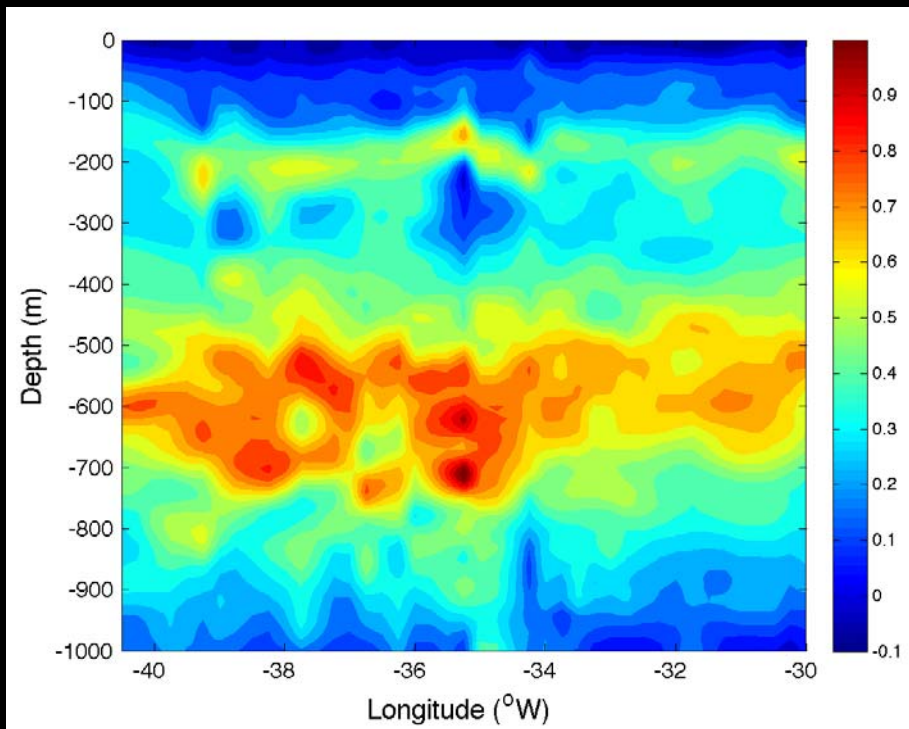


Results – MOVAR

Temperature difference

08/2005

02/2005

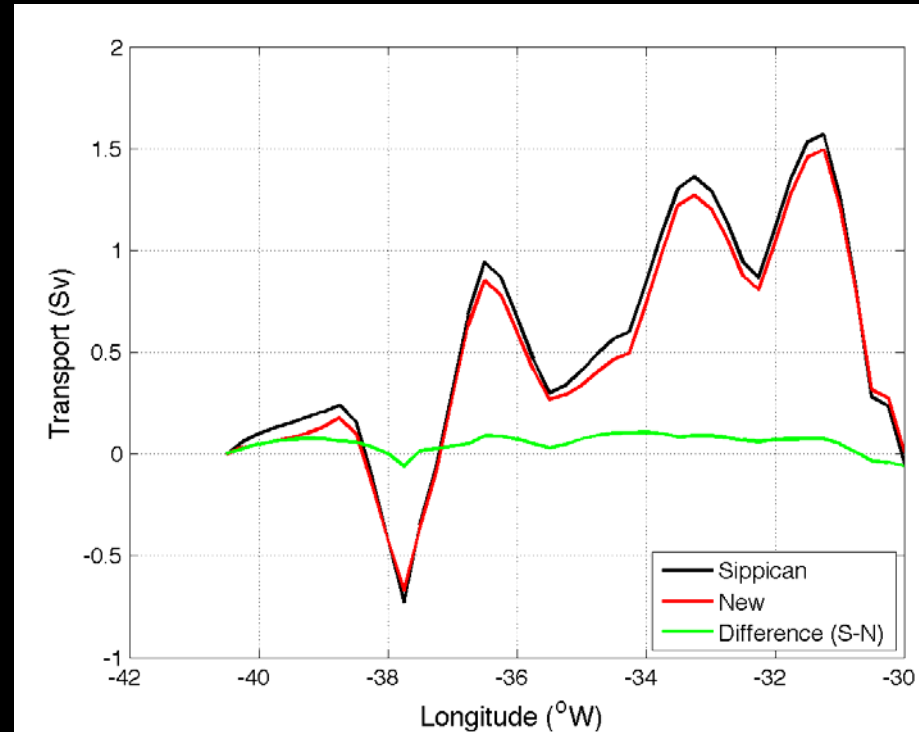
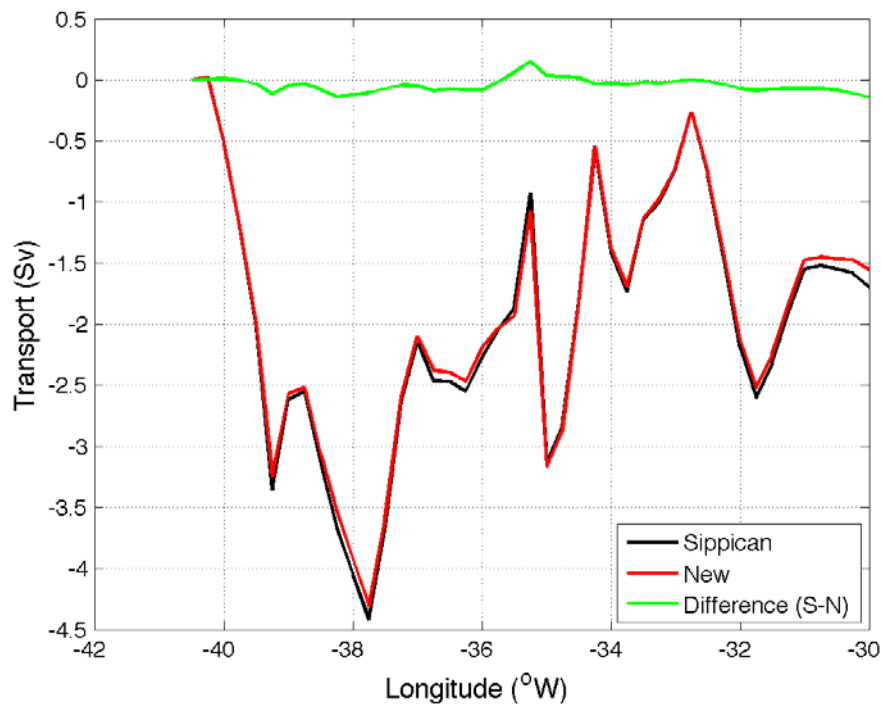


Results – MOVAR

Volume transport

08/2005

02/2005

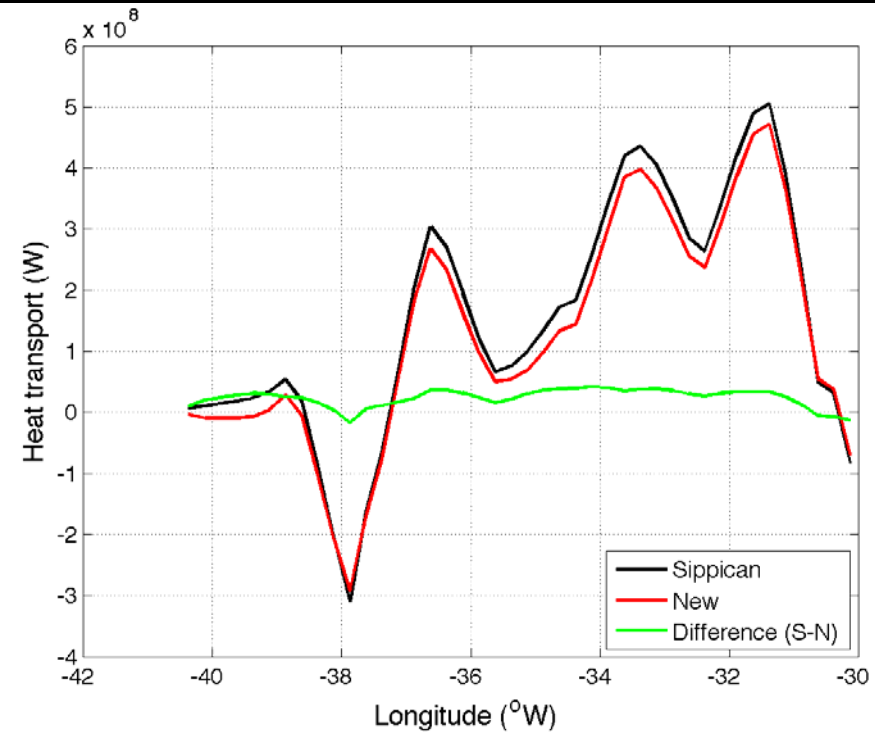
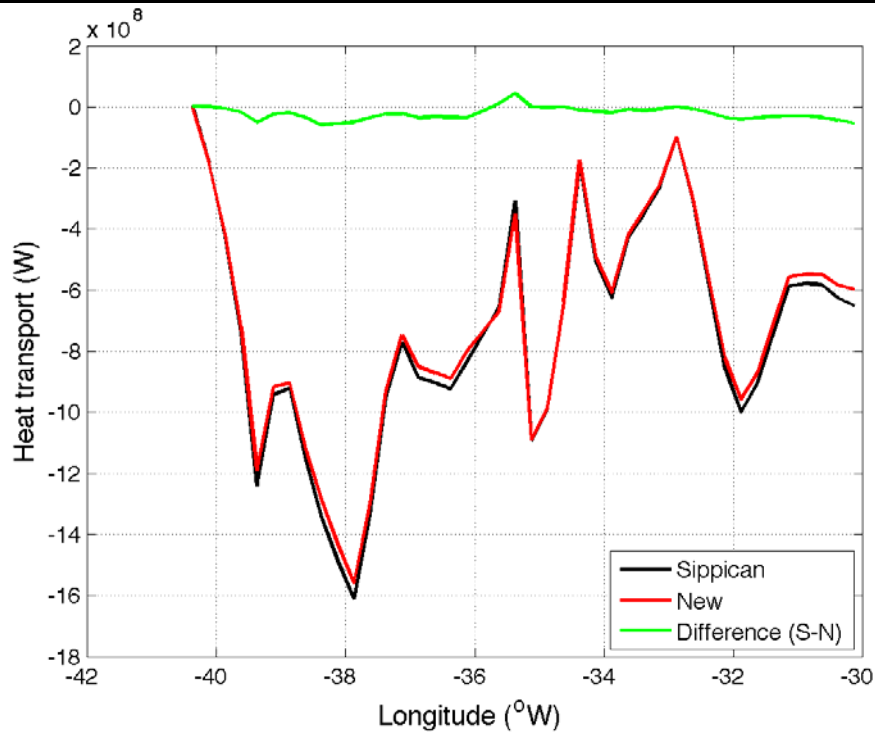


Results – MOVAR

Heat transport

08/2005

02/2005



Conclusions

- Depth is overestimated by Sippican fall rate
- CTD and XBT temperature differences are higher around 200m,
- The new fall rate proposed reduced the RMSE from 38.09m to 19.70m ;
- MOVAR sections had larger temperature differences around 600m
- Volume and heat transport above 400m had only slight changes (< 10%)

For the future

- Search more matches for CTD and XBT casts;
- Verify possible errors for other XBT models;
- Try to get good comparison data below 1000m;
- Encourage simultaneous CTD and XBT casts

Thank you for the attention