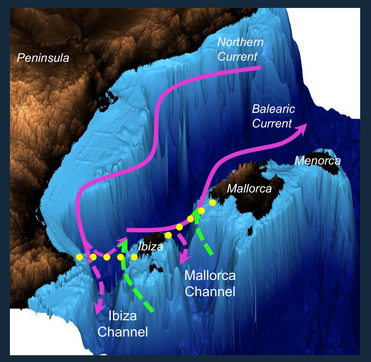
0203

GLIDER TECHNOLOGY ENABLES LONG TERM OBSERVING AT A NEW TEMPORAL SCALE

Glider observed sub-seasonal variability in water mass transport in the Ibiza Channel: a key 'choke' point for Western Mediterranean circulation

01 Basis for research



Glider 'endurance lines'
Outflows (intermittant)
Inflows (intermittant) less saline waters

Ibiza Channel:
Key 'choke point' in basin scale circulation
Governs an important north/south exchange of watermasses

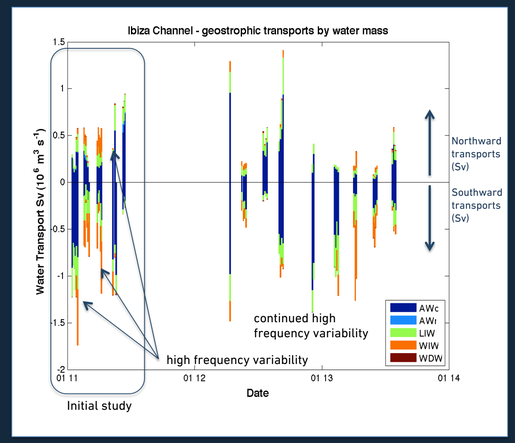
Issues:
Defining seasonal variability in our current system is vital to understanding climate change (Bryden at al. 2012)
Water mass exchange affects local ecosystems, e.g. spawning blue fin tuna (Alemany et al. 2010)

Potential:
Improve knowledge of interplay between mesoscale and basin scale dynamic processes
Link physical to biogeochemical processes
Improve our modeling skill
Detection of long term climatic change

02 Initial results

- Gliders reveal high frequency variability in transports (Heslop et al. 2012)
- Changes of same scale as the seasonal signal (0.9 Sv, Pinot et al. 2002), but over time periods of days – week

Questions:
How can we model the observed high frequency variability?
Are there typical temporal and spatial frequencies for the variability?



03 Extended dataset

3.1 Glider and ship transects

- Glider missions span 2.5 years – 53 complete Ibiza Channel transects
- Ship missions span 16 years – 44 complete Ibiza Channel transects

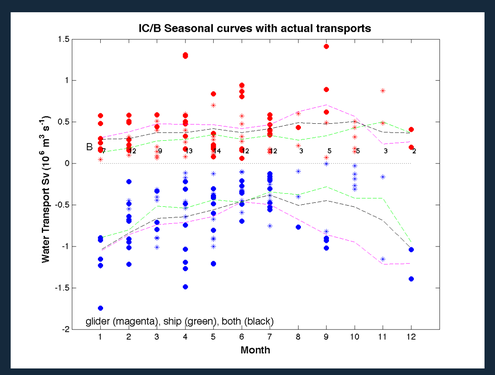
3.2 Methods:

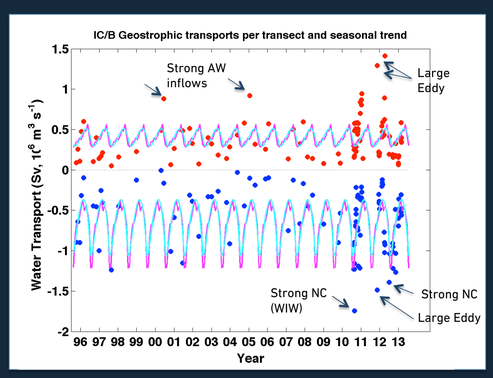
- Data processing and transport calculation following Heslop et al. (2012)
- Cross-validation from contemporary glider and ship transects
- EOF analysis

04 Seasonal cycle: relevance in light of high variability?

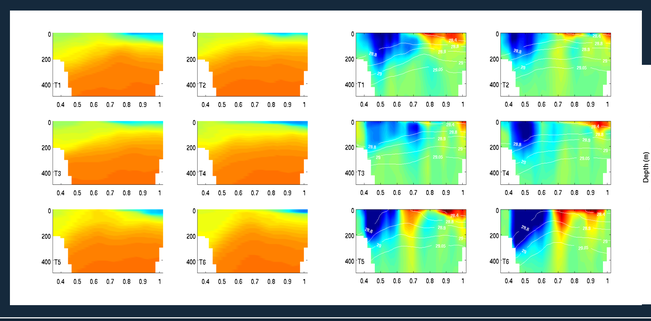
- Monthly means from glider and ship used to provide a 'seasonal cycle'
- Affected by sparse sampling (Nov and Dec)
- Convergence between independent datasets
- Transports south have a distinct cycle
- Mesoscale variability dominates

seasonal cycle does not provide a useful model

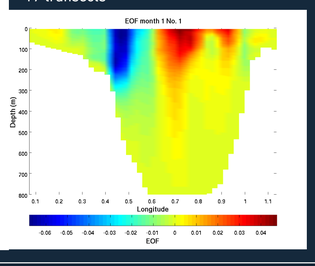




05 Characterising channel dynamics



Geostrophic velocity EOF1
Dec – Feb 'winter'
17 transects



Seasonal Patterns or modes:

- First EOFs (30 - 50%) show characteristic patterns for seasons winter, spring and summer
- Stronger events follow patterns

06 Conclusions and next challenges

Strong mesoscale variability dominates the seasonal cycle, interannual means and interannual variability

Glider 'endurance lines' key to providing this new view of transport variability

next challenges:
- Quantify temporal and spatial variability?
- Using glider transects to constrain coupled models, can we provide predictive capability?

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SOCIB Balearic Islands Coastal Observing and Forecasting System

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