The Shelf Agulhas Glider Experiment (SAGE)

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Piloting & Technical support

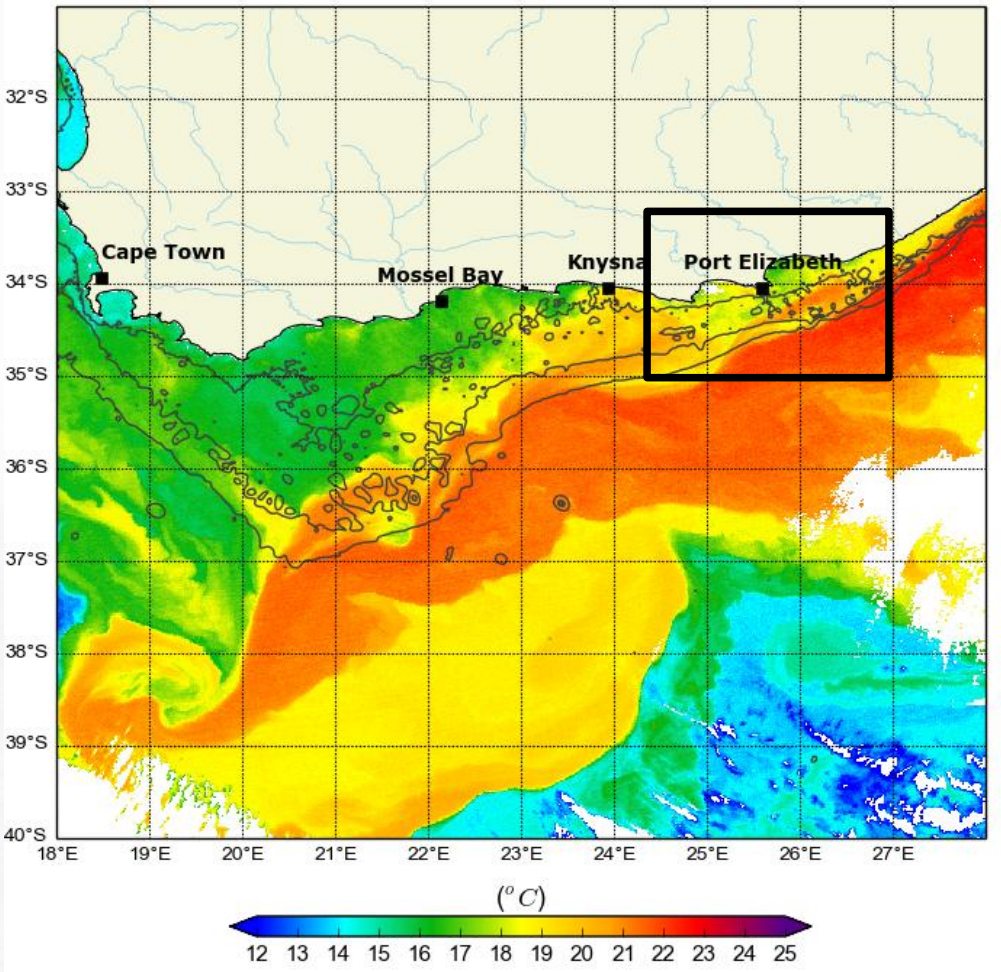
Piloting the Seagliders is a 24H/7 job, especially in the Agulhas Current region

- Maintainance, calibration and piloting done through the CSIR-led South Africa Marine Engineering & Robotics Centre (SAMERC) in collaboration with Sea Technology Services (STS)

- Initial data processing and real-time visualisation done in collaboration with the Applied Physics Lab at the University of Washington.

Observations

SAGE is ***a CSIR-SAEON joint experiment***
(http://socco.org.za/sage/)



Research:

- How does the Agulhas Current interact with the coastal ocean ?
- How would climate variability affect such interactions ?

Innovation:

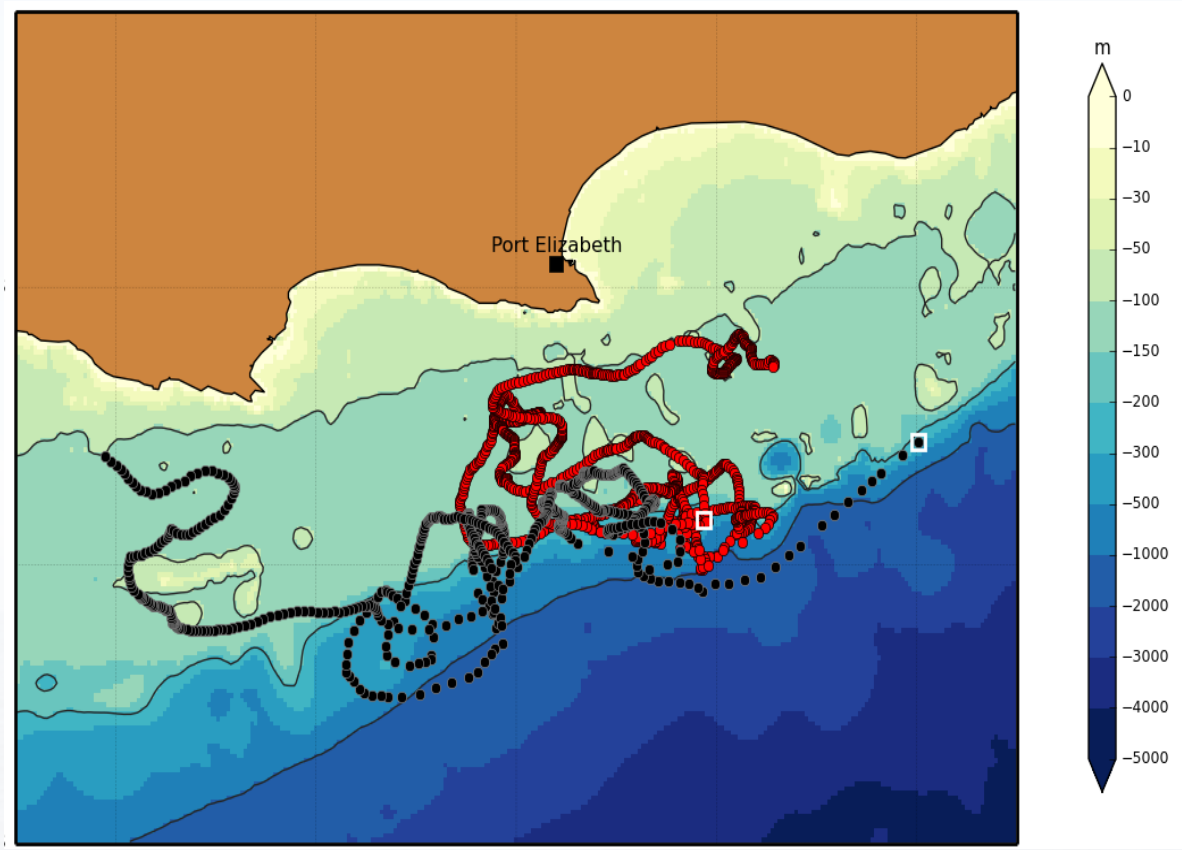
- 1st experiences with ocean gliders in the very dynamic and energetic Agulhas Current region

Deployment & Recovery

Deployment from the RV ALGOA as part of ASCA cruise activities
19 and **22 April 2015**

Recovery from the RV SAIAB *uKwabelana*
29th May 2015

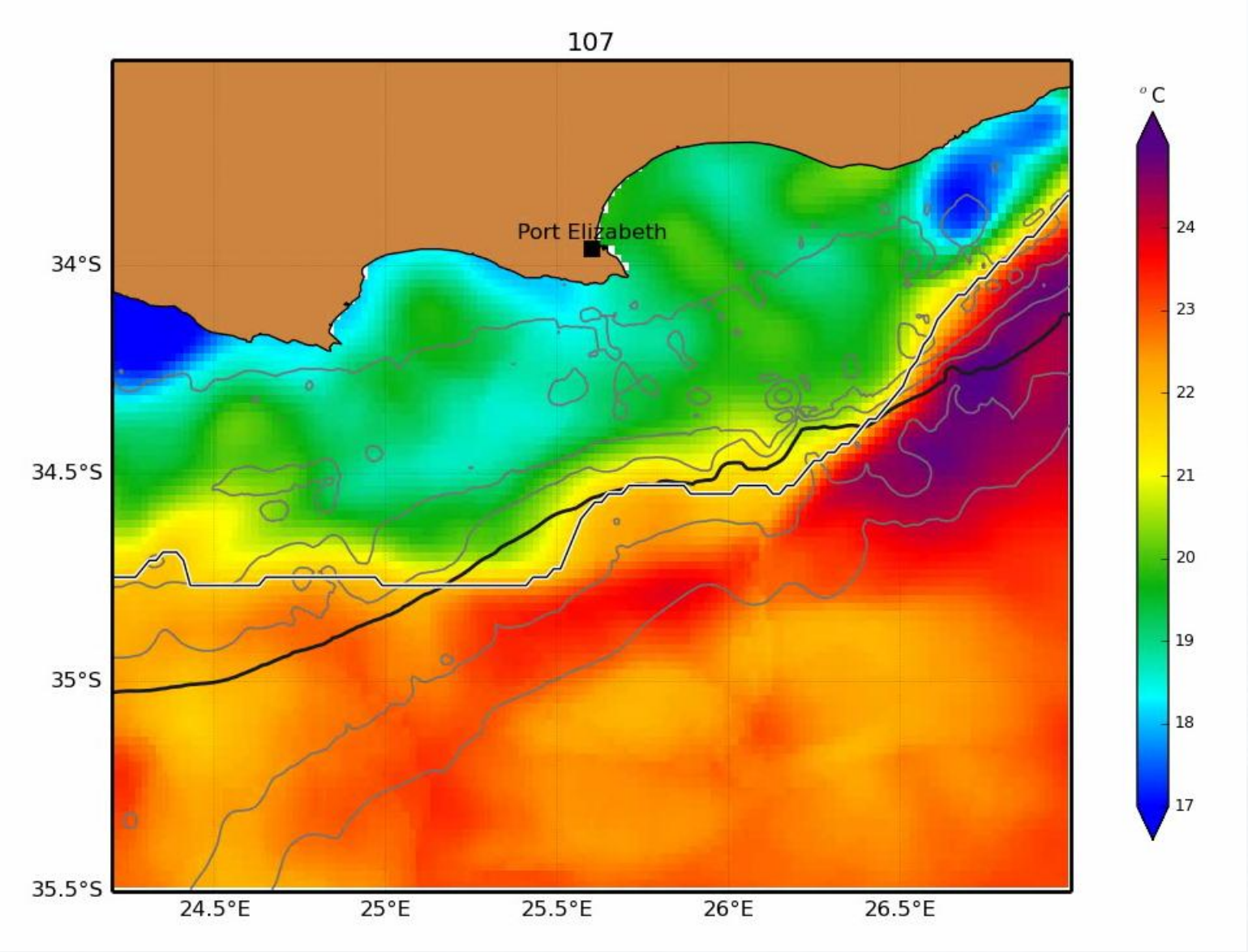
Observations



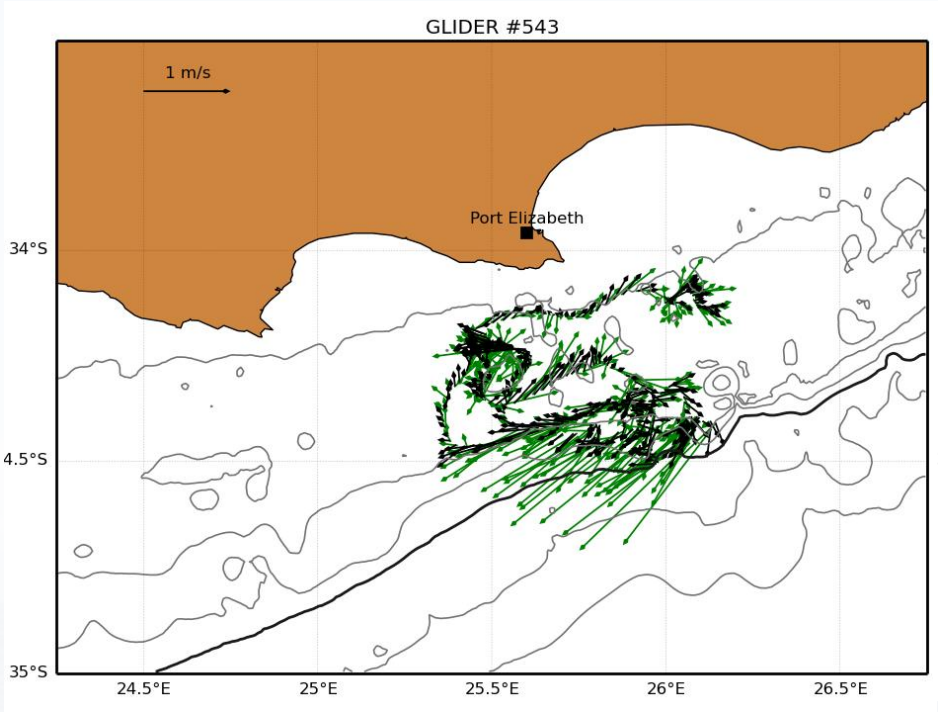
- Sampled for ~40 days
- Measured temperature, salinity, oxygen, chlorophyll, depth-averaged currents, surface currents and more !
- Average spacing between dives ~500m
- Average dive duration ~1 hour

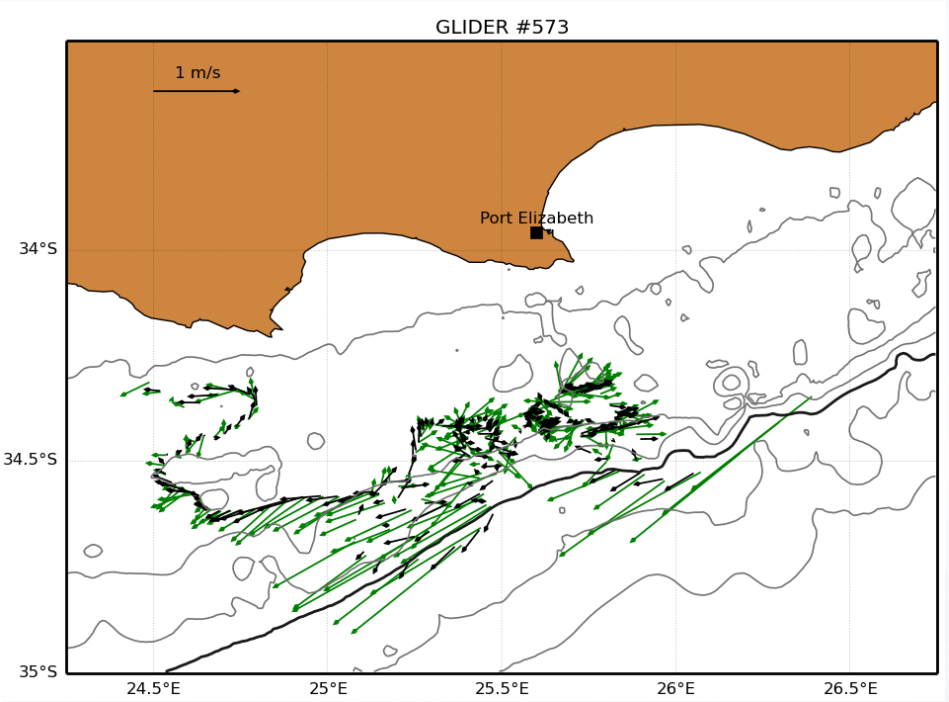
➢ Data communicated back to land via satellite every time gliders are surfacing

Observations



Ocean Currents

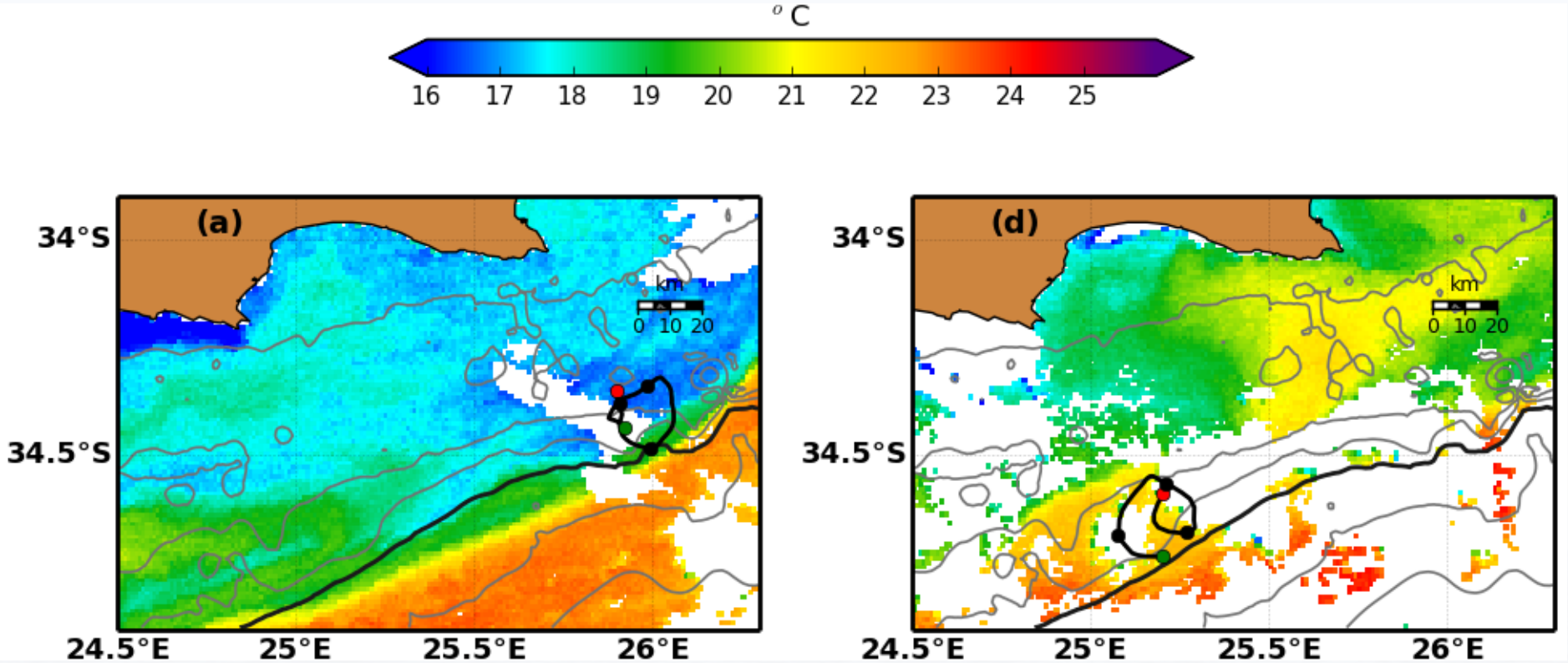




- Strong currents with maximum observed closer to Agulhas Current's edge
- Significant differences between surface and depth-averaged currents

Marjolaine Krug (CSIR-NRE), Seb Swart (CSIR-SOCCO), Wayne Goschen (SAEON) – Jan 2016

Ocean Currents

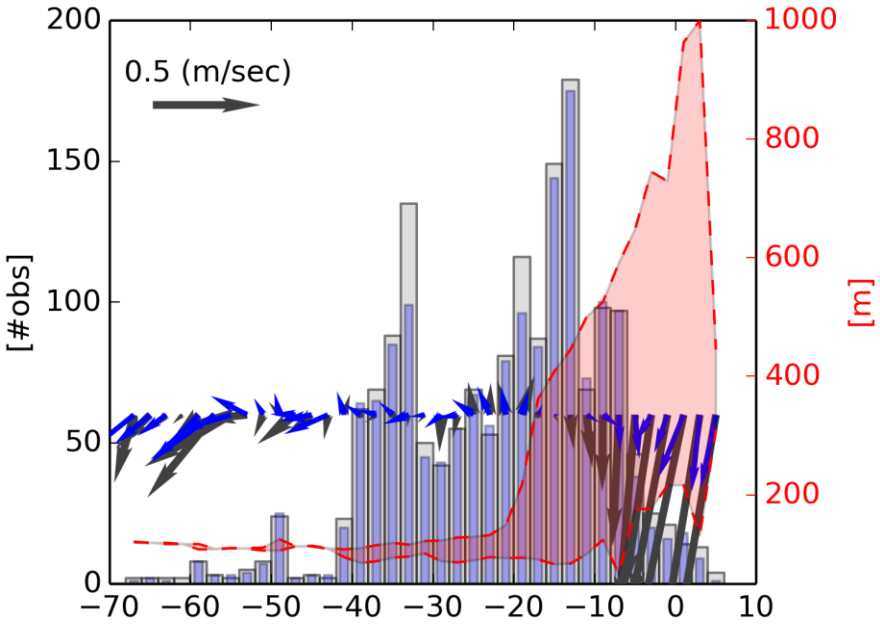


- Small clockwise eddies are observed at the inshore edge of the Agulhas Current
- These features are associated with strong currents and sudden current reversals and are very difficult to observe using satellites

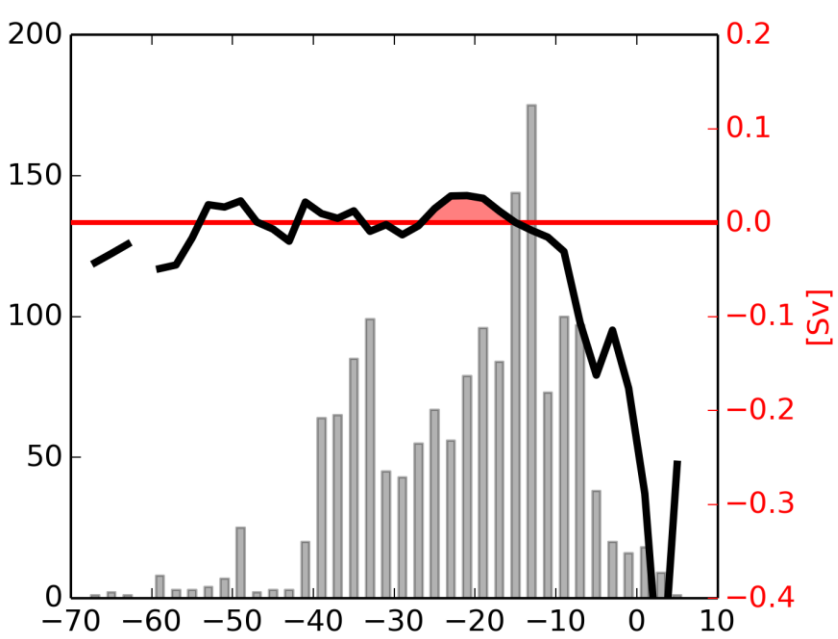
Impact on the mean

Mean from coast to 1000m depth

Along-shore currents



Along-shore transport



- Cumulative impact of very small eddies is to create a flow against the Agulhas at the inshore boundary of the Agulhas Current.
- Integrated transport (red shaded area) of 0.11 million $m^3 .s^{-1}$

Summary & Perspectives

- Perturbations at the Agulhas Current's inshore front cause a counter current, mainly in water depth of 100 – 200m.
- This counter current provides a mechanism for many fish species to move eastward and northward against the Agulhas Current and towards their spawning grounds.
- Larry Hutchings et al. (1994) hypothesized that anchovies spawned in small shear-edge eddies to benefit from the presence of a counter current
- Only now thanks to the continuous observations from the Seagliders could we verify these hypotheses.

Special thanks to

- ASCA, the R. V Algoa crew and in particular Tammy Morris
- Fred Fourie and JP Smit from STS who were just awesome
- Juliet Hermes, Tommy Bornman and Shaun Denzel for their support
- Pedro Monteiro for supporting the use of gliders in the Agulhas Current region

Photo courtesy of Fred Fourie