



Coastal Altimetry: on the ‘wish list’ for a Southern African OOS

Paolo Cipollini¹ + the COASTALT crew

¹National Oceanography Centre, Southampton, UK
cipo@noc.soton.ac.uk





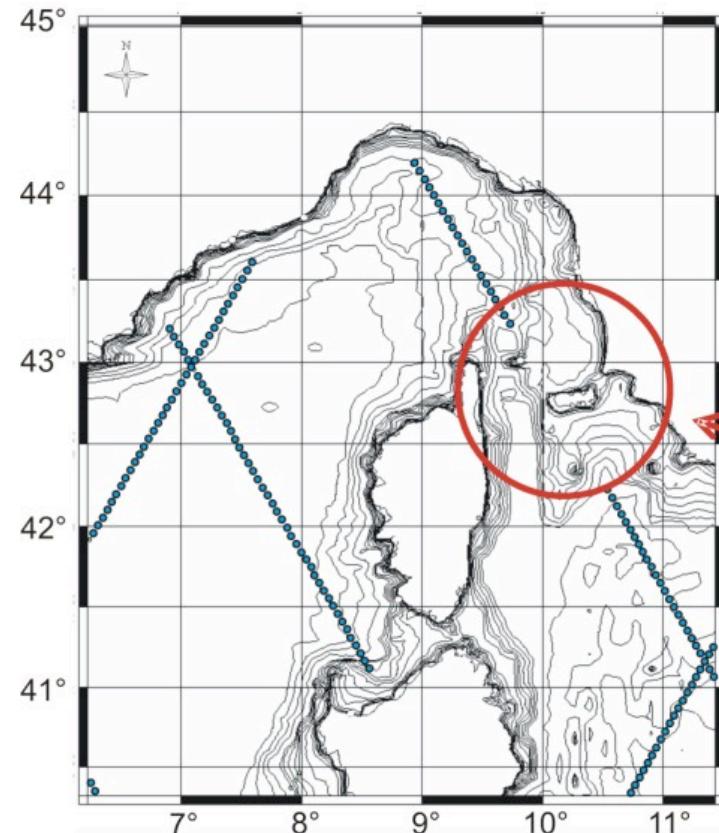
Rationale for Coastal Altimetry

- Altimetry: **most successful technique** for ocean remote sensing
 - To study/monitor the open ocean dynamics
 - large-scale & meso-scale phenomena (currents, Rossby waves, eddies), Niños, etc.
 - open ocean sea level change
 - Great “give & take” with tidal science
- **Now we need to extend it to the Coastal Zone!**
- Unlikely to be used in isolation, but great synergies with in situ and modelling systems, for:
 - sea level, currents, waves - not only long term studies and climatologies, but also specific hazardous events
 - Assimilation into coastal models
 - Fisheries, shipping, sediment transport, erosion

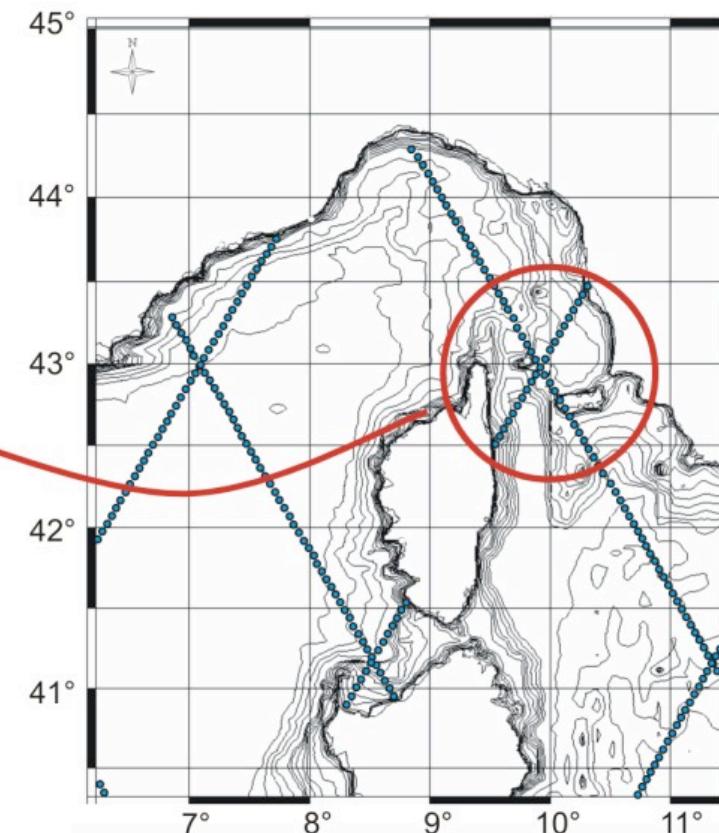


One picture is worth 1000 words

TOPEX/Poseidon - Ground Track Reference Mask



Standard Product



Improved Product

From this...

To this...



Coastal Altimetry: the context

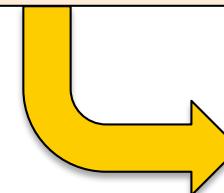
ALBICOCCA

France-Italy-UK 2001/04
Feasibility

ALTICORE-EU

EU/INTAS 2006/08
Capacity building

MAP/XTRACK/MARINA
CNES/LEGOS/CTOH
Integrated approach



ALTICORE-India
ALTICORE-Africa

PRODUCT DEVELOPMENT STUDIES INCLUDING RETRACKING

PISTACH

CNES 2007-present
For Jason-2

COASTALT

ESA 2008-present
For Envisat

...plus several OSTST Projects funded by NASA and CNES



COASTALT - objectives

- COASTALT aims to lead to the definition, specification and prototyping of **a new pulse-limited radar altimetry coastal zone product**.
- In COASTALT this is done over a number of study regions:
 - NW Mediterranean
 - West Britain
 - Portugal Coast
- The new product is eventually destined to become operationally processed by ESA
 - including the reprocessing of all the ESA Radar Altimetry archive (ERS-1, ERS-2, ENVISAT)
 - exploitation of CryoSat and Sentinel-3 over the coastal zone
 - **PISTACH** focuses on NASA/CNES Jason-1, Jason-2 instead





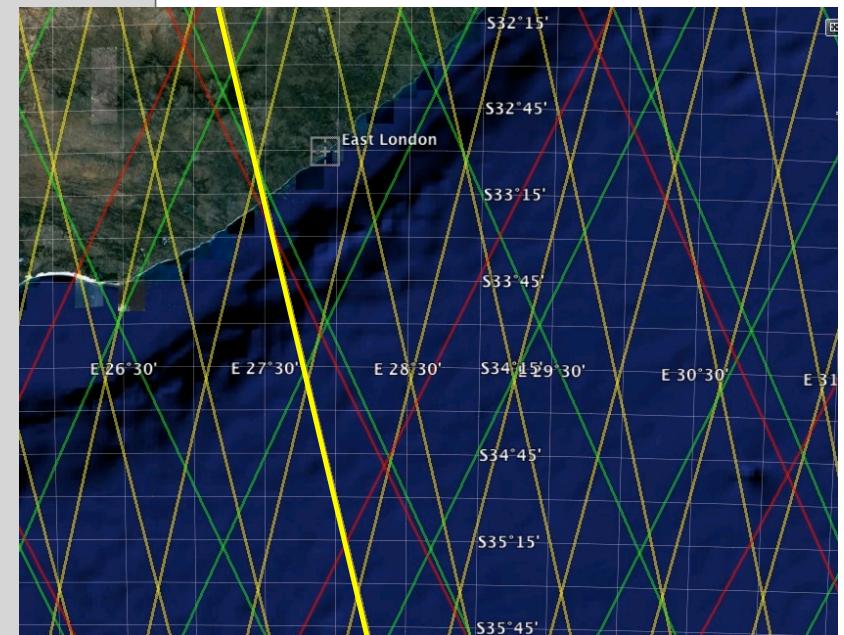
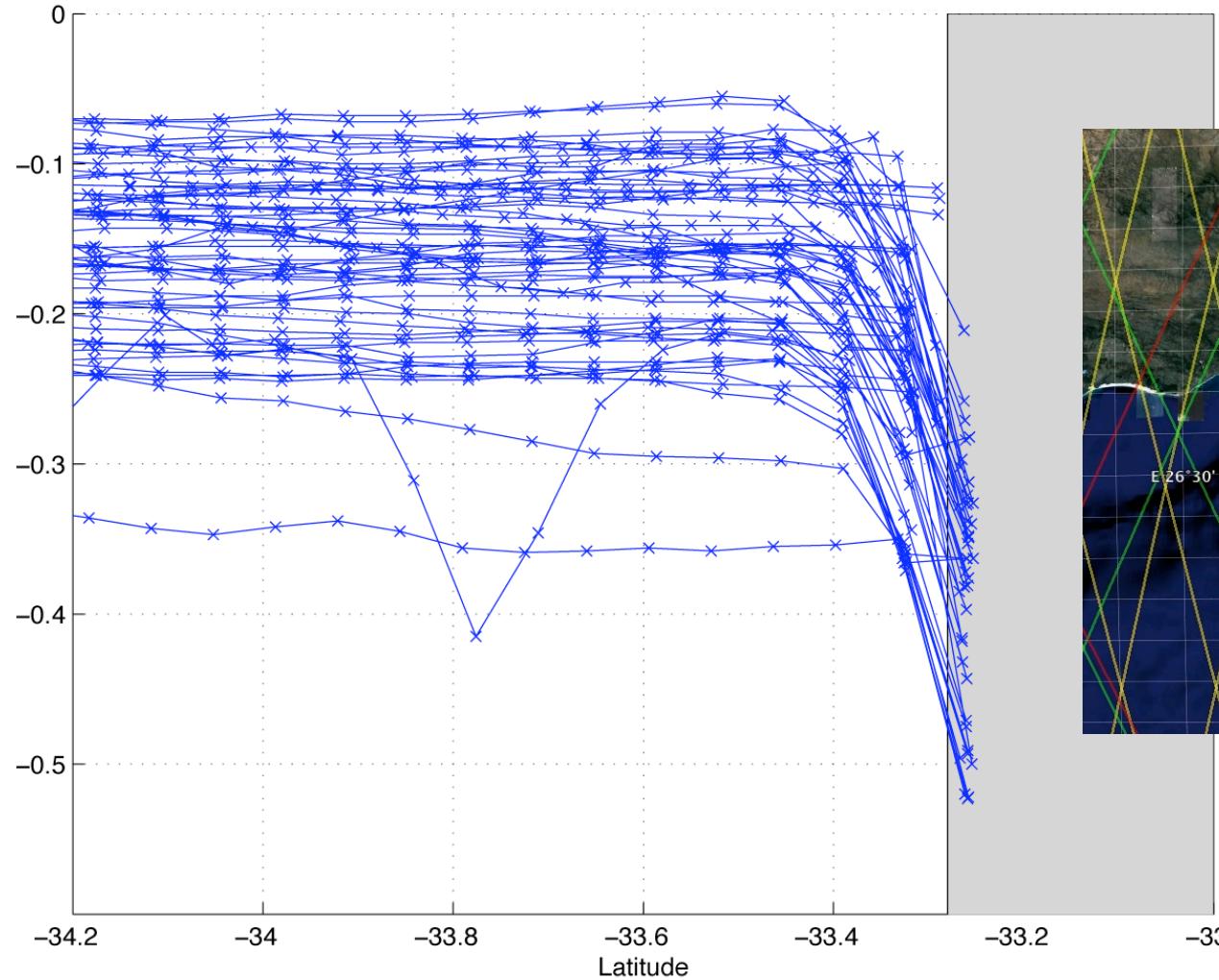
Sorting out coastal altimetry – in three steps!

- On the Shelf (100-0 km): main problem is the correction of **tides** (and HF atmospheric effects)
 - NEED **GOOD TIDAL & HF MODELS**
- Coastal strip (30-0 km): radiometer-derived **wet tropospheric correction** affected by land vicinity
 - NEED GOOD TIDES/HF + SOME **OPTIMIZED COASTAL WET TROPO** (a few ideas around...)
- Up to the shore (10-0 Km): the altimetric echoes **waveforms** affected by land & specular reflections
 - NEED TIDES+WET TROPO+ **DEDICATED WAVEFORM RETRACKING**



Example: Wet Tropo correction

Radiometer Wet tropo correction along Envisat track 343



Plot by Joseph M. Mbui for
ALTICORE -Africa



Retracking: the COASTALT processor

- Coded in C and Fortran: I/O in C
 - Read L2 SGDR files
 - Generate NetCDF output files
- waveform fitting in Fortran
 - Least-square fitting (weighted or unweighted)
 - **Brown, Specular and Mixed** waveform models
- **Output in NetCDF**
 - Over selected tracks in pilot regions
 - Software being tested/validated (By Starlab, UCadiz, NOCS); pilot reprocessed tracks will be made available on www.coastalt.eu in near future
- Includes a separate module to append to the NetCDF any custom correction (so fully flexible+expandable)

C. Gommenginger/ S. Gleason/ H. Snaith (NOCS)



COASTALT: next

- **Test products** out (on www.coastalt.eu)
 - PISTACH Jason-2 products already available at <ftp://ftpsedr.cls.fr/pub/oceano/pistach/>
- **User Handbook** (Helen Snaith, NOCS)
- **Outreach**: selection of case study examples and implementation of a tutorial module for BRAT
<http://earth.esa.int/brat/> (Val Byfield, NOCS)
- Extending the work to **other areas**....
 - Such as the one covered by the ALTICORE-Africa partnership



ALTICORE-Africa

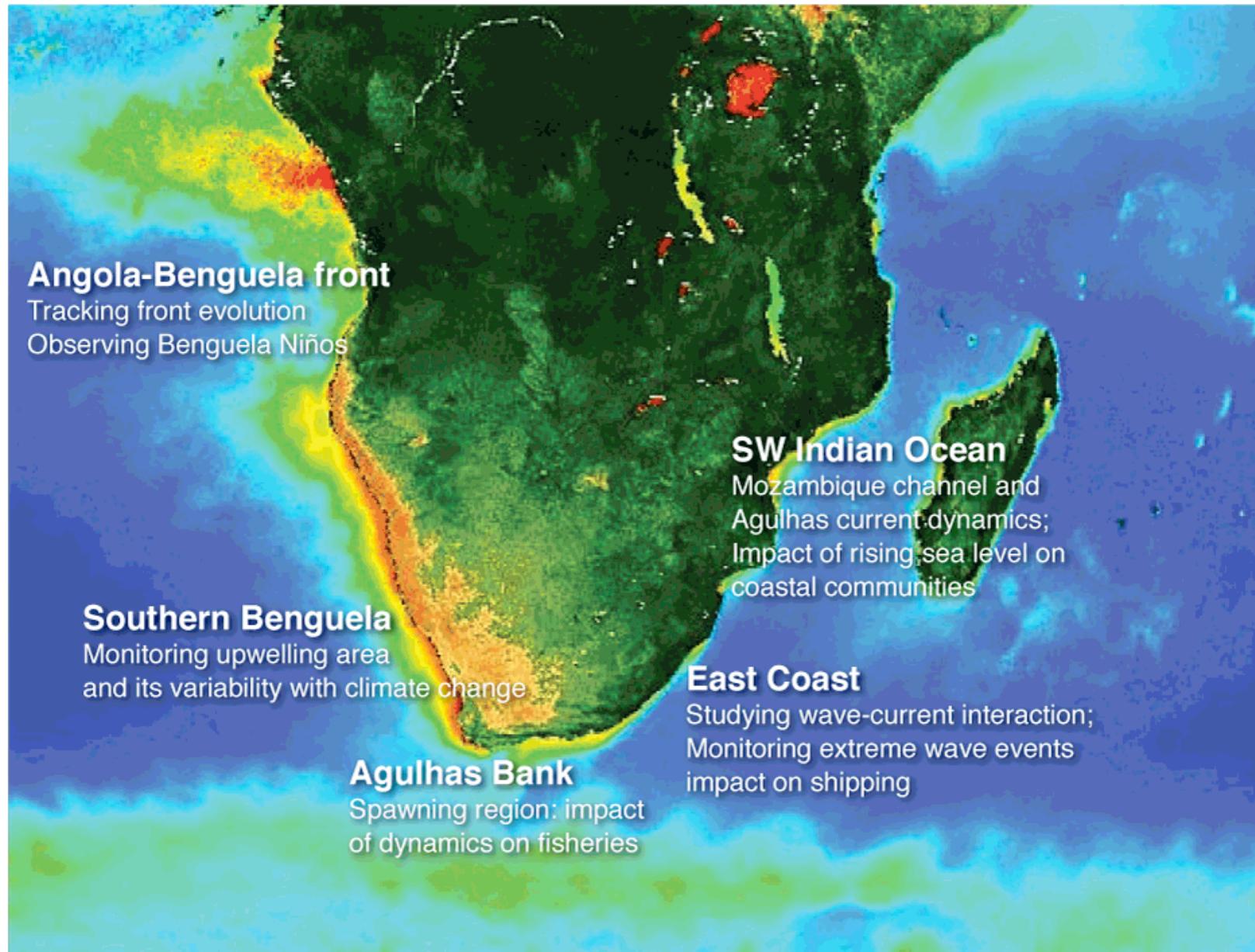


Cape Town Workshop,
April 2008

Lots of ideas on how to
use coastal altimetry in
the Southern African
region....

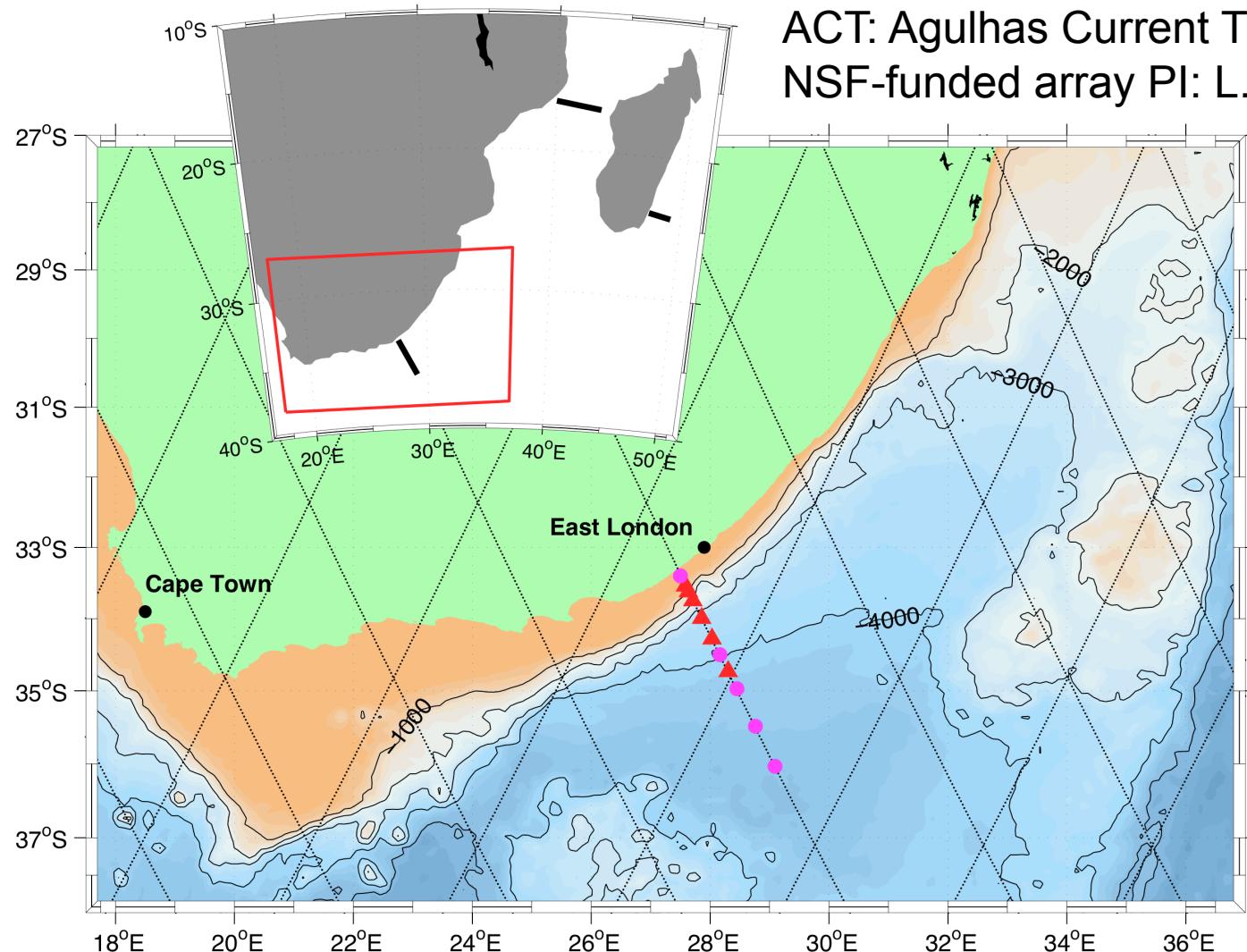


COASTALT for ALTI CORE-Africa





Natural laboratory: the ACT area





→ 3rd COASTAL ALTIMETRY WORKSHOP



17th-18th September 2009

Frascati (Rome), Italy

www.coastalt.eu