Coastal Altimetry: the 1-km Challenge

a short summary of the 9th Coastal Altimetry Workshop

Paolo Cipollini, National Oceanography Centre, UK

Organizing committee: J. Benveniste (ESA), H. Bonekamp (EUMETSAT), P. Cipollini (NOC), L. Miller (NOAA), N. Picot (CNES), T. Strub (OSU), D. Vandemark (UNH), S. Vignudelli (CNR)

Session Chairs: O.B. Andersen (DTU), F. Birol (LEGOS), M. Cancet (Noveltis), J. Fernandes (U Porto), J. Hausman (JPL), K. Ichikawa (Kyushu U), L. Fenoglio (TUD), C. Martin-Puig (NOAA), A. Pascual (IMEDEA), M. Saraceno (U Buenos Aires), R. Scharroo (EUMETSAT), W.H.F. Smith (NOAA), P. Thibaut (CLS), J. Wilkin (Rutgers U).

plus the many scientists who contributed papers, posters & animated discussions

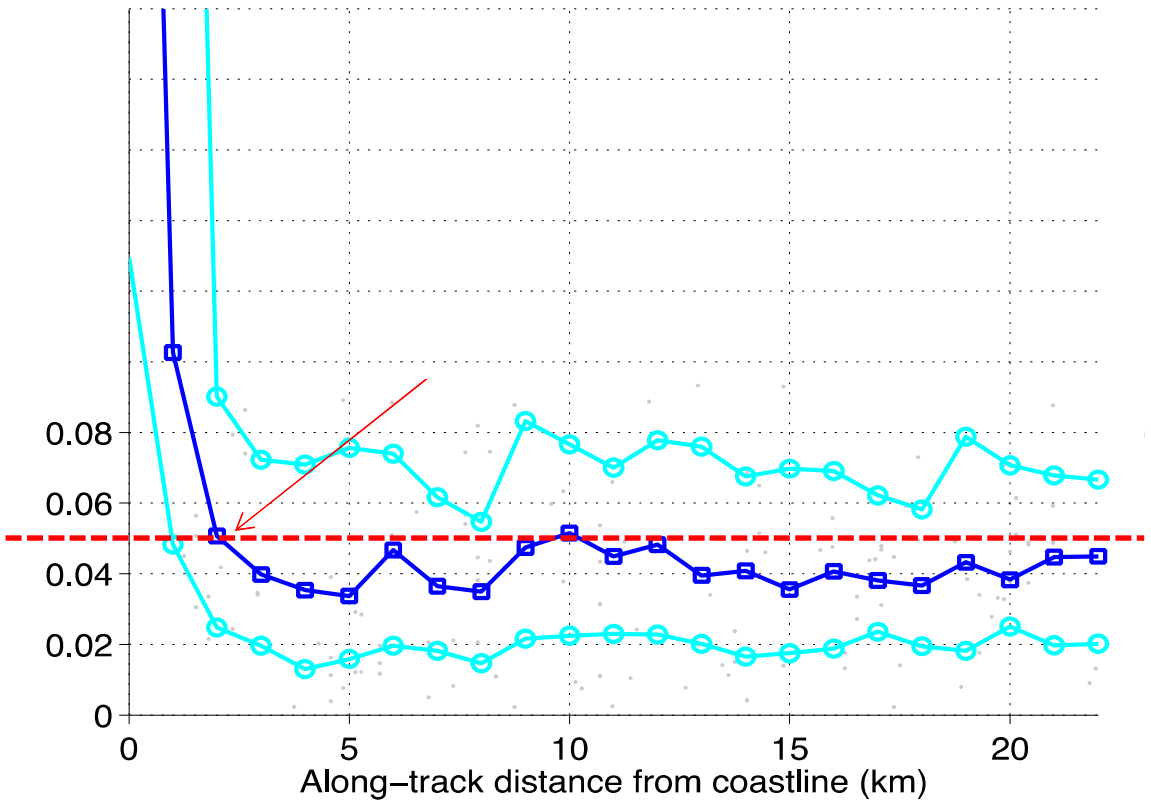
…and at both ends of the spectrum

This is made possible by a number of advancements

AltiKa working extremely well

  - PEACHI project has introduced many improvements in processing

- Advances in retracking
  - For LRM: ALES (NOC, on PODAAC), DCORE (CLS)
  - For SAR: SAMOSA Coastal (ESRIN), convolution-based retracker (TUDarmstadt)



Data from “Brighton Box” (South UK) processed by GPOD @ ESRIN

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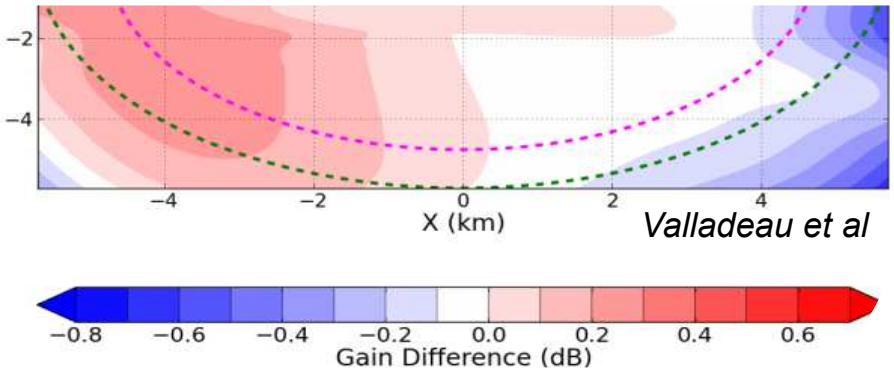

AltiKa antenna pattern compensation

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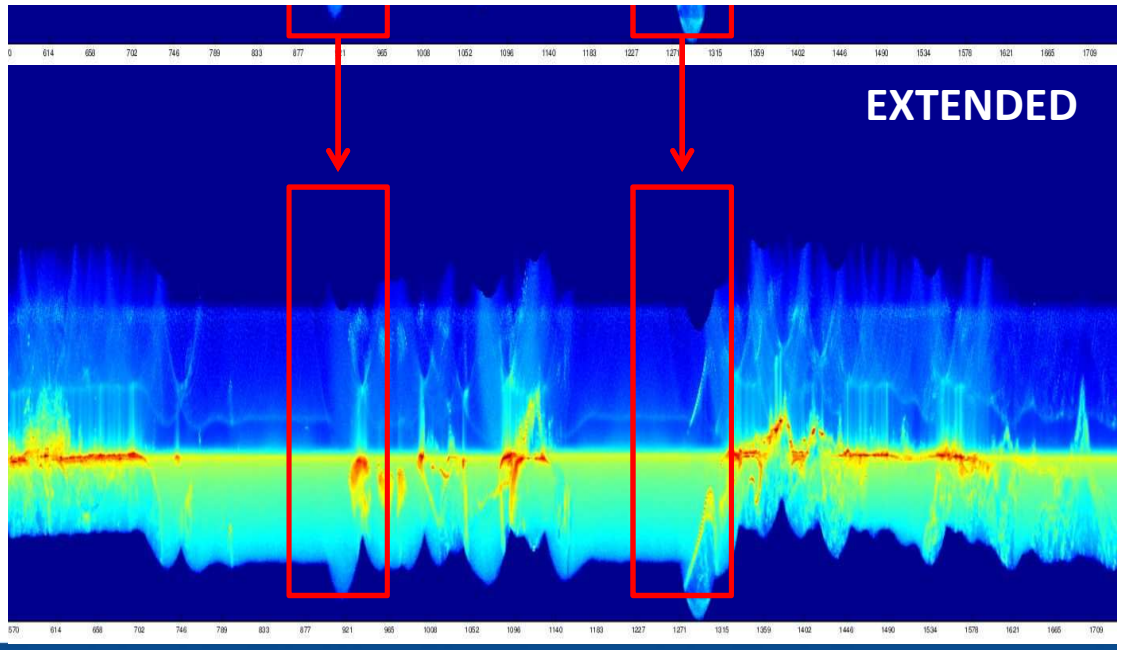
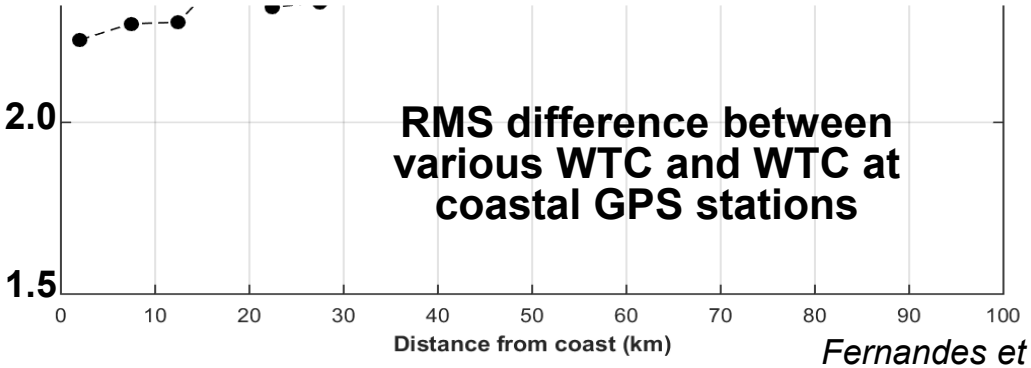


- tides continue to improve and remain crucial
  - and many applications will need regional tidal models
- New MSS models with coastal improvements



Fernandes et al

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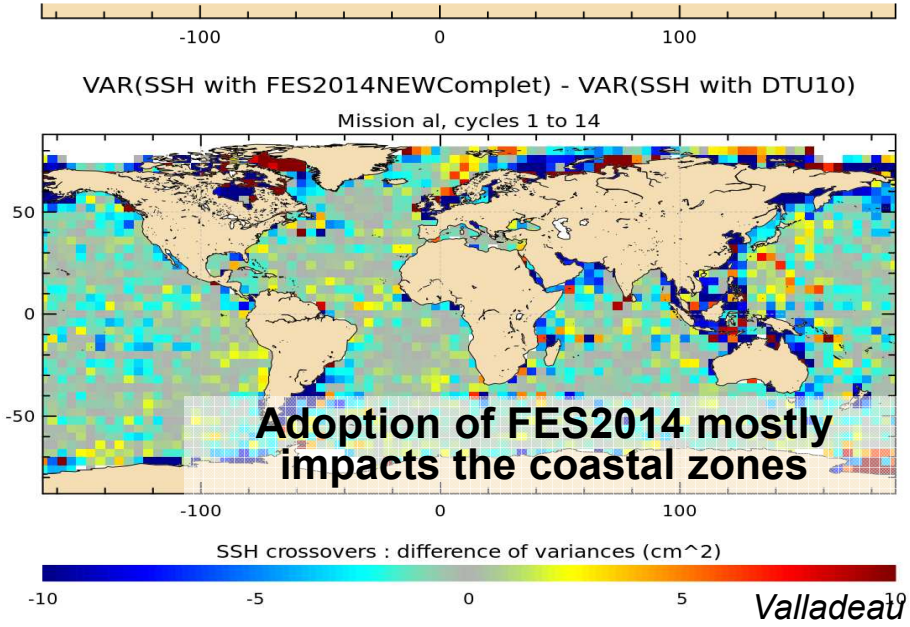

Valladeau et al

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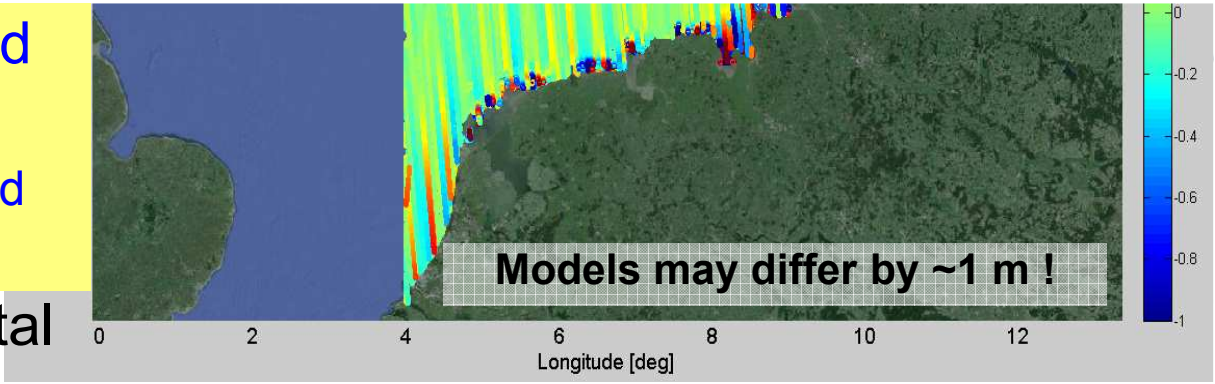

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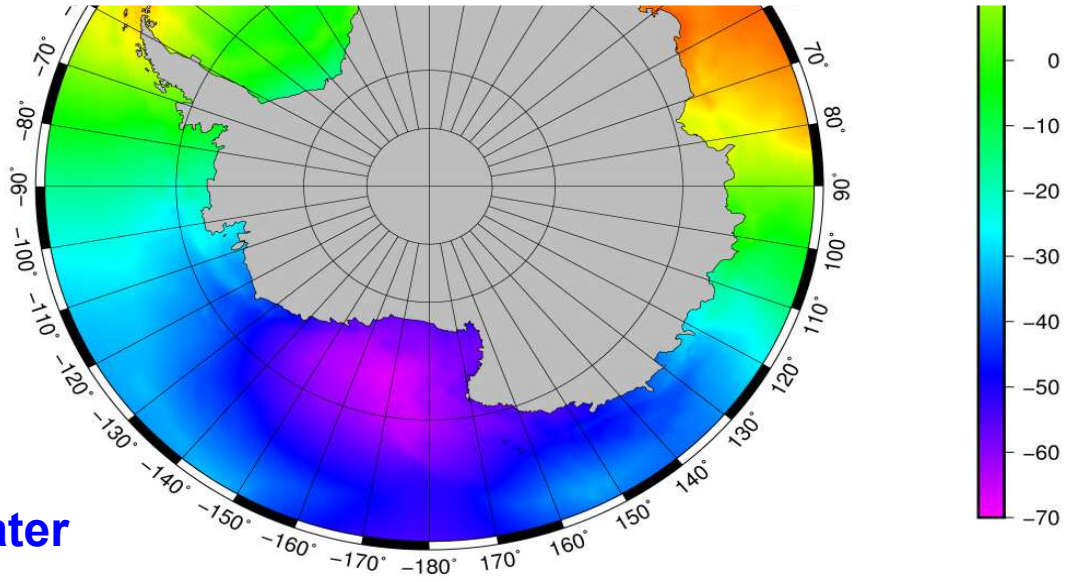
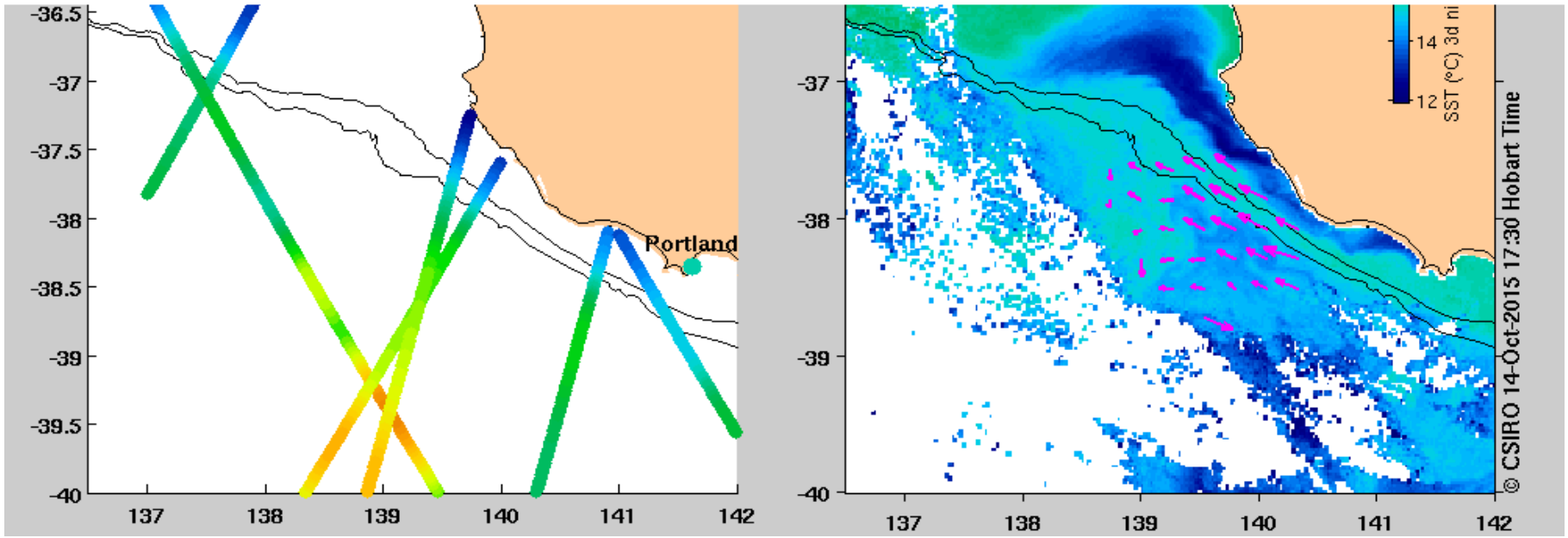


Some applications just require Total Water Level (independent on corrections)

PEACHI	CLS CNES	sa	L2	40 Hz	Global	AVISO+
XTRACK	LEGOS- CTOH	tx, j1, j2, gfo, en	L2, L3	1 Hz 20Hz (test)	23 regions	CTOH AVISO+
RADS	EUMETSAT, NOAA, TUDelft	gs, e1, tx, pn, e2, gfo, j1, n1, j2, c2, sa		1 Hz	Global	TUDelft
ALES	NOC	j2, n1 (coming)		20 Hz	Global, <50 km from coast	PODAAC
SARvatore	ESA-ESRIN	c2 (SAR only)		20 Hz	SAR mode regions	ESA GPOD
COP	ESA	c2 (LRM/PLRM)	L2	20 Hz	Global	ESA

- submesoscales
- …but also to the **very long/slow end**
  - climate scales
  - mean sea level


-36.5
-37
-37.5
-38
-38.5
-39
-39.5
-40
137
138
139
140
141
142
Portland
14
12
SST (°C) 3d ni
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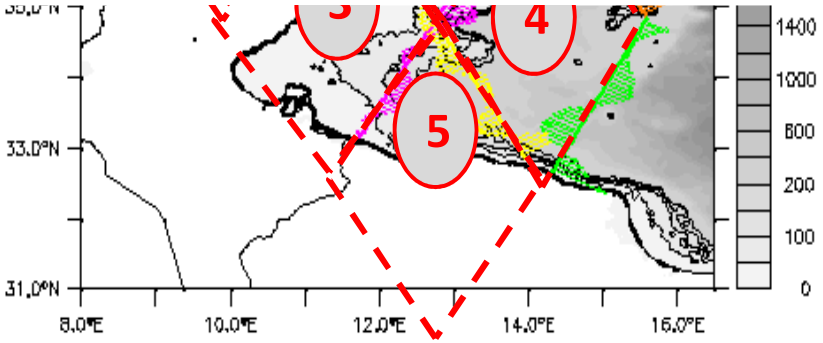

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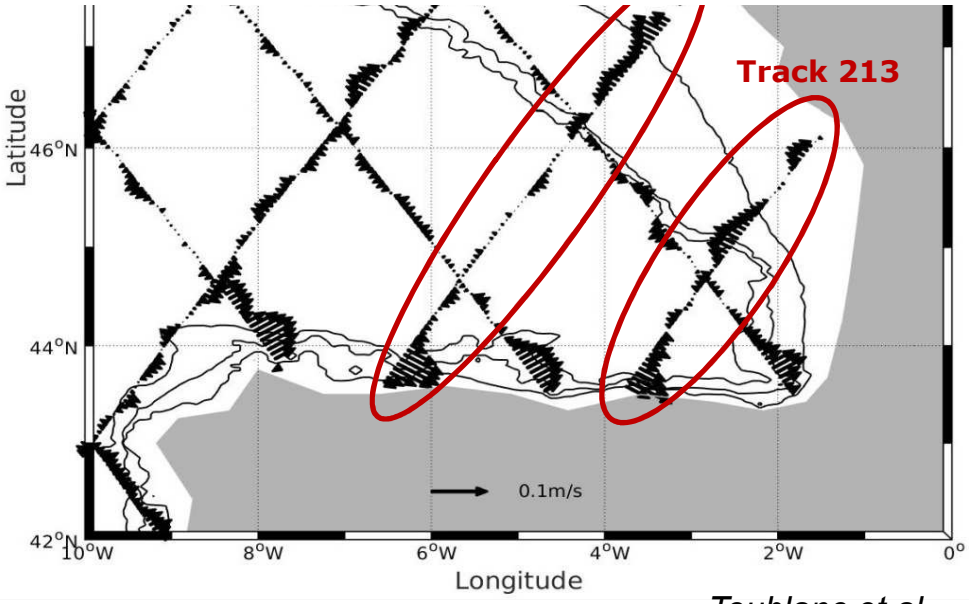
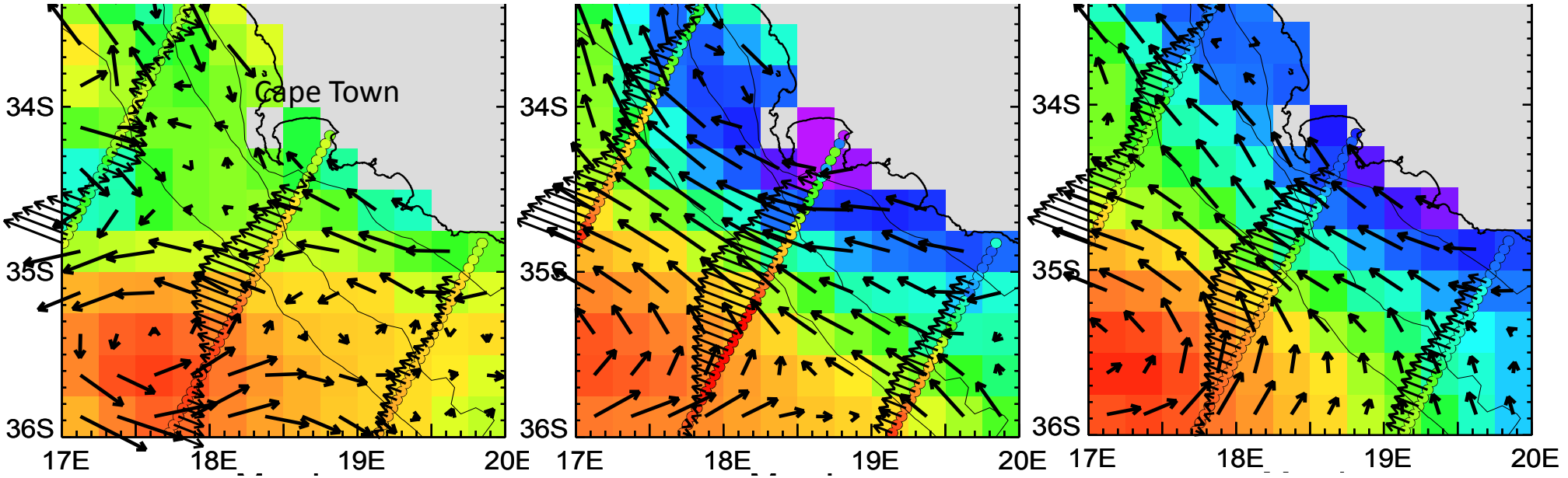
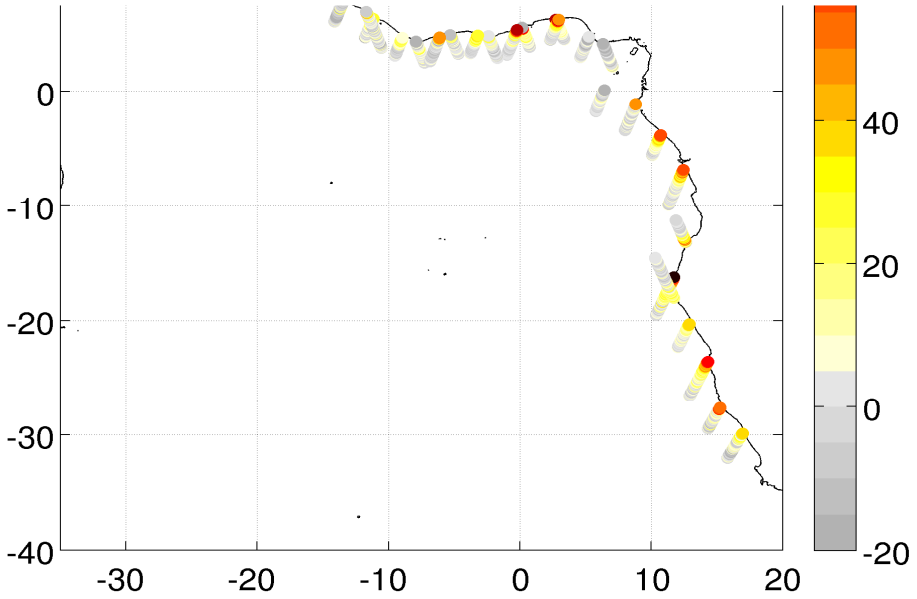
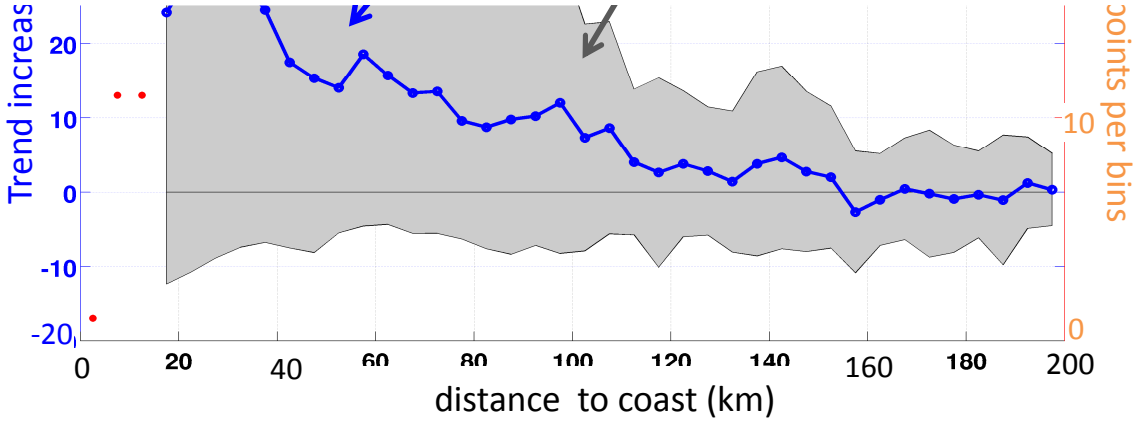


Toublanc et al


Cape Town
34S
35S
36S
17E
18E
19E
20E

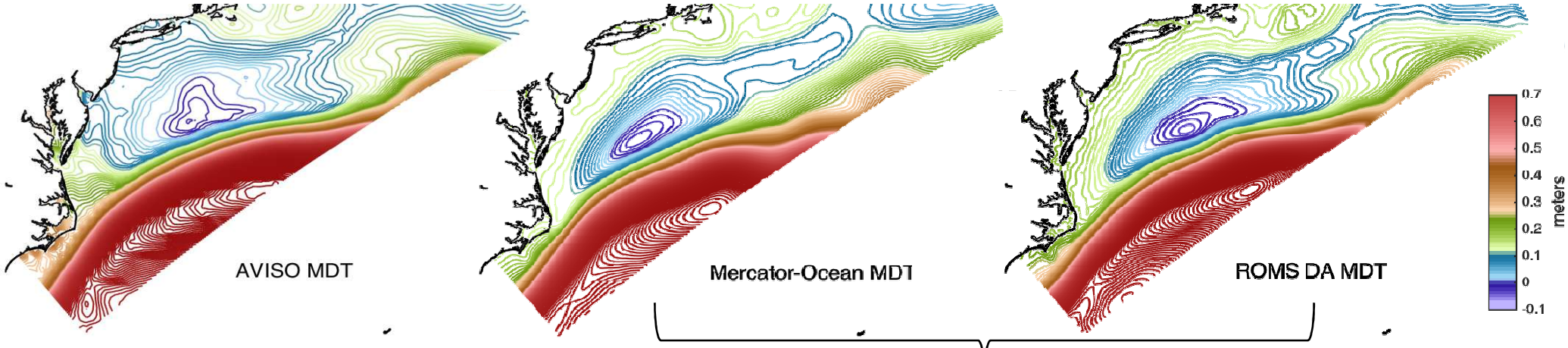




Faster sea level rise onshore (+20-30%)
Robust for coastal sections


Keynote by Eric Lindstrom calling for closer collaboration between sea level change community and coastal altimetry community

  - MSS/geoid, MDT, geophysical corrections, sampling patterns, re-tracking, signal/noise
- Emphasized "*know your corrections*" to match altimeter data relevant to coastal dynamics
- Example application: observation impact in coastal variational Data Assimilation



ROMS MDT matched to Mercator sea level datum in open ocean

John Wilkin, Rutgers

1	products available, data access points, and examples uses.
2	At ARCOM it was suggested that a “decision tree” guide (flow chart) would help with data selection be offered.
3	Desire for a “multi-mission along-track coastal AVISO” with default choices that presents data to oceanographers in a common format for use in integrated analyses, to overcome activation energy of first use of coastal altimetry

The "1-km challenge":

- **in the coast:** can we capture the dynamics up to 1 km from the coast? and Sea Level (also over long scales) up to 1 km from the coast? *(yes!)*
- **over open ocean:** spectra show us we cannot resolve 1 km, but how do we use the increased resolution & accuracy?

And finally, how we best integrate this information with other data and models?


23 talks over 7 sessions → all to go on www.coastalt.eu/community
1 keynote
2 poster sessions
83 participants
15 countries, 6 continents