CP40 WP4000/5000

Evaluation of CryoSat-2 SAR mode performance around the UK coasts

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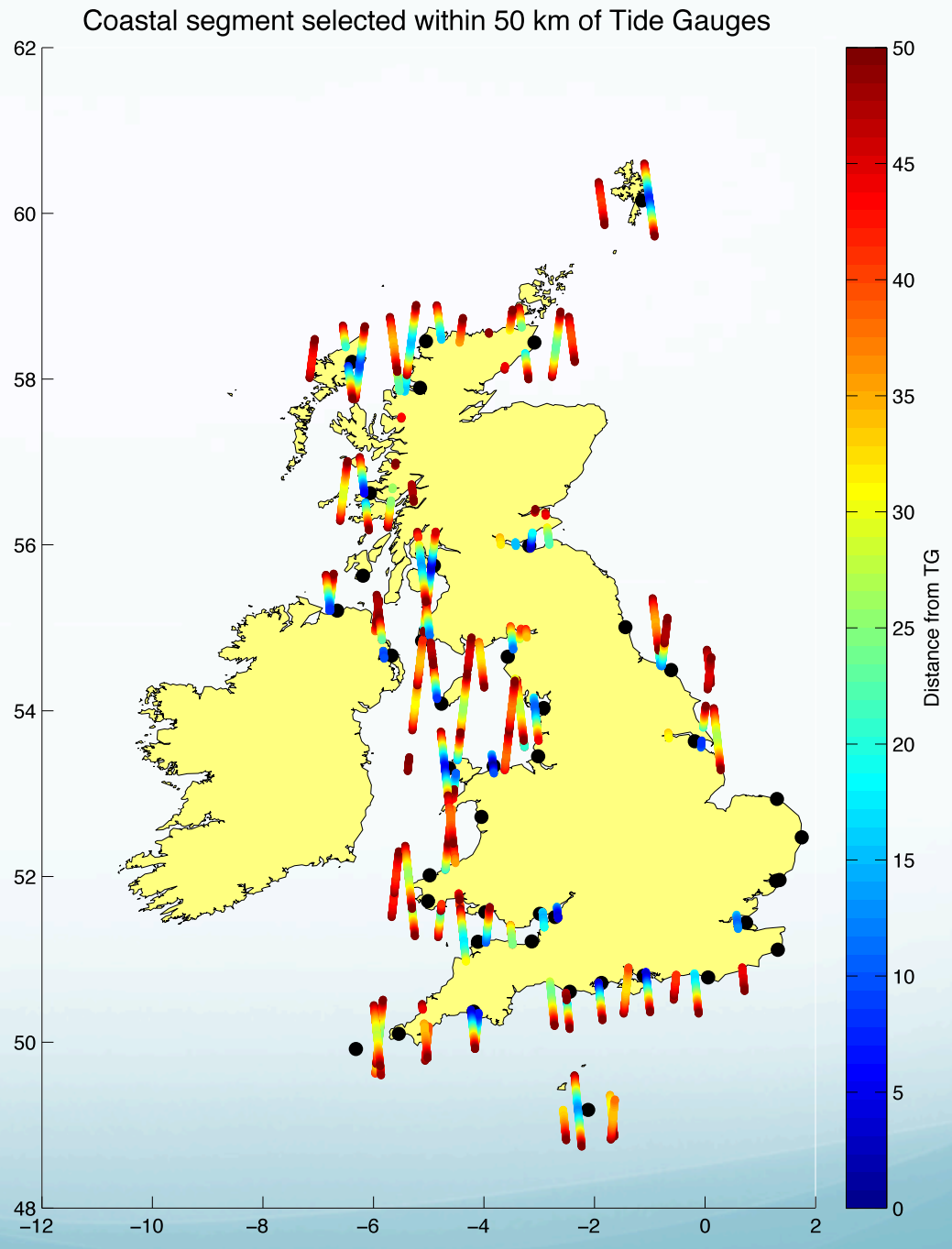
Coastal Zone objectives and strategy

- assess CryoSat-2 noise in coastal zone, as function of distance from coast
- show that CryoSat-2 heights compares favourably with Tide Gauges
- non-repeat (and only 2 months of data): cannot use time series at specific location
- our attempt: alt/TG match-ups over a wide geographical area disregarding the time information.
- then, noise analysis (verification) based on differences of consecutive 20-Hz values

Data and Methodology

- ESRIN R1 run from L1B CPP, Jul 2012 & Jan 2013
- Updated correction from RADS
- Use TWLE (Total Water Level Envelope, i.e. the sea level inclusive of ocean tides and atmospheric forcing due to pressure and wind effect)
- Tide Gauge data: UK Tide Gauge Network accessible via the British Oceanographic Data Centre
- subset segments of each pass within 50 km from a tide gauge, and create match-ups within alt TWLE and tide gauge height (effectively a TWLE)



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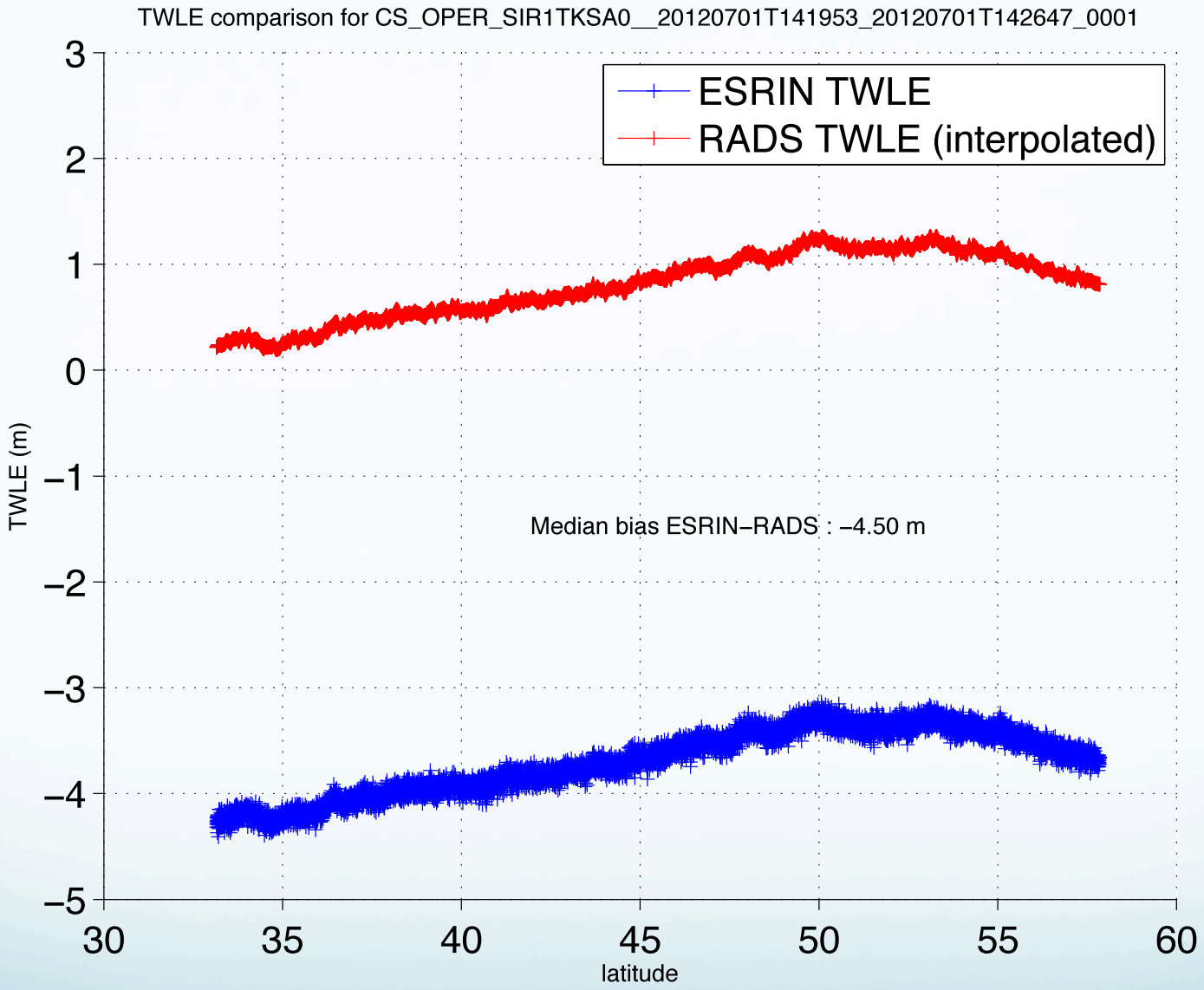
Validation results: large offsets

- results are dominated by large offsets, variable from match-up to match-up, with **a mean value (mean bias) of ~725 cm**
  - possibly internal path delay correction + platform reference bias
  - obviously needs discussion and perhaps further investigation by comparison with other datasets (run ESRIN R5 run CNES CPP)
- However profiles do follow RADS (see example in next slide) so the oceanographic information must be there:



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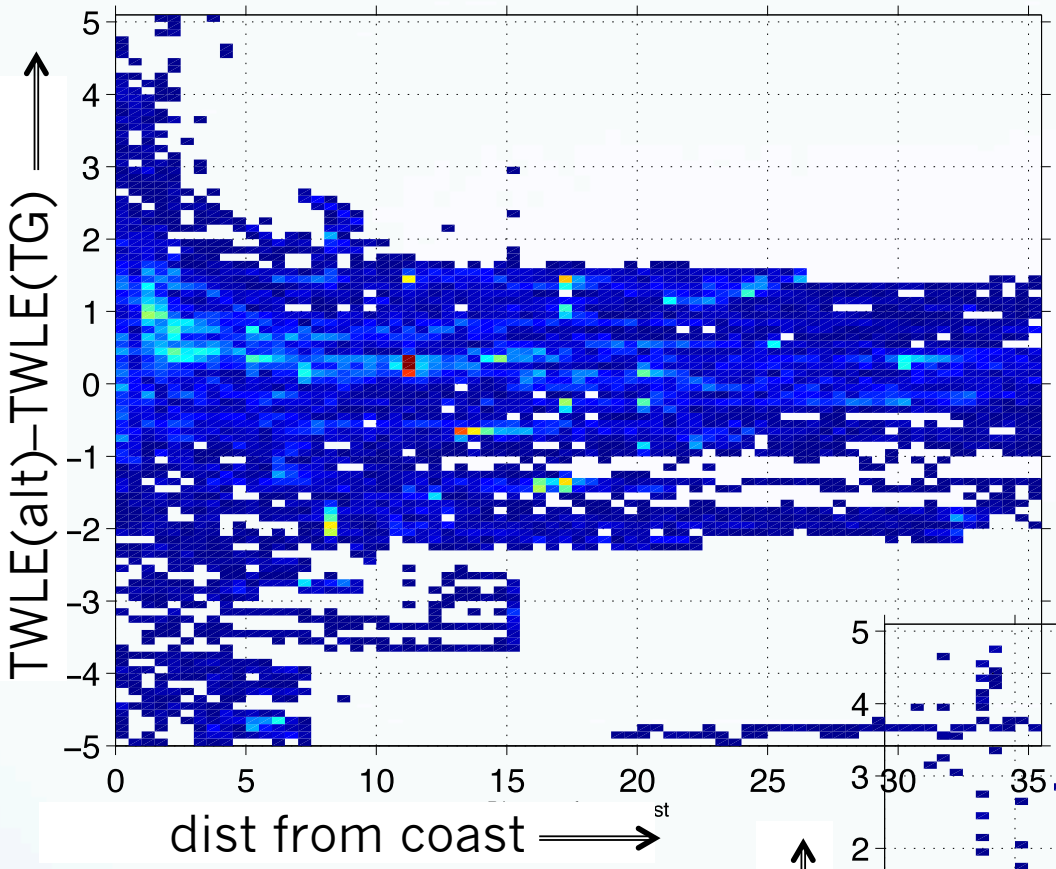
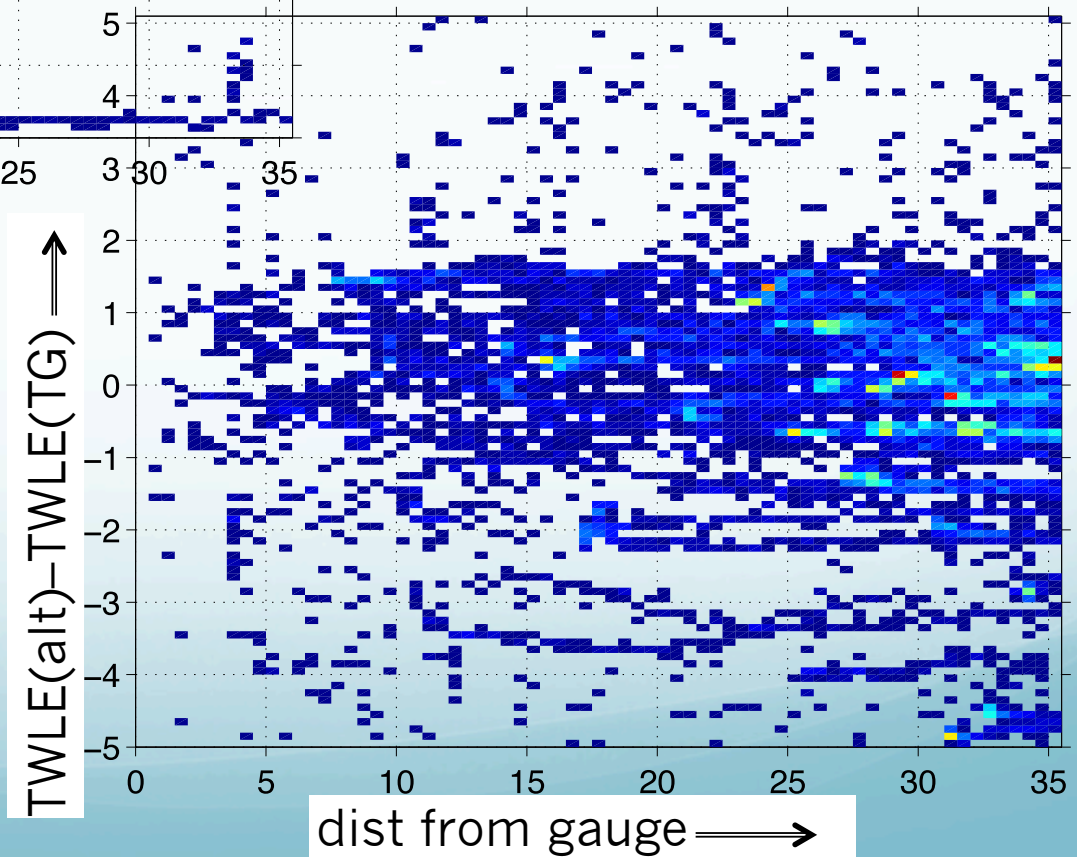
2D histograms of TWLE differences

(–725 cm bias removed)





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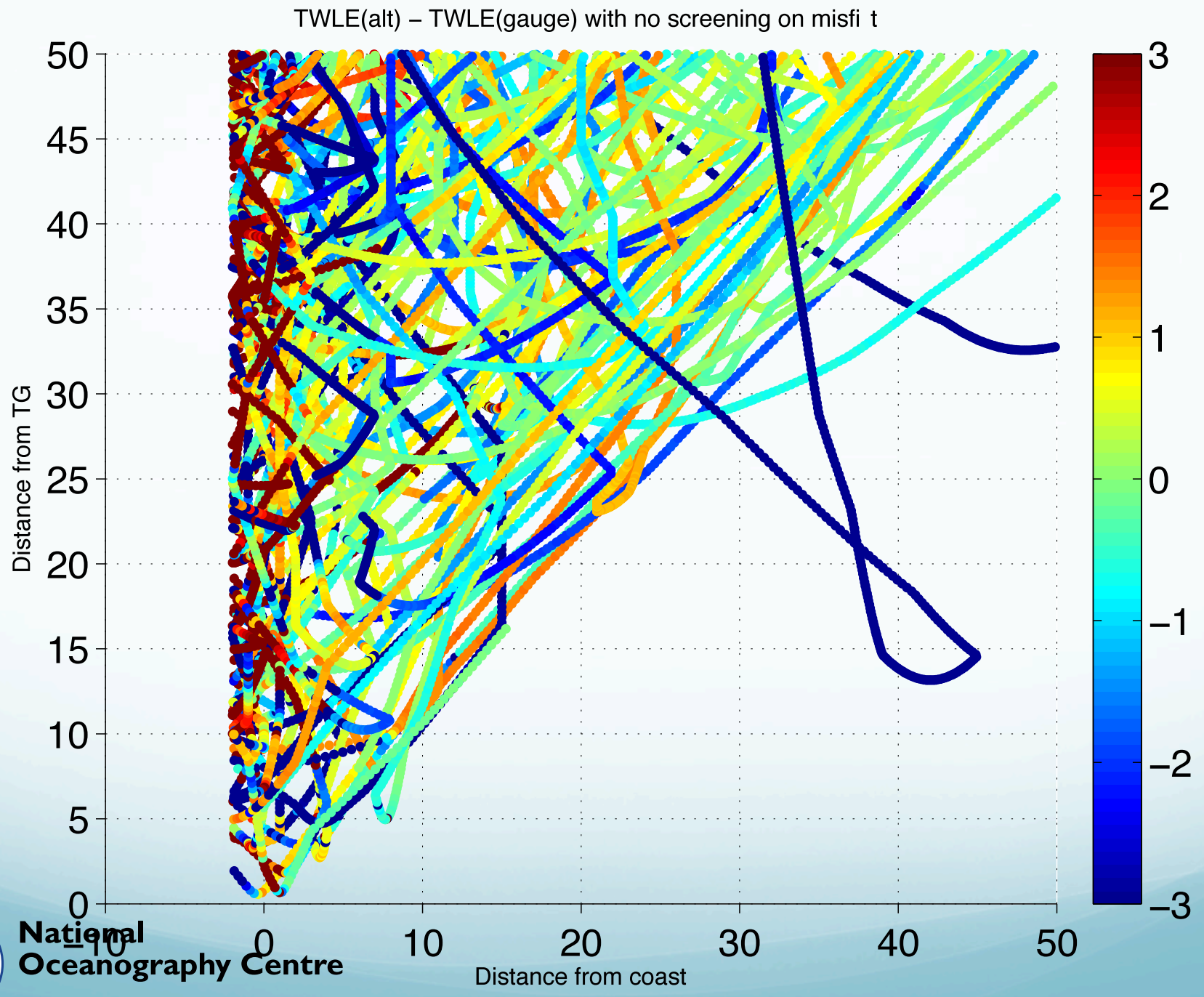

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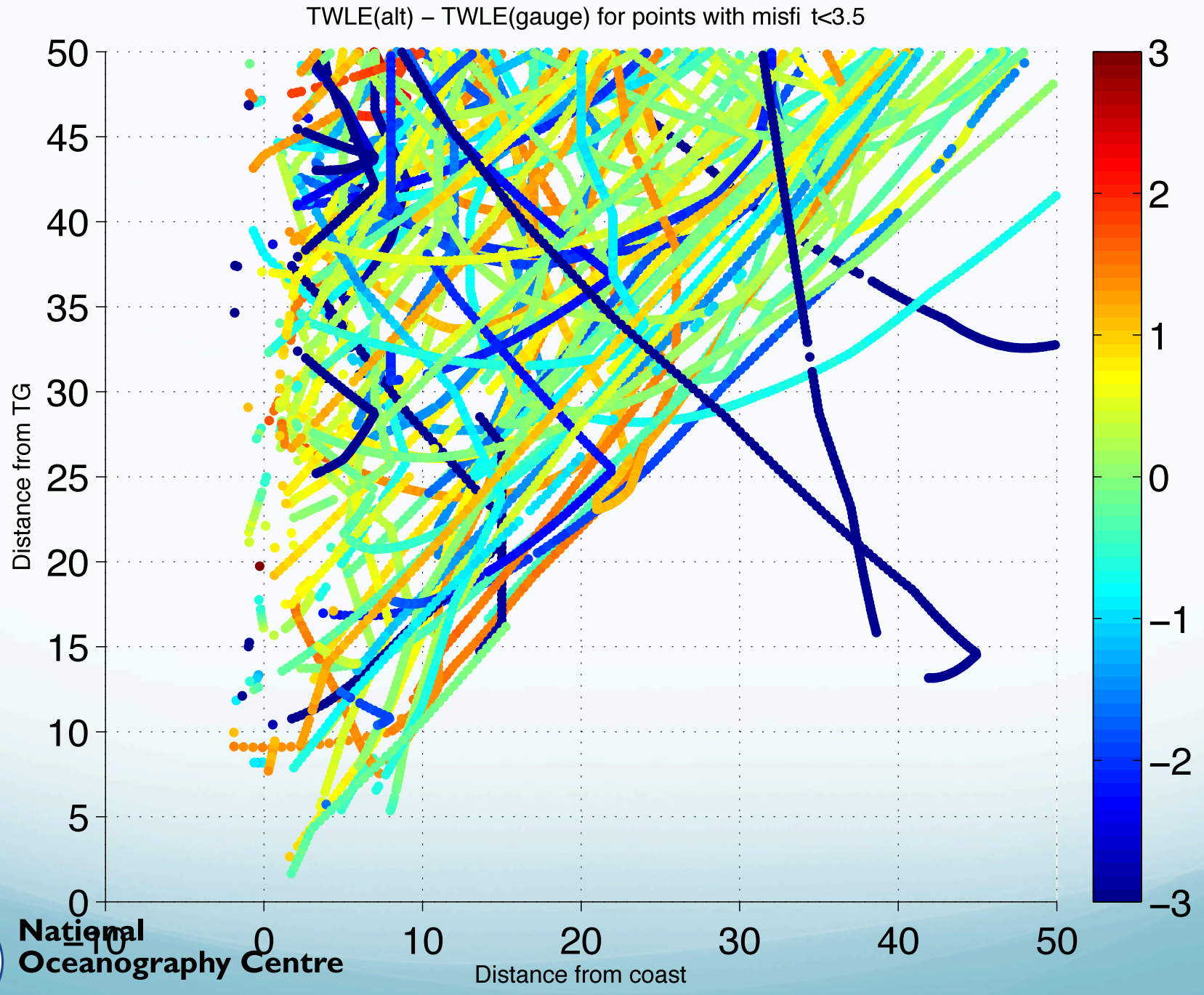

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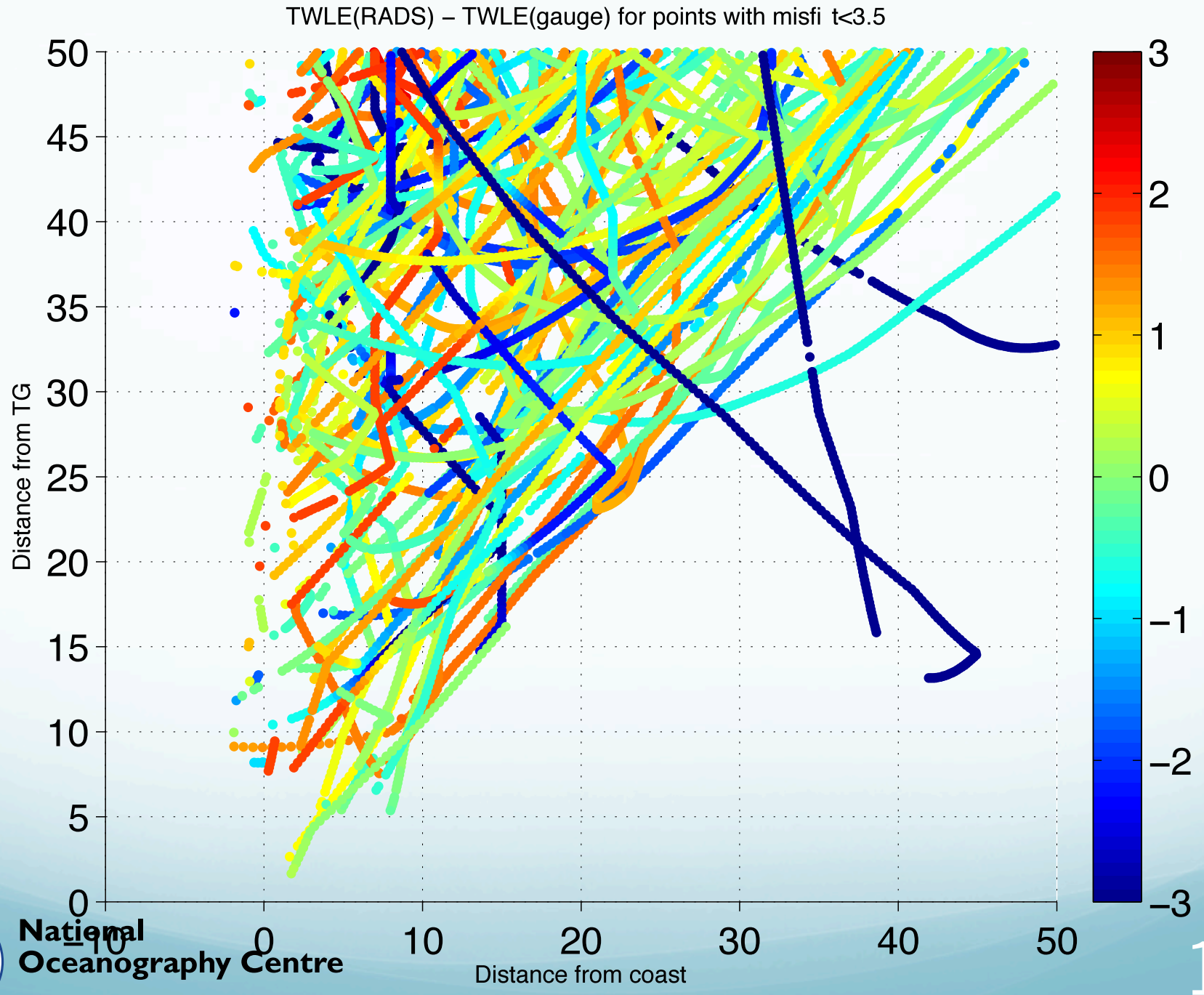

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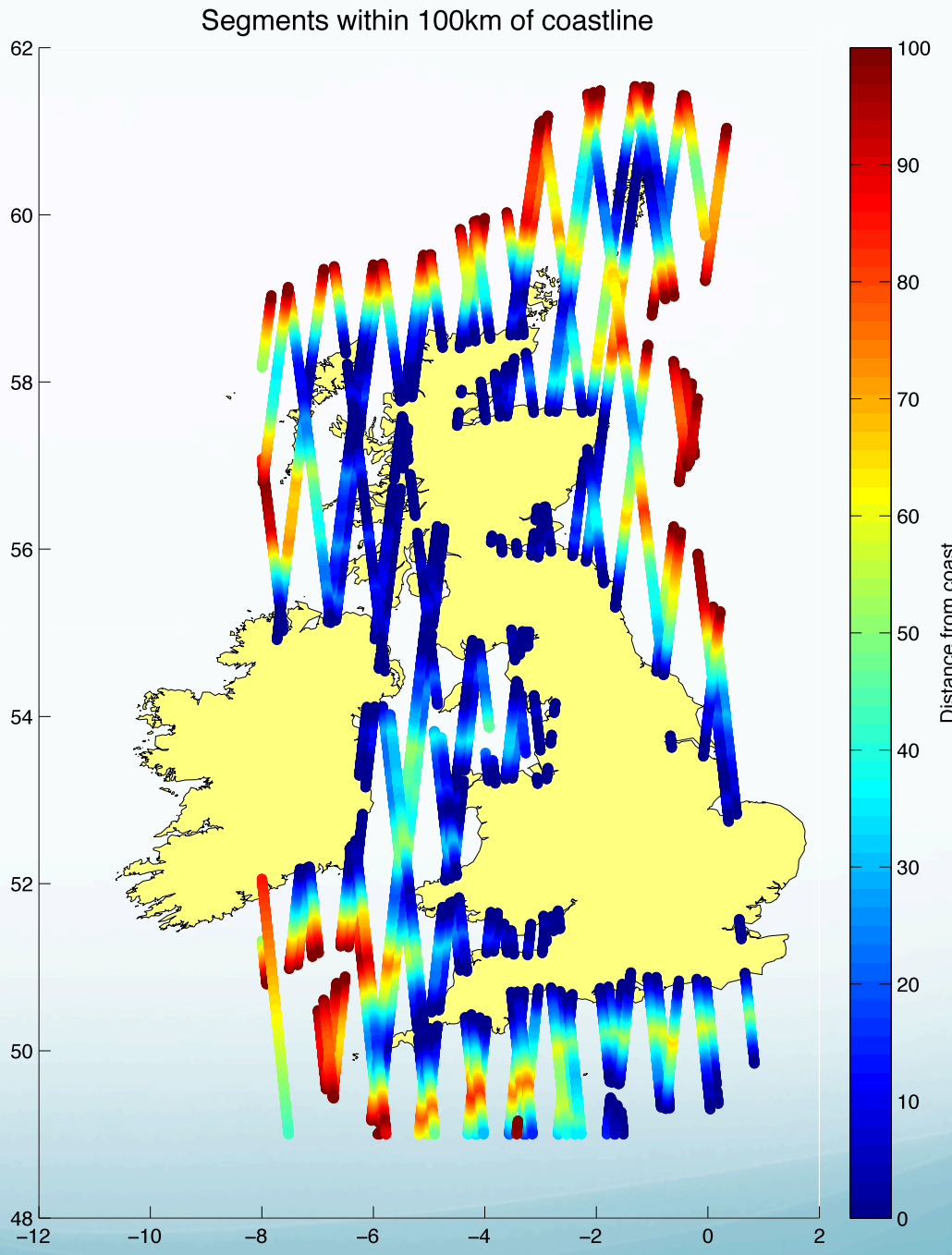
Summary for validation against TG

- Large biases
- Need to step back: **verification of measurement precision** (noise analysis)
  - Use differences amongst 20-Hz consecutive values
  - median(abs(diff)) is good approximation of sigma_noise
    - std(diff)/sqrt(2) would be even better…TBD



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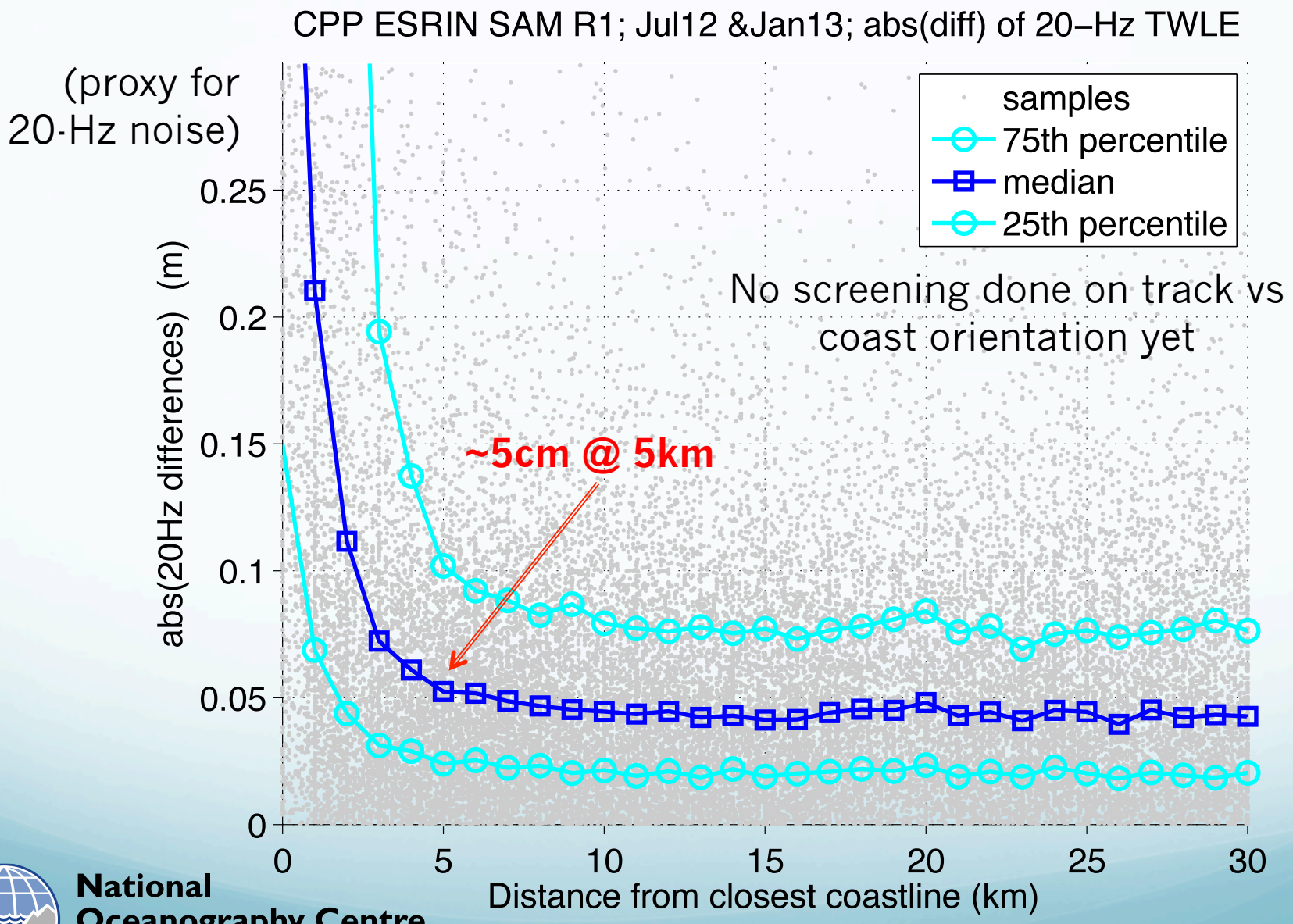
Coastal results around UK



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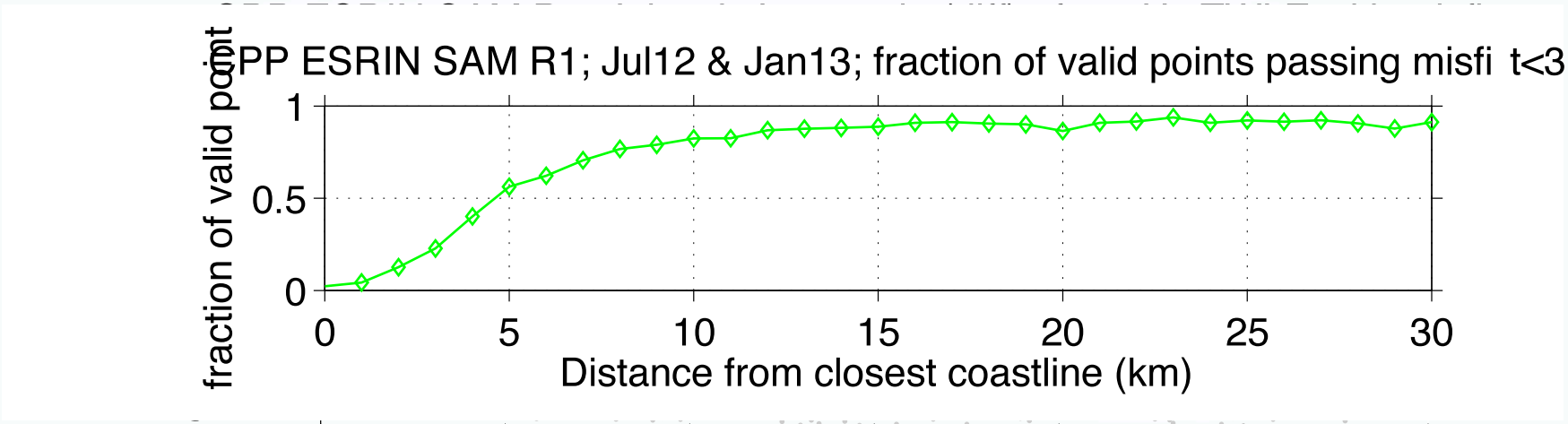
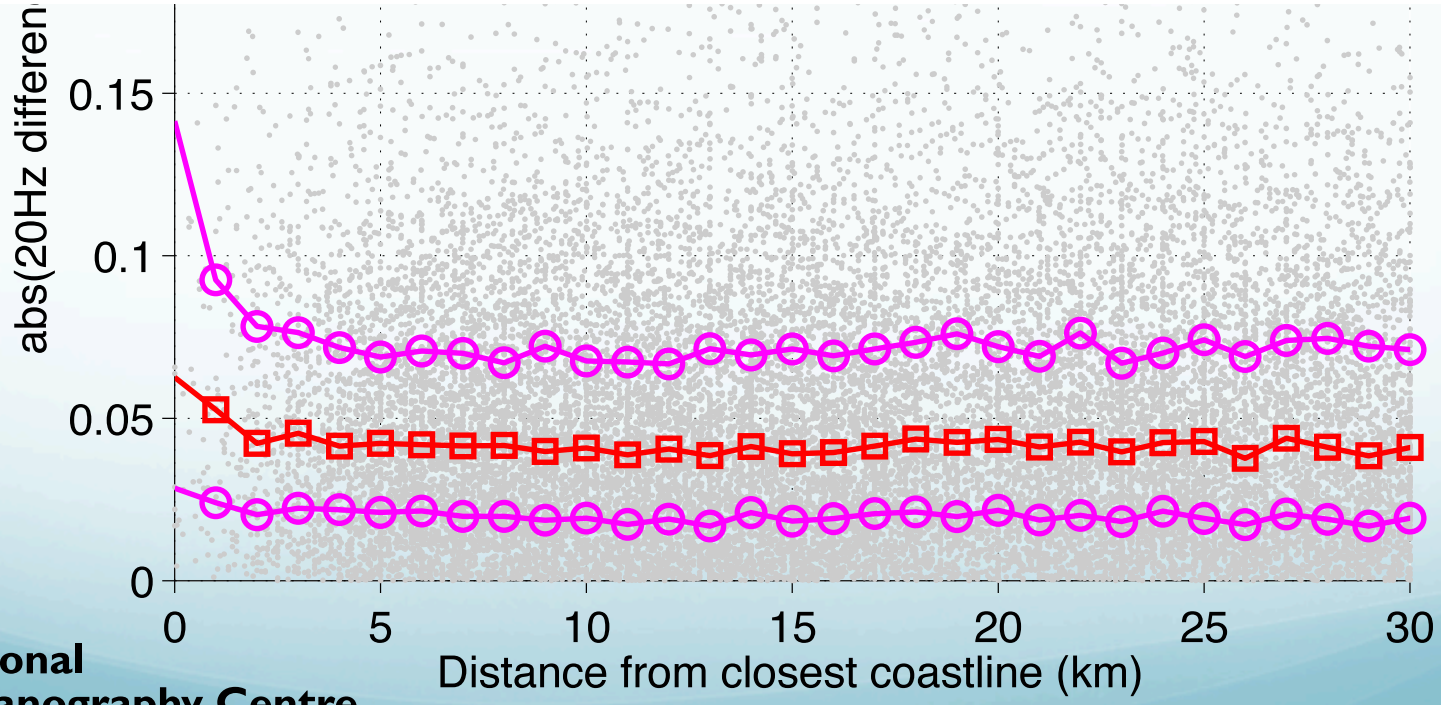
with screening based on misfit





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Summary & Conclusions (coastal)

- encouraging performance in coastal regions: 5cm@5km, no screening based on orientation yet.
  - precision stats are bound to improve if relative orientation of track vs coastline is taken into account
- there is scope for repeating the analysis using coastal proximity rather than distance from coast.
  - coastal proximity was defined in SL CCI to account for effects of coastal morphology and topography on waveforms
  - can be extended to SAR mode (note it varies between ascending and descending passes)