Glider and SWOT satellite comparisons in the Cape Basin during the SWOT fast repeat phase

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[2]Department of Marine Sciences, University of Gothenburg, Gothenburg, Sweden
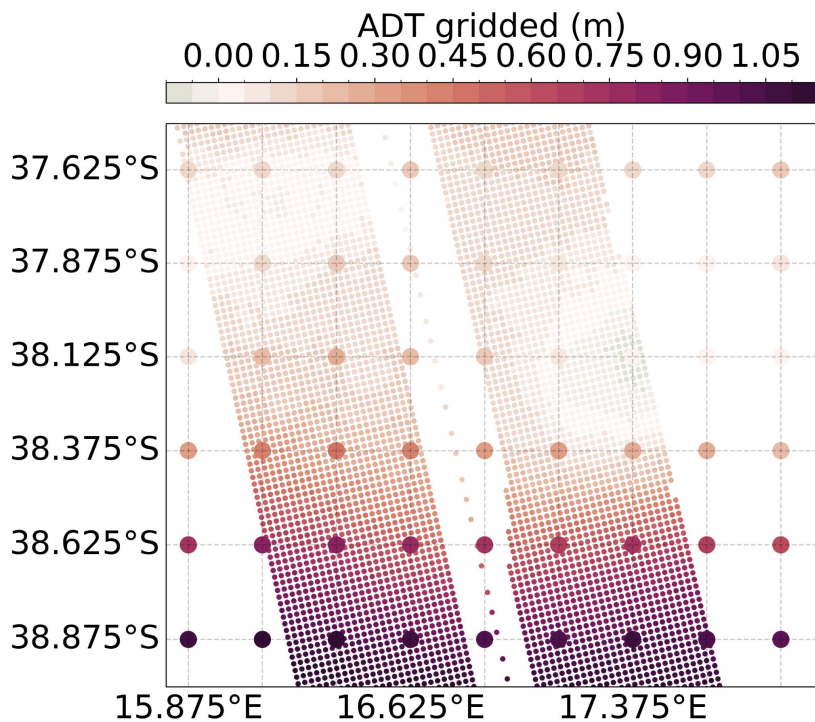
IUGC 2024

ENS | PSL★

IPSL LMD
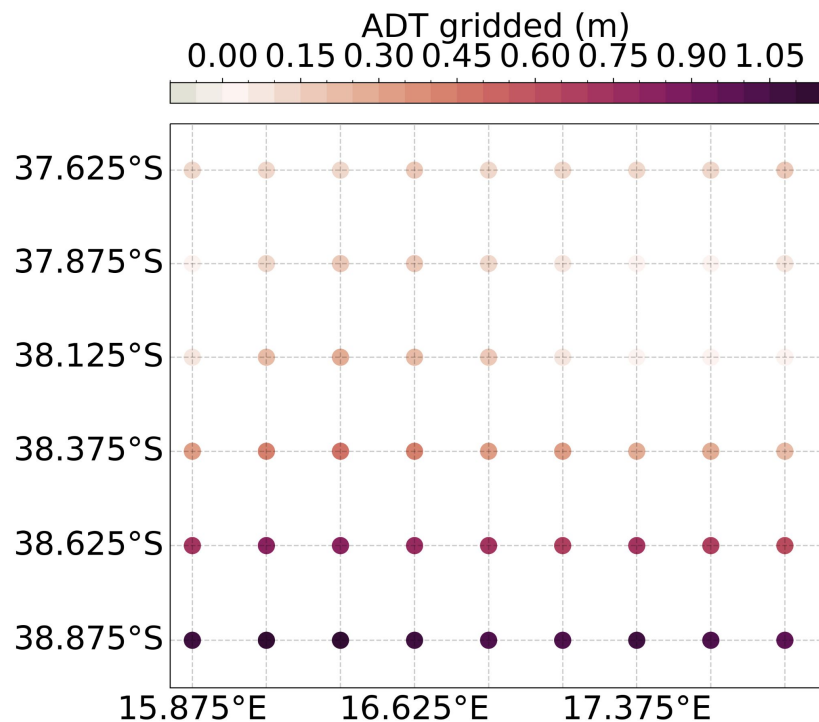
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Scales of altimetric observations

ADT gridded (m)

IUGC 2024 by train
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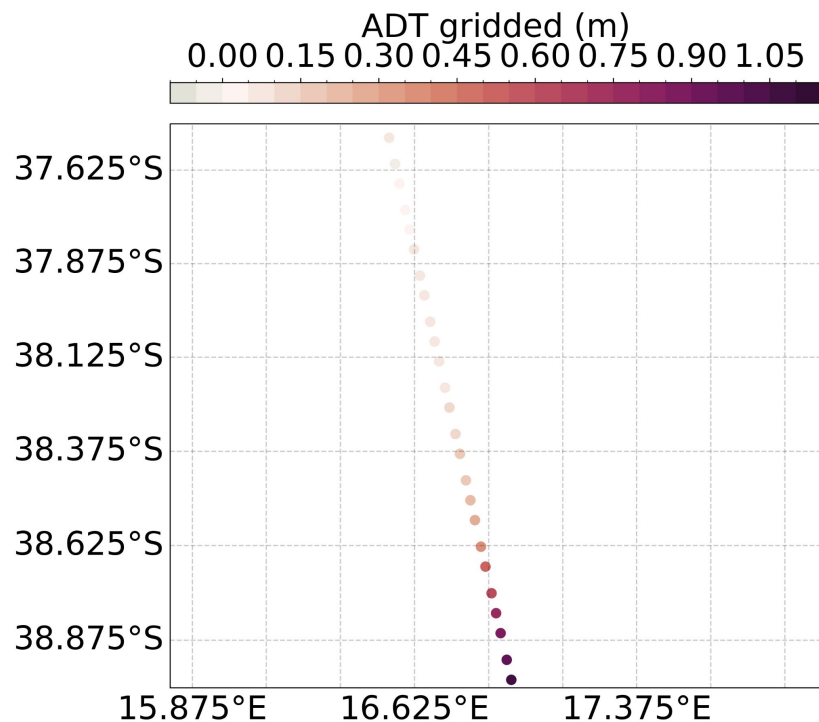of the carbon footprint of research

ADT gridded (m)

Scales of altimetric observations

0.25 ° (~ **25 km**) for Ssalto/Duacs gridded multimission altimeter product

IUGC 2024 by train
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Scales of altimetric observations

ADT gridded (m)

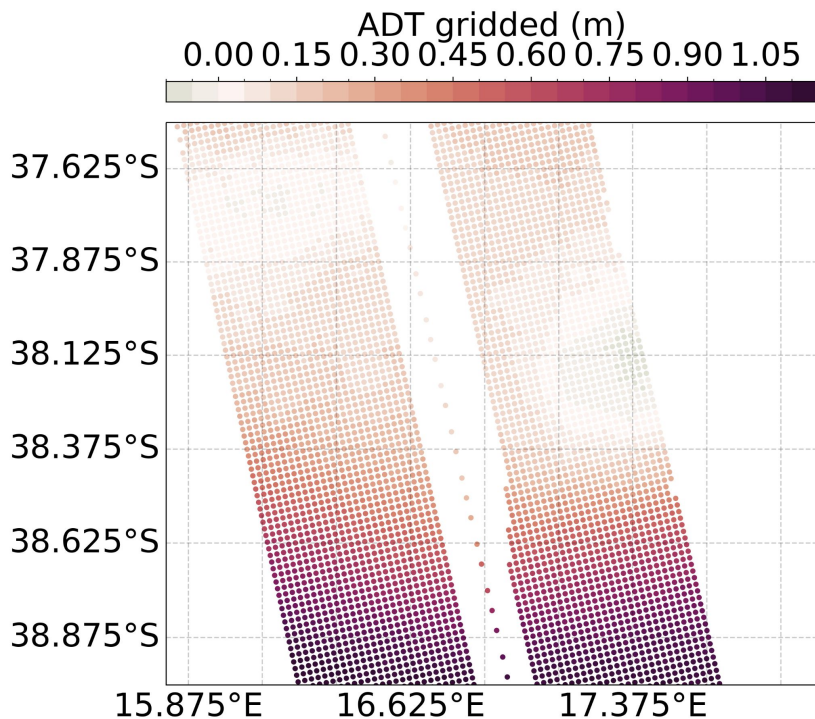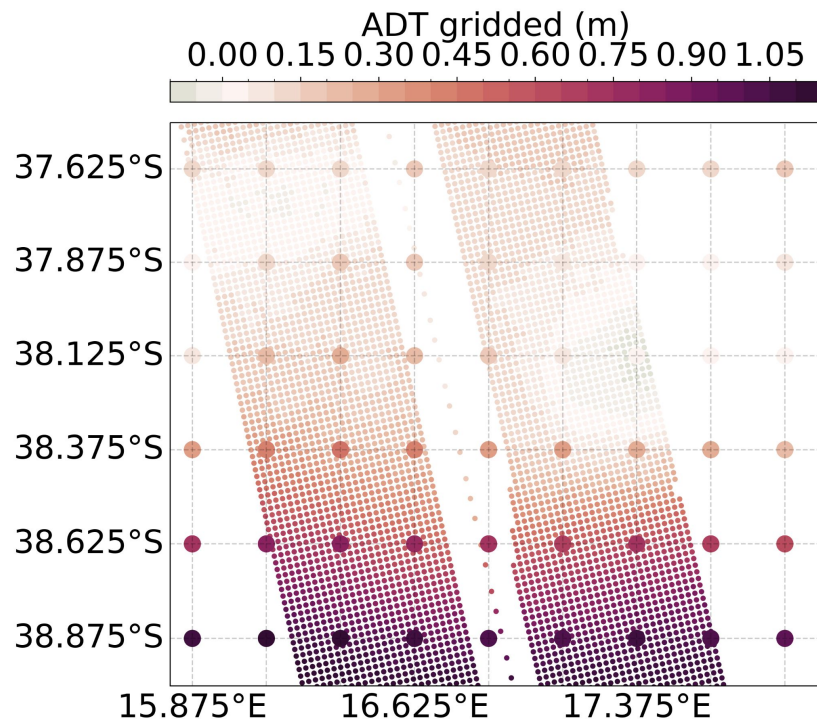0.25 ° (~ **25 km**) for Ssalto/Duacs gridded multimission altimeter product

Nadir altimeters with an along track resolution of
~ **6-7 km**

IUGC 2024 by train
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of the carbon footprint of research

Scales of altimetric observations

ADT gridded (m)

0.00 0.15 0.30 0.45 0.60 0.75 0.90 1.05

0.25 ° (~ **25 km**) for Ssalto/Duacs gridded multimission altimeter product

Nadir altimeters with an along track resolution of
~ **6-7 km**

SWOT satellite
~ **2 km**

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Scales of altimetric observations

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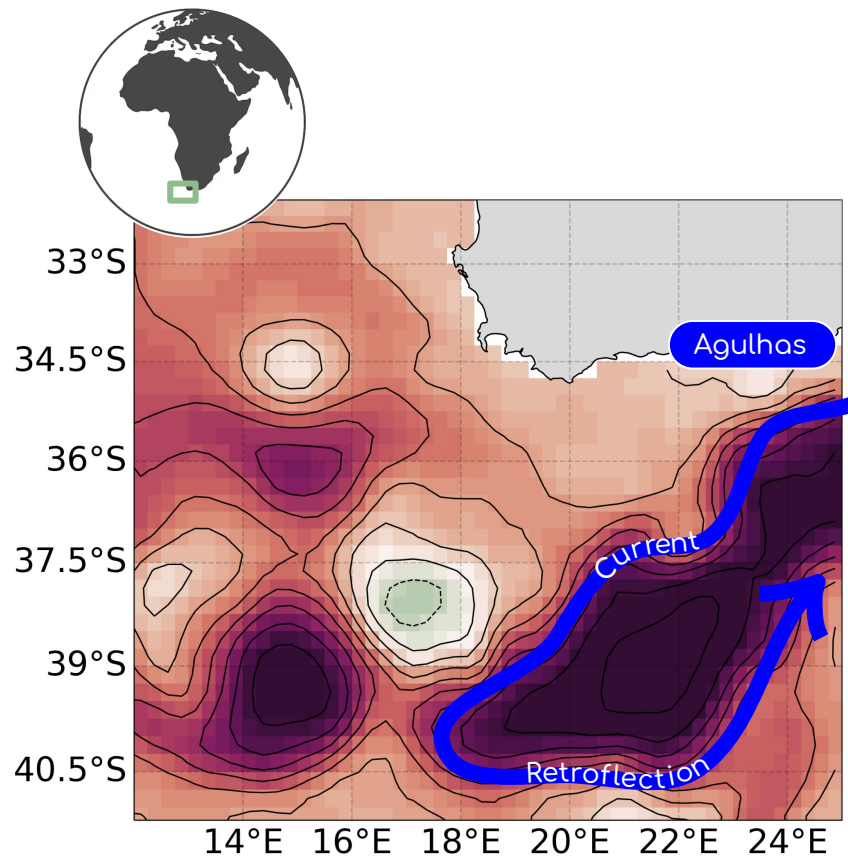SWOT satellite
~ **2 km**

During the
<u>fast sampling period</u>:

revisit of the same place
once a day
(twice at the crossover)

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Share & exchange while taking care
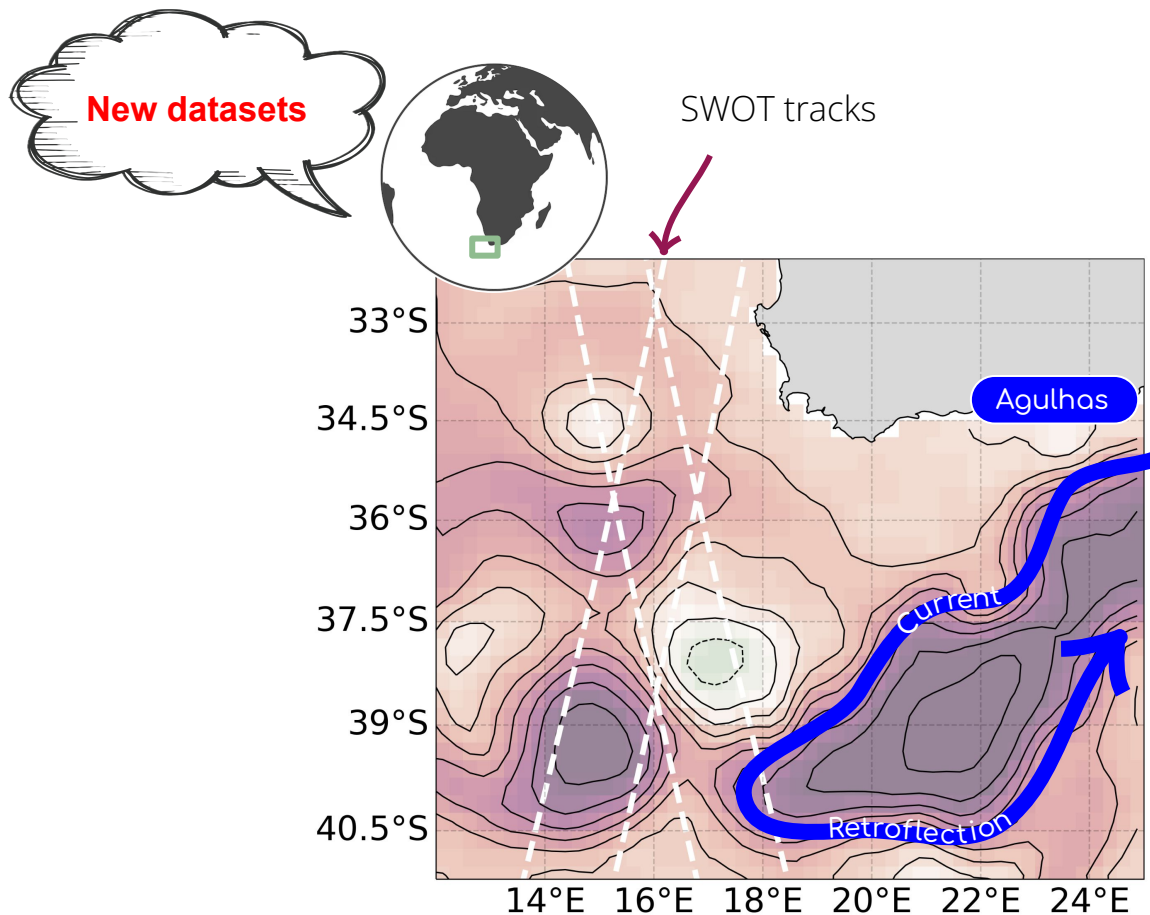of the carbon footprint of research

Cape Bassin crossover

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Cape Bassin crossover

New datasets

SWOT tracks

Satellite observations

Daily observations from **SWOT**
between *March* and July

Agulhas

current

Retroflection

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of the carbon footprint of research

Cape Bassin crossover

New datasets

SWOT tracks

Sailbuoys

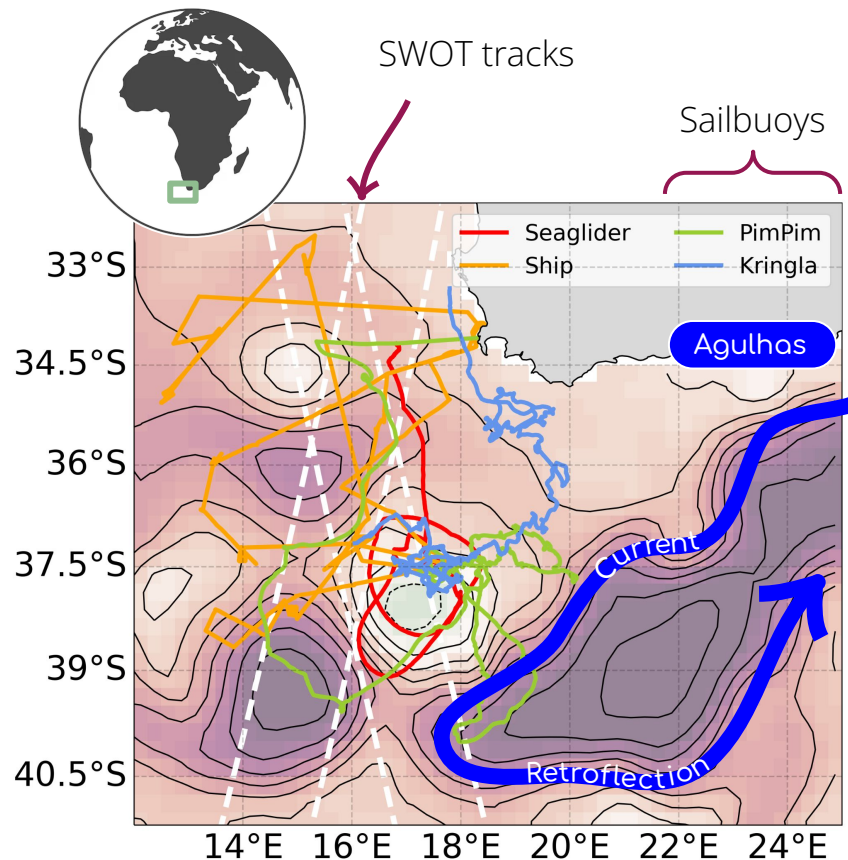## Satellite observations

Daily observations from **SWOT** between *March* and July

In-situ observations

In-situ data collected during the **QUICCHE cruise** in March 2023 & couple of months afterwards

Legend:
- Seaglider (red)
- Ship (orange)
- PimPim (green)
- Kringla (blue)

Agulhas
Current
Retroflection

33°S
34.5°S
36°S
37.5°S
39°S
40.5°S

14°E 16°E 18°E 20°E 22°E 24°E

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Cape Bassin crossover
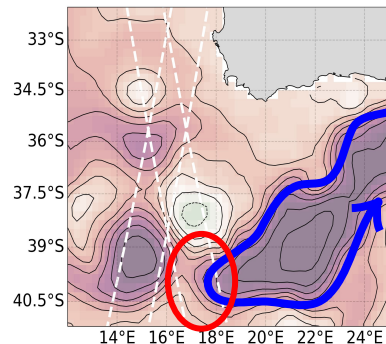
Satellite observations

Daily observations from **SWOT** between *March* and July

Gridded MADT, SST, Chla products...

In-situ observations

In-situ data collected during the **QUICCHE cruise** in March 2023 & couple of months afterwards

IUGC 2024 by train
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SWOT tracks

Sailbuoys

| Seaglider | PimPim |
| Ship | Kringla |

Agulhas

Current

Retroflection

Cape Bassin crossover

Satellite observations

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Gridded MADT, SST, Chla products...

In-situ observations

In-situ data collected during the **QUICCHE cruise** in March 2023 & couple of months afterwards

What scales and structures SWOT is resolving ?

How does it compare with other remotely sensed data and high-resolution in-situ data ?

What can we learn on the dynamics from that new perspective ?

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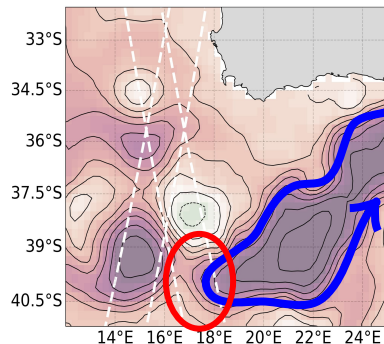
Fine-scale structures revealed by SWOT…
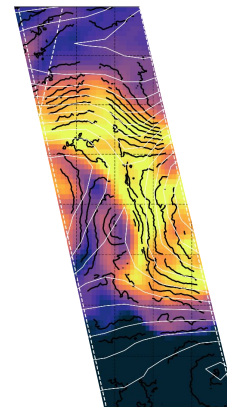
<u>**Satellite observations**</u>

Daily observations from **SWOT**
between *March* and July
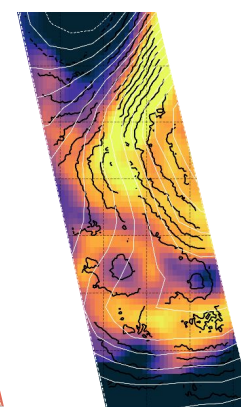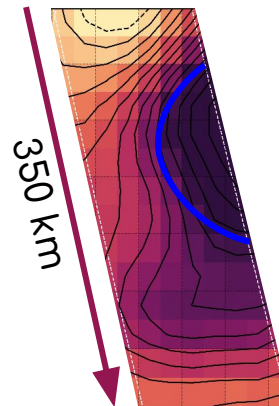
Gridded MADT, SST, Chla products…

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Fine-scale structures revealed by SWOT…

Satellite observations

Daily observations from **SWOT**
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Gridded **MADT**, SST, Chla products…
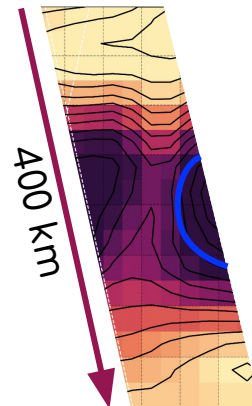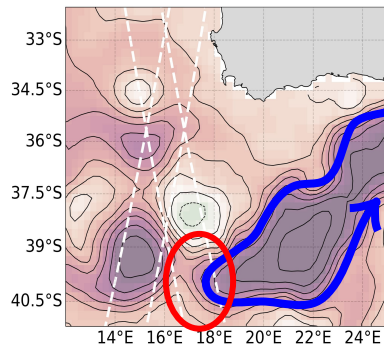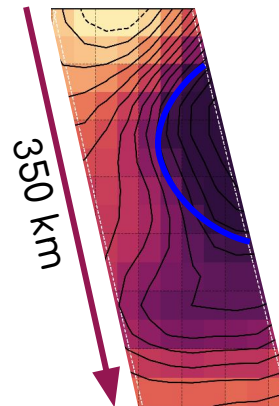
MADT

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Fine-scale structures revealed by SWOT…

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Daily observations from **SWOT** between *March* and July

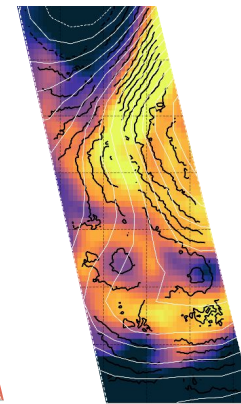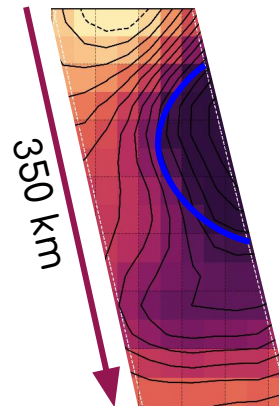Gridded MADT, **SST**, Chla products…
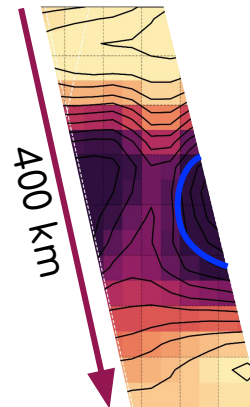
MADT   **SST**

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Fine-scale structures revealed by SWOT…

Satellite observations

Daily observations from **SWOT**
between *March* and July

Gridded MADT, SST, Chla products…
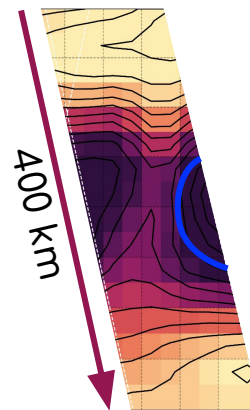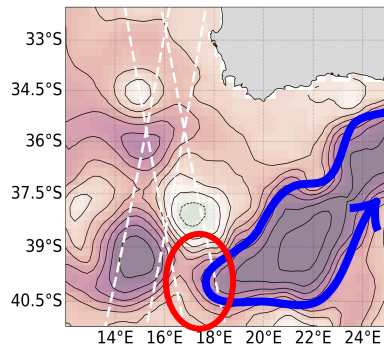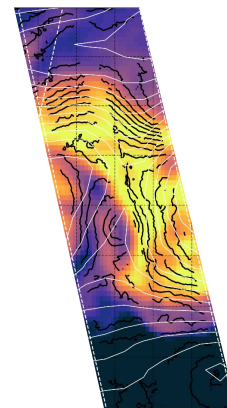
MADT   SST   SWOT
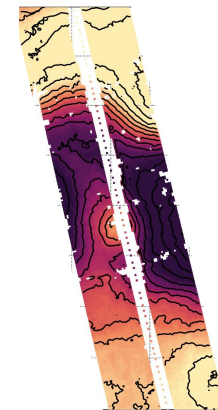
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Stronger gradients captured by SWOT
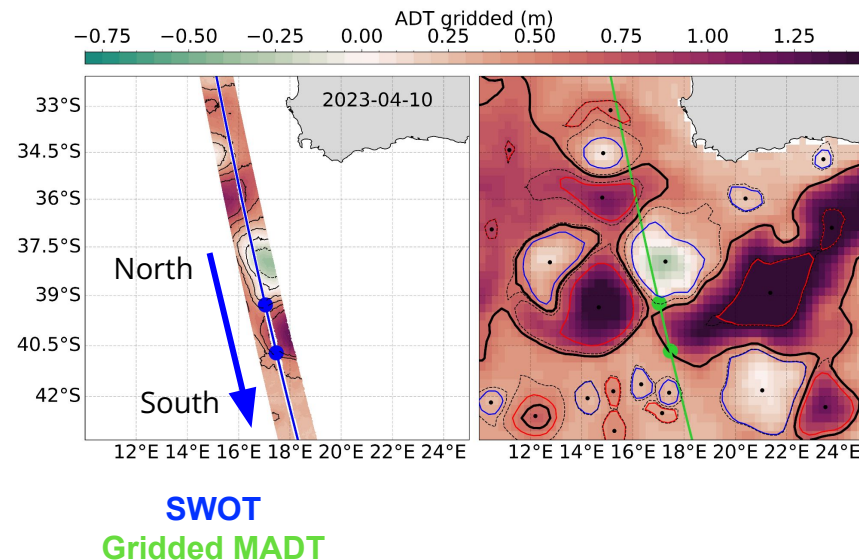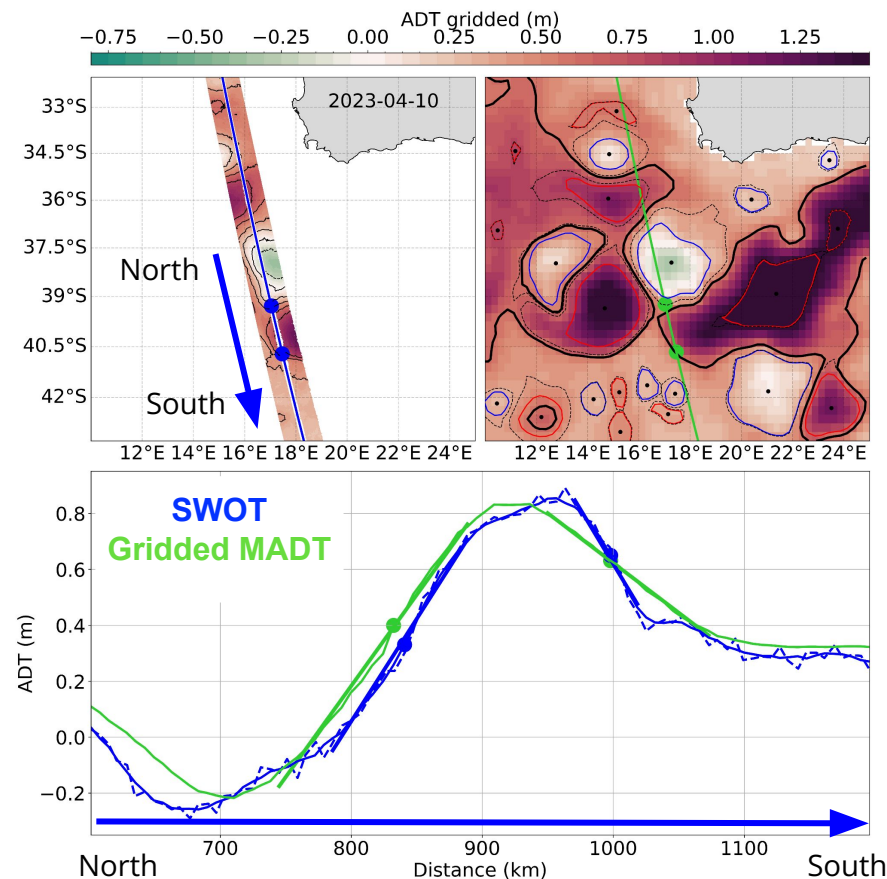
Method:

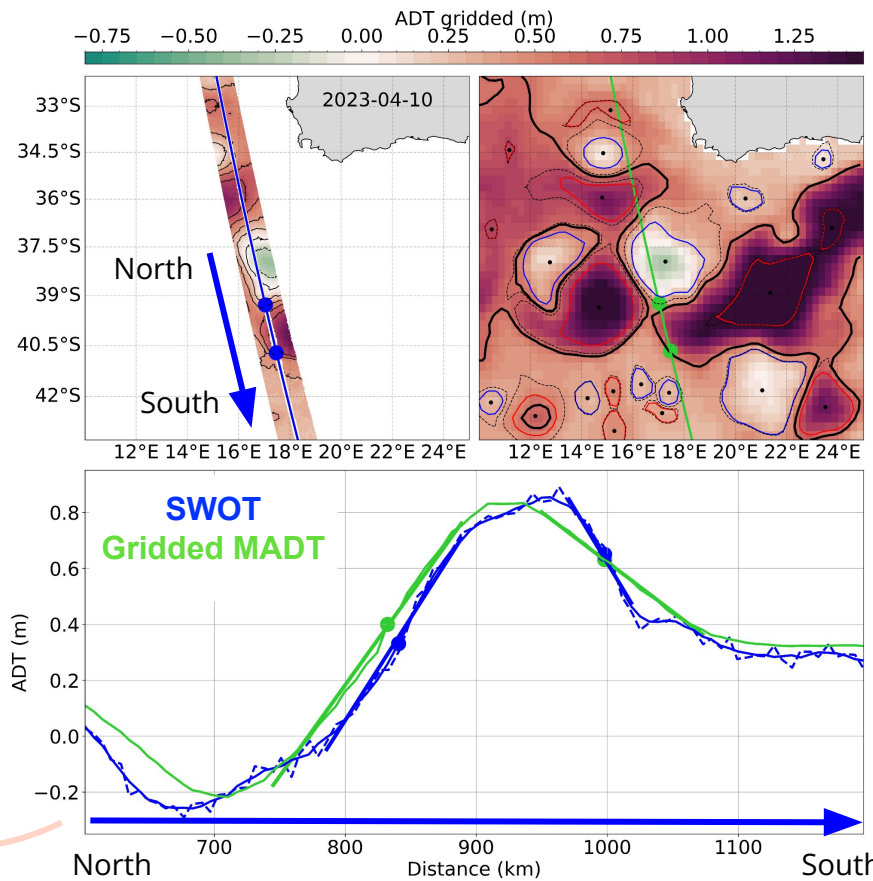Compare ADT gradient of **a quasi standing front**

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of the carbon footprint of research

Stronger gradients captured by SWOT

Method:

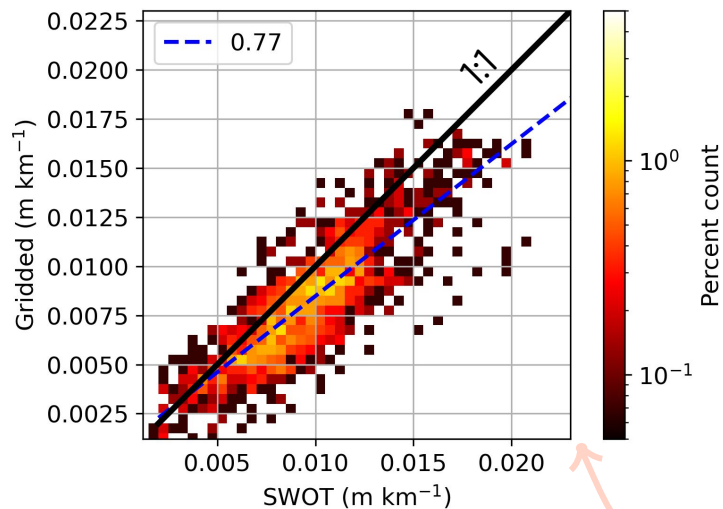Compare ADT gradient of **a quasi standing front**

SWOT
Gridded MADT

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North ——————————————→ South

Stronger gradients captured by SWOT

Method:

Compare ADT gradient of **a quasi standing front**

ADT gridded (m)

2023-04-10

North

South

SWOT
Gridded MADT

ADT (m)

Distance (km)

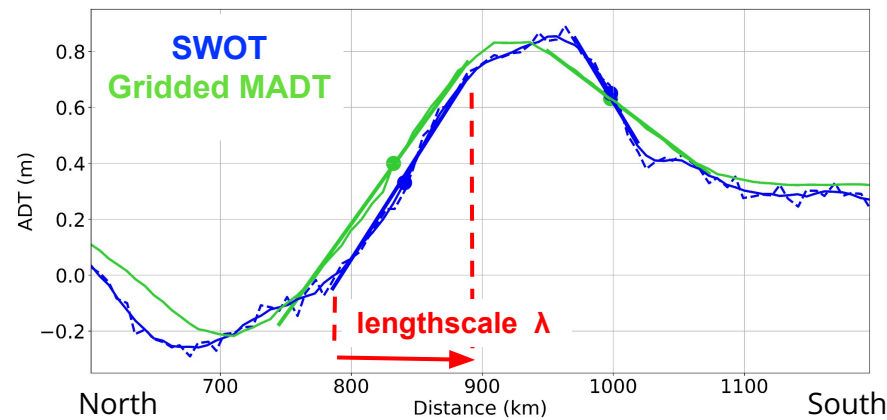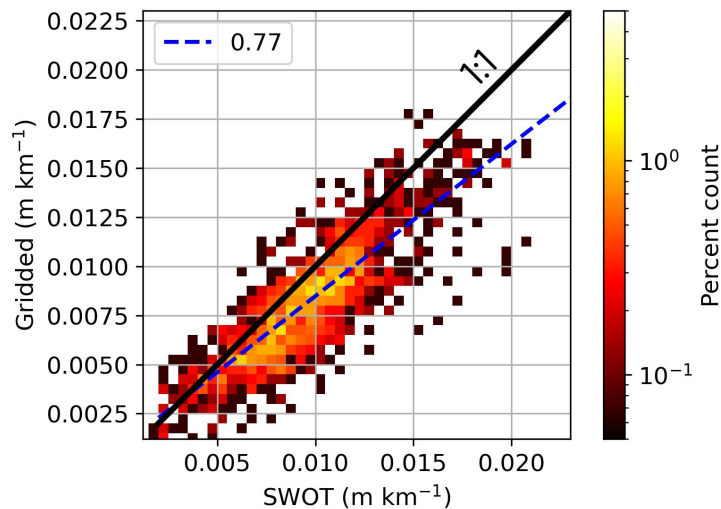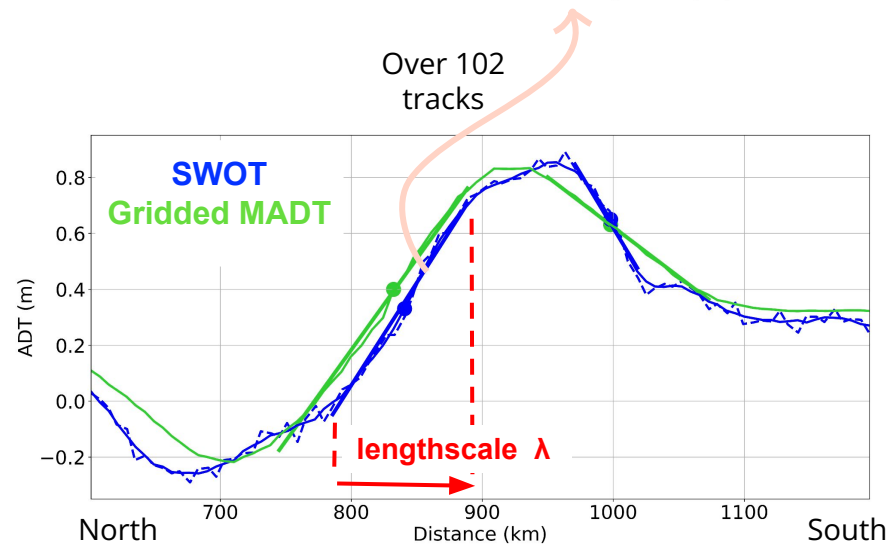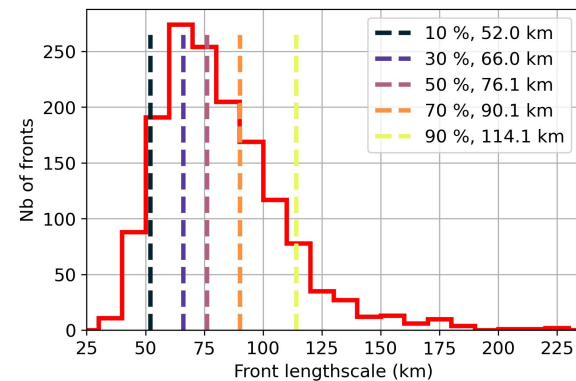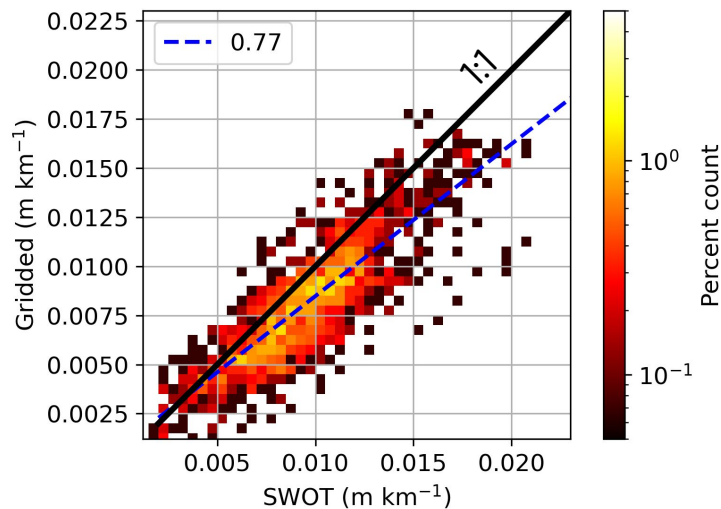North   South

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Stronger gradients captured by SWOT

<u>Results:</u>

Stronger gradients
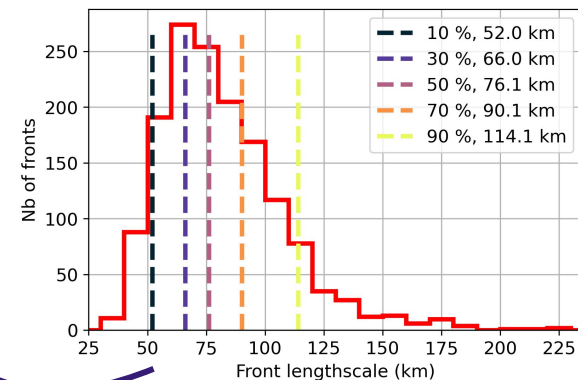captured by SWOT

Over 102 tracks

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Stronger gradients captured by SWOT

Results:

Stronger gradients captured by SWOT
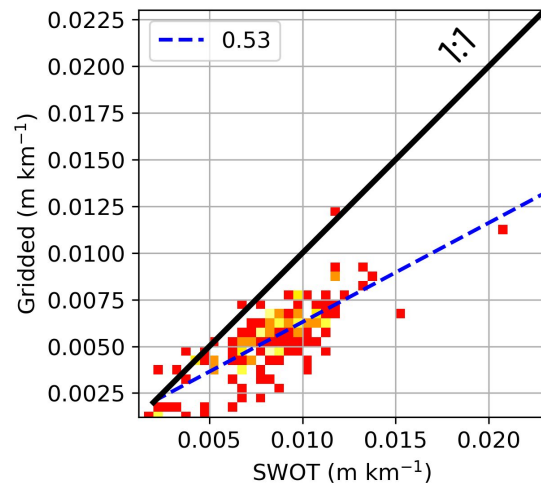
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Stronger gradients captured by SWOT

Results:

Stronger gradients
captured by SWOT

Over 102 tracks

SWOT
Gridded MADT

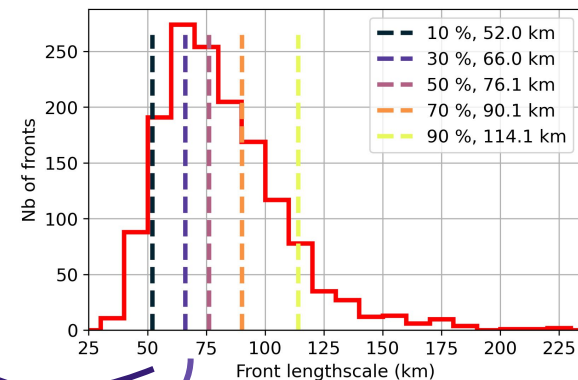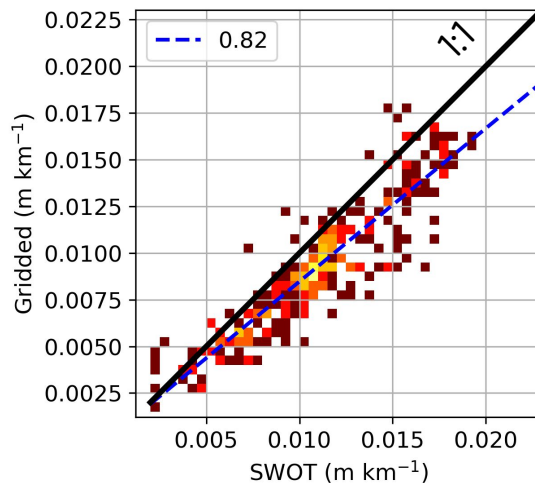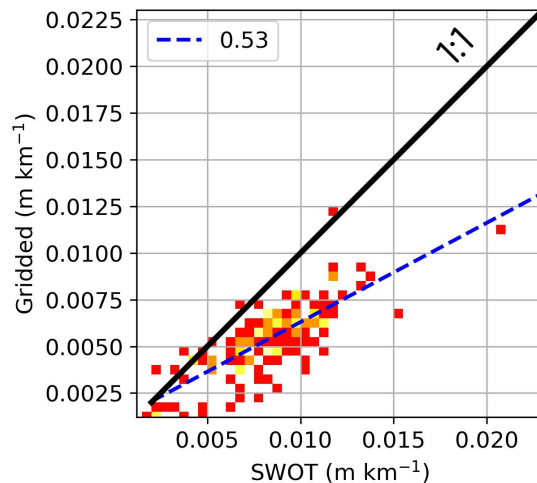lengthscale λ

North   South

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Stronger gradients captured by SWOT

Results:

< 10 %

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Stronger gradients captured by SWOT

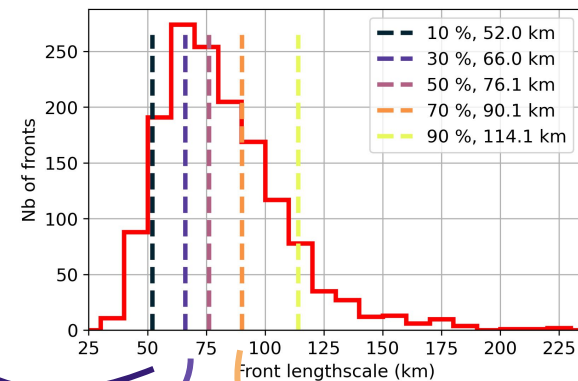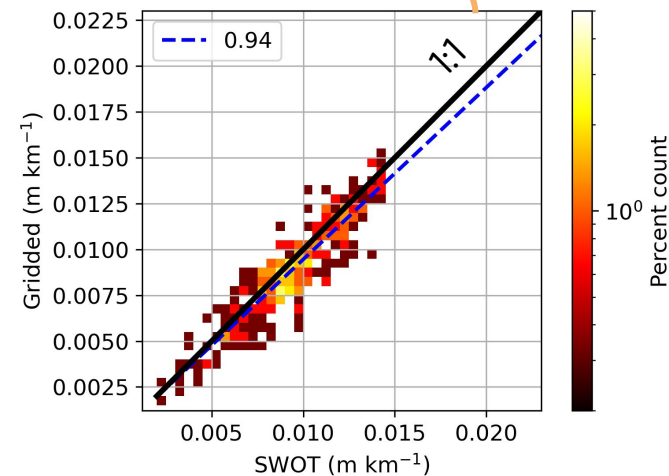**Results:**

< 10 %

< 30 %

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Stronger gradients captured by SWOT

Results:

< 10 %

< 30 %

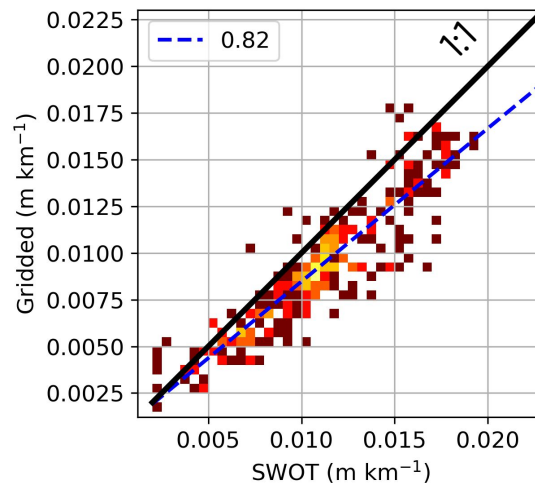< 70 %

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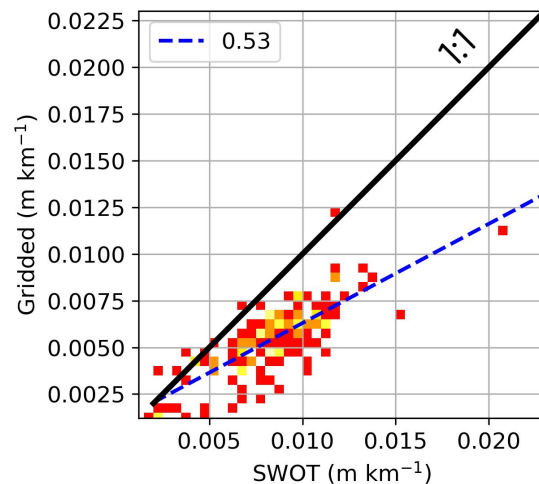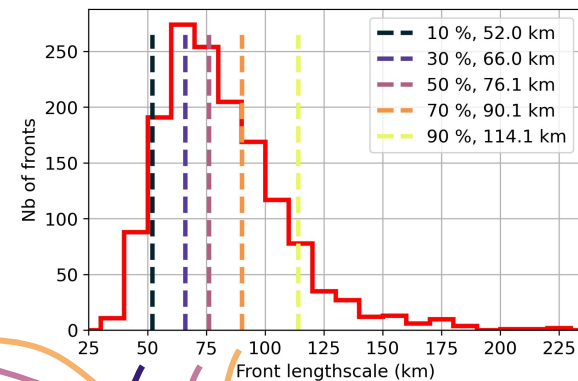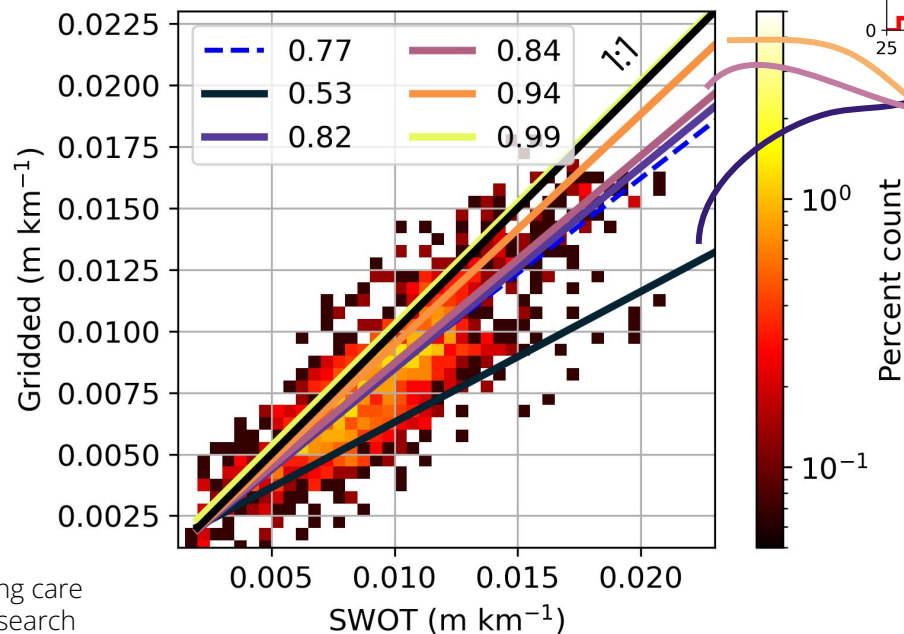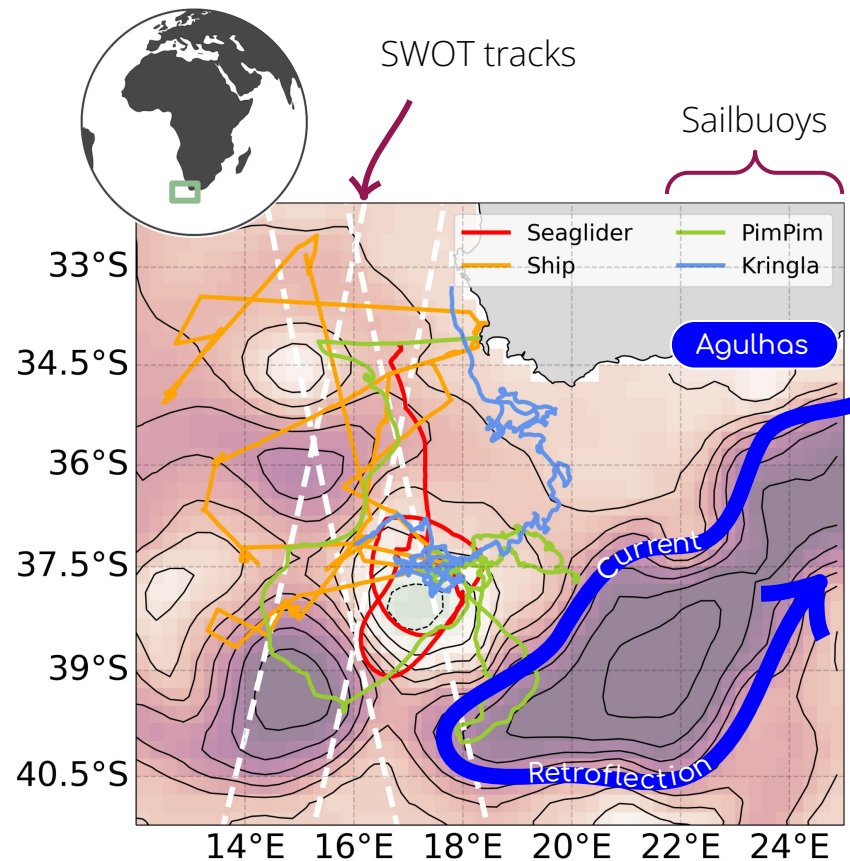
Stronger gradients captured by SWOT

<u>Results:</u>

Small scale gradients are largely underestimated by DUACS compare to larger ones

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Surface velocities comparison

SWOT tracks

Sailbuoys

Agulhas

Current

Retroflection

Seaglider — PimPim
Ship — Kringla

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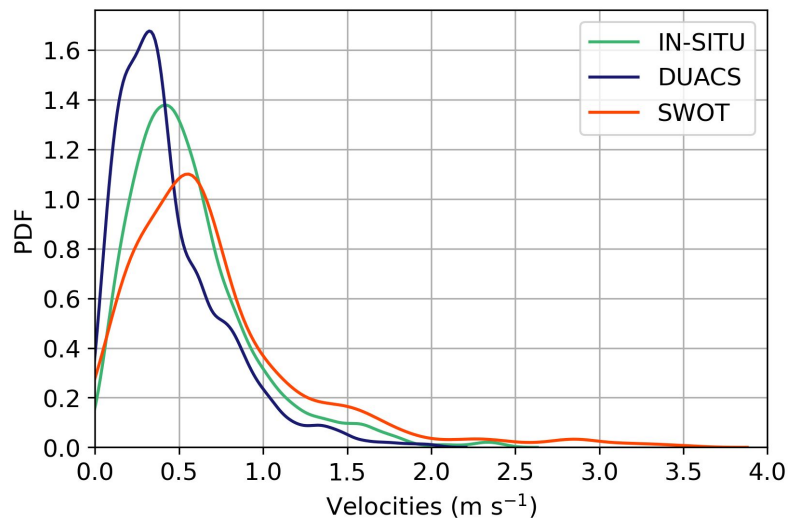of the carbon footprint of research

A unique dataset to try to understand (a bit more) the fine-scales

SWOT reveals ~ **20 - 50 km** structures with a SSH signature

Stronger gradients captured by SWOT

Small scale gradients are largely underestimated by previous altimetric product compare to larger ones

SWOT better captures the **surface velocities** derived from in-situ data
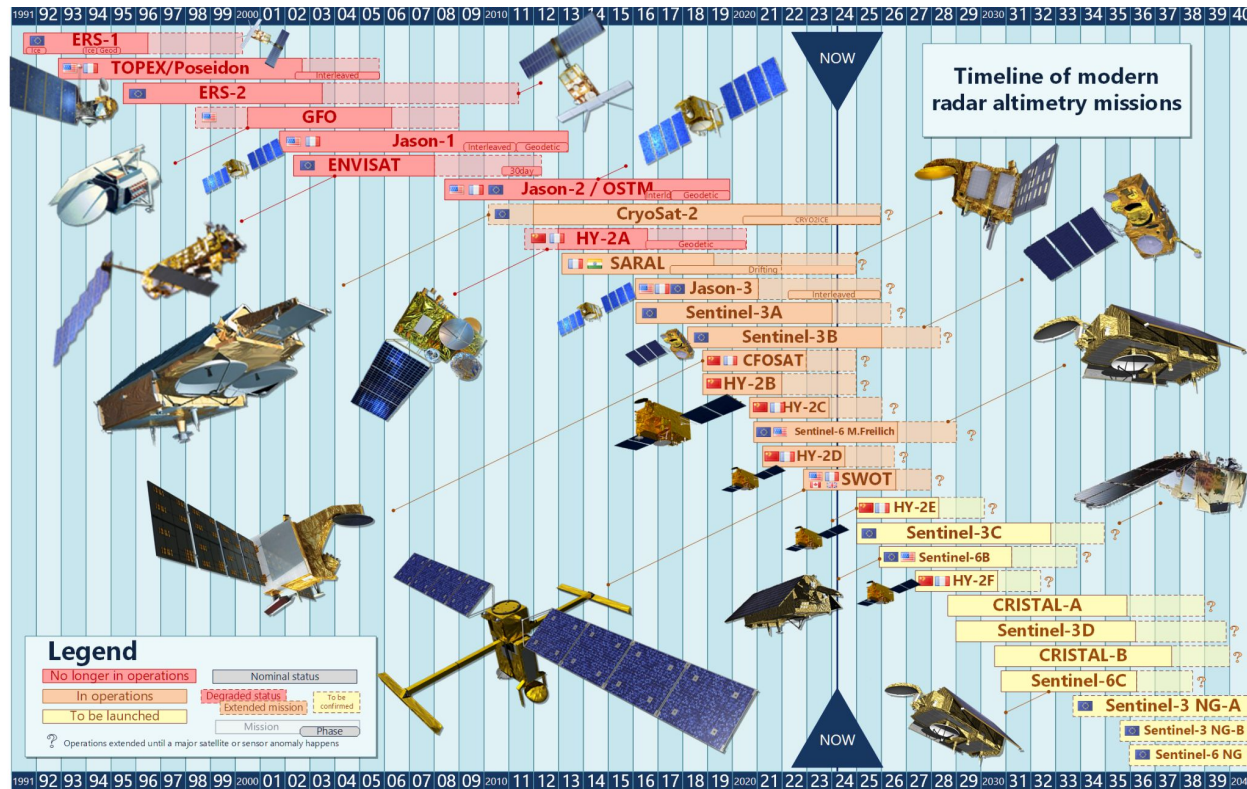
We're still trying to figure out how to best make use of this SWOT - in-situ overlap

Any suggestions, ideas,… more than welcome!
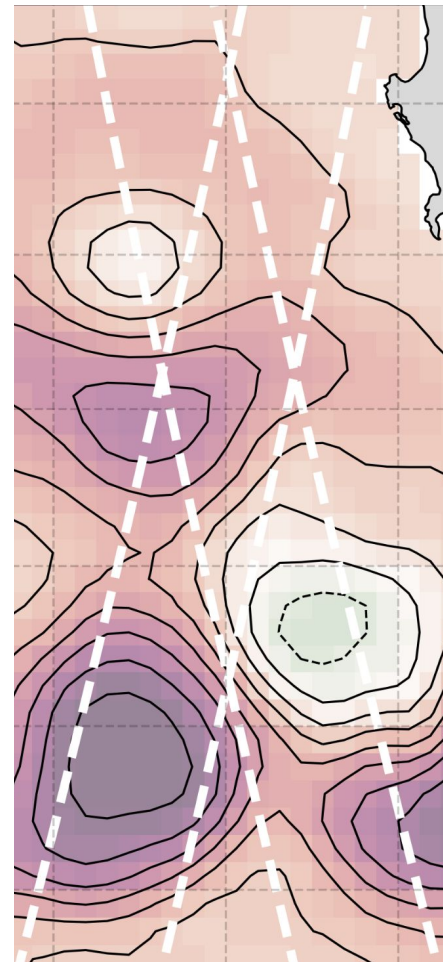
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Aviso+ (2022). Timeline of modern radar altimetry missions.
https://doi.org/10.24400/527896/A02-2022.001 version 2024/06

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