

HR Altimetry in the Aghullas current

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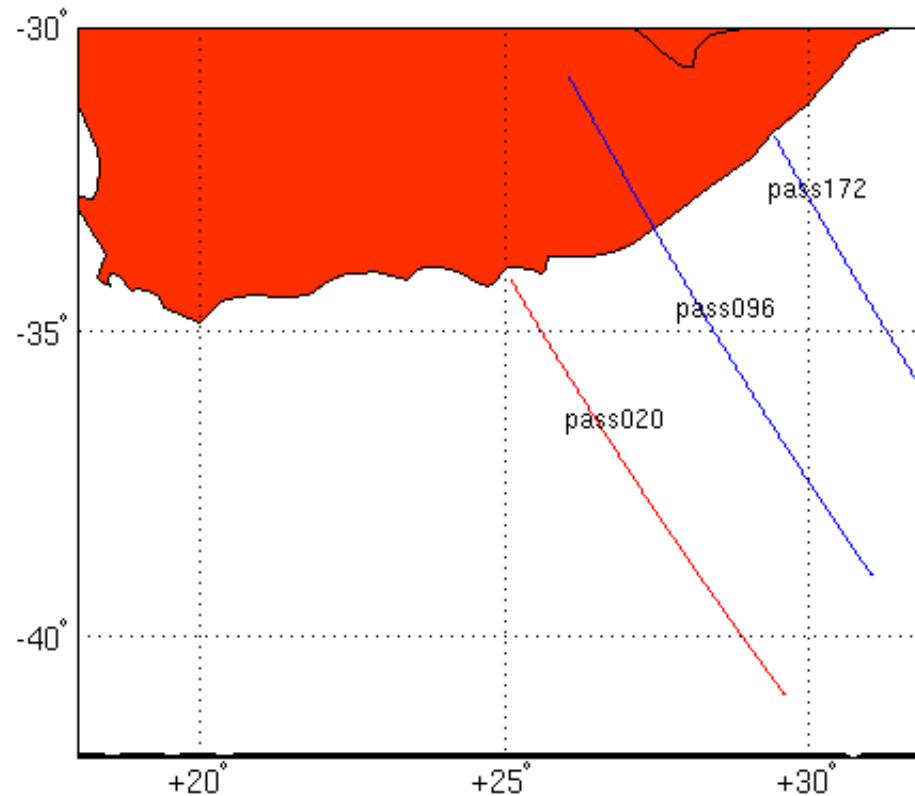
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For coastal applications it is necessary to use the High Rate altimetry data (10 or 20 Hz) rather than the 1Hz because the dynamics characteristic scales are much smaller than in open ocean. The 1Hz average data are not precise enough to detect and map the dynamical features.

HR data has a much higher noise level than 1 Hz but contain more information about the slope of the SSH and thus could give better current speed. But they are noisier and it is important to test their capacity of HR data to reconstitute correctly the current speed.

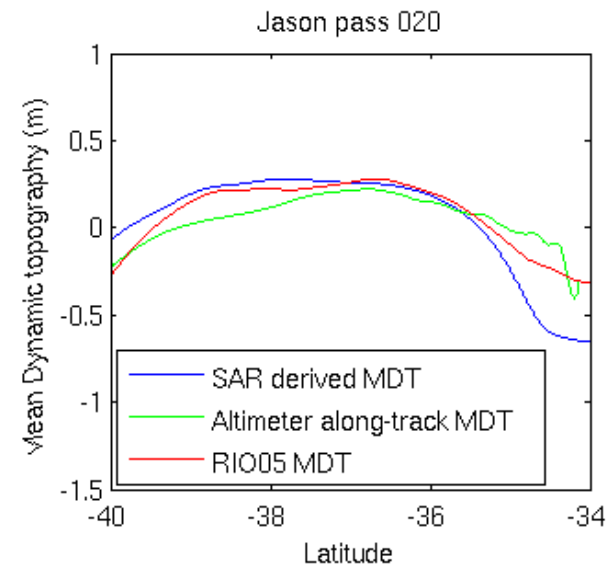
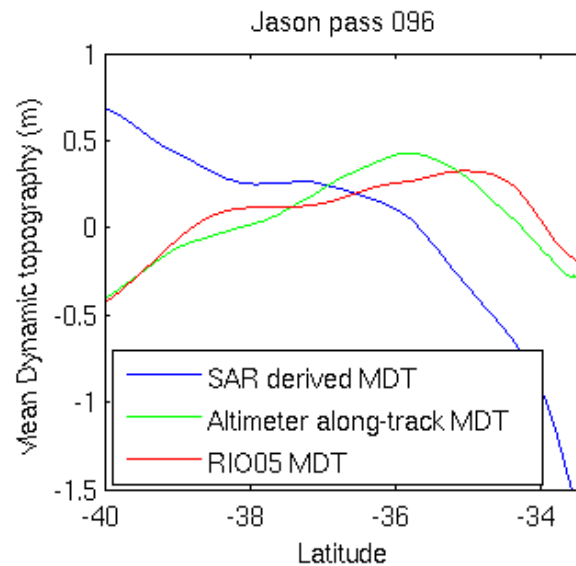
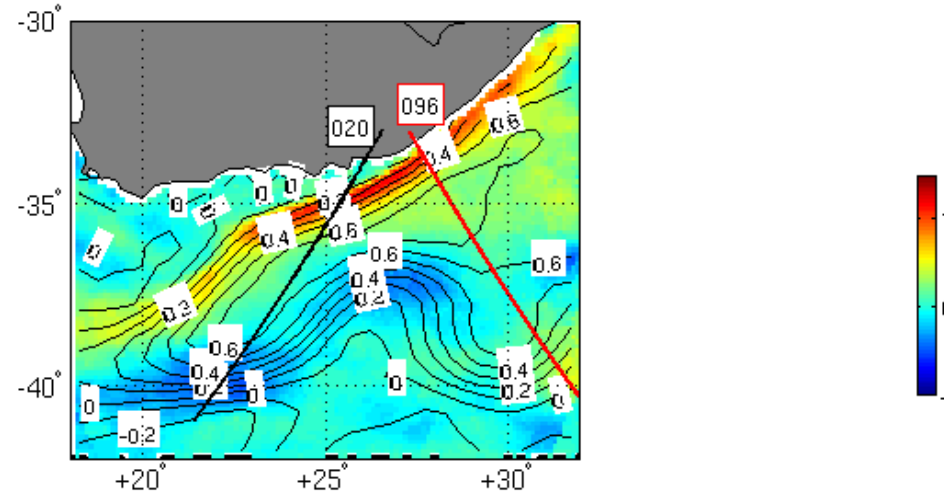
Choice of Aghullas current because quite constant, well defined, distant from the coast varies with latitude.

Mean surface current speed from SAR data
~1000 images processed: analysis of Doppler
measurements. Mean SST superimposed



3 TP, Jason passes, distance current shores increases
Towards the south

Use of the SAR data to compute the MDT. (to get sea surface height) Comparison with RIO05 MDT

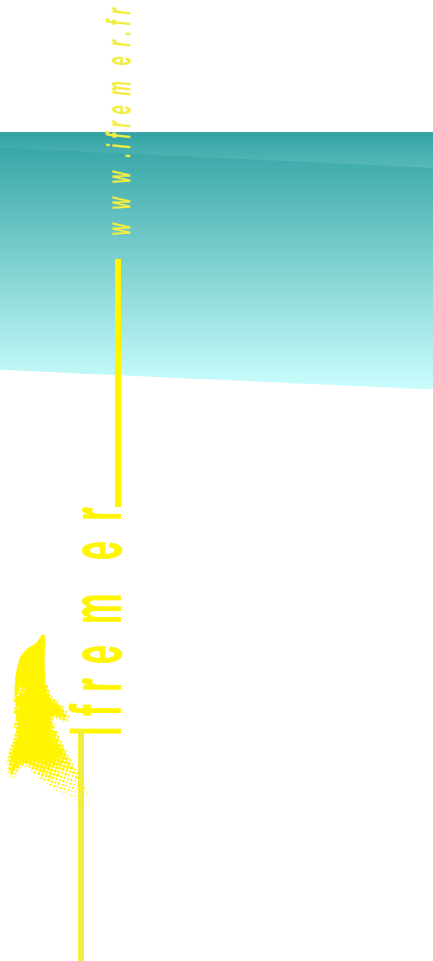
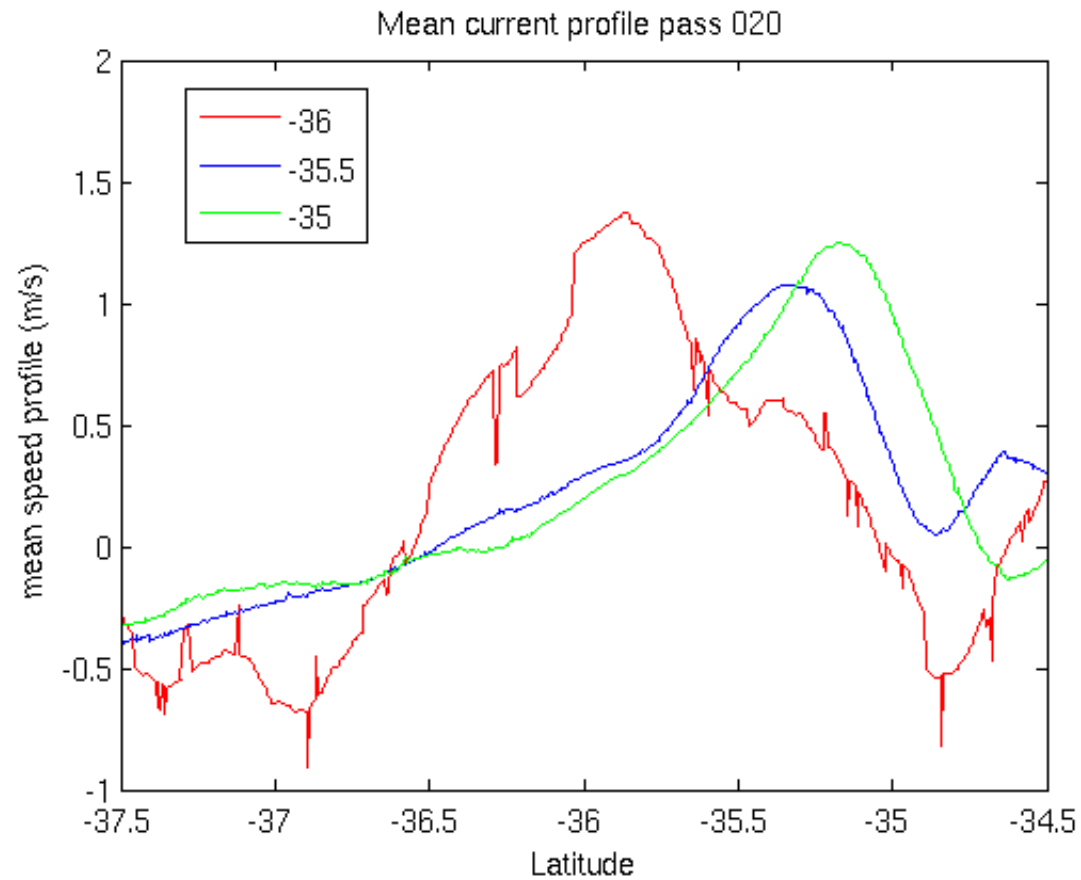


- Two passes considered here 020 and 172
- Data Jason1 and Topex GDR 20Hz and 10Hz data
- Processing.
- HR ssh with all the 1Hz correction except wet tropo.
- HR sigma0 Ku and C for rain flagging using Tournadre and Morland (1997)
- Flag for sigma0 bloom (here sigma0 Ku > 8 db)
- Flagged for difference between Ku and C band SSH > 3 rms
- Filtering using Lee filtering (outliers).
- Computation of the mean along track SSH
- Computation of the SSH (SSH=SSH-mean+MDT)
- Computation of the geostrophic cross track speed
- Idem for 1 Hz
- Gaussian fit to the current.

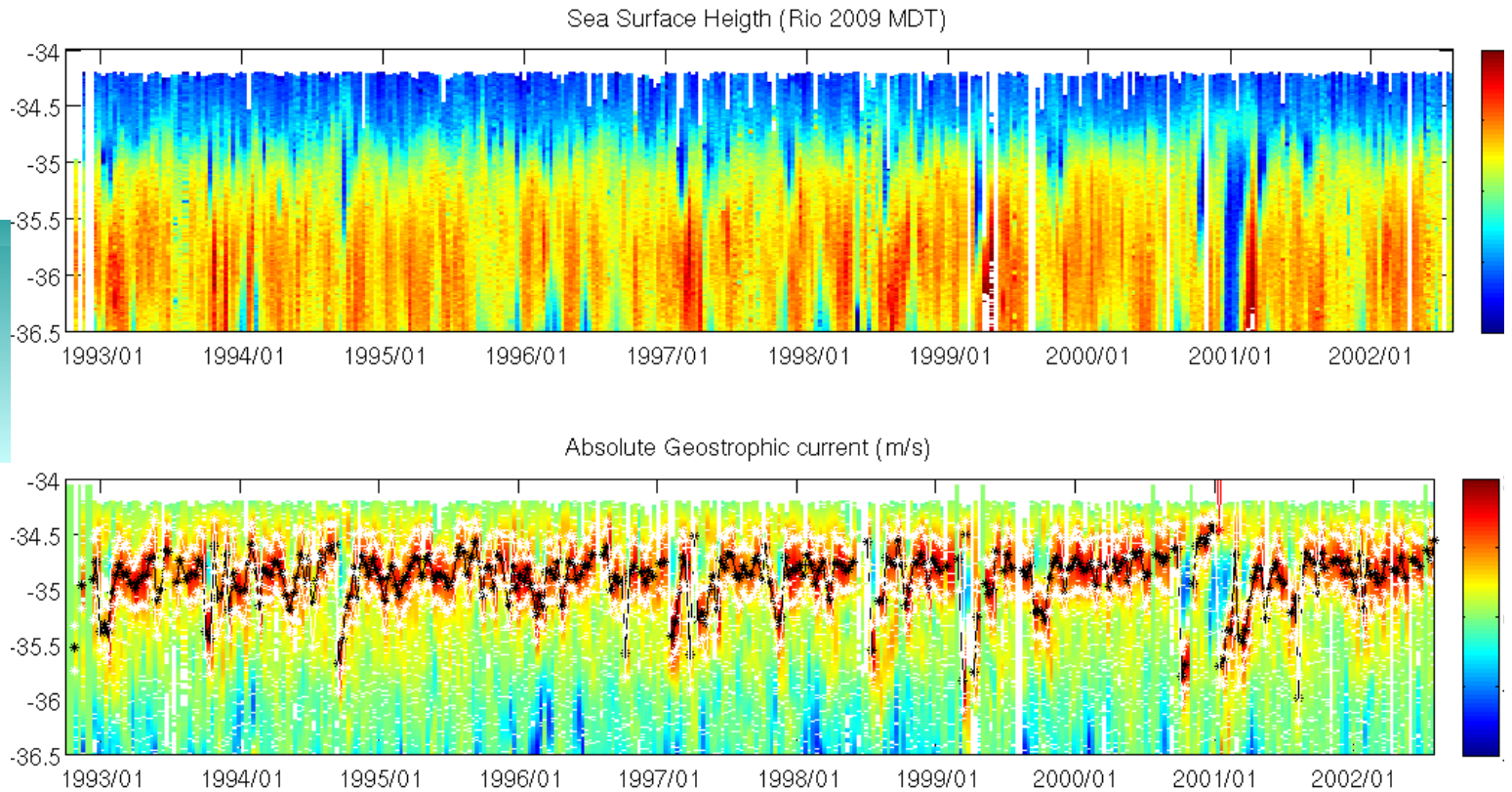


Gaussian approximation

Mean speed profile as a function of the position of the Maximum speed



Pass 020 Topex 10 Hz data SSH filtered and speed



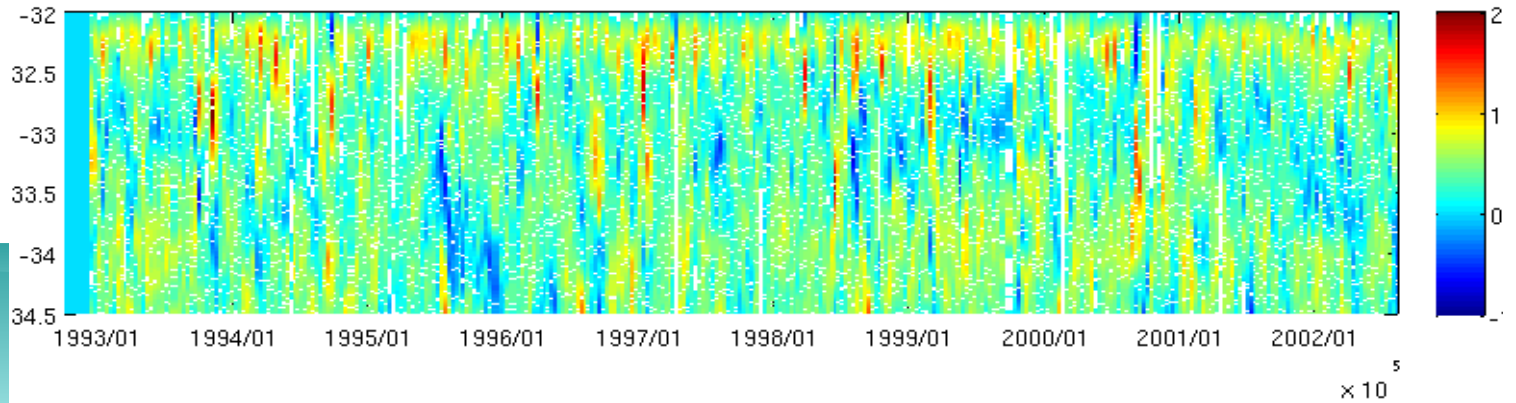
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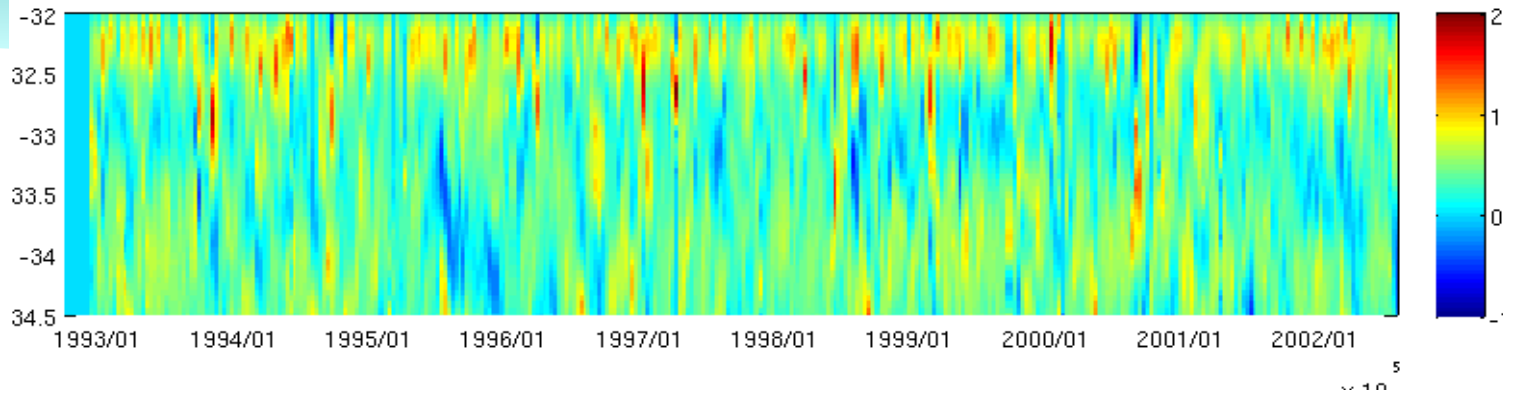


Topex pass 020 Speed 10Hz/1Hz

Current speed 10 Hz Topex Pass 172



Current speed 1 Hz Topex Pass 172



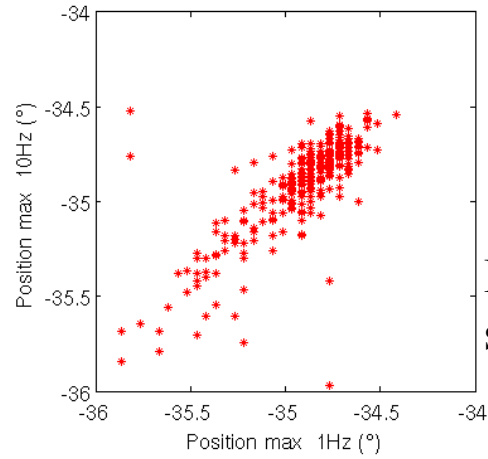
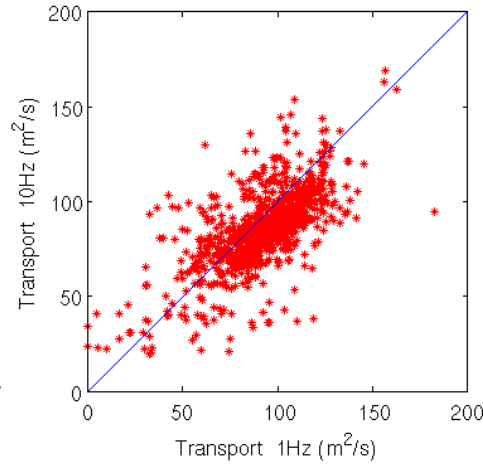
10Hz/1Hz Gaussian fit parameters comparison Pass020

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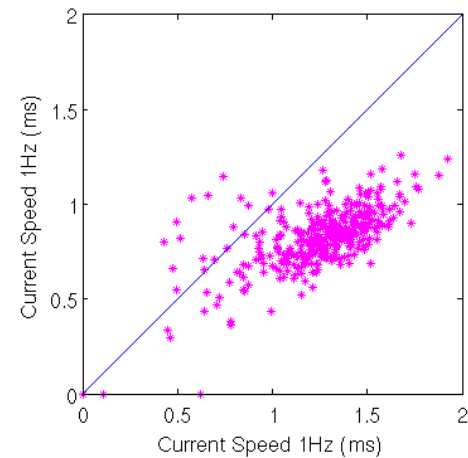
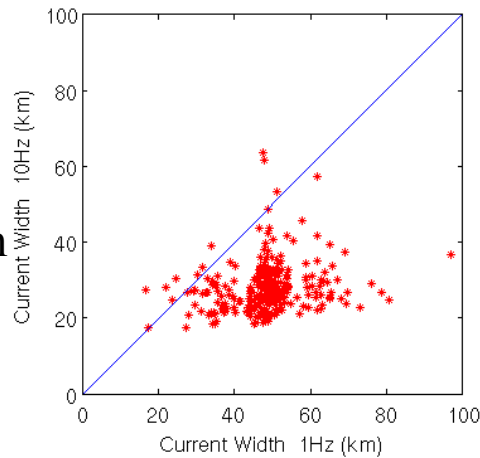
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$$\int_{x_0 - \text{width}}^{x + \text{width}} V_g dx$$

Width (gaussian sigma)



Latitude maximum speed



Maximum speed



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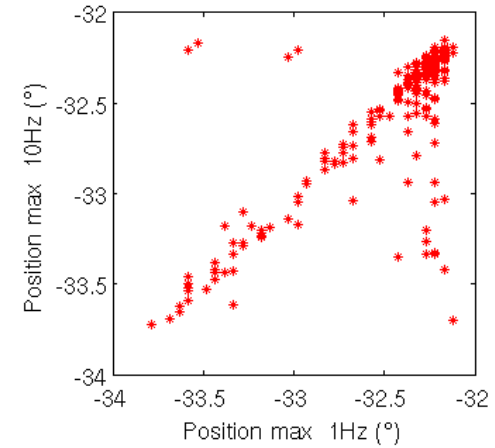
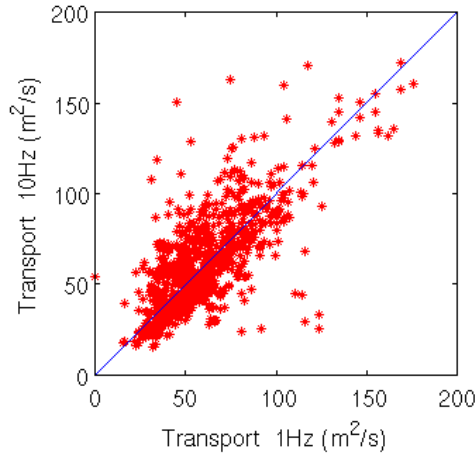
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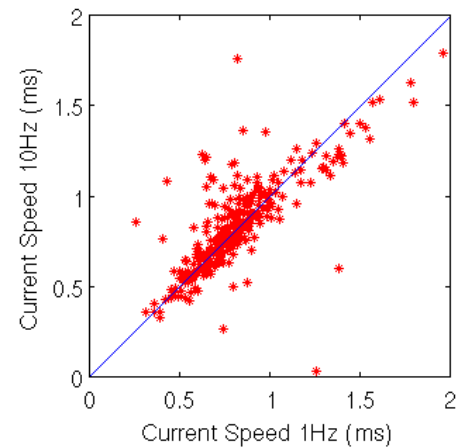
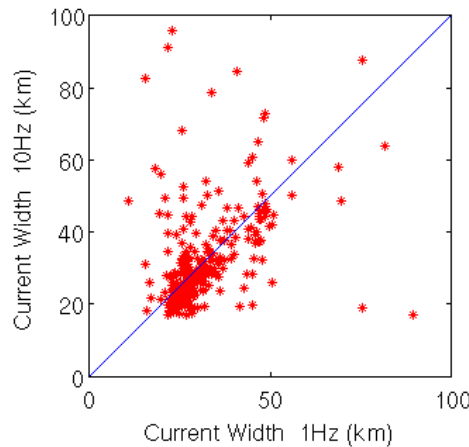
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$$\int_{x_0 - \text{width}}^{x + \text{width}} V_g dx$$

Width (gaussian sigma)



Latitude maximum speed



Maximum speed



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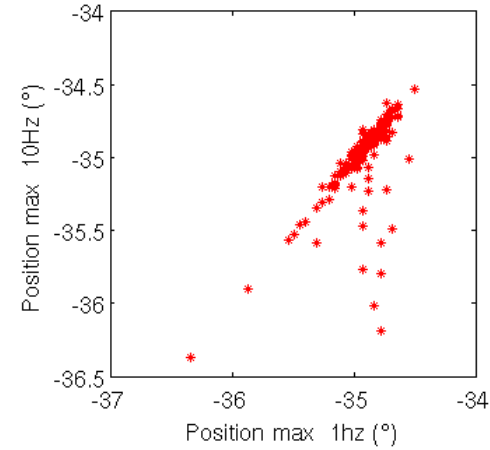
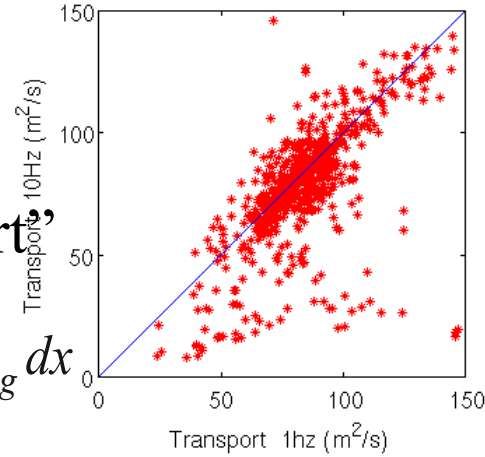
20Hz/1Hz Gaussian fit parameters comparison Pass020 Jason

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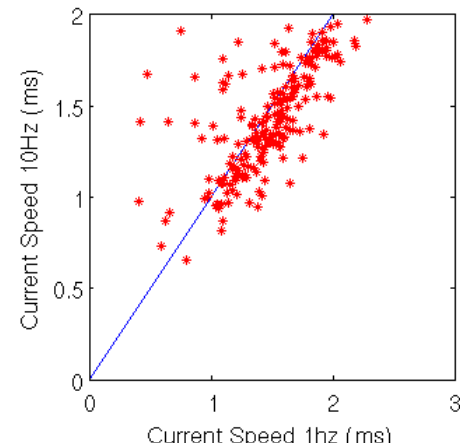
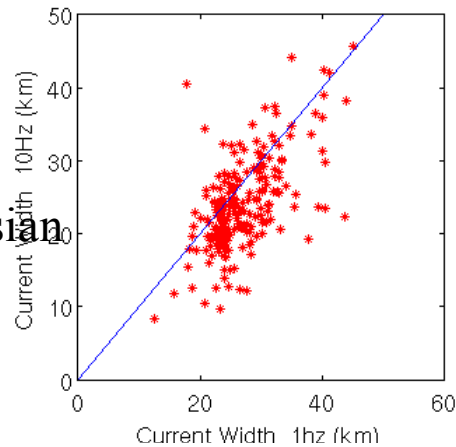
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$$\int_{x_0 - \text{width}}^{x + \text{width}} V_g dx$$

Width (gaussian sigma)



Latitude maximum speed



Maximum speed



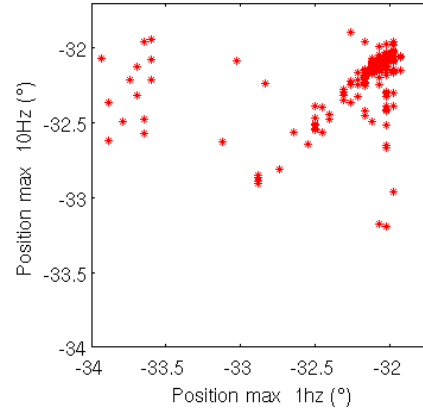
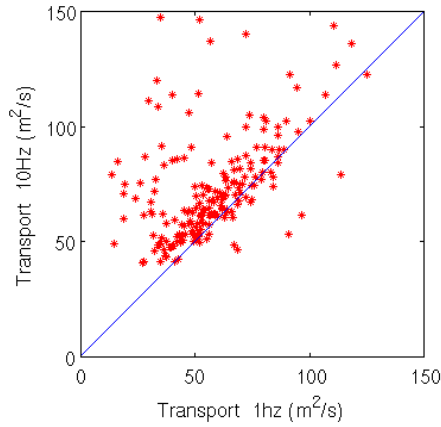
20Hz/1Hz Gaussian fit parameters comparison Pass172 Jason

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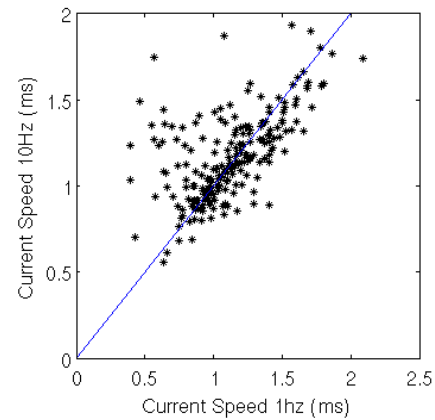
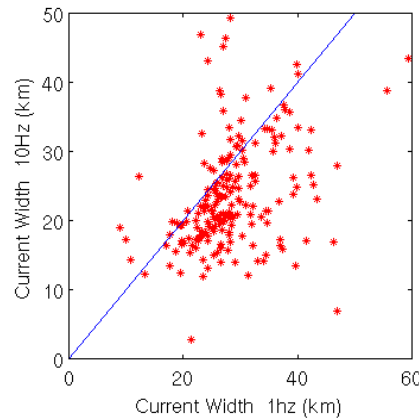
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$$\int_{x_0 - width}^{x + width} V_g dx$$

Width (gaussian sigma)



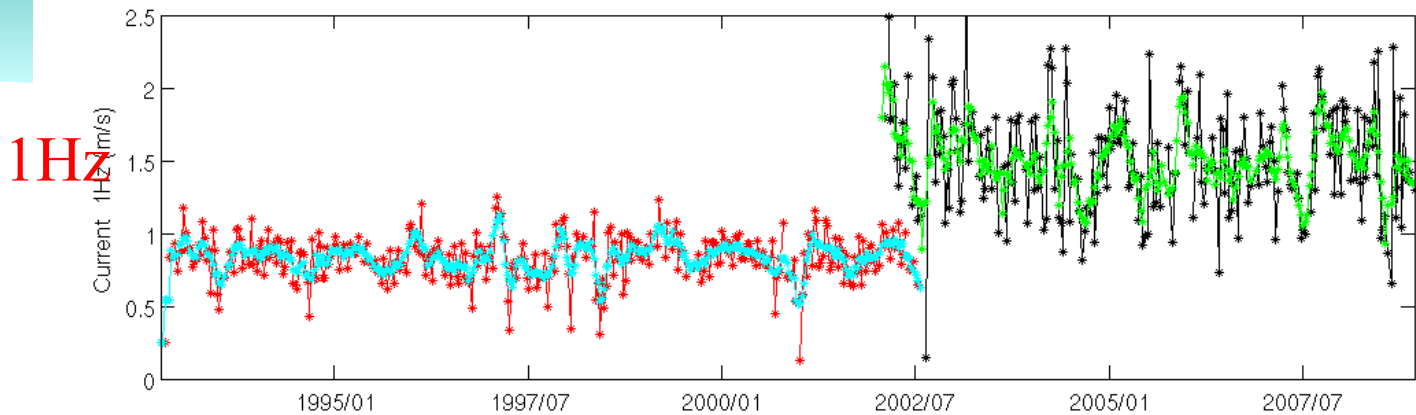
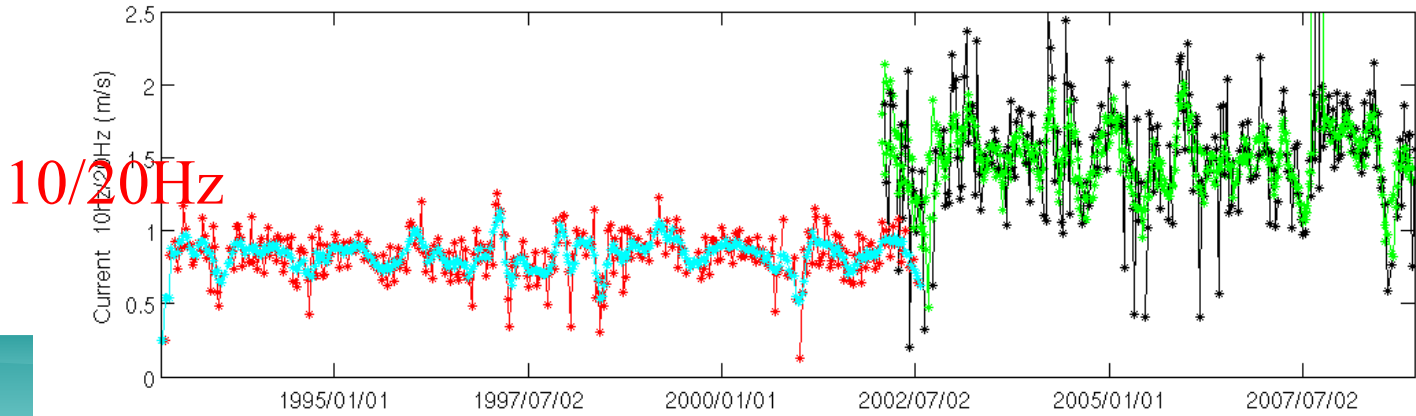
Latitude maximum speed



Maximum speed



Current speed Topex and Jason Pass 020

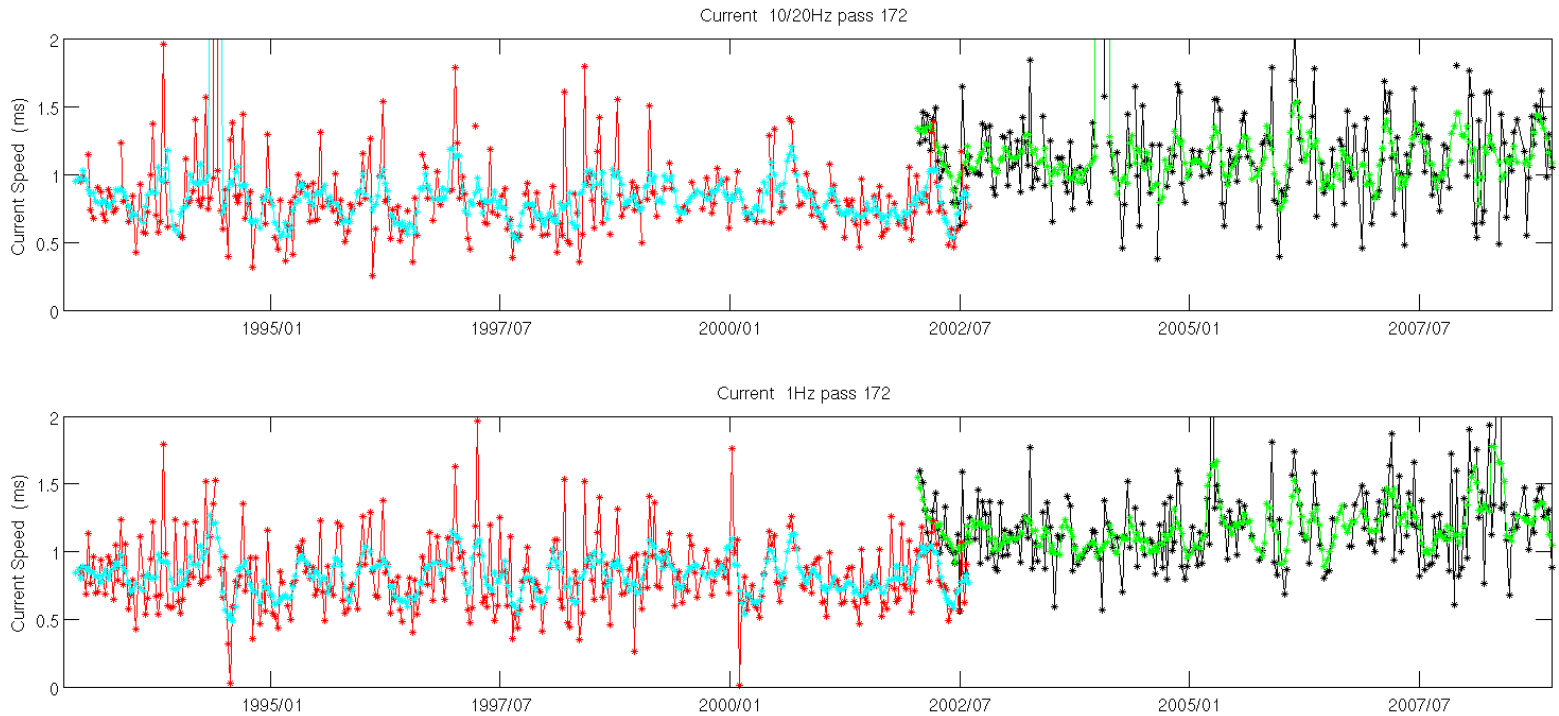


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Current speed Topex and Jason Pass 172



Conclusion

- The HR ssh can be used to estimate current with a reasonable noise level if good MDT
- HR gives higher speed and sharper features
- Discrepancies between Topex and Jason for the maximum current speed. Why?

