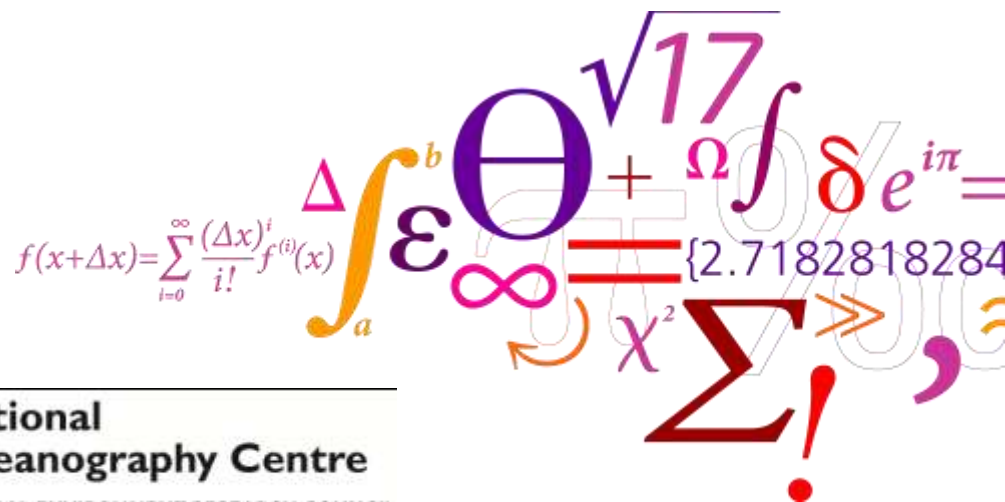


Final Presentation

Retracking Airborne ASIRAS data

Lars Stenseng, DTU-Space

Christine Gommenginger, NOC

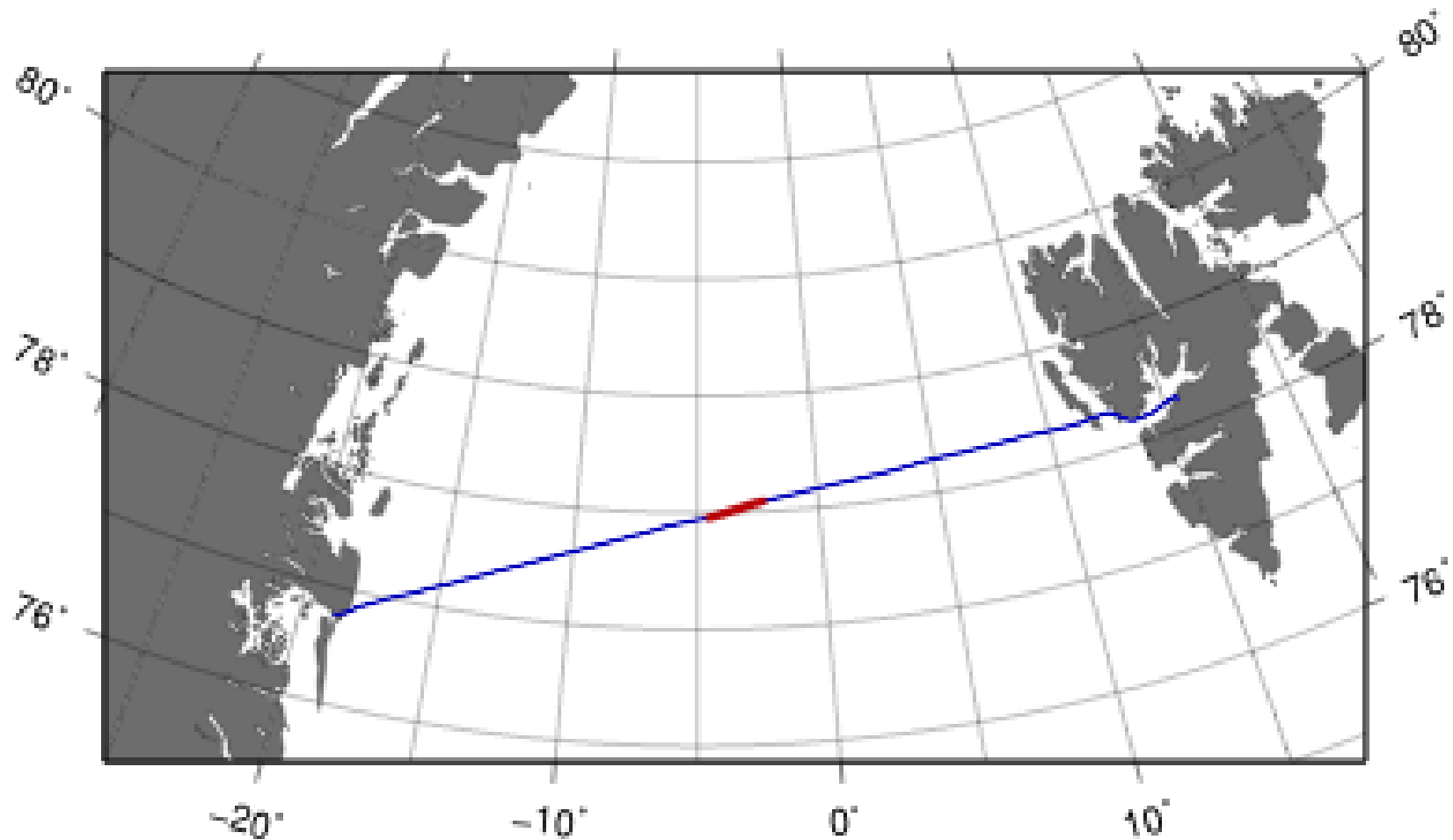


The Airborne SAR/Interferometric Altimeter System (ASIRAS)

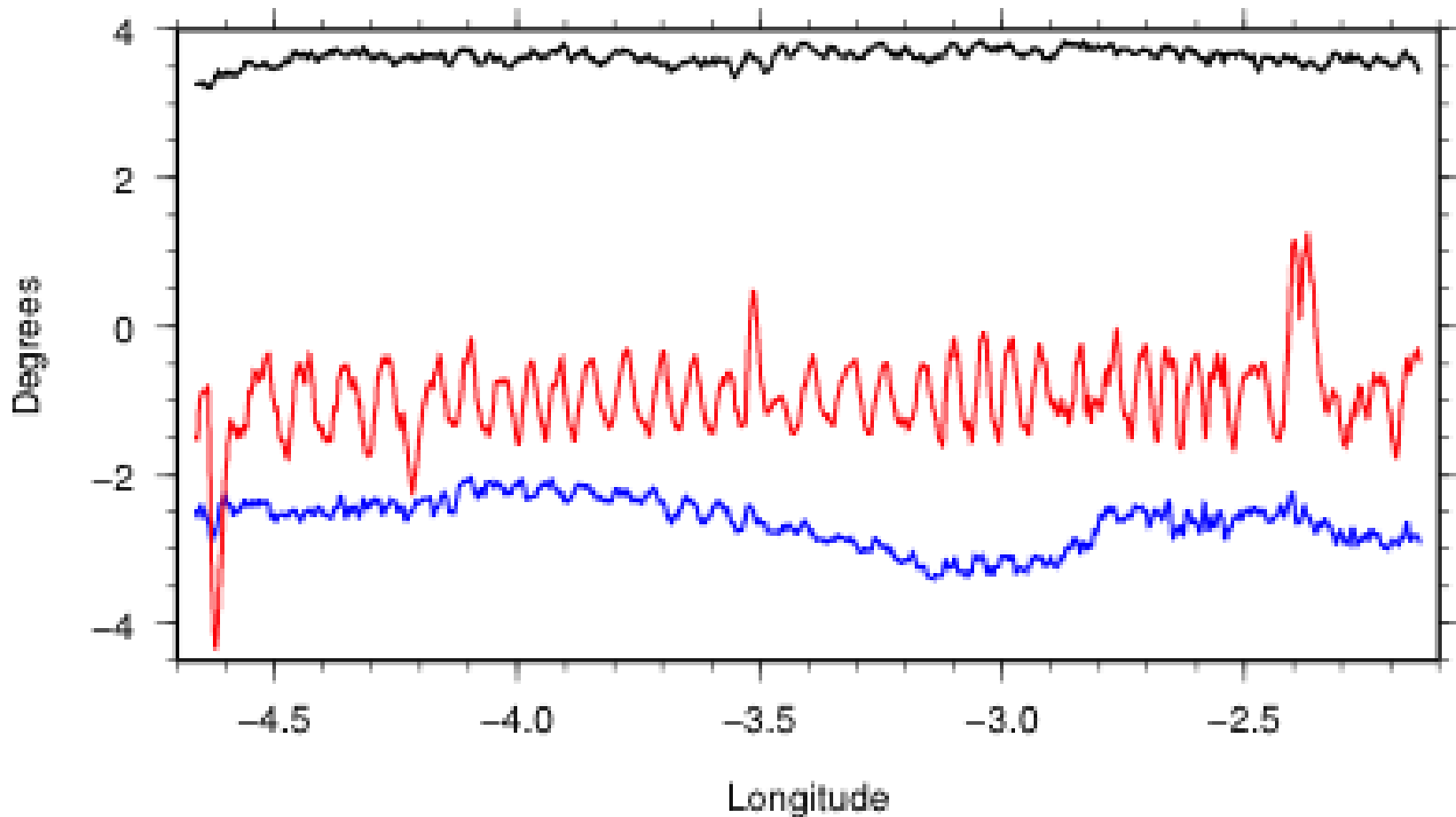


Antenna pattern highly elliptical
1000 MHz bandwidth

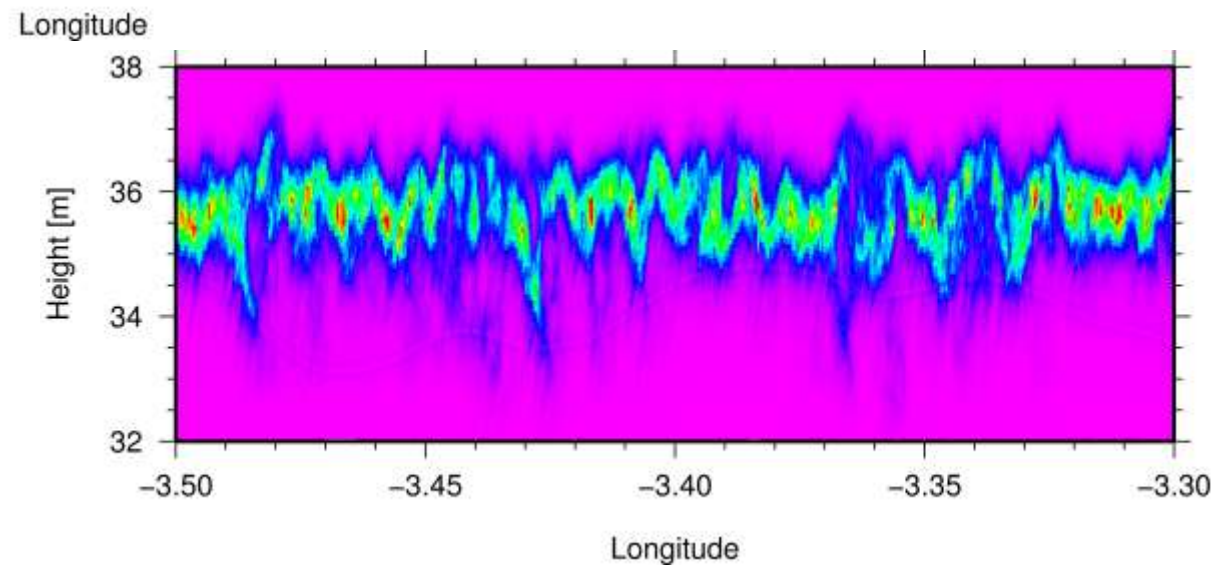
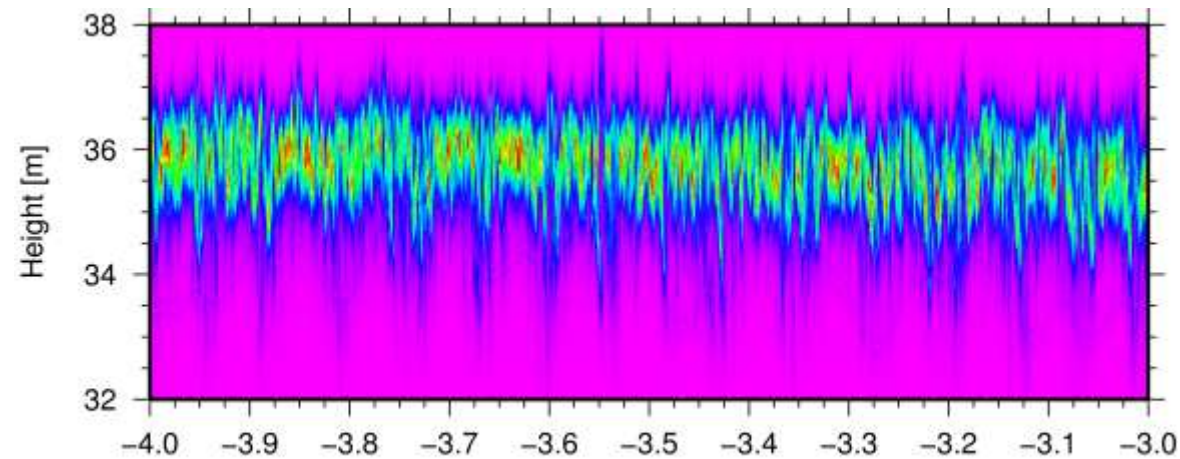
ASIRAS data



Attitude during flight



L1b ASIRAS data

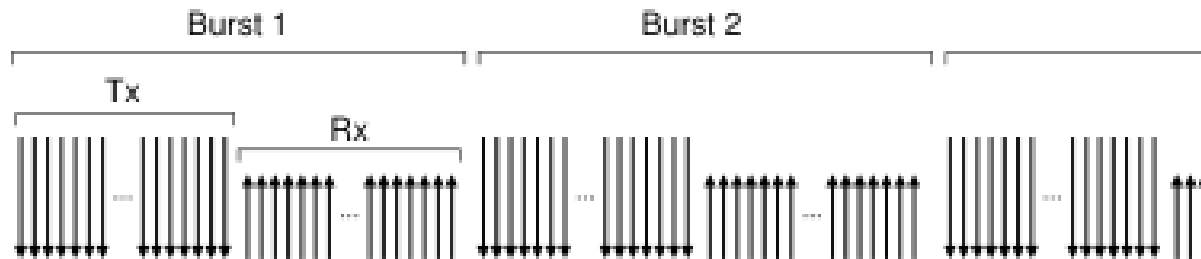


SAMOSa retracker parameters

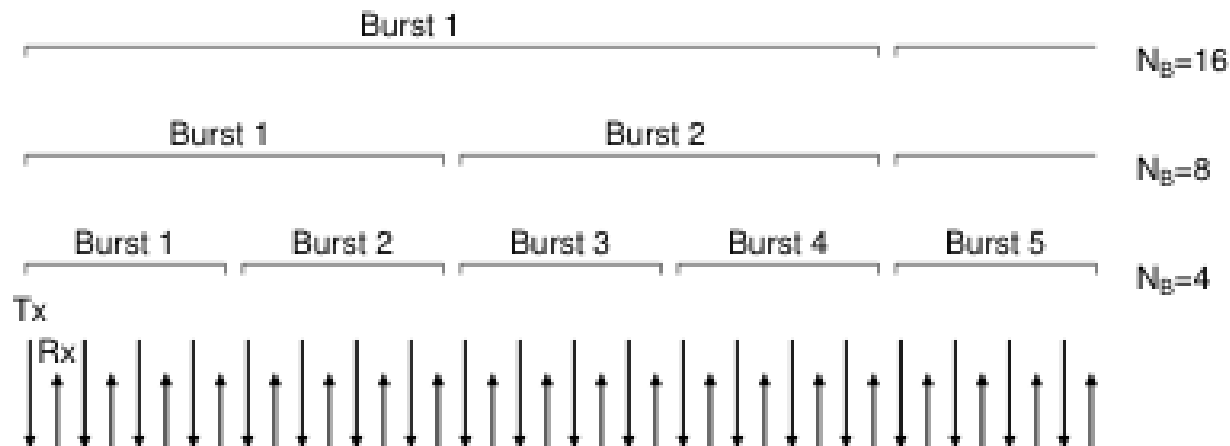
	ASIRAS	SIRAL
Bandwidth	1000 MHz	320 MHz
Range gate spacing	0.585e-9 s	3.125e-9 s
Number of range gates	256	128
Pulse Repetition Frequency	2.5e3 Hz	17.8e3 Hz
Burst size	64, 128 or 256	64
Along-track beam width (3 dB)	10.0°	1.0766°
Burst repetition interval	2.56e-2 s, 5.12e-2 s or 1.024e-1 s	11.7e-3 s
Max antenna gain	26 dB	42 dB
Pulse length	4e-6 s	51e-6 s
PTR Gaussian approximation coeff.	0.366	0.366
Mean platform velocity	70.5 m/s	7000 m/s
Mean platform altitude	2774 m	717242 m

Burst configuration

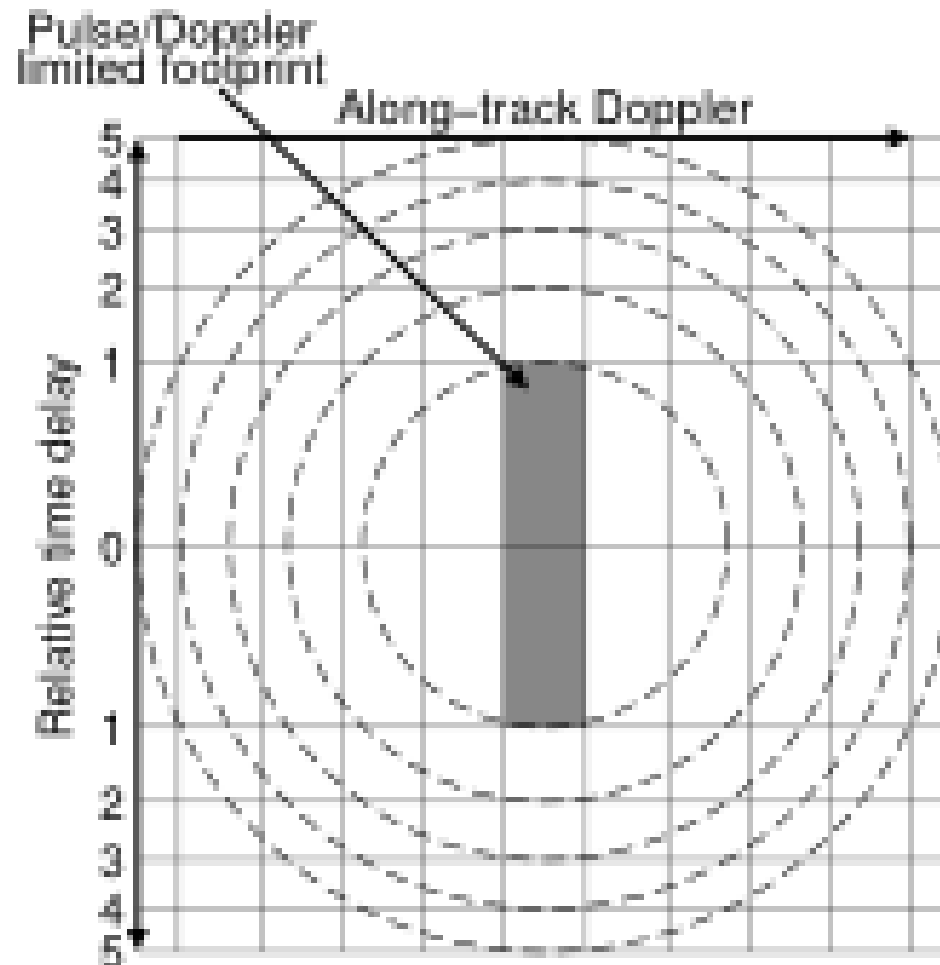
CryoSat-2 SAR mode (burst fixed at 64 pulses)



ASIRAS LAM and HAM (burst chosen at during post-processing)



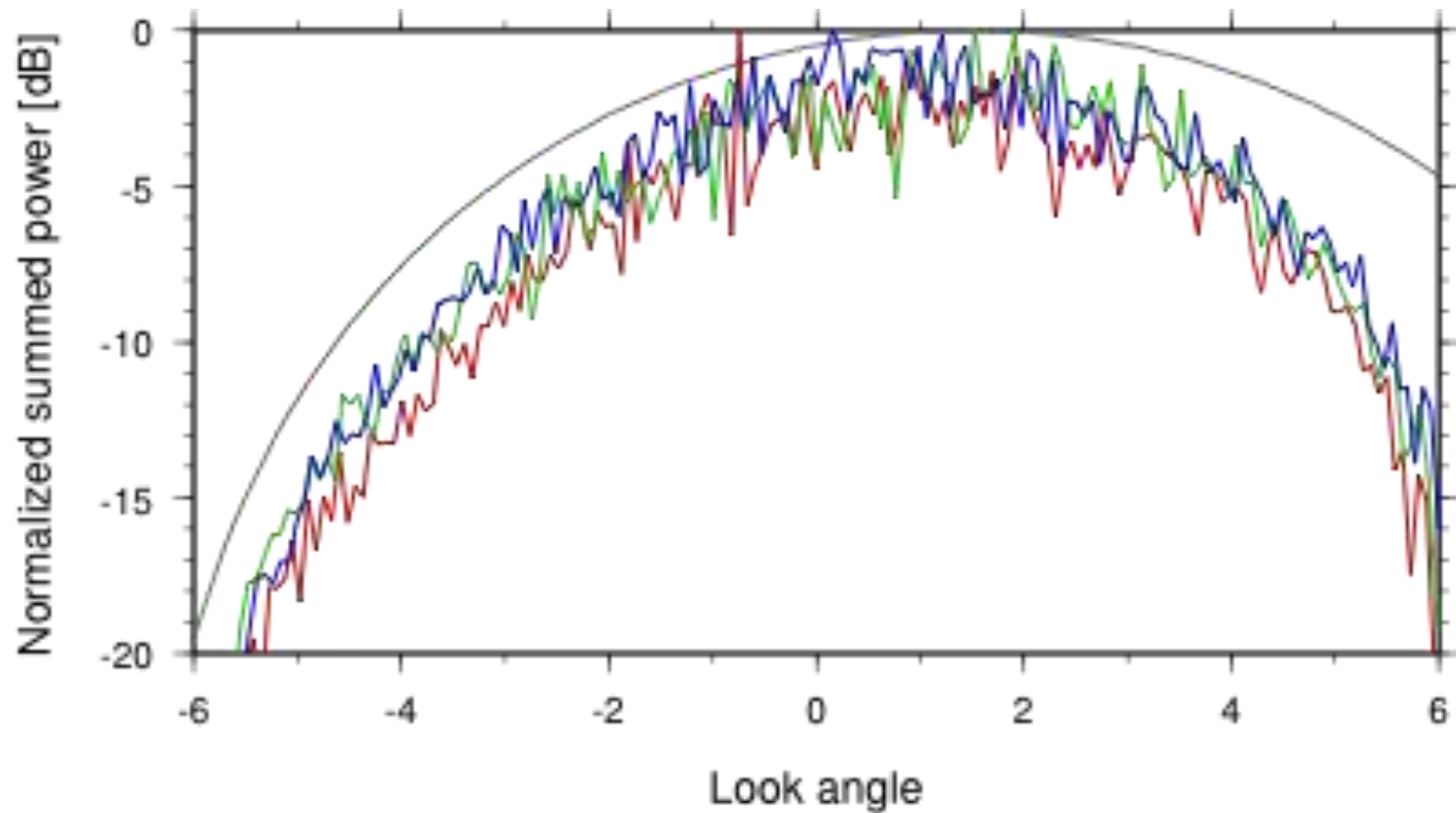
Footprint geometry



Comparison of footprints

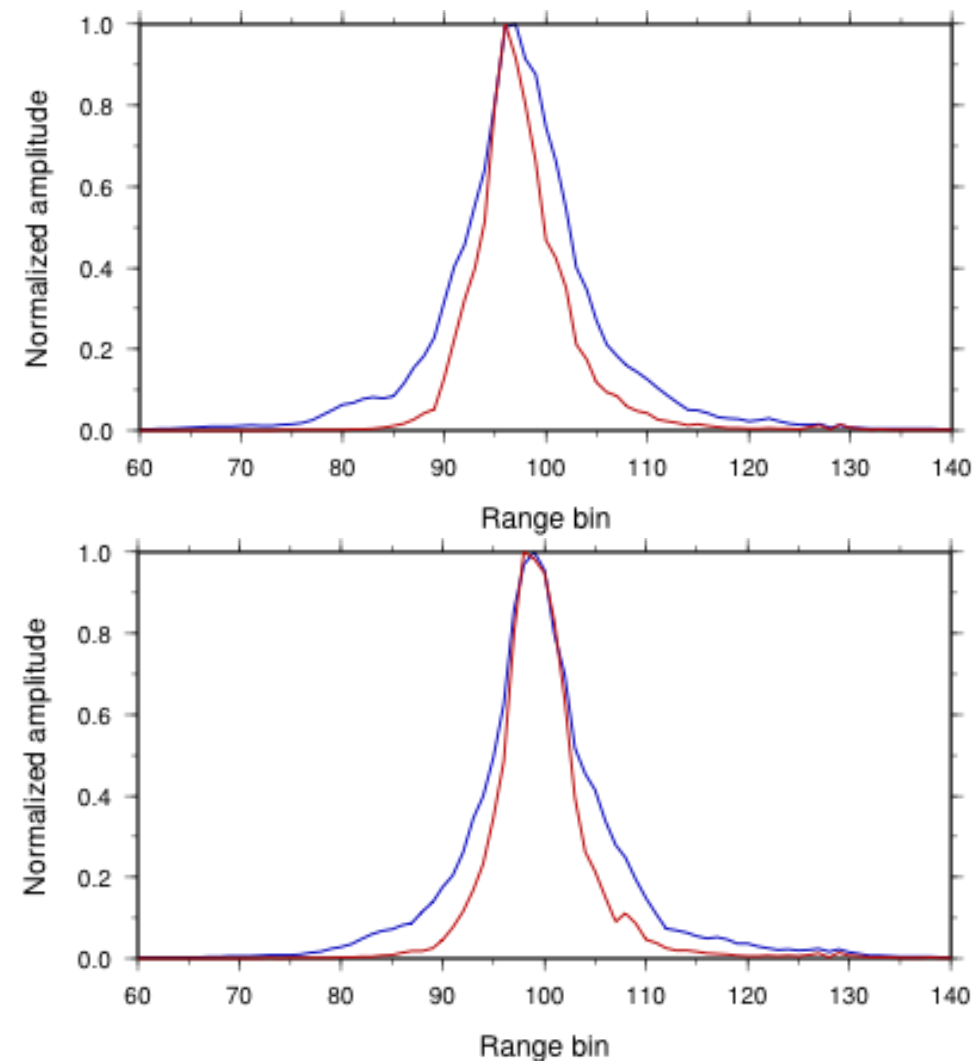
	ASIRAS	SIRAL
Along-track	4, 8, or 16 m	~250 m
Beam limited x-track	~120 m	~15 km
Pulse limited x-track	~215 m	~3.5 km

Power versus look angle



Effect of look angle

Burst size	Doppler Bin size	Critical angle	Number of looks
64	16.69 m	0.30°	15
128	8.34 m	0.60°	15
256	4.17 m	1.2°	15

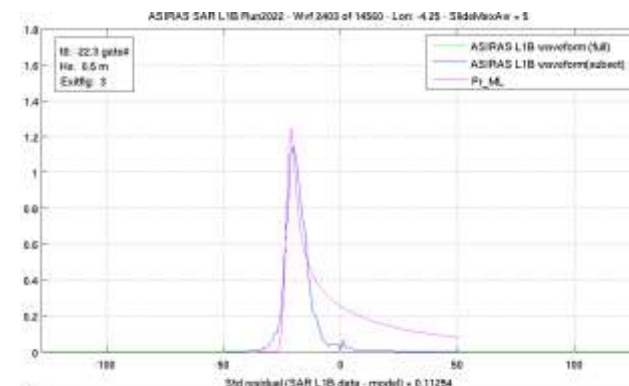
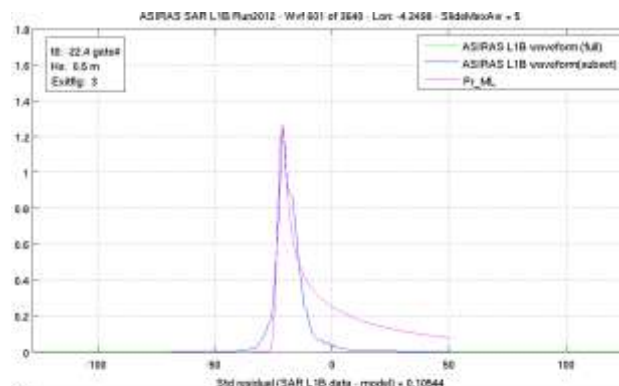
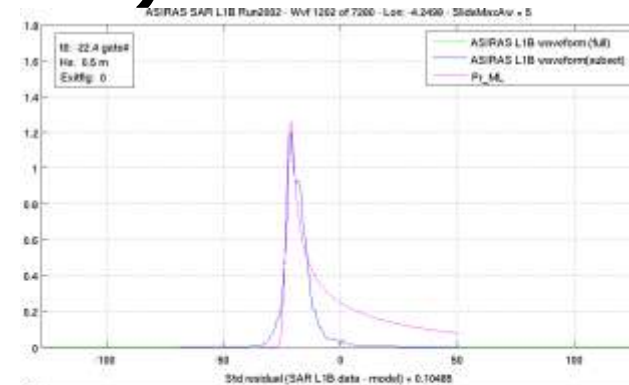
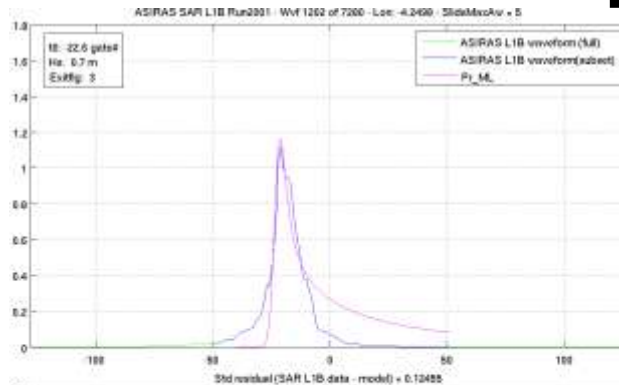


ASIRAS processing runs

Run	Burst size	Doppler Bin size	Look angle	Number of looks
2001	128	8.34 m	6.0°	159
2002	128	8.34 m	1.4°	37
2012	64	16.69 m	1.4°	74
2022	256	4.17 m	1.4°	19

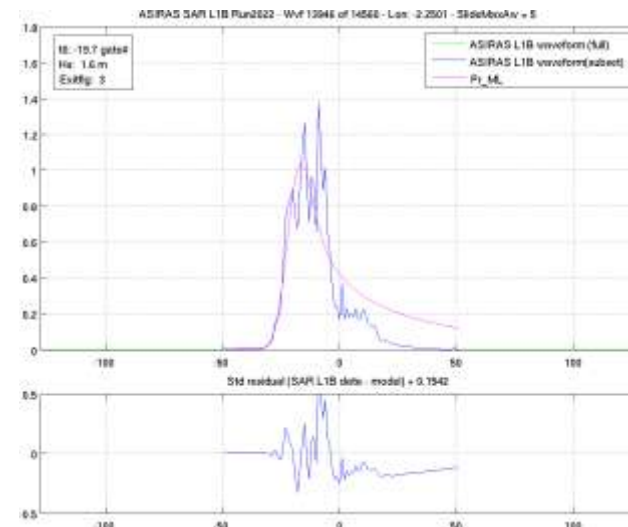
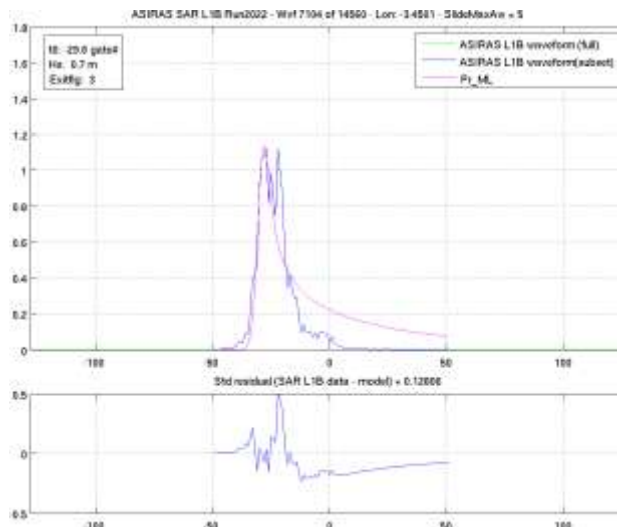
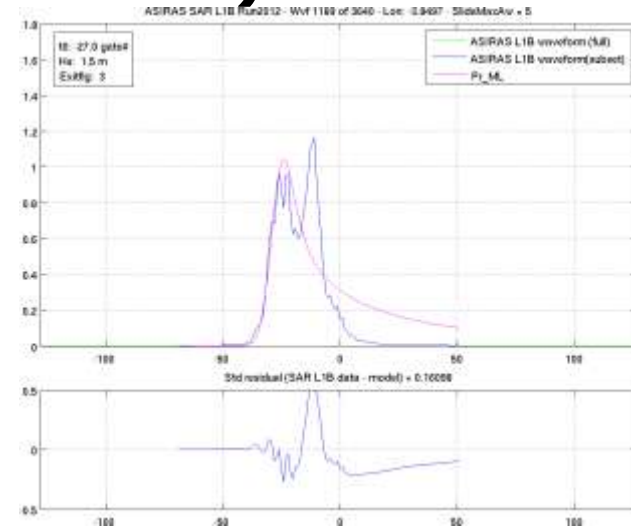
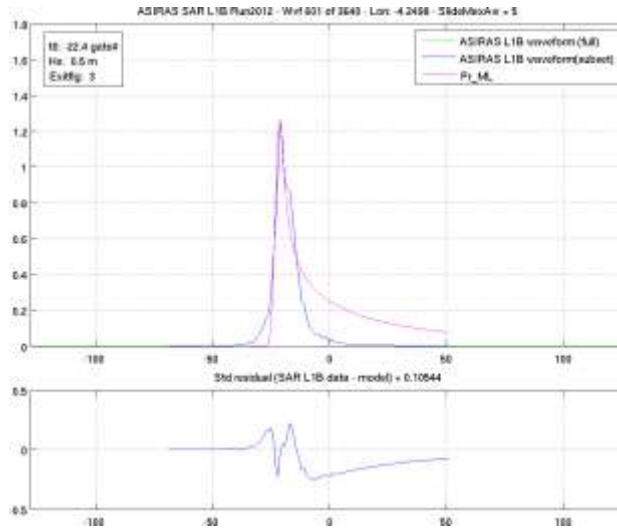
SAMOSA1 retracker results

Fitted model example (pos 2)

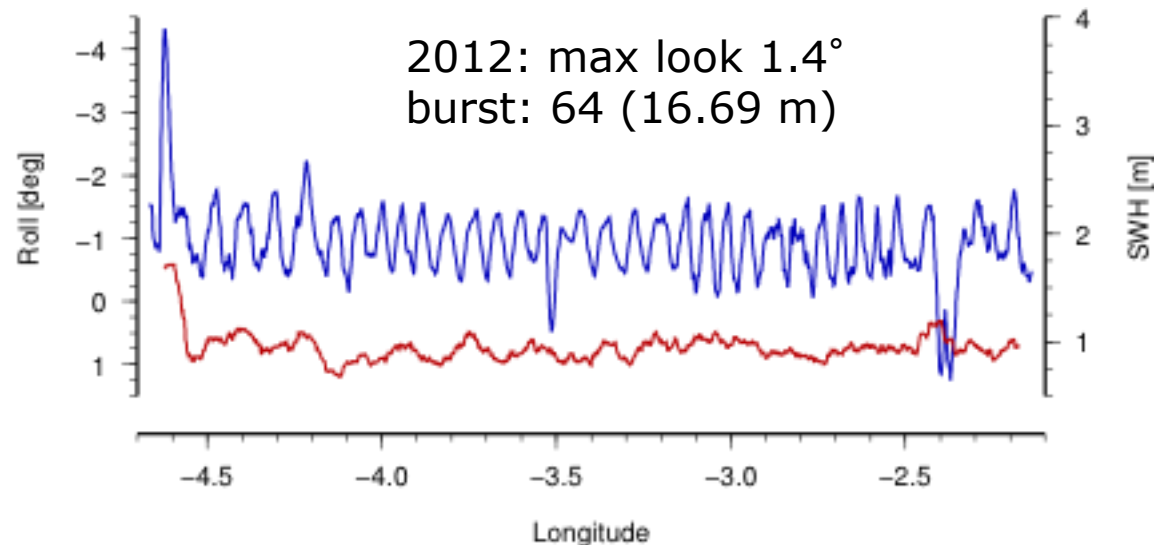
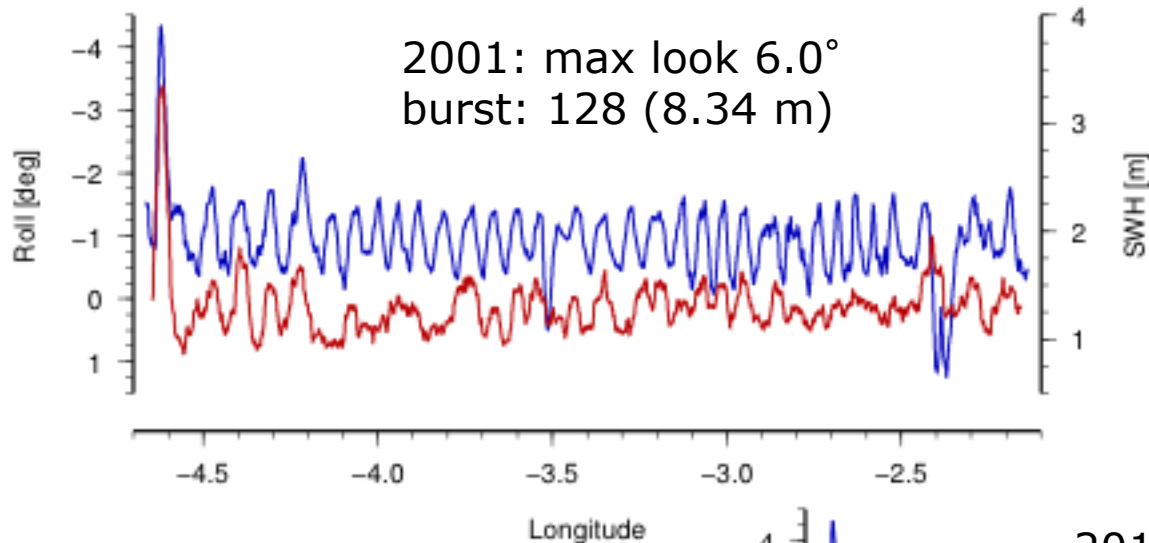


SAMOSA1 retracker results

Fitted model example (run 2012)

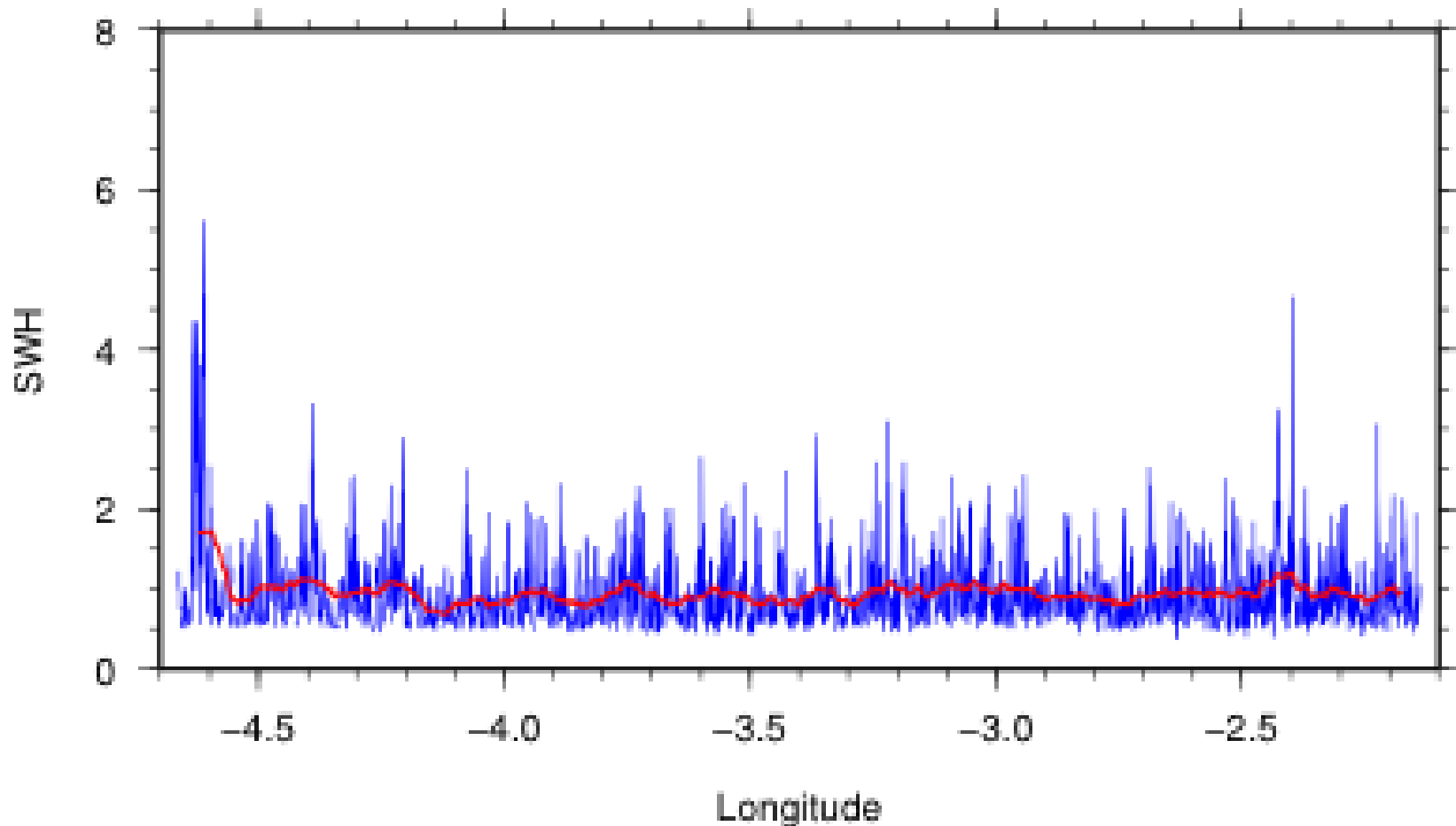


Platform roll effect



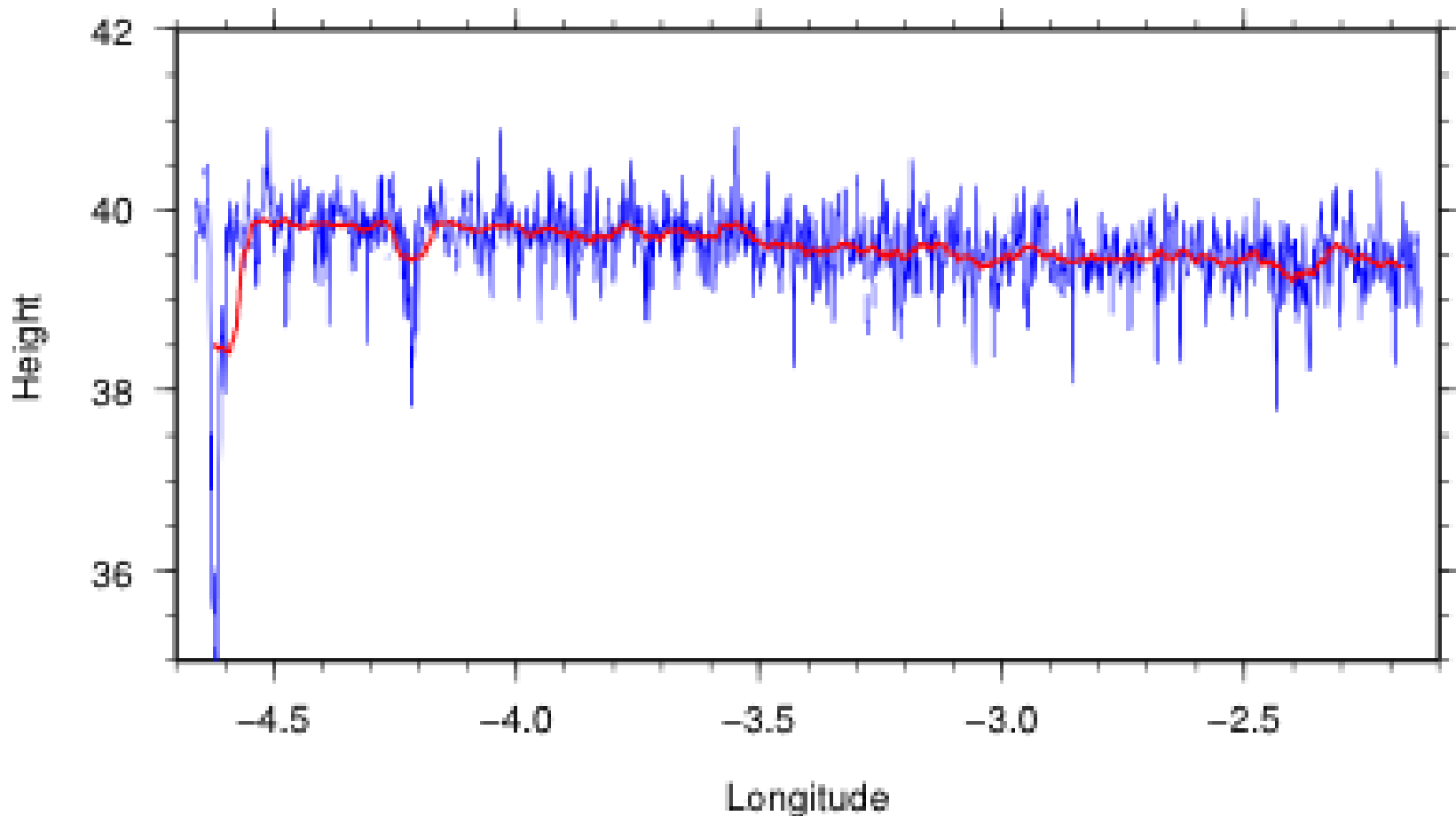
SAMOSA1 retracker results

Significant Wave Height



SAMOSA1 retracker results

Range



Validation of results

	SAMOSA1 retracker	Model
Surface height	39.63 ± 0.36 m.a.e	40.71 m.a.e
Significant wave height	0.93 ± 0.40 m	1.83 m – 1.46 m

- Surface height model: DTU10 Mean sea surface
- Significant wave height: ECMWF wave model

Conclusion

- Run 2001 (high look angle) estimates a higher surface and significant wave height
- Run 2002, 2012 and 2022 generally agree well on the estimated parameters
- Except for a toe there is good agreement between the leading edge in ASIRAS data and model fitted by the SAMOSA1 retracker
- The rapid decaying trailing edge in ASIRAS data is not captured by the SAMOSA1 retracker
- Run 2012 (large along-track) has the best overall agreement with the fitted SAMOSA1 SAR waveform model.
- SAMOSA1 retracker obtained a fit for 96% of the waveforms (Run 2012)