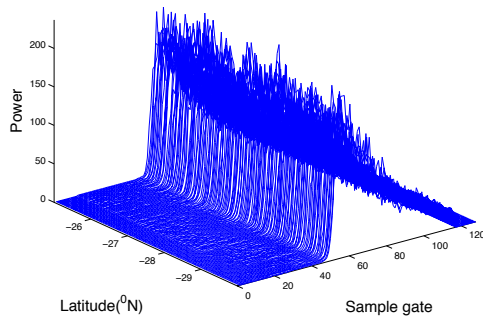

According to the previous discussion about the paper, there are some questions left to complete the planned paper. This is a notes of work about these questions.

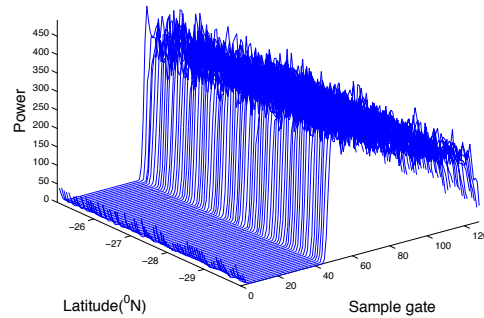
1, Waveform comparison for altika, envisat, cryostat-2 SAR, Jason1, cryostat-2 LRM and cryostat-2 SIN.

Firstly, I plot the typical waveforms for these different missions.

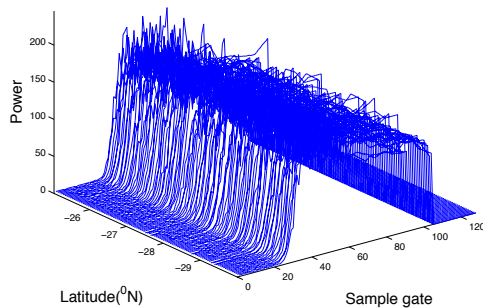
Typical waveform – AltiKa



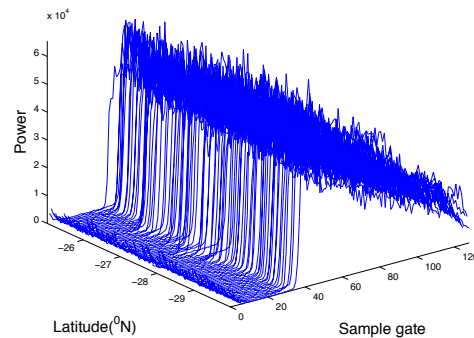
Typical waveform – Envisat



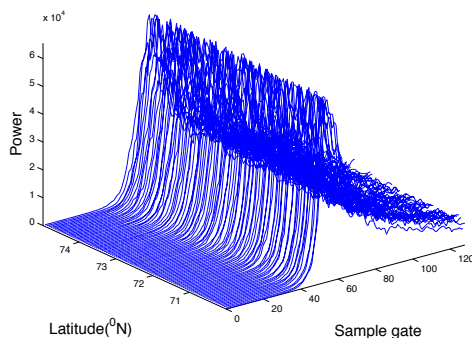
Typical waveform – Jason1



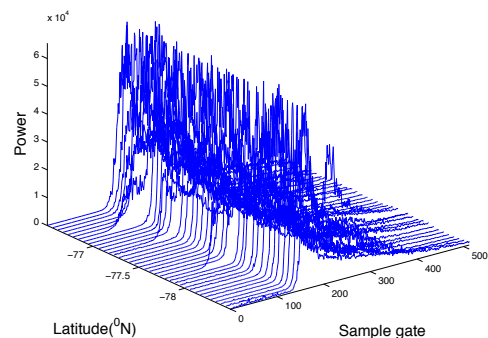
Typical waveform – Cryosat/LRM



Typical waveform – Cryosat/SAR



Typical waveform – Cryosat/SIN



As shown in the figure, AltiKa has a similar waveform like Cryosat/LRM and its trailing edge decay is pretty convergent, not like the complex waveforms of Cryosat/SAR and Cryosat/SIN. In addition, the 40Hz waveform can maintain a high quality level along track.

In addition, I have not plotted the renormalized and modeled waveform of Jason1 and Cryostat for comparison (as figure 3 in the draft), because this work needs codes modification for each retracking program and will not count much for the paper.

2, retracking altika for several cycles.

For this question, I have firstly retracked 3 cycles of AltiKa data from cycle023 to cycle025. These data were retracked for each pass and then be merged together using cat command.

I have tested, the order will not affect the result with your advice. And I use this order just to make sure I can evaluate the coherence level for original pass, retracked pass and filtered cdr pass, separately.

3, Analysis altika data solely about erf3 and erf2 noise level in five randomly selected regions, just provide a sample. Besides, where is the region used in Garcia's paper?

Based on the three cycles of AltiKa data mentioned previously, I randomly chose five 40*40 regions and their location is shown in following figure (Region1: 190~230, 20S~60S; Region2: 300~340, 10N~50N; Region3: 140~180, 20S~20N; Region4: 190~230, 15N~55N; Region5: 55~95, 35S~5N).

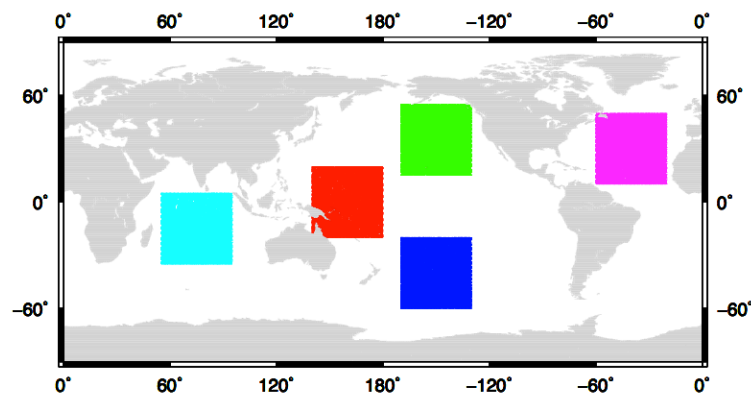


Figure: Geographical location of selected five regions
(Region1,blue; Region2, purple; Region3, red;Region4, green; Region5, cyan)

The corresponding 40Hz noise level for each cycle is also plotted as following figure, region1 to region5 from up to down. Besides, I also statistic the mean standard deviation values of 40Hz noise level at 2m and 6m swl separately as shown in table1

to table3. These figures and tables all can prove that the erf2 results can bring an obvious decline of noise level by a factor of 1.6.

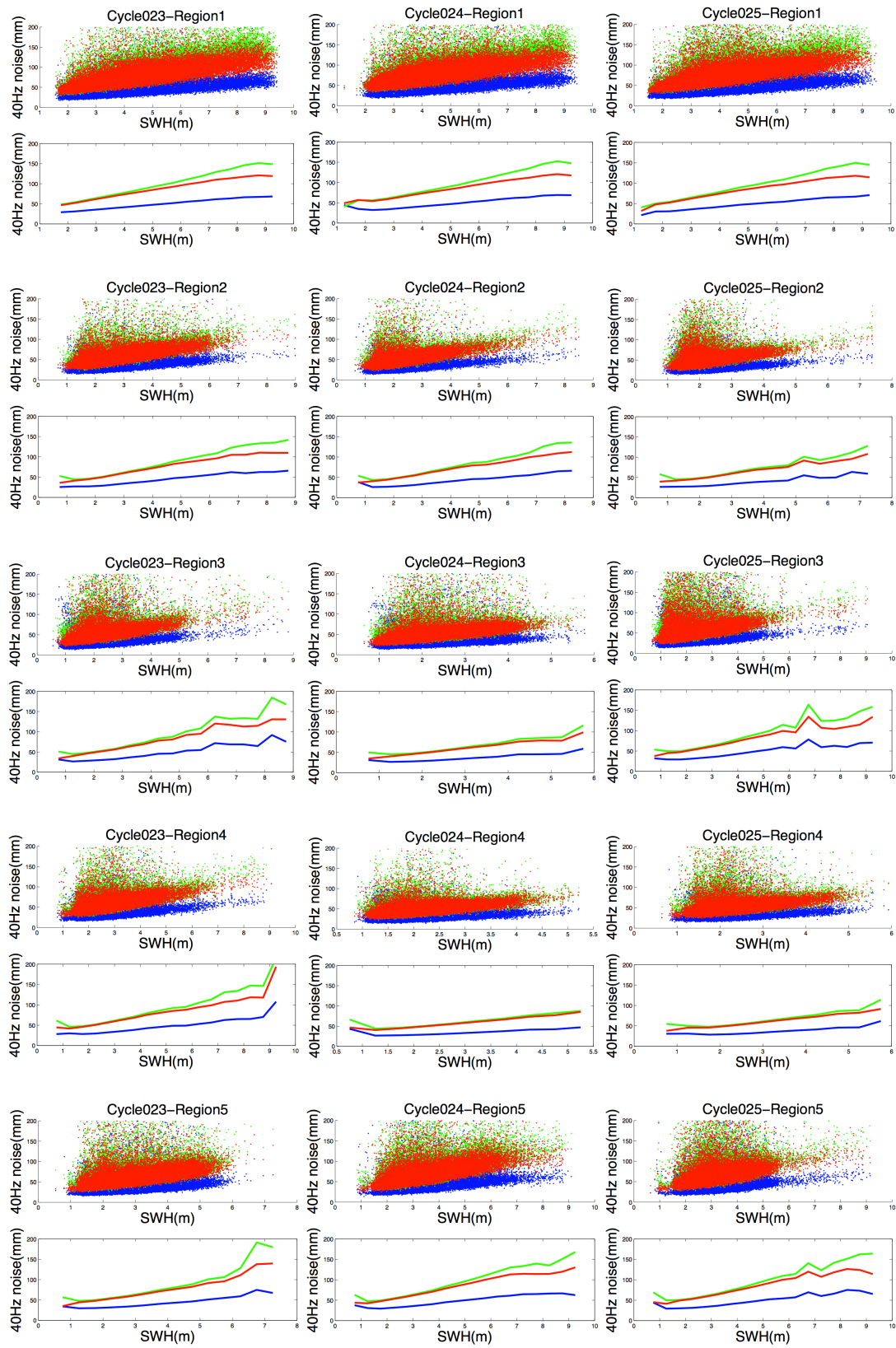


Fig 40Hz noise level of 3 cycles AltiKa data for 5 randomly selected regions

Tab1 Comparison of mean value of 40Hz noise std of cycle023 for 2m and 6m swl (Unit: mm)

	2m			6m		
	GDR	Erf3	Erf2(Erf3/Erf2)	GDR	Erf3	Erf2
Region1	46.4964	48.2681	28.9608(1.66)	76.1796	81.0146	42.9296
Region2	44.5330	46.0312	27.0138(1.70)	91.6283	102.7753	53.5981
Region3	46.0081	47.9087	28.1624(1.70)	94.9076	108.5046	54.7008
Region4	45.8000	47.4337	28.3174(1.67)	87.9427	94.9509	48.8933
Region5	47.9451	49.9632	30.2544(1.65)	95.9303	106.2482	55.1299

Tab2 Comparison of mean value of 40Hz noise std of cycle024 for 2m and 6m swl (Unit: mm)

	2m			6m		
	GDR	Erf3	Erf2(Erf3/Erf2)	GDR	Erf3	Erf2
Region1	57.0410	56.1132	34.7822(1.61)	92.4800	102.2538	52.1507
Region2	44.0039	45.3729	26.7345(1.69)	86.2758	95.9831	49.4905
Region3	45.3266	47.1498	27.6046(1.70)	99.1601	116.1751	58.9367
Region4	44.5812	46.1353	27.4274(1.68)	85.1115(5.5m)	87.4719(5.5)	46.9776(5.5)
Region5	47.5258	49.1497	29.3427(1.67)	99.7469	109.9668	54.7730

Tab3 Comparison of mean value of 40Hz noise std of cycle025 for 2m and 6m swl (Unit: mm)

	2m			6m		
	GDR	Erf3	Erf2(Erf3/Erf2)	GDR	Erf3	Erf2
Region1	47.6510	49.9747	30.3029(1.65)	93.4137	103.1114	52.3638
Region2	45.2932	46.8480	27.6404(1.69)	83.8229	92.8324	48.9744
Region3	47.1987	49.2317	29.0987(1.69)	99.3683	114.3002	59.4731
Region4	45.7172	47.6437	28.2431(1.68)	91.4687	114.0358	61.6014
Region5	48.9554	50.5968	30.0666(1.68)	99.9757	109.3706	54.1461

4, Analysis the noise level at high-latitude areas.

As I used the rain edit parameter criteria, the high latitude data is edit out for a high percentage. As this comparison needs redo the a40_1stat again which needs another day. I will do this comparison tomorrow. However, before I do this comparison, will you please give me a typical polar ocean range with high-latitude to evaluate the sea-ice influence. So I can effectively reduce the processing time.

5, How to realize the coherence analysis? Your guidance is listed in blue.

This is a bit of a challenge. You first need to select some repeat passes that have no missing data and are all the same length. Maybe select all the repeats in some latitude band in the North Pacific, we'll call them cycle A and cycle B. Try to select the latitude range so the number of points in the pass is a power of 2. These data must be very clean so they might be CDR records. Also if there are any small gaps they need to be interpolated. Then put them end-to-end in one long vector for A and one long vector for B. If you plotted them they would look the same and they would hve steps in exactly the same places where the ends of the passes were joined.

Then read the two vectors and run pwelch() or maybe they call it spectrum() now. This program has an option to window the data before analysis. You make the window length equal to the length of each of the sub passes so the ends of each sub pass are multiplied by zero and the steps where they join are gone. You set th window length and nfft both equal to the length of the sub pass and compute the power spectrum and the coherence. You could also do the same analysis with erf2 minus erf3 and see a spectral hump.

The problem is that there will be small gaps in each subpass that somehow need to be filled - not easy. I have some CDR code to do all this somewhere.

Through looking into the codes in CDR folder, the subroutine of autoc.f is used to compute the autocorrelation of along-track deflections. Additionally, hanning.f windows a profile with a hanning window and cool.f can realize the process of fourier transform of length n in place cooley-tukey method.

According to my understanding, these subroutines maybe useful for coherence analysis. But I did not find the main program to generate the repeat passes products that have no missing data and are all the same length. **Therefore, I write this notes and maybe you can remember relative programs and give me some guidance.**

6, How to make global noise map? You will be working with CDR's so make global CDR's with erf2 and erf3 for several cycles.

As mentioned before, I have made ascending and descending CDR files for each cycle. As the AltiKa data are exact repeat mission currently, maybe 3 cycles are representative. If 3 cycles are not enough, please inform me and I'll redo the process for more cycles. Actually I have downloaded 25 cycles of AltiKa SGDR data.

In my opinion, we may need to make a draft of global noise map for 3 cycle data firstly. **Therefore, will you please show me the example for Jason1 data?**