R3S - SWOT

R3S simulations

SWOT configuration

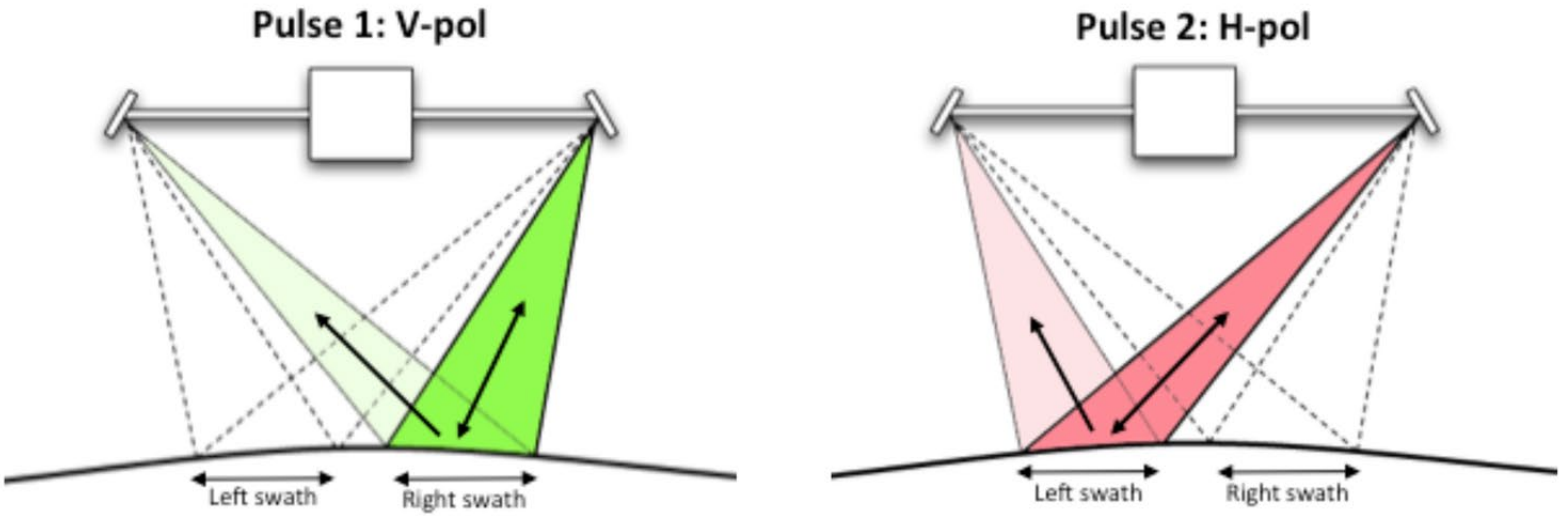


Figure 2: SWOT architecture and KaRIn non ping-pong operation mode.

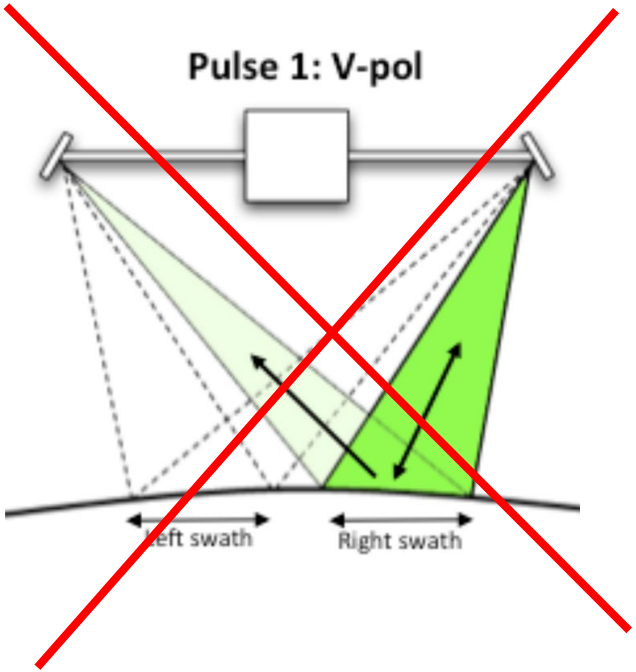
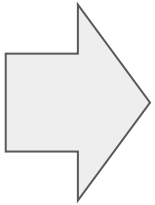
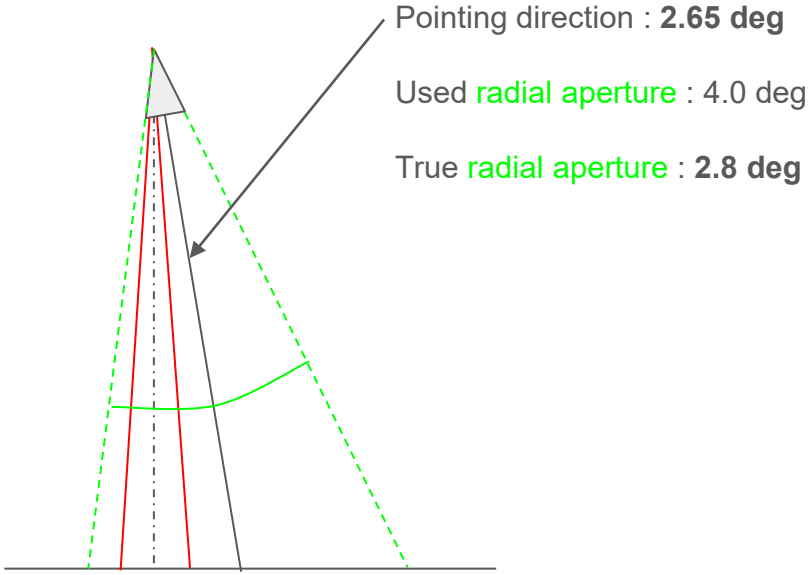


Figure 2: SWOT architecture a





Ocillations in interferometric phase at NEAR RANGE come from the “left swath” contribution !

Configuration:

- Frequency : 35.75 Ghz
- PRF : 4.42 kHz
- Bandwidth : 200 MHz
- f_sampling : 300 MHz
- pulse length : 5.6 micro
- Transmitter : right VV
- Receivers : Left and right VV
- Baseline : 10 m
- Radial aperture : 2.8 deg
- Azimuthal aperture : 0.1
- Incidence : 2.65 deg

Simulation & Processing steps:

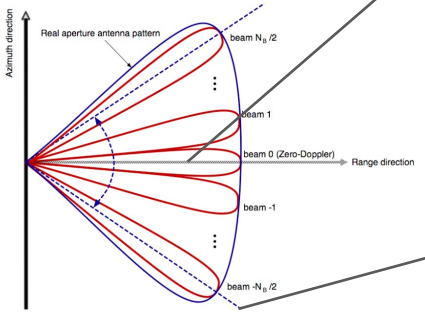
Duration : 5.42 s (24000 pulses)

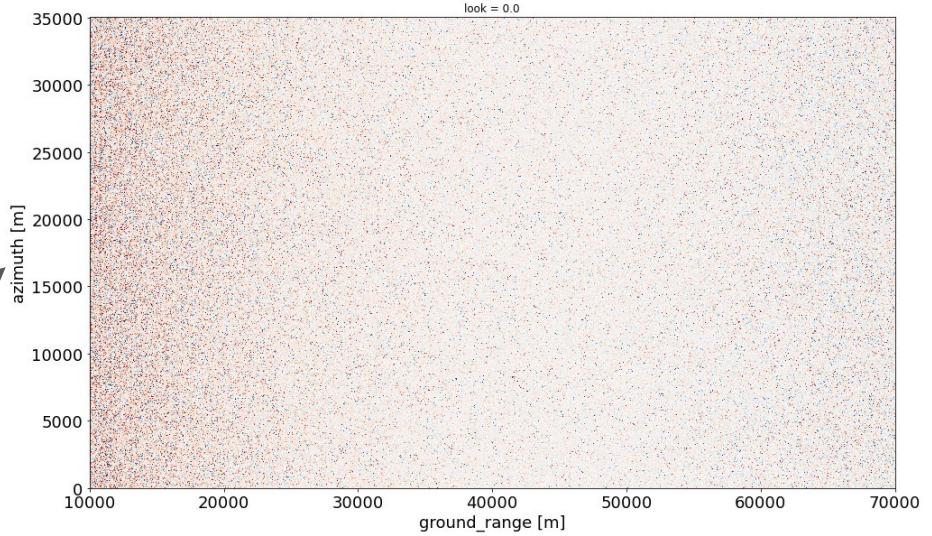
35 km (azimuth) x 60 km (range)

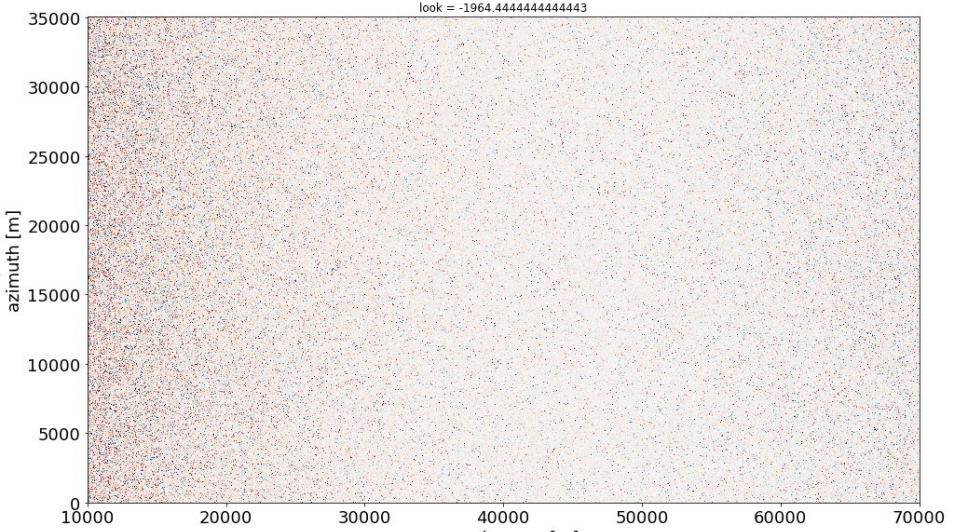
- Range compression
- Doppler centroid estimation
- co-registration of receivers (range dependent sinc interpolation)
- Unfocus SAR + 9 looks (Using Doppler)
- **Removing “theoretical wrapped interfero phase” (reference rough simulation) per look.**
- Compute interferograms + power maps
- slant-to-ground projection
- Degrade product resolution !
- Remove reference phase (On-ground processing)

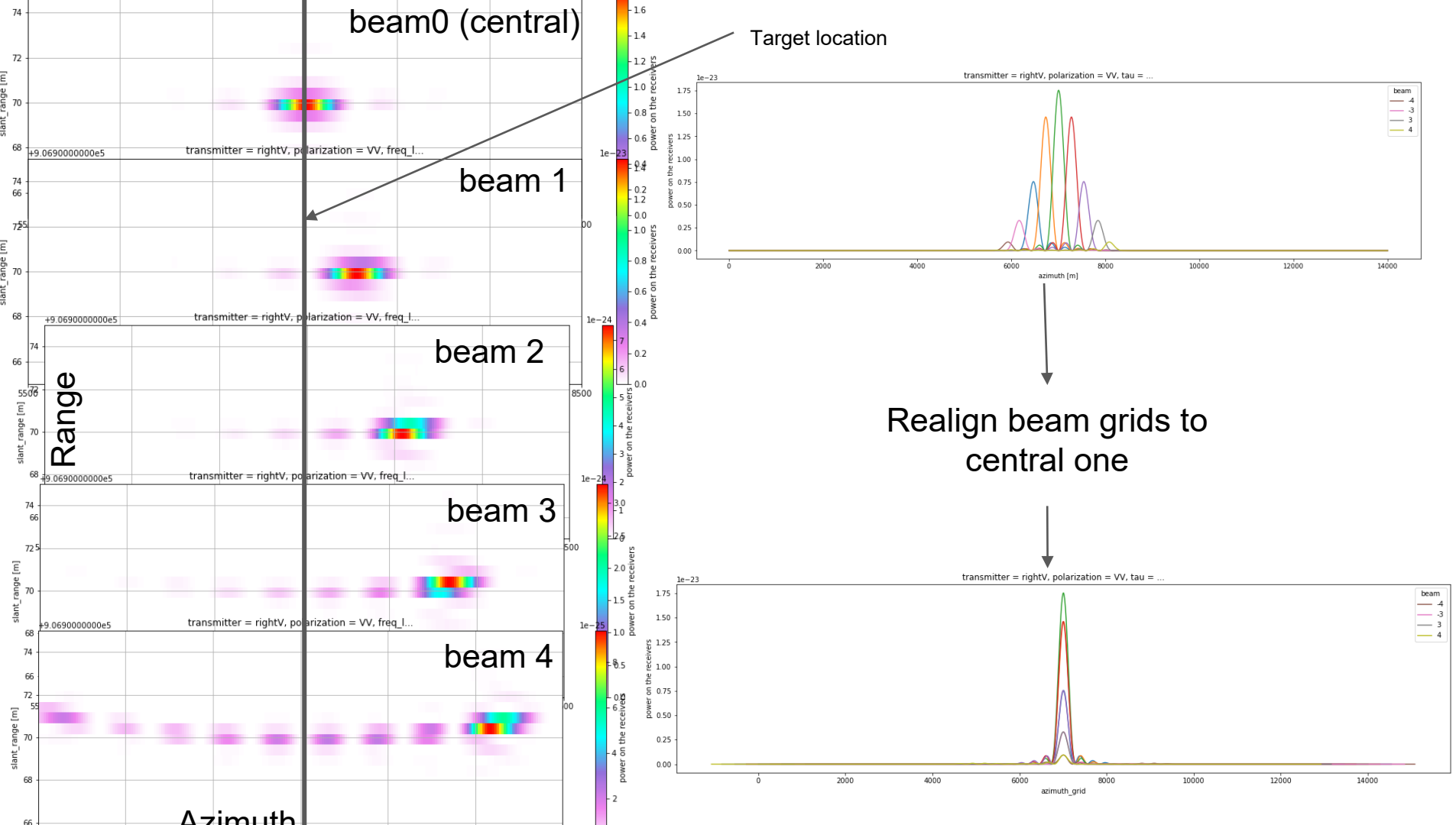
Full-res interferogams

- Nb = 9 looks / interferograms
- available onboard only
- Phase unwrapped (rough)
- Co-registered (range-dependent)








beam0 (central)
beam 1
beam 2
beam 3
beam 4
Range
Azimuth
Target location
Realign beam grids to central one
transmitter = rightV, polarization = VV, tau = ...
transmitter = rightV, polarization = VV, freq_l...
slant_range [m]
power on the receivers
azimuth [m]
azimuth_grid
beam
-4
-3
3
4

Averaging

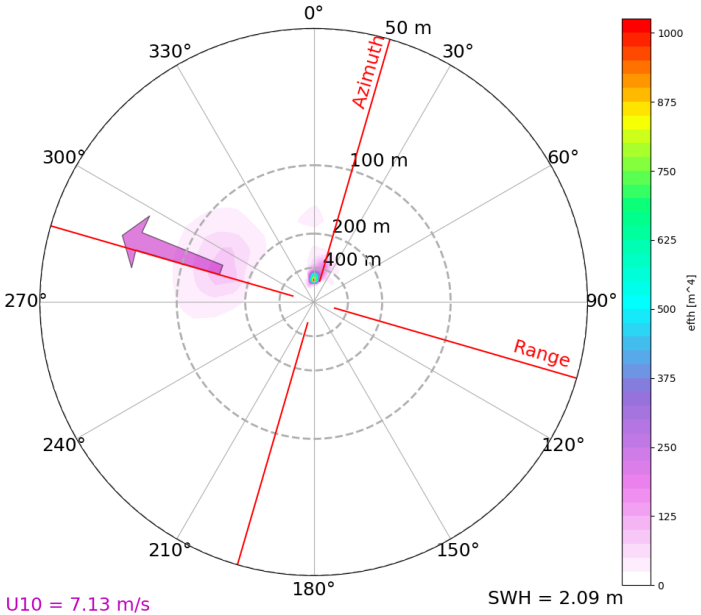
Azimuth:

- Blackman-Harris window
- 500 m averaging (36 lines)
- 250 m posting (18 lines)

Range:

- 500 m (ground-range) -> Parzen window (range dependent)
- 250 m posting

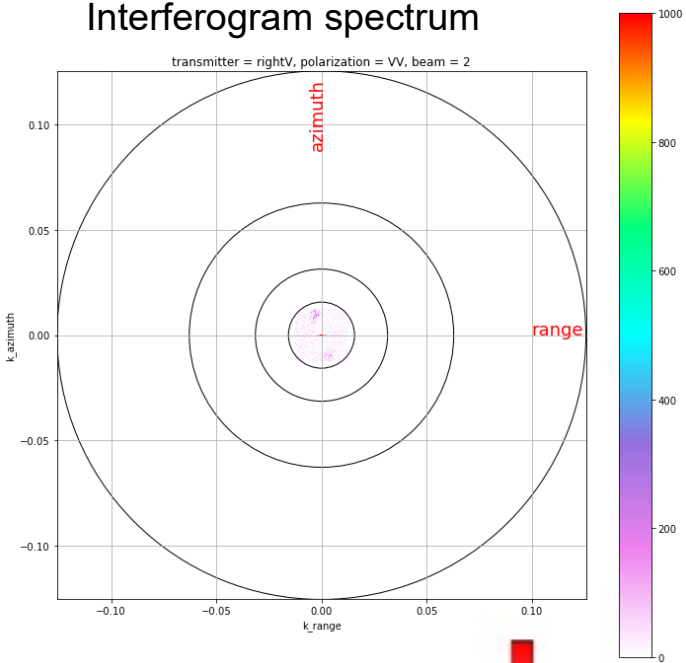
Input wave spectrum

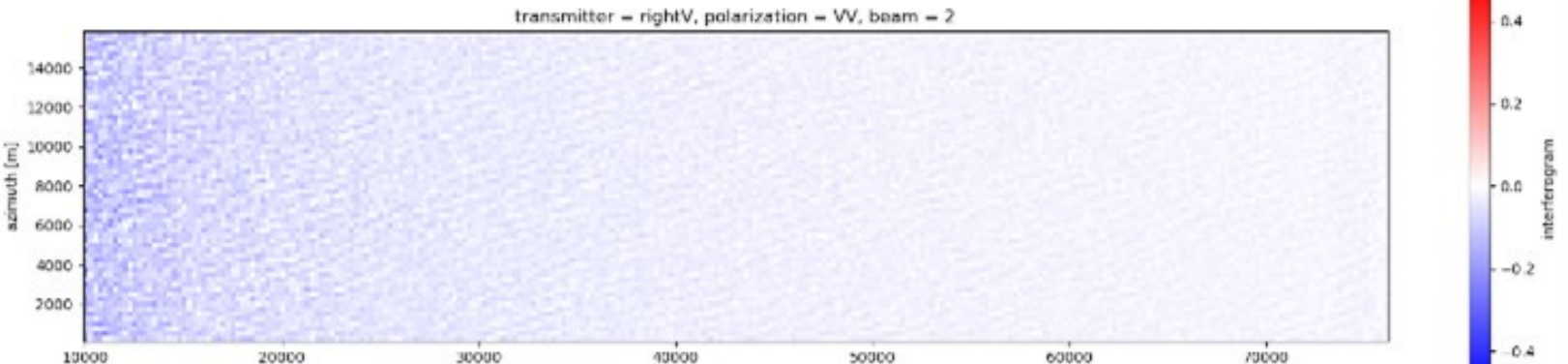


U10 = 7.13 m/s

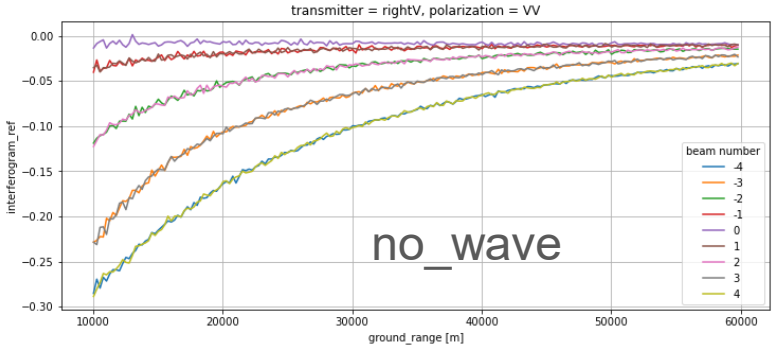
SWH = 2.09 m

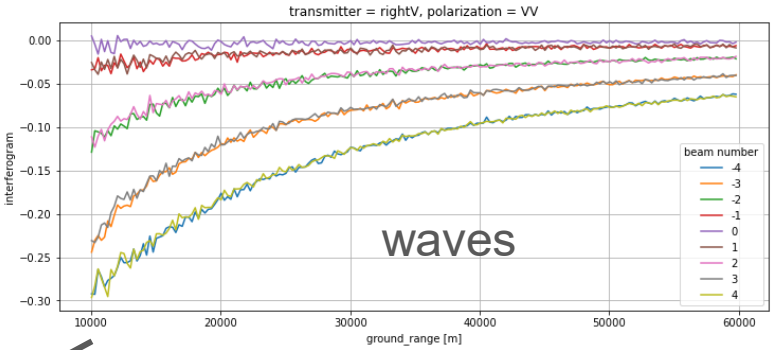
Interferogram spectrum



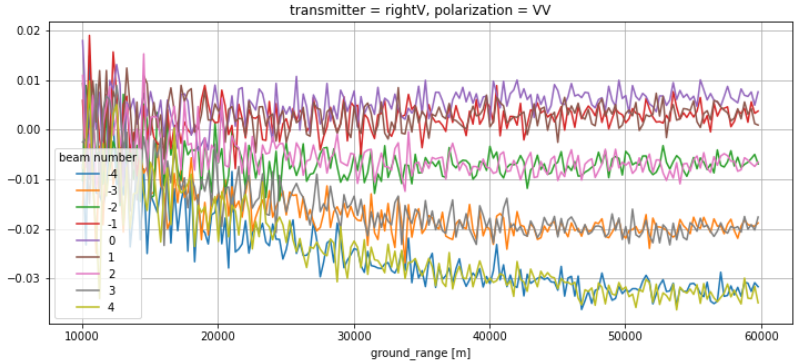


Azimuth-averaged interferograms

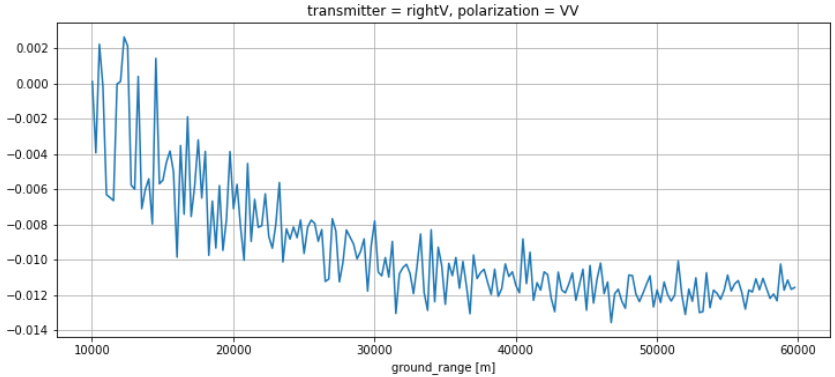




"waves" minus "no_wave"



Beam averaged residual



retrieved SSH (after beam averaged + phase_to_height)