

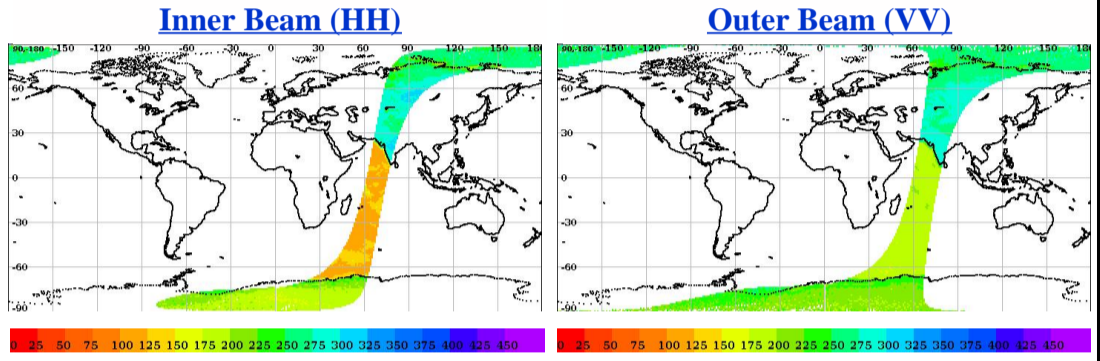
# SCATSAT-1 Scatterometer Level-1B Data Quality Evaluation Report

## Table of Contents

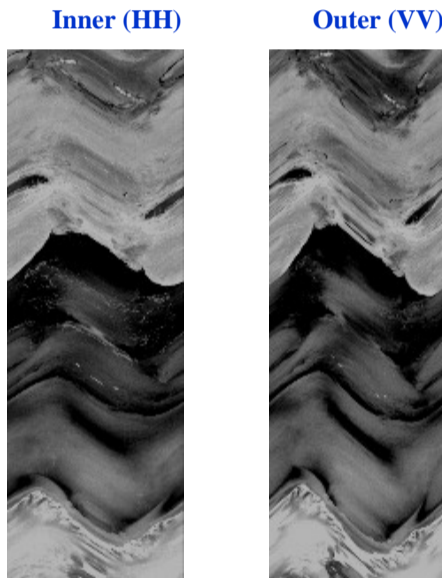
- Half-Orbit Coverage using BT & Sigma-0
- Invariant Site Sigma-0 Statistics (if Available)
- Half-Orbit Data Statistics
- Half Orbit wise - Dynamic Parameter (Sigma-0, Kp, SNR) Behaviour
- Dynamic Range (Data Histogram)
- Half Orbit Wise Behaviour - Static Parameters
- Doppler Variation (Across/Along Track for HH/VV Beam)
- LIB Parameter as a function of Latitude
- Half Orbit OAT Behaviour

|                              |               |                              |              |                               |      |
|------------------------------|---------------|------------------------------|--------------|-------------------------------|------|
| <b>Satellite Id</b>          | ScatSat-1     | <b>Start Orbit</b>           | 19313        | <b>Total Scans</b>            | 1015 |
| <b>Sensor Name</b>           | Scatterometer | <b>End Orbit</b>             | 19314        | <b>No of Inner FootPrints</b> | 281  |
| <b>Processor Version</b>     | v1.1.4        | <b>Rev. Number</b>           | 19313_19314  | <b>No Of Outer FootPrints</b> | 282  |
| <b>Half Orbit Direction</b>  | NS            | <b>Data Production Date</b>  | 20-05-2020   | <b>No. Of Inner Slices</b>    | 9    |
| <b>Equator Crossing Date</b> | 20-05-2020    | <b>Equator Crossing Time</b> | 03:46:03.000 | <b>No Of Outer Slices</b>     | 15   |

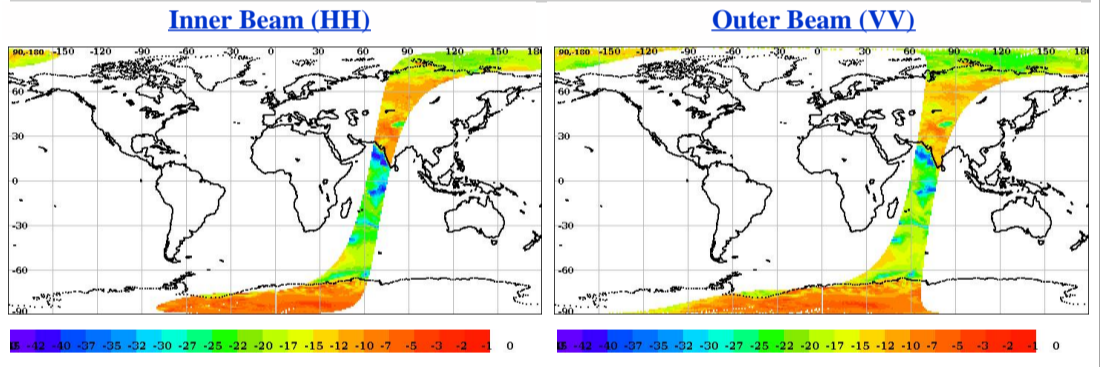
## Brightness Temperature(k) Footprint trace



## Image Snapshot for Inner & Outer Beam



## Sigma0(dB) Footprint trace



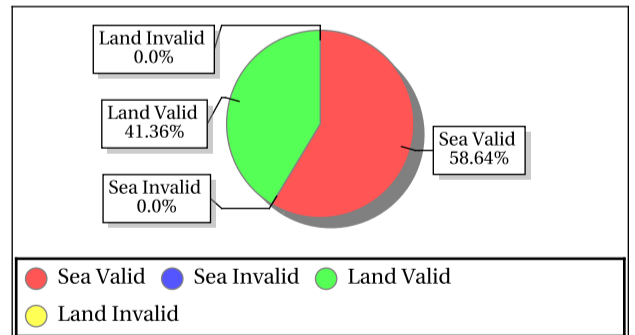
## Invalid and Poor Sigma-0 Quality Flag Statistics for Inner/Outer Slices\*

| Sigma-0 Flags                            | Inner Beam | Outer Beam |
|--|------------|------------|
| Invalid Sigma0(%)                        | 0.00       | 0.00       |
| Data Not Available From Payload (%)      | 0.0        | 0.0        |
| Slice not within sample array limits (%) | 0.00       | 0.00       |
| C(S+N) - C(N) < 0.1 (%)                  | 0.00       | 0.00       |
| Poor Sigma0(%)                           | 22.23      | 13.34      |
| Noise samples for blending Saturated     | 0.0        | 0.002619   |
| Count samp. for interpol. saturated (%)  | 0.00       | 0.00       |
| Sigma0 < lower bound (-96dB) (%)         | 0.0        | 0.0        |
| Sigma0 > upper bound (0 dB) (%)          | 0.00       | 0.00       |
| SNR < -65 dB (%)                         | 0.023663   | 0.047496   |

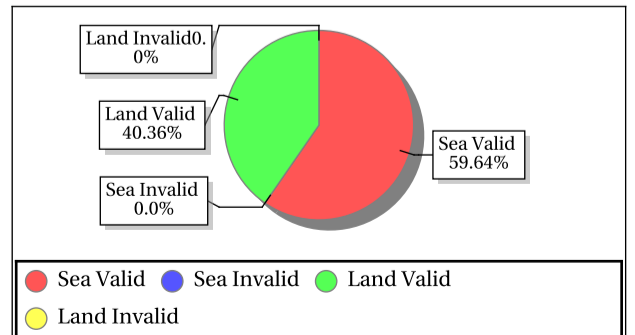
\*DP Format Document

## Sigma-0 Quality Flag Statistics for Inner/Outer Footprints

### Inner Beam (HH)



### Outer Beam (VV)



## Invariant Site Sigma-0 Statistics for Ascending/Descending, Fore/Aft in HH/VV beams

| Site Name | Center Lat | Center Lon | Beam  | Node | ScanDir | Sigma0 Min | Sigma0 Max | Sigma0 Mean | Sigma0 Std | BT Min | BT Max | BT Mean | BT Std |
|-----------|------------|------------|-------|------|---------|------------|------------|-------------|------------|--------|--------|---------|--------|
| ROK       | 23.00      | 73.60      | Inner | DSC  | Aft     | -11.87     | -9.05      | -10.56      | 0.67       | 265.50 | 317.74 | 295.58  | 13.77  |
| ROK       | 23.00      | 73.60      | Inner | DSC  | Fore    | -11.70     | -7.88      | -10.02      | 0.89       | 257.50 | 332.15 | 296.85  | 16.05  |
| ROK       | 23.00      | 73.60      | Outer | DSC  | Aft     | -13.16     | -10.48     | -11.77      | 0.57       | 264.07 | 316.35 | 288.98  | 13.73  |
| ROK       | 23.00      | 73.60      | Outer | DSC  | Fore    | -12.71     | -10.53     | -11.75      | 0.58       | 257.19 | 342.97 | 294.42  | 19.89  |



## Overall statistics for the Static Parameters (Footprint-wise)

| Inner Beam (HH) |         |        |      |              |          |        |      |              |          |       |       |              |           |       |       |              |
|-----------------|---------|--------|------|--------------|----------|--------|------|--------------|----------|-------|-------|--------------|-----------|-------|-------|--------------|
|                 | Sea Aft |        |      |              | Sea Fore |        |      |              | Land Aft |       |       |              | Land fore |       |       |              |
|                 | Min     | Max    | Mean | Bad Occ. (%) | Min      | Max    | Mean | Bad Occ. (%) | Min      | Max   | Mean  | Bad Occ. (%) | Min       | Max   | Mean  | Bad Occ. (%) |
| <b>Kp</b>       | 0.12    | 279.06 | 0.28 | 2.370        | 0.12     | 236.37 | 0.28 | 2.229        | 0.12     | 0.33  | 0.12  | 0.000        | 0.12      | 2.61  | 0.12  | 0.002        |
| <b>Kpa</b>      | 0.01    | 0.02   | 0.01 | 0.000        | 0.01     | 0.02   | 0.01 | 0.000        | 0.01     | 0.01  | 0.01  | 0.000        | 0.01      | 0.01  | 0.01  | 0.000        |
| <b>Kpb</b>      | 0.02    | 0.02   | 0.02 | 0.000        | 0.02     | 0.02   | 0.02 | 0.000        | 0.02     | 0.02  | 0.02  | 0.000        | 0.02      | 0.02  | 0.02  | 0.000        |
| <b>Kpc</b>      | 0.01    | 0.01   | 0.01 | 0.000        | 0.01     | 0.01   | 0.01 | 0.000        | 0.01     | 0.01  | 0.01  | 0.000        | 0.01      | 0.01  | 0.01  | 0.000        |
| <b>SNR</b>      | -34.59  | 24.83  | 6.58 | 0.010        | -33.87   | 25.77  | 6.94 | 0.009        | -3.74    | 29.47 | 17.59 | 7.656        | -14.15    | 29.12 | 18.58 | 14.241       |

| Outer Beam (VV) |         |        |      |              |          |        |      |              |          |       |       |              |           |       |       |              |
|-----------------|---------|--------|------|--------------|----------|--------|------|--------------|----------|-------|-------|--------------|-----------|-------|-------|--------------|
|                 | Sea Aft |        |      |              | Sea Fore |        |      |              | Land Aft |       |       |              | Land fore |       |       |              |
|                 | Min     | Max    | Mean | Bad Occ. (%) | Min      | Max    | Mean | Bad Occ. (%) | Min      | Max   | Mean  | Bad Occ. (%) | Min       | Max   | Mean  | Bad Occ. (%) |
| <b>Kp</b>       | 0.09    | 211.22 | 0.24 | 2.184        | 0.09     | 232.96 | 0.24 | 2.040        | 0.09     | 0.63  | 0.09  | 0.000        | 0.09      | 16.86 | 0.09  | 0.032        |
| <b>Kpa</b>      | 0.01    | 0.01   | 0.01 | 0.000        | 0.01     | 0.01   | 0.01 | 0.000        | 0.01     | 0.01  | 0.01  | 0.000        | 0.01      | 0.01  | 0.01  | 0.000        |
| <b>Kpb</b>      | 0.01    | 0.01   | 0.01 | 0.000        | 0.01     | 0.01   | 0.01 | 0.000        | 0.01     | 0.01  | 0.01  | 0.000        | 0.01      | 0.01  | 0.01  | 0.000        |
| <b>Kpc</b>      | 0.01    | 0.01   | 0.01 | 0.000        | 0.01     | 0.01   | 0.01 | 0.000        | 0.01     | 0.01  | 0.01  | 0.000        | 0.01      | 0.01  | 0.01  | 0.000        |
| <b>SNR</b>      | -34.55  | 17.00  | 4.23 | 0.000        | -34.98   | 17.37  | 4.28 | 0.000        | -8.83    | 22.57 | 11.75 | 0.007        | -23.56    | 22.49 | 12.60 | 0.015        |

| Parameter Specifications |      |      |      |      |        |
|--------------------------|------|------|------|------|--------|
| Parameter                | Kp   | Kpa  | Kpb  | Kpc  | SNR    |
| Min                      | 0.00 | 0.00 | 0.00 | 0.00 | -65.00 |
| Max                      | 1.00 | 1.00 | 1.00 | 1.00 | 22.00  |

- Normal
- Deviations
- Alarming
- High Errors

## Overall statistics for static parameter (Footprint-wise)

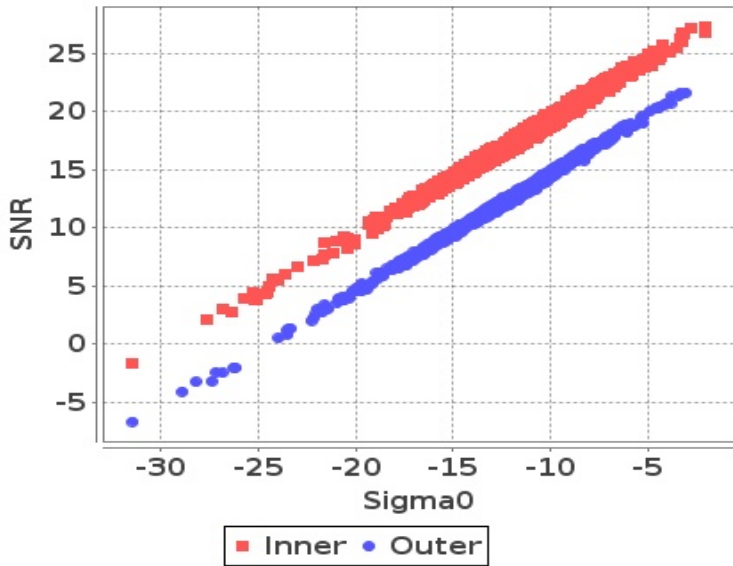
|                              | Inner Beam (HH) |         |         |              | Outer Beam (VV) |         |         |              | Parameter Specifications   |  |         |
|------------------------------|-----------------|---------|---------|--------------|-----------------|---------|---------|--------------|--|--|---------|
|                              | Min             | Max     | Mean    | Bad Occ. (%) | Min             | Max     | Mean    | Bad Occ. (%) | Parameter  | Min  | Max     |
| <b>Incidence Angle (deg)</b> | 48.76           | 49.33   | 49.01   | 0.000        | 57.52           | 58.22   | 57.91   | 0.000        | Inci.(Inner)   | 47.10  | 49.90   |
| <b>Azimuth Diff. (deg)</b>   | 0.0026          | 266.76  | 1.28    | 2.557        | 0.0000          | 296.80  | 1.27    | 3.741        | Inci.(Outer)   | 57.30  | 58.90   |
| <b>Range(Km)</b>             | 1039.95         | 1081.41 | 1057.34 | 0.000        | 1219.18         | 1270.49 | 1241.94 | 0.000        | Azimuth Diff.  | 0.60   | 2.00    |
| <b>X Factor(dbm)</b>         | -91.31          | -89.68  | -90.20  | 0.000        | -92.70          | -91.72  | -92.03  | 0.000        | Range(Inner)   | 1025.00  | 1095.70 |
| <b>Across Distance (Km)</b>  | 15.90           | 16.50   | 16.11   | 0.000        | 21.01           | 22.62   | 21.22   | 2.000        | Range(Outer)   | 1210.00  | 1280.00 |
| <b>Along Distance (Km)</b>   | 18.50           | 1328.89 | 22.28   | 2.000        | 18.05           | 1737.78 | 22.99   | 2.000        | X-Factor   | -100.00  | -80.00  |
|                              |                 |         |         |              |                 |         |         |              | Ac.Distance(Inner)   | 15.00  | 20.00   |
|                              |                 |         |         |              |                 |         |         |              | Ac.Distance(Outer)   | 15.00  | 22.00   |
|                              |                 |         |         |              |                 |         |         |              | Al.Distance(Inner)   | 15.00  | 30.00   |
|                              |                 |         |         |              |                 |         |         |              | Al.Distance(Outer)   | 10.00  | 30.00   |
|                              |                 |         |         |              |                 |         |         |              | <span style="display: inline-block; width: 15px; height: 15px; background-color: green; border: 1px solid black; margin-right: 5px;"></span> Normal      | <span style="display: inline-block; width: 15px; height: 15px; background-color: orange; border: 1px solid black; margin-right: 5px;"></span> Alarming |         |
|                              |                 |         |         |              |                 |         |         |              | <span style="display: inline-block; width: 15px; height: 15px; background-color: yellow; border: 1px solid black; margin-right: 5px;"></span> Deviations | <span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black; margin-right: 5px;"></span> High Errors |         |



## Sigma0 Behaviour (Sigma0 Vs SNR)

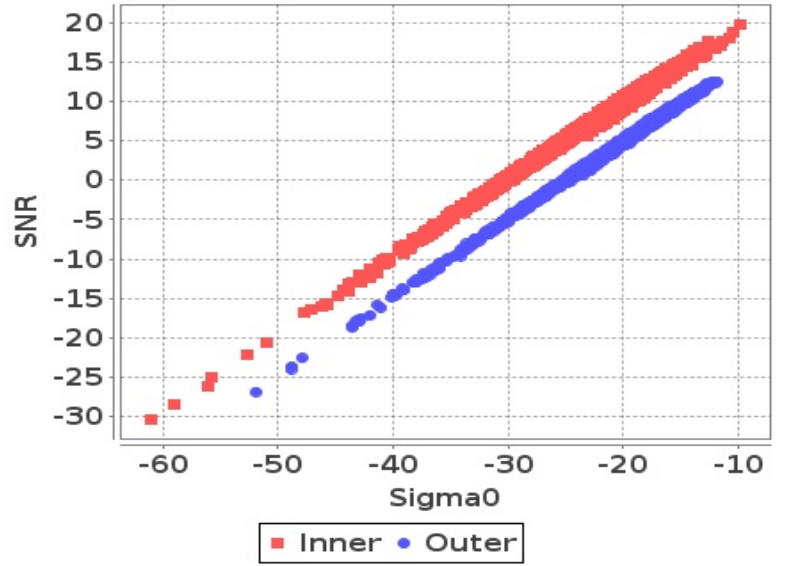
Footprint-Land

Sigma0 Vs SNR (Land)



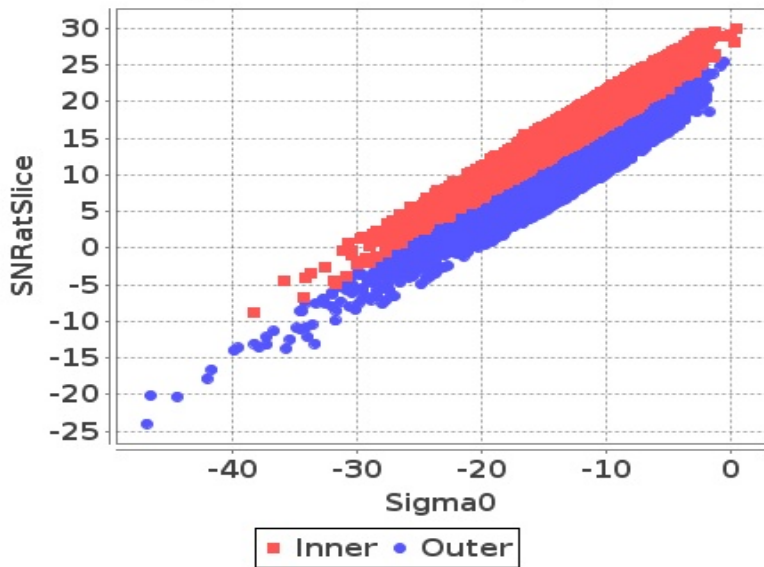
Footprint-Sea

Sigma0 Vs SNR (Sea)



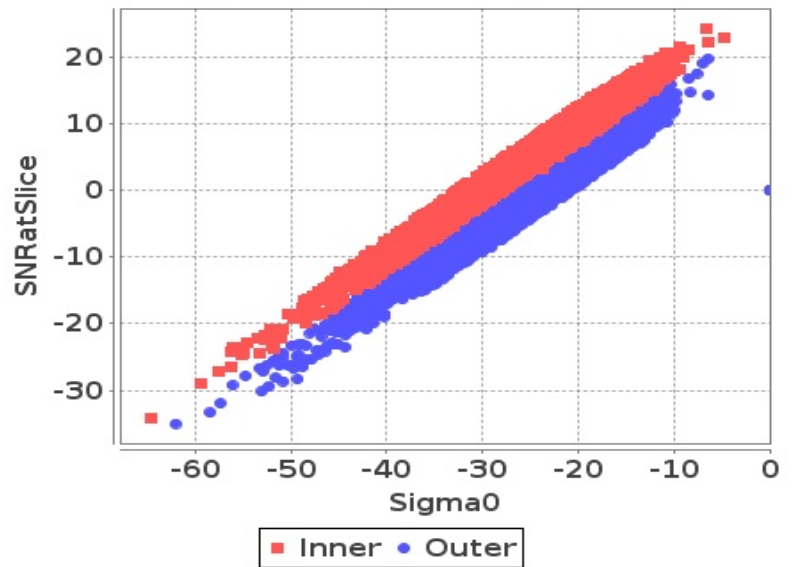
Slice-Land

Sigma0 Vs SNRatSlice (Land)



Slice-Sea

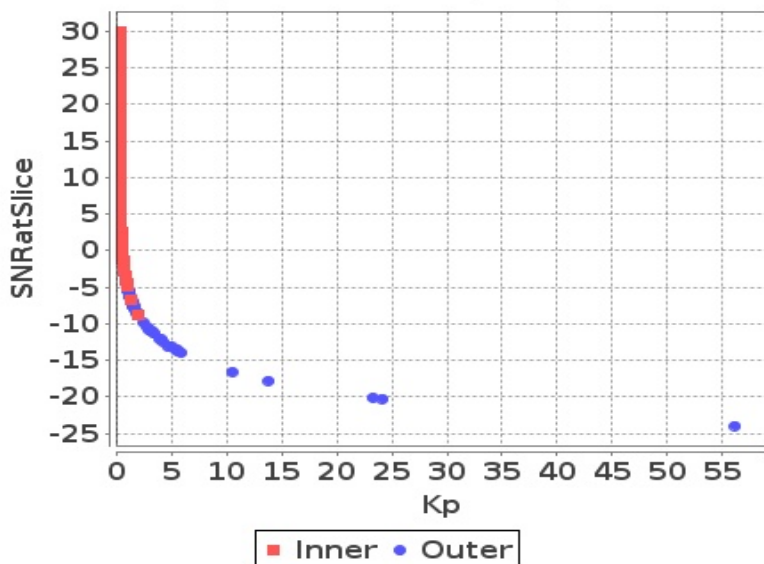
Sigma0 Vs SNRatSlice (Sea)



## Sigma0 Behaviour (Kp Vs SNR)

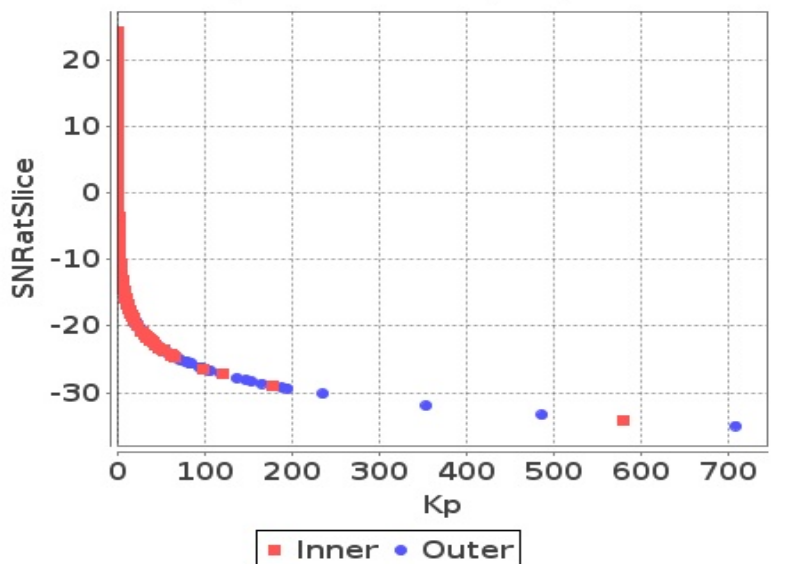
Slice

Kp Vs SNRatSlice (Land)



Slice

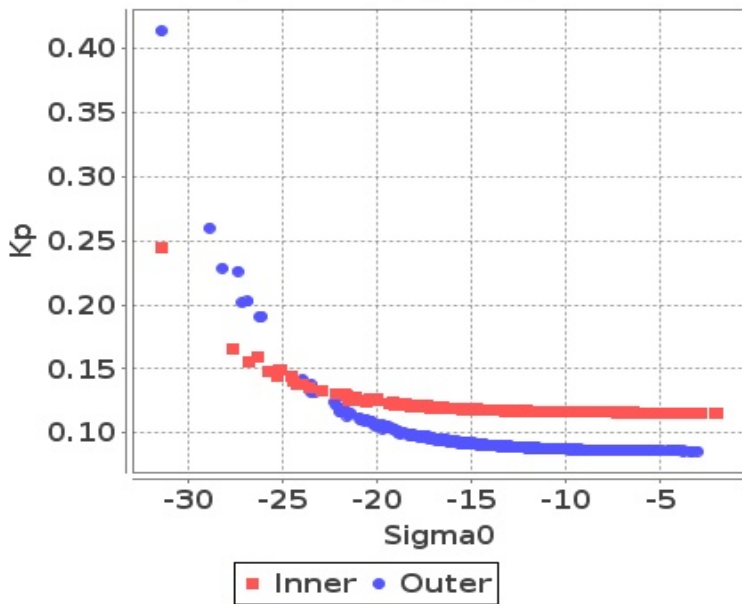
Kp Vs SNRatSlice (Sea)



# Sigma0 Behaviour(Sigma0 Vs Kp)

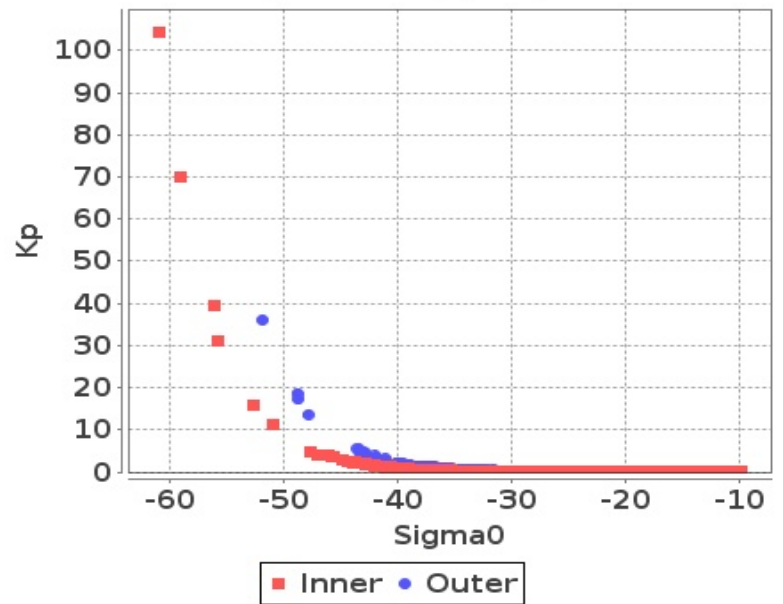
## Footprint-Land

### Sigma0 Vs Kp (Land)



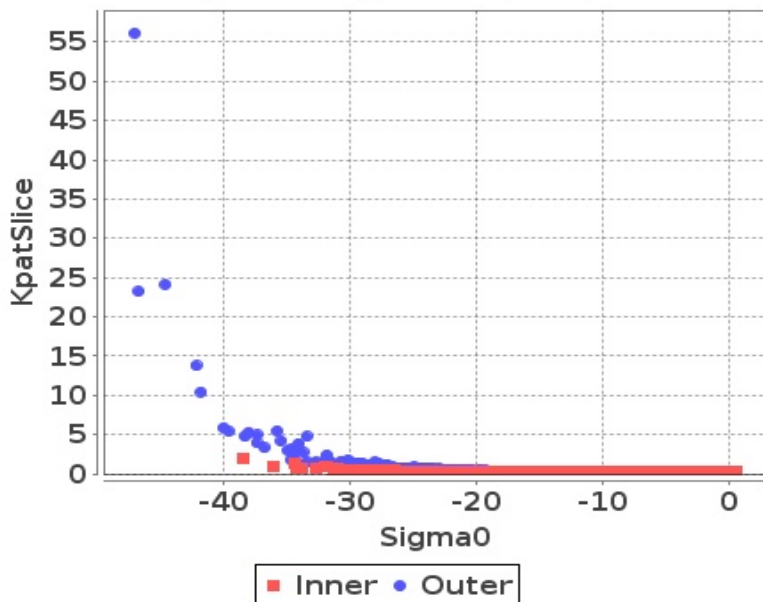
## Footprint-Sea

### Sigma0 Vs Kp (Sea)



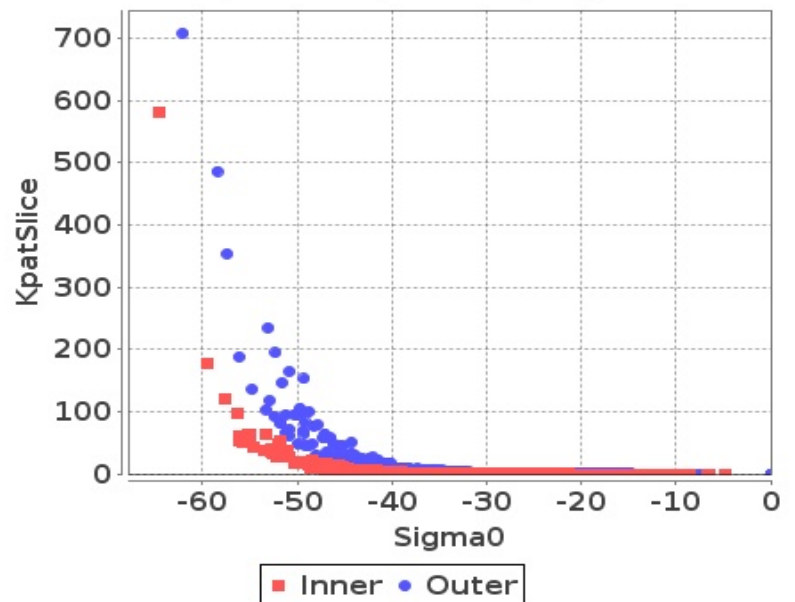
## Slice-Land

### Sigma0 Vs KpatSlice (Land)



## Slice-Sea

### Sigma0 Vs KpatSlice (Sea)



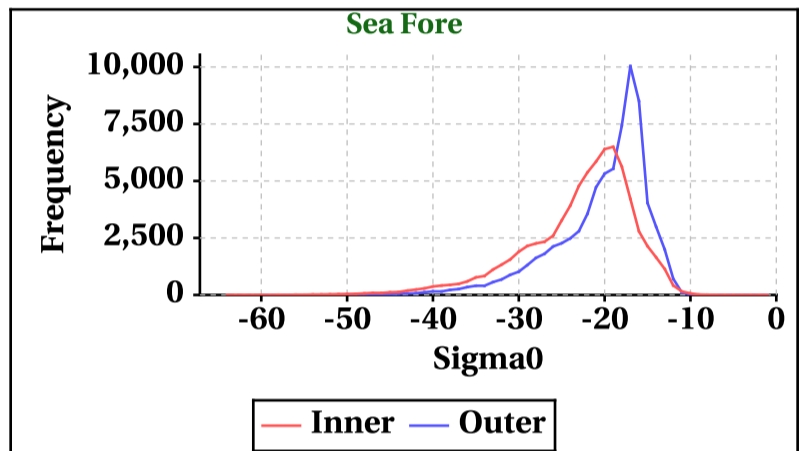
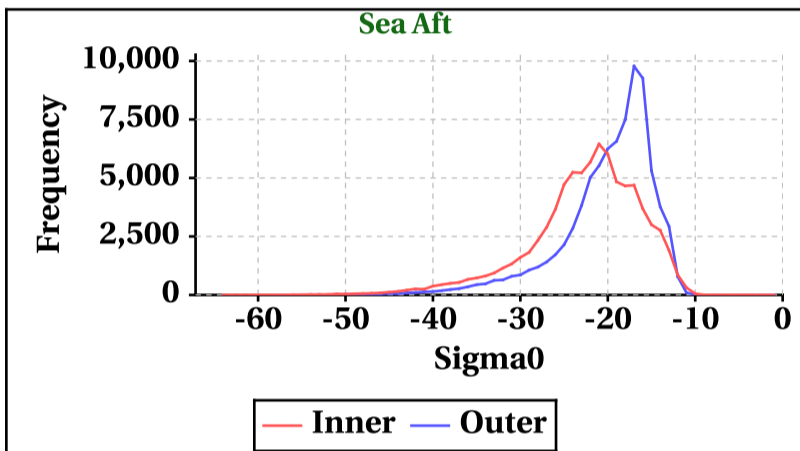
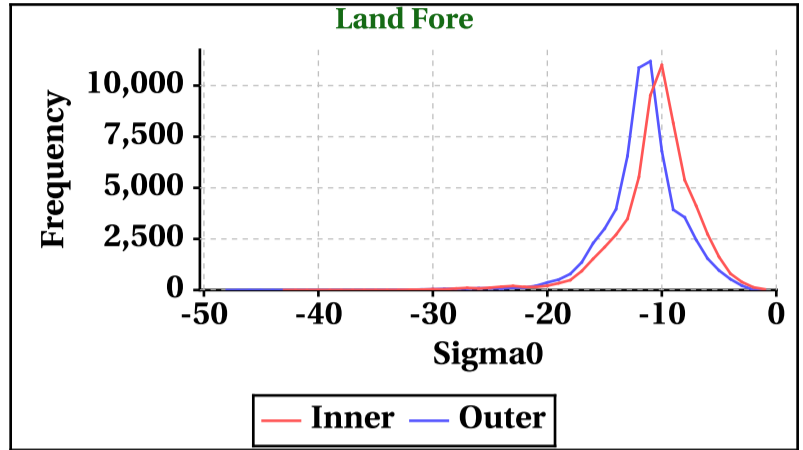
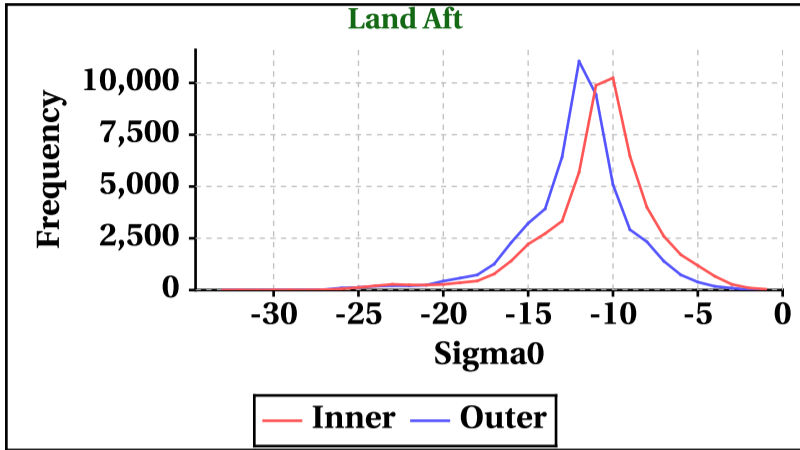


# Dynamic Range (Data Histograms)

## Sigma0(db)

| Inner Beam (HH) |          |           |         |          |
|-----------------|----------|-----------|---------|----------|
|                 | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min             | -33      | -43       | -64     | -64      |
| Max             | 0        | 0         | 0       | 0        |

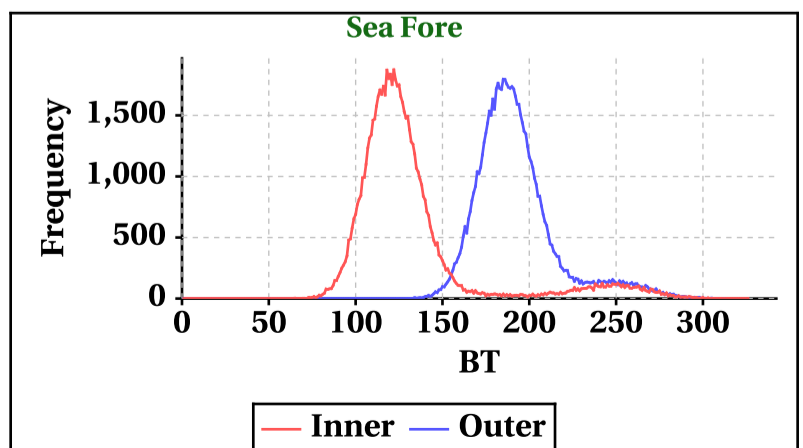
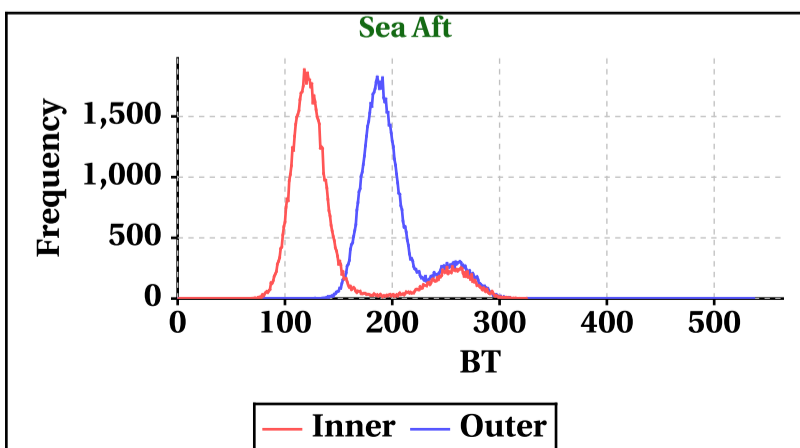
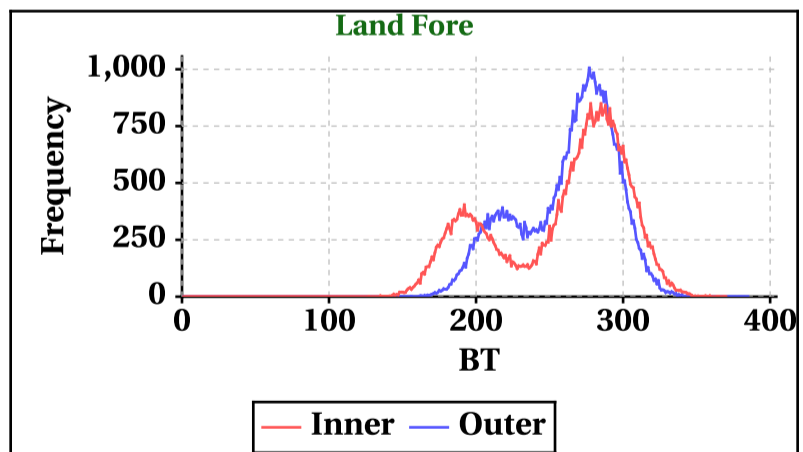
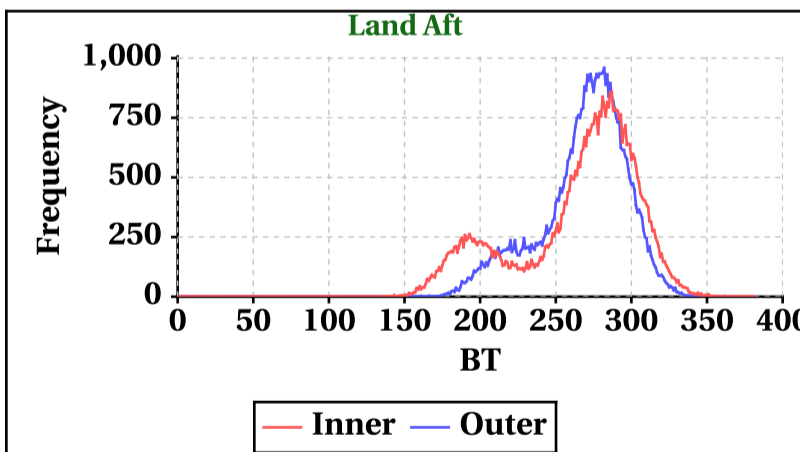
| Outer Beam (VV) |          |           |         |          |
|-----------------|----------|-----------|---------|----------|
|                 | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min             | -33      | -48       | -59     | -60      |
| Max             | 0        | 0         | 0       | 0        |



## Brightness Temperature(K)

| Inner Beam(HH) |          |           |         |          |
|----------------|----------|-----------|---------|----------|
|                | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min            | 0        | 0         | 0       | 0        |
| Max            | 381      | 370       | 325     | 326      |

| Outer Beam(VV) |          |           |         |          |
|----------------|----------|-----------|---------|----------|
|                | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min            | 0        | 0         | 0       | 0        |
| Max            | 364      | 385       | 537     | 313      |

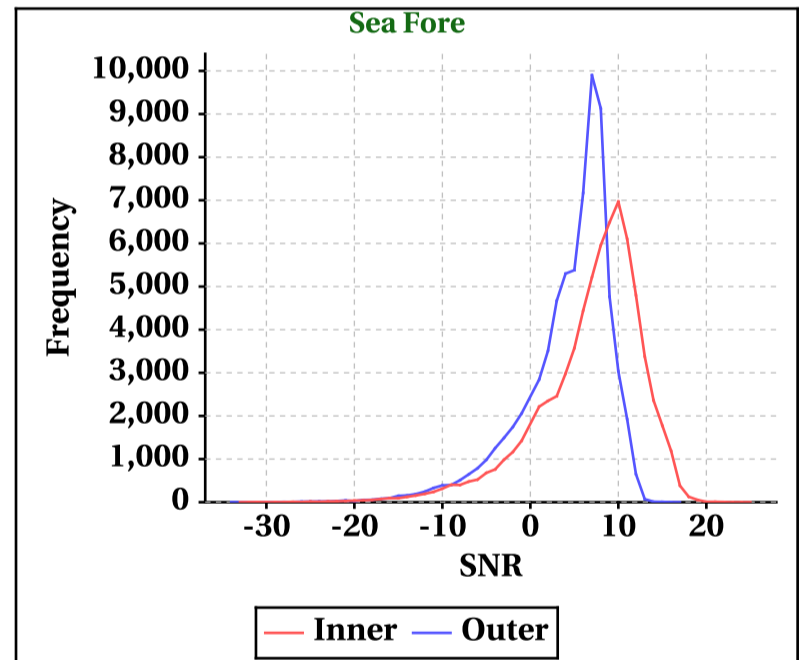
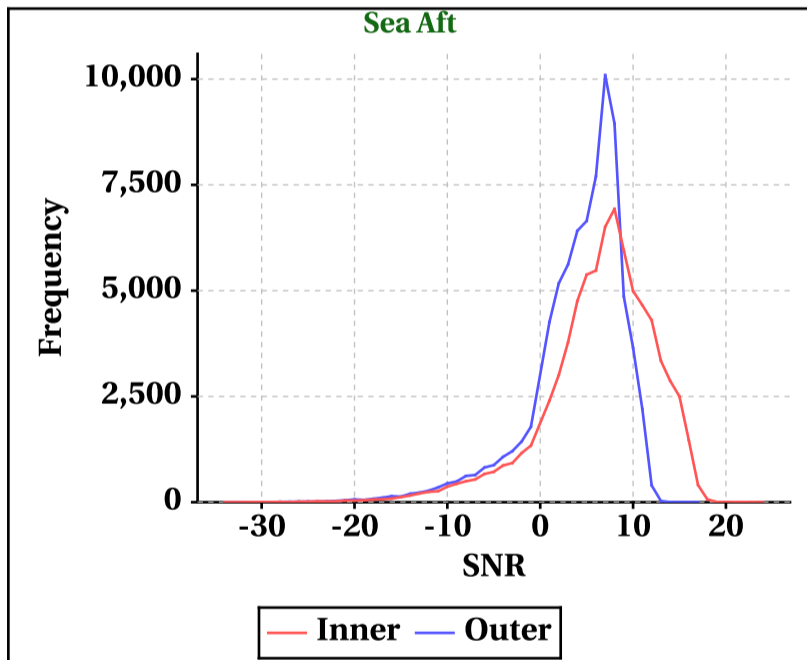
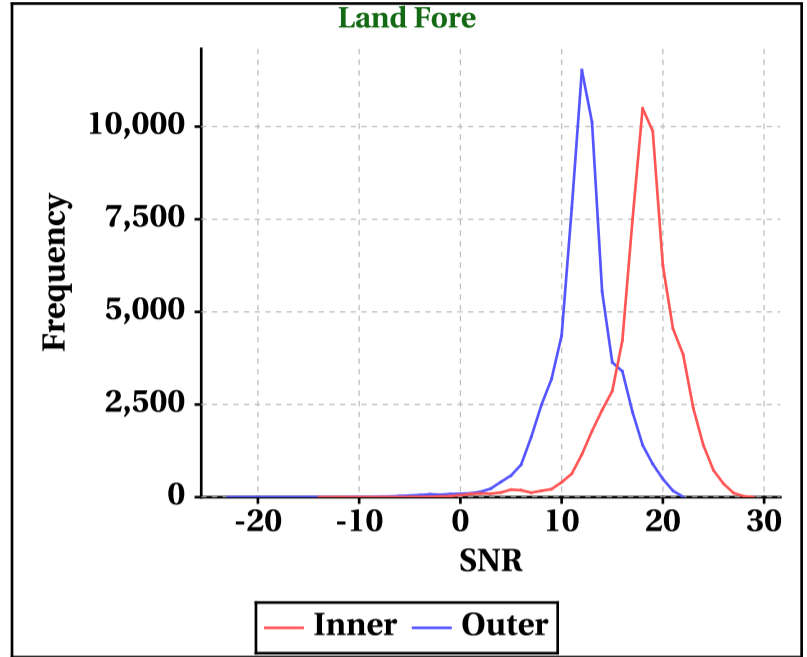
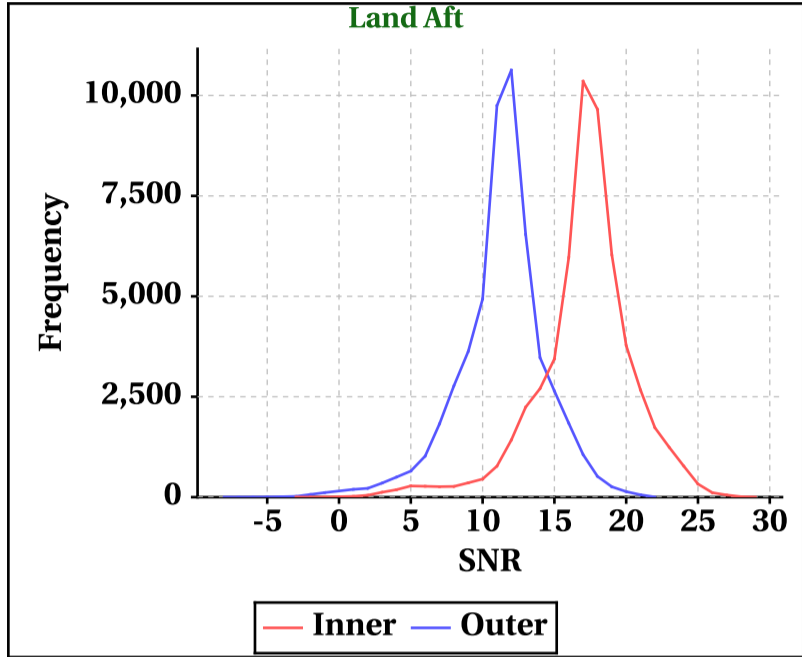


# Dynamic Range (Data Histograms)

## SNR(dBm)

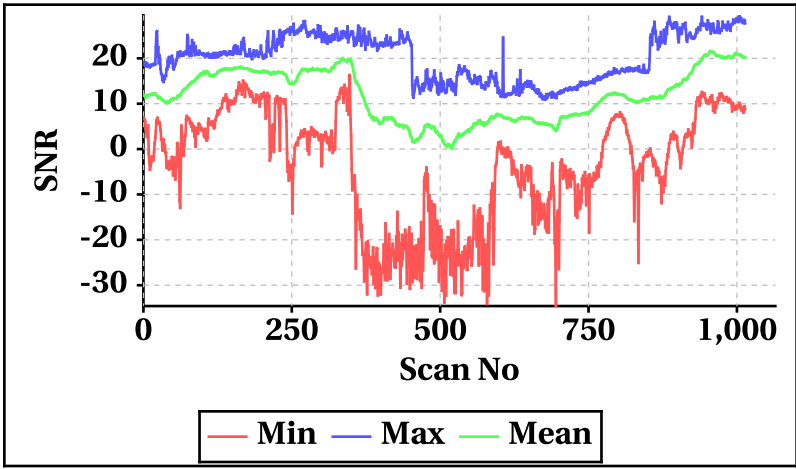
| Inner Beam (HH) |          |           |         |          |
|-----------------|----------|-----------|---------|----------|
|                 | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min             | -3       | -14       | -34     | -33      |
| Max             | 29       | 29        | 24      | 25       |

| Outer Beam (VV) |          |           |         |          |
|-----------------|----------|-----------|---------|----------|
|                 | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min             | -8       | -23       | -34     | -34      |
| Max             | 22       | 22        | 17      | 17       |

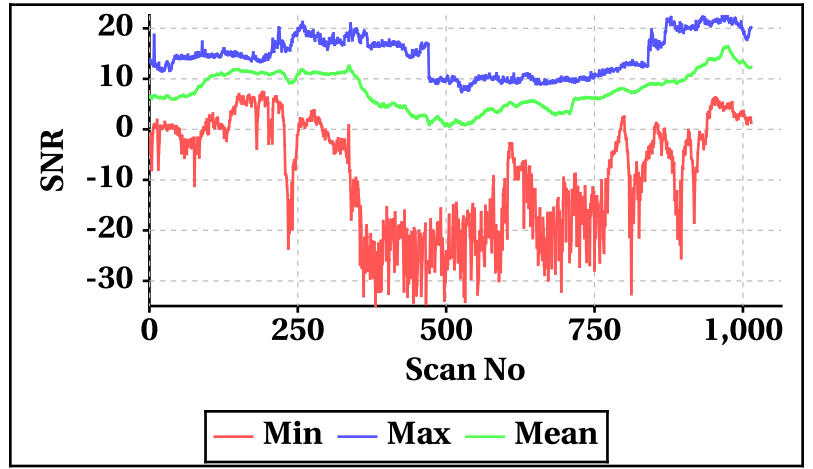


## Orbit-wise behaviour of SNR

Inner Beam (HH)

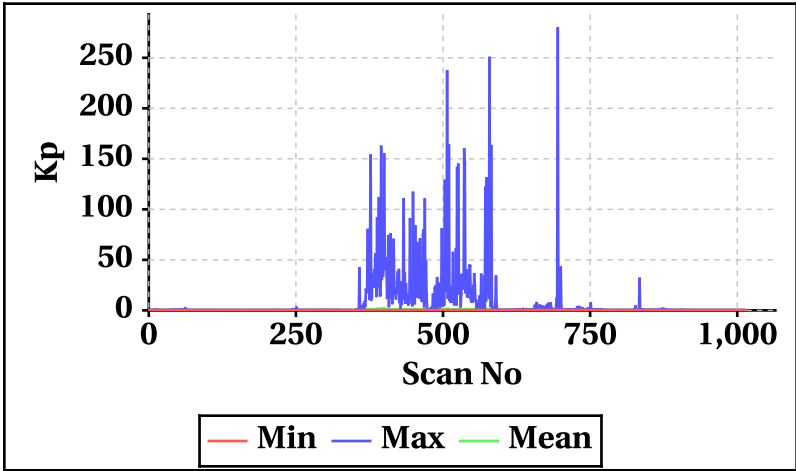


Outer Beam(VV)

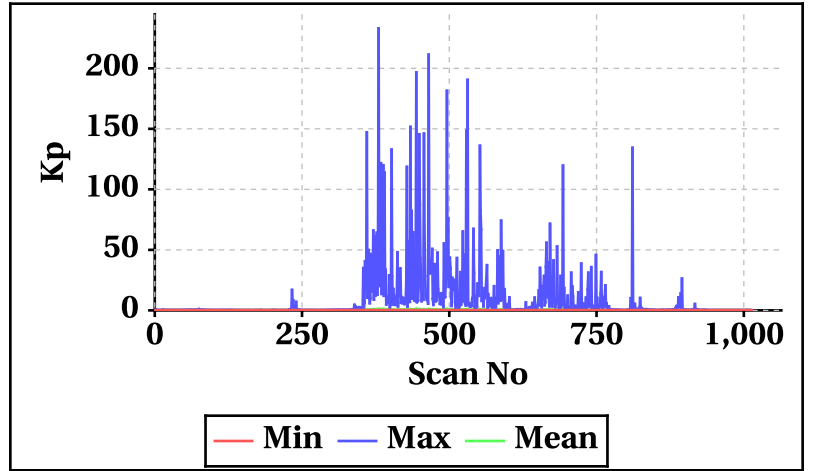


## Orbit-wise behaviour of Kp,Kpa,Kpb,Kpc

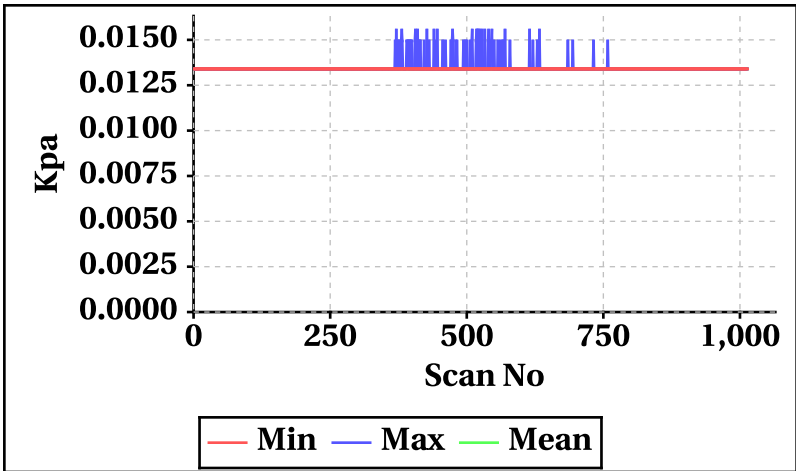
Inner Beam(HH)



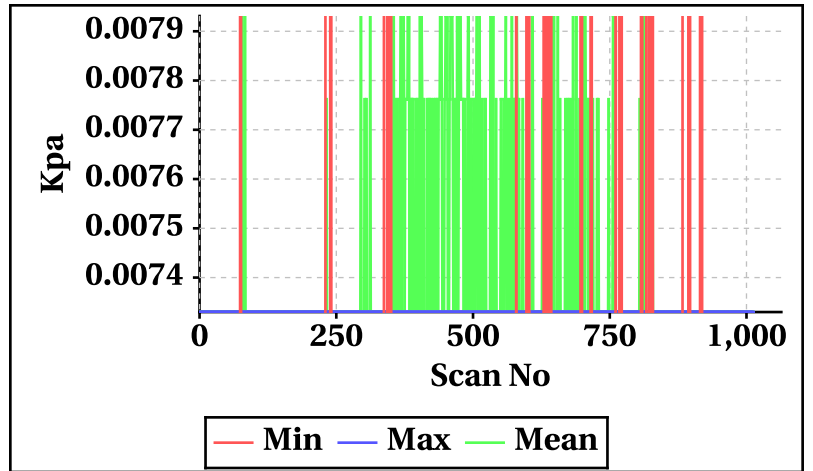
Outer Beam(VV)



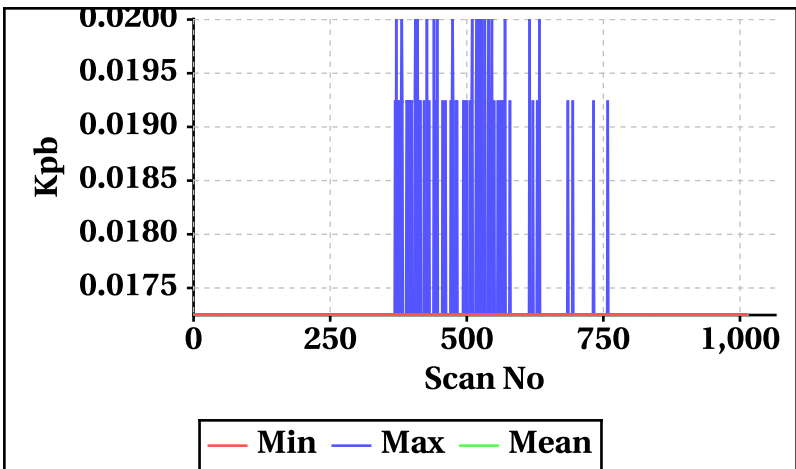
Inner Beam(HH)



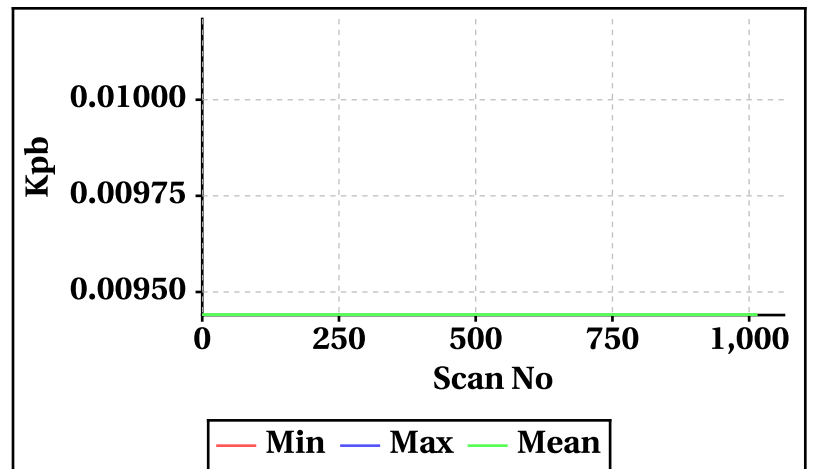
Outer Beam(VV)



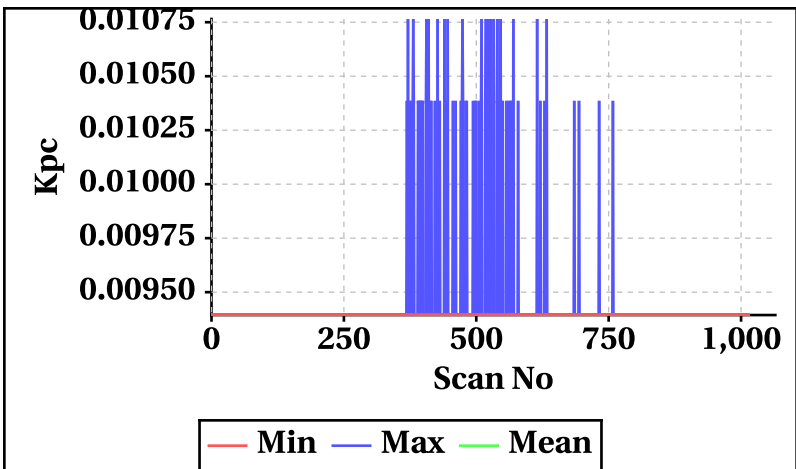
Inner Beam(HH)



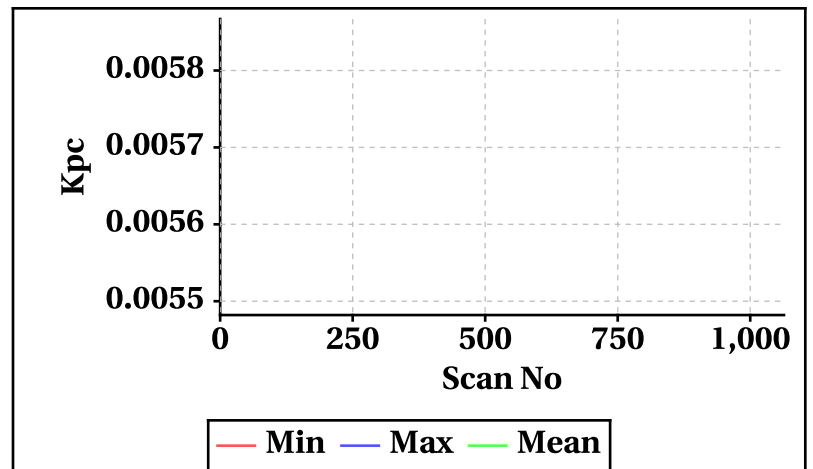
Outer Beam(VV)



Inner Beam(HH)



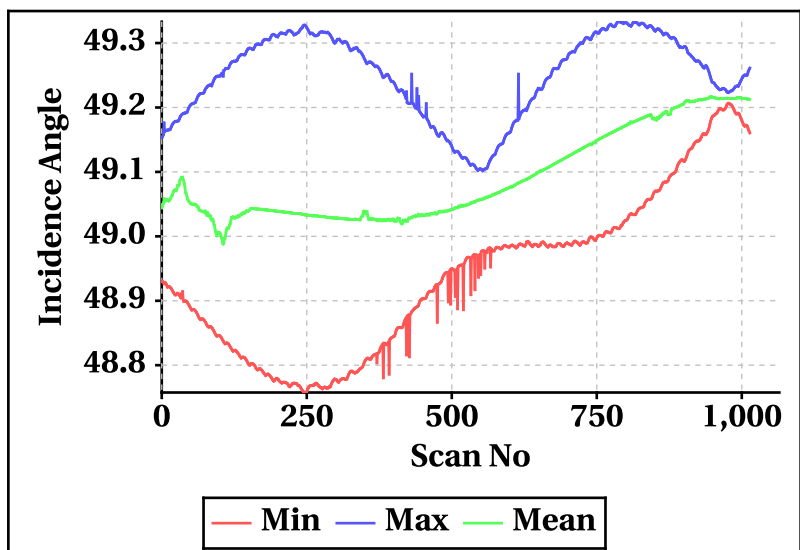
Outer Beam(VV)



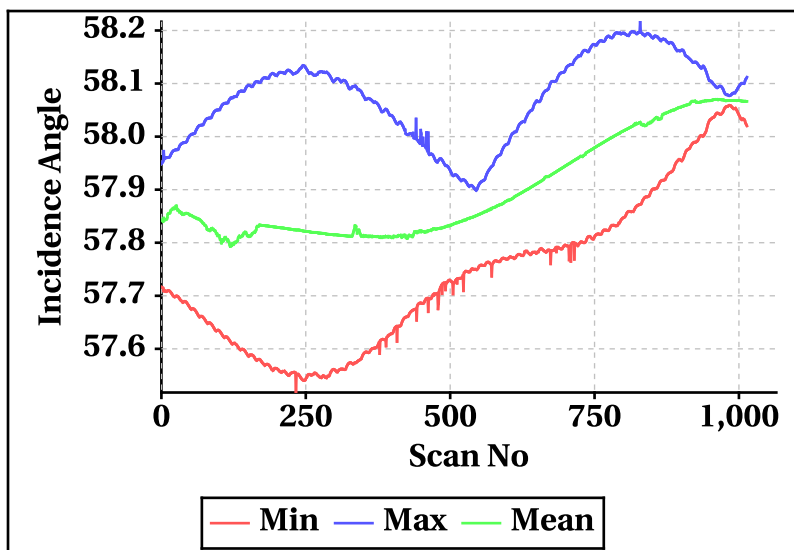


Orbit-wise behaviour of Incidence, Azimuth, Range, X-Factor

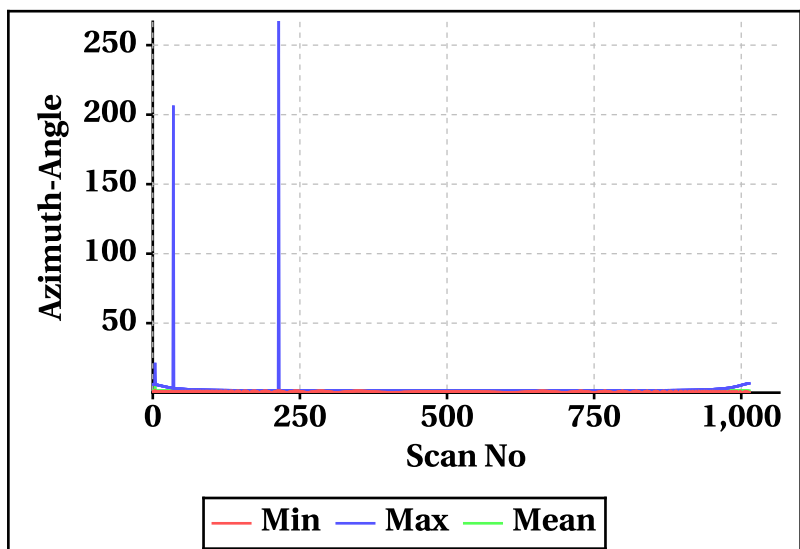
Inner Beam (HH)



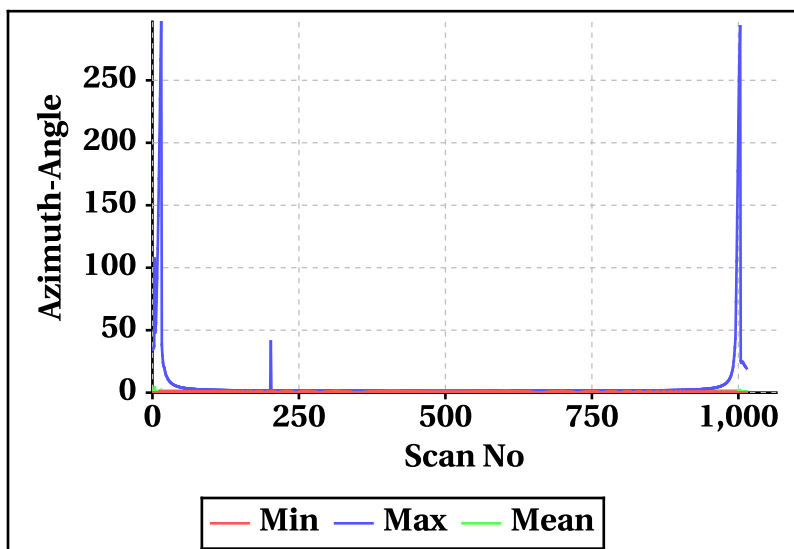
Outer Beam(VV)



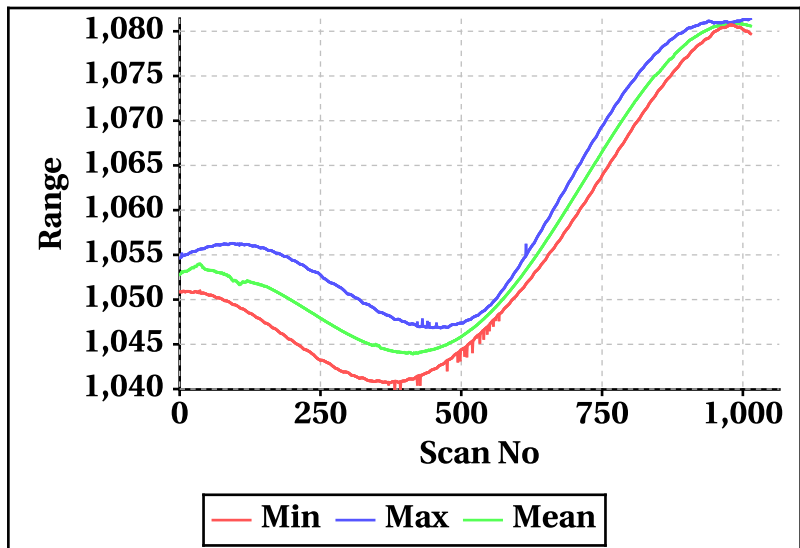
Inner Beam (HH)



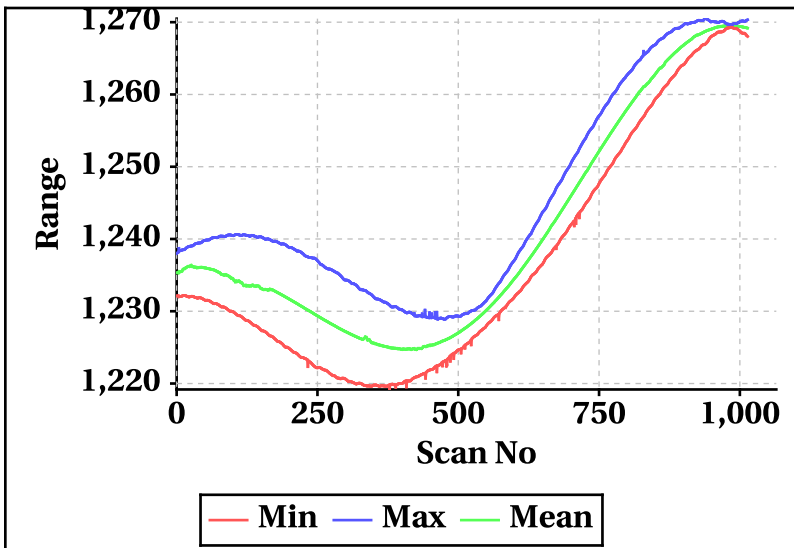
Outer Beam(VV)



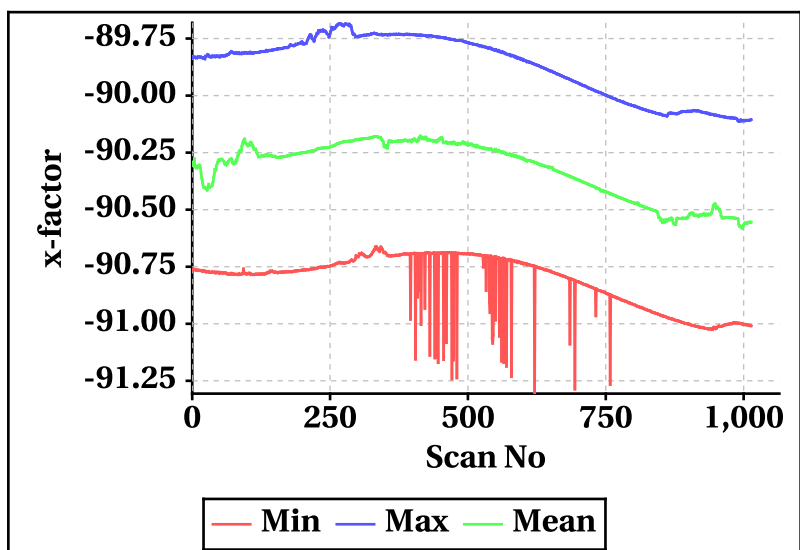
Inner Beam (HH)



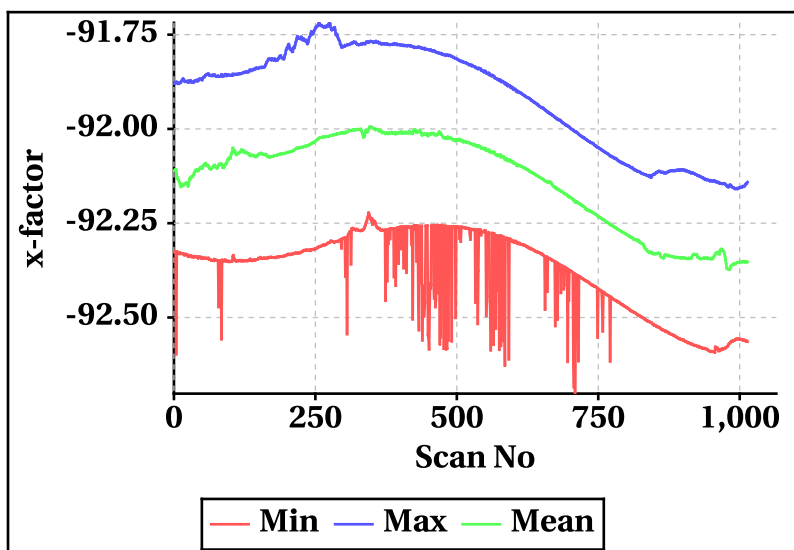
Outer Beam(VV)



Inner Beam (HH)



Outer Beam(VV)

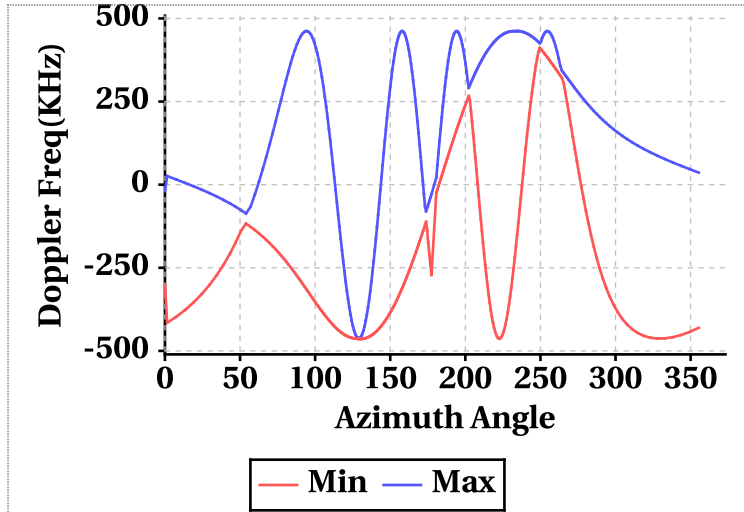


# Doppler Frequency Variation

Doppler Frequency(KHz) variation statistics Over the half Orbit

|     | Inner Beam (HH) | Outer Beam (VV) |
|-----|-----------------|-----------------|
| Min | -464.18         | -519.90         |
| Max | 462.06          | 518.02          |

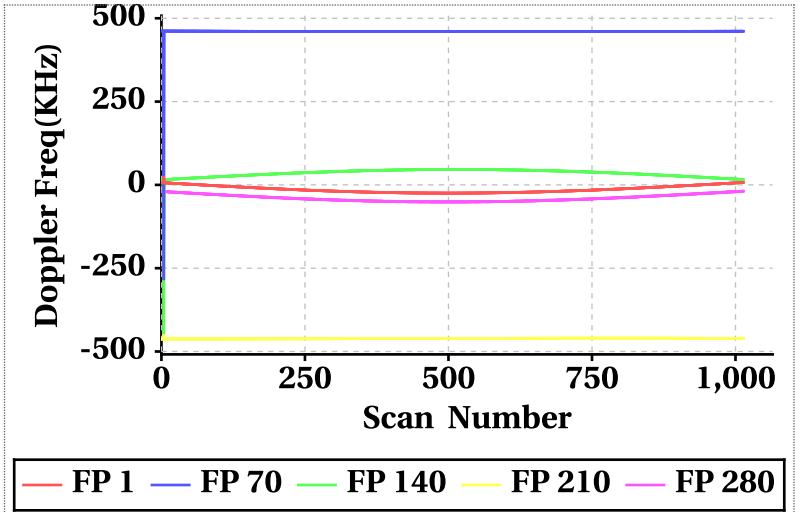
Footprint wise Doppler frequency variation Inner Beam (HH)



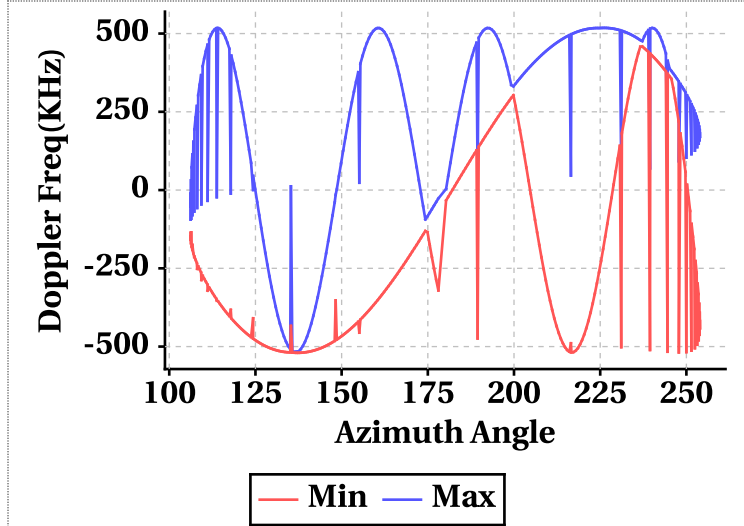
Doppler Frequency(KHz) variation

| Doppler_FP  | Inner Beam (HH) |         |         | Outer Beam (VV) |         |         |
|-------------|-----------------|---------|---------|-----------------|---------|---------|
|             | Min             | Max     | Mean    | Min             | Max     | Mean    |
| Doppler_1   | -24.72          | 21.78   | -13.09  | -33.14          | 3.72    | -20.16  |
| Doppler_70  | -281.68         | 461.62  | 459.84  | -331.84         | 517.36  | 515.12  |
| Doppler_140 | -442.80         | 46.46   | 34.68   | -489.54         | 46.44   | 33.19   |
| Doppler_210 | -462.40         | -438.84 | -460.95 | -518.34         | -497.96 | -516.94 |
| Doppler_280 | -300.74         | -18.86  | -39.76  | -352.62         | -15.28  | -38.57  |

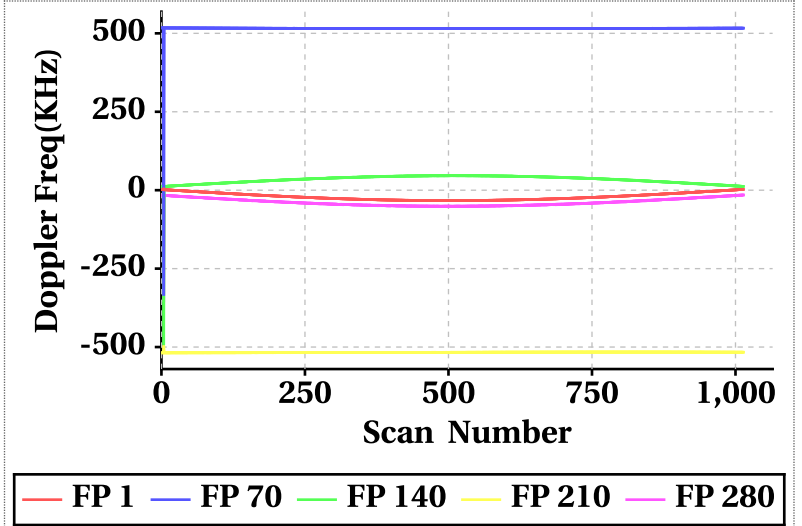
Doppler frequency variation at footprints: 1, 70, 140, 210 & 280 Inner Beam (HH)



Footprint wise Doppler frequency variation Outer Beam (VV)

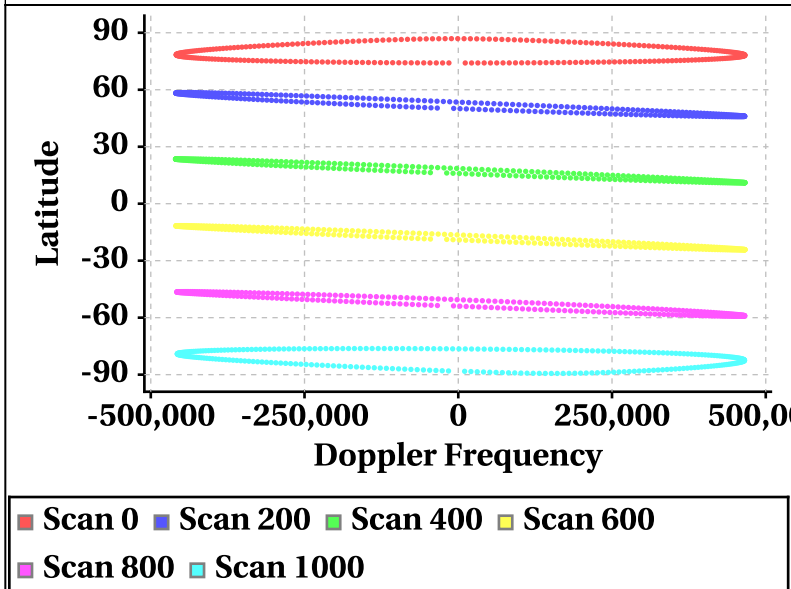


Doppler frequency variation at footprints: 1, 70, 140, 210 & 280 Outer Beam (VV)

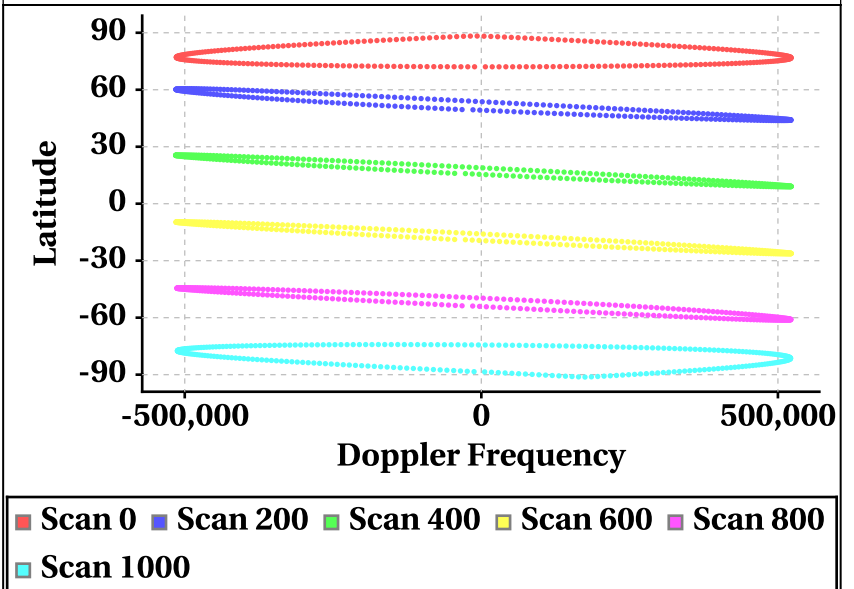


# Latitude Vs Doppler Frequency

Doppler Frequency at Scan Interval of 200 [Inner Beam(HH)]



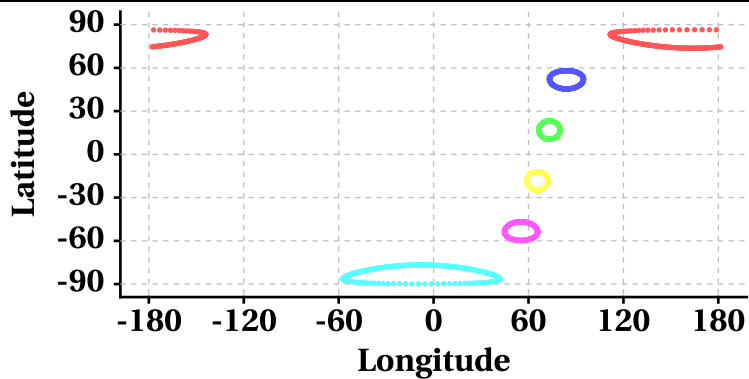
Doppler Frequency at Scan Interval of 200 [Outer Beam(VV)]



# Parameter as a function of Latitude

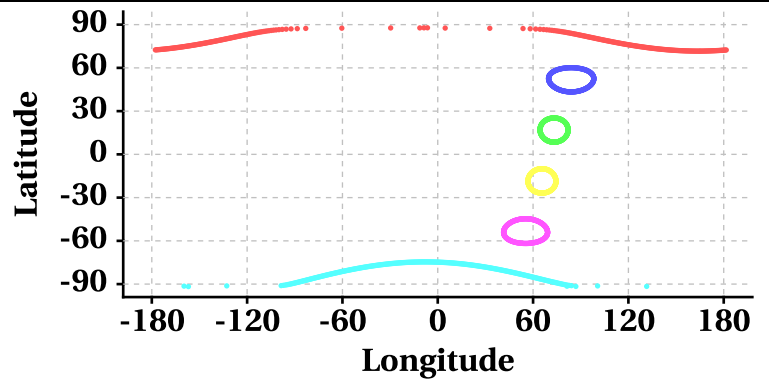
## Latitude Vs Longitude

Scan Trace [Inner Beam(HH)]



Scan 0 Scan 200 Scan 400 Scan 600  
Scan 800 Scan 1000

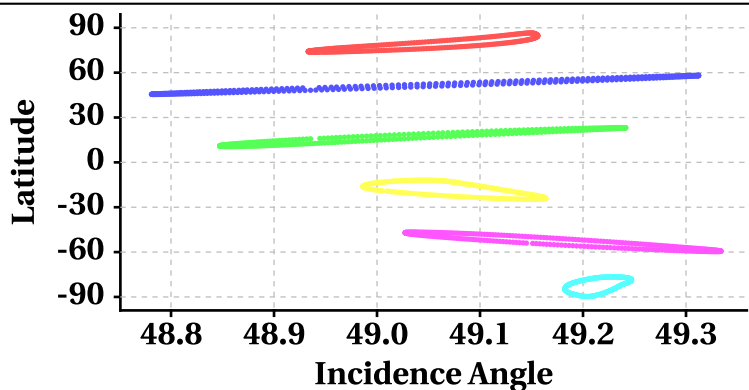
Scan Trace [Outer Beam (VV)]



Scan 0 Scan 200 Scan 400 Scan 600  
Scan 800 Scan 1000

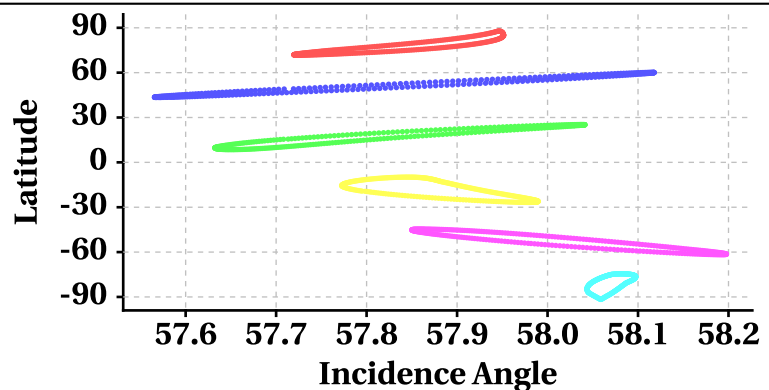
## Latitude Vs Incidence Angle

Incidence Angle at Scan Interval of 200 [Inner Beam(HH)]



Scan 0 Scan 200 Scan 400 Scan 600  
Scan 800 Scan 1000

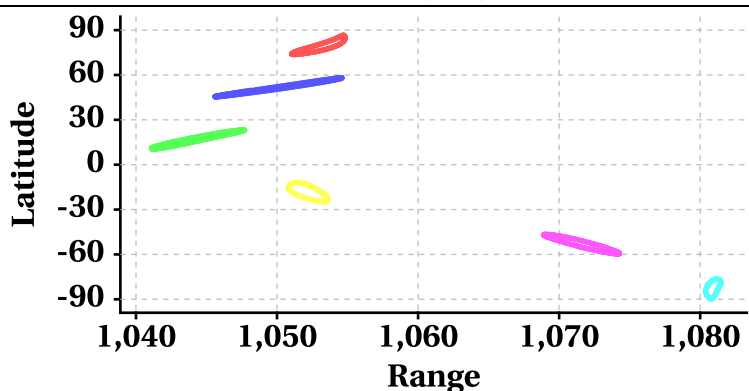
Incidence Angle at Scan Interval of 200 [Outer Beam (VV)]



Scan 0 Scan 200 Scan 400 Scan 600  
Scan 800 Scan 1000

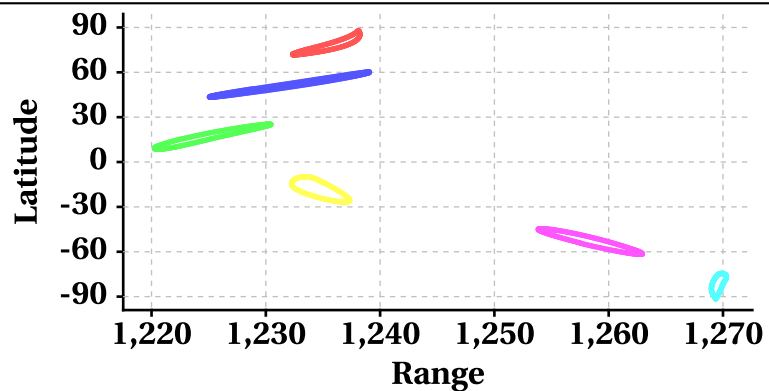
## Latitude Vs Range

Range at Scan Interval of 200 [Inner Beam(HH)]



Scan 0 Scan 200 Scan 400 Scan 600  
Scan 800 Scan 1000

Range at Scan Interval of 200 [Outer Beam(VV)]



Scan 0 Scan 200 Scan 400 Scan 600  
Scan 800 Scan 1000



# Variation in Orbit and Attitude Parameters

