

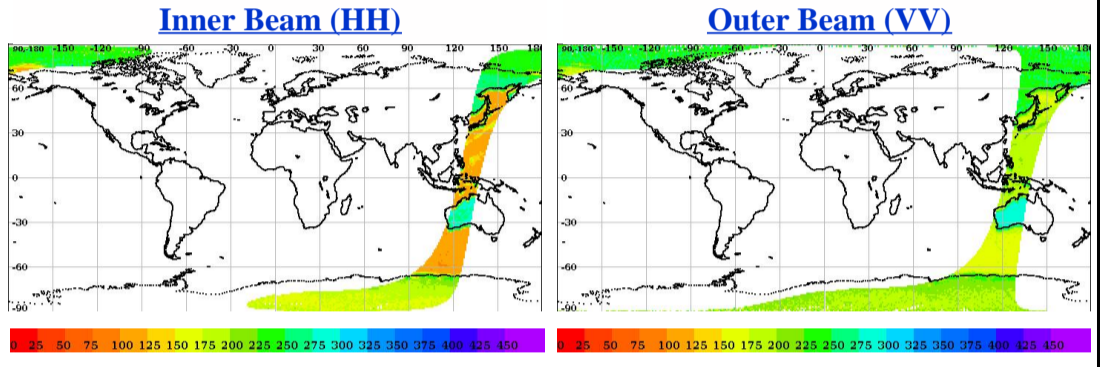
# SCATSAT-1 Scatterometer Level-1B Data Quality Evaluation Report

## Table of Contents

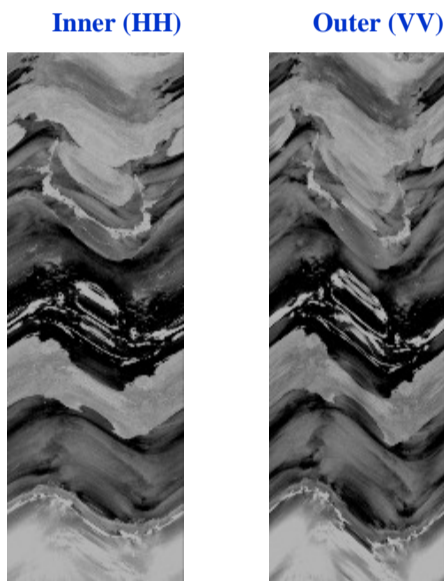
- Half-Orbit Coverage using BT & Sigma-0
- Invariant Site Sigma-0 Statistics (if Available)
- Half-Orbit Data Statistics
- Half Orbit wise - Dynamic Parameter (Sigma-0, Kp, SNR) Behaviour
- Dynamic Range (Data Histogram)
- Half Orbit Wise Behaviour - Static Parameters
- Doppler Variation (Across/Along 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>           | 16657        | <b>Total Scans</b>            | 1017 |
| <b>Sensor Name</b>           | Scatterometer | <b>End Orbit</b>             | 16658        | <b>No of Inner FootPrints</b> | 281  |
| <b>Processor Version</b>     | v1.1.3        | <b>Rev. Number</b>           | 16657_16658  | <b>No Of Outer FootPrints</b> | 282  |
| <b>Half Orbit Direction</b>  | NS            | <b>Data Production Date</b>  | 19-11-2019   | <b>No. Of Inner Slices</b>    | 9    |
| <b>Equator Crossing Date</b> | 18-11-2019    | <b>Equator Crossing Time</b> | 23:47:28.000 | <b>No Of Outer Slices</b>     | 15   |

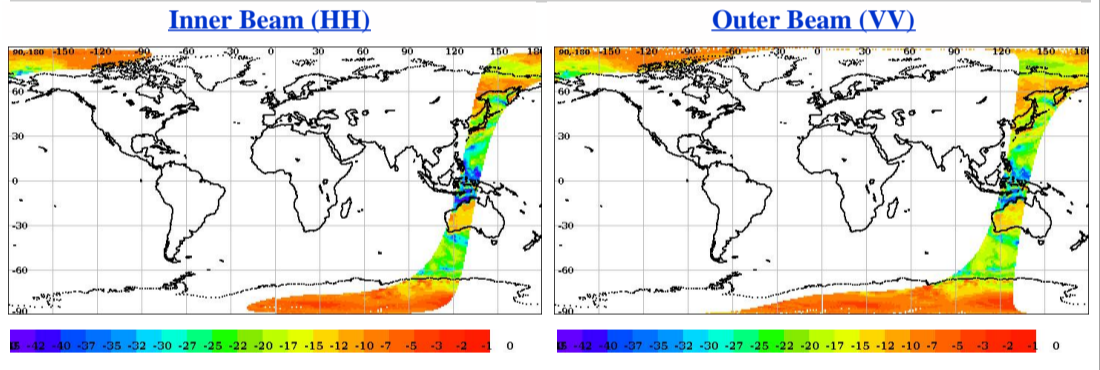
## Brightness Temperature(k) Footprint trace



## Image Snapshot for Inner & Outer Beam



## Sigma0(dB) Footprint trace



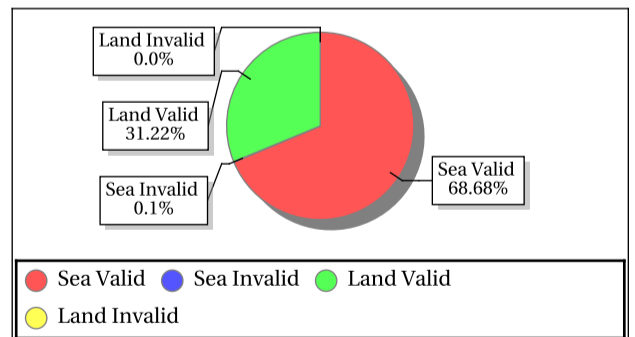
## Invalid and Poor Sigma-0 Quality Flag Statistics for Inner/Outer Slices\*

| <b>Sigma-0 Flags</b>                            | <b>Inner Beam</b> | <b>Outer Beam</b> |
|---|-------------------|-------------------|
| <b>Invalid Sigma0(%)</b>                        | 0.10              | 0.10              |
| <b>Data Not Available From Payload (%)</b>      | 100.0             | 100.0             |
| <b>Slice not within sample array limits (%)</b> | 0.00              | 0.00              |
| <b>C(S+N) - C(N) &lt; 0.1 (%)</b>               | 0.00              | 0.00              |
| <b>Poor Sigma0(%)</b>                           | 22.23             | 13.34             |
| <b>Noise samples for blending Saturated</b>     | 0.0               | 0.0               |
| <b>Count samp. for interpol. saturated (%)</b>  | 0.00              | 0.00              |
| <b>Sigma0&lt;lower bound (-96dB) (%)</b>        | 0.0               | 0.0               |
| <b>Sigma0&gt;upper bound (0 dB) (%)</b>         | 0.00              | 0.00              |
| <b>SNR &lt;-65 dB (%)</b>                       | 0.047749          | 0.09529           |

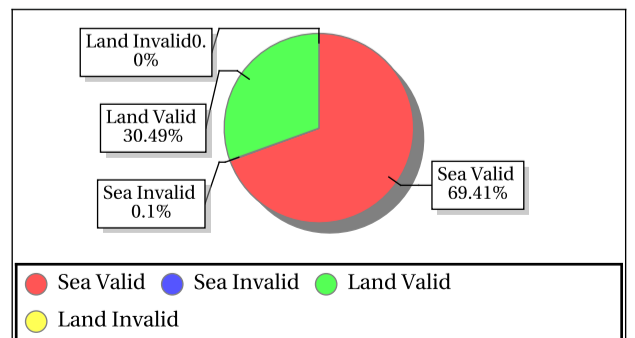
\*DP Format Document

## 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 |
|-----------|------------|------------|-------|------|---------|------------|------------|-------------|------------|--------|--------|---------|--------|
| Australia | -23.00     | 118.00     | Inner | DSC  | Aft     | -11.50     | -7.61      | -9.11       | 0.76       | 247.56 | 324.05 | 284.84  | 16.69  |
| Australia | -23.00     | 118.00     | Inner | DSC  | Fore    | -11.15     | -7.41      | -8.98       | 0.83       | 235.74 | 320.29 | 283.16  | 17.22  |
| ANT_1     | -75.00     | 121.00     | Outer | DSC  | Aft     | -9.08      | -6.45      | -7.93       | 0.79       | 177.61 | 222.96 | 204.33  | 12.08  |
| ANT_1     | -75.00     | 121.00     | Outer | DSC  | Fore    | -9.39      | -7.06      | -8.33       | 0.68       | 183.92 | 232.86 | 204.20  | 13.74  |
| Australia | -23.00     | 118.00     | Outer | DSC  | Aft     | -12.33     | -8.77      | -10.70      | 0.81       | 238.12 | 320.47 | 283.20  | 18.07  |
| Australia | -23.00     | 118.00     | Outer | DSC  | Fore    | -11.72     | -9.43      | -10.64      | 0.60       | 247.36 | 310.68 | 275.88  | 14.21  |



## 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    | 269.91 | 0.53 | 6.229        | 0.12     | 267.64 | 0.49 | 5.413        | 0.12     | 0.13  | 0.12  | 0.000        | 0.12      | 0.13  | 0.12  | 0.000        |
| <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>      | -34.45  | 23.55  | 5.39 | 0.211        | -34.41   | 24.92  | 5.18 | 0.016        | 7.52     | 29.69 | 18.14 | 10.217       | 7.25      | 28.82 | 18.96 | 18.581       |

| 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    | 221.20 | 0.44 | 4.907        | 0.09     | 231.91 | 0.41 | 4.702        | 0.09     | 0.15  | 0.09  | 0.000        | 0.09      | 0.15  | 0.09  | 0.000        |
| <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>      | -34.75  | 18.84  | 2.78 | 0.000        | -34.96   | 20.42  | 2.61 | 0.000        | -0.23    | 23.01 | 12.40 | 0.107        | -0.10     | 23.49 | 13.23 | 0.152        |

| 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> | 48.73           | 49.29    | 49.01   | 0.000        | 57.50           | 58.14    | 57.87   | 0.000        | Inci.(Inner)             | 47.10   | 49.90   |
| <b>Azimuth Diff. (deg)</b>   | 0.0000          | 210.70   | 1.27    | 2.838        | 0.0000          | 290.33   | 1.27    | 4.090        | Inci.(Outer)             | 57.30   | 58.90   |
| <b>Range(Km)</b>             | 1030.61         | 1076.94  | 1050.04 | 0.000        | 1207.86         | 1264.81  | 1230.83 | 3.441        | Azimuth Diff.            | 0.60    | 2.00    |
| <b>X Factor(dbm)</b>         | -91.82          | -89.98   | -90.57  | 0.000        | -93.12          | -92.03   | -92.19  | 0.000        | Range(Inner)             | 1025.00 | 1095.70 |
| <b>Across Distance (Km)</b>  | 15.87           | 16.38    | 16.05   | 0.000        | 11.16           | 37.53    | 21.15   | 4.000        | Range(Outer)             | 1210.00 | 1280.00 |
| <b>Along Distance (Km)</b>   | 18.69           | 11136.15 | 42.61   | 3.000        | 0.31            | 11292.33 | 43.11   | 4.000        | 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   |

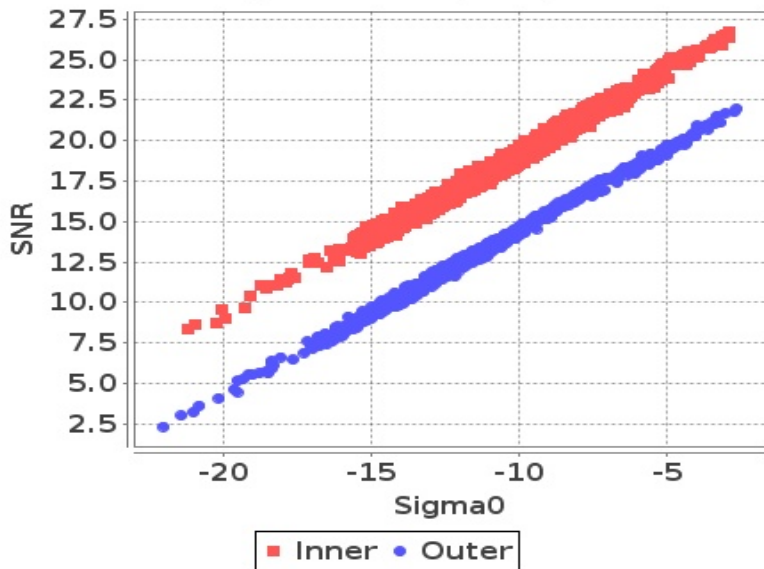
- Normal
- Deviations
- Alarming
- High Errors



# Sigma0 Behaviour (Sigma0 Vs SNR)

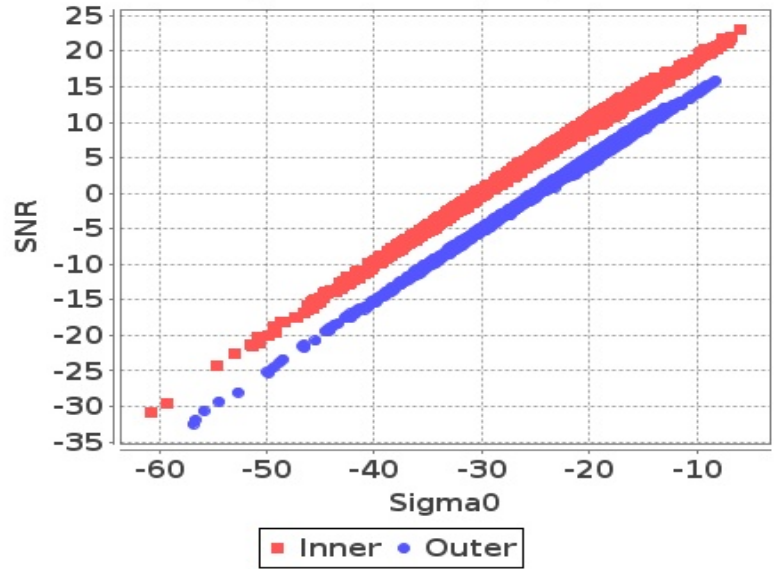
## Footprint-Land

### Sigma0 Vs SNR (Land)



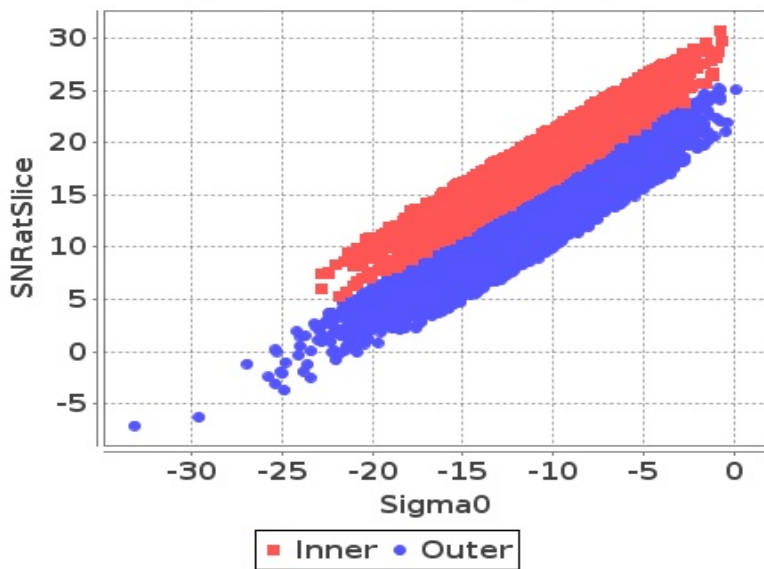
## Footprint-Sea

### Sigma0 Vs SNR (Sea)



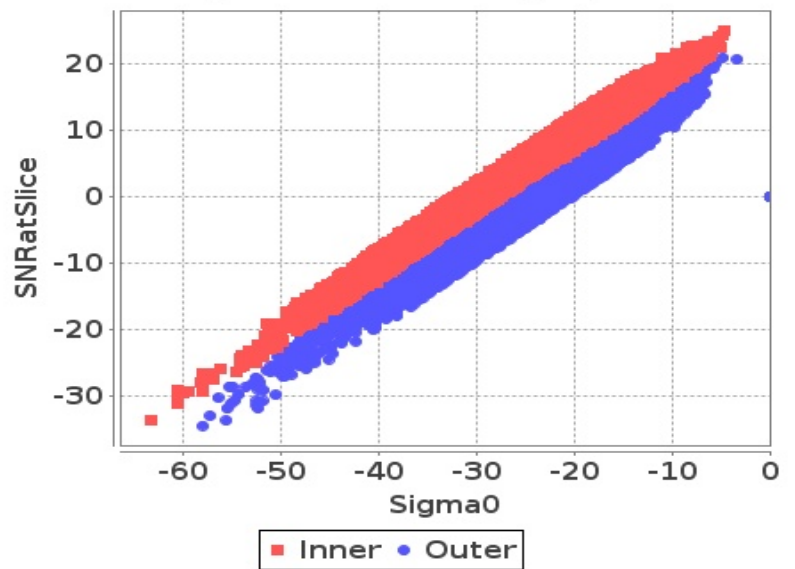
## Slice-Land

### Sigma0 Vs SNRatSlice (Land)



## Slice-Sea

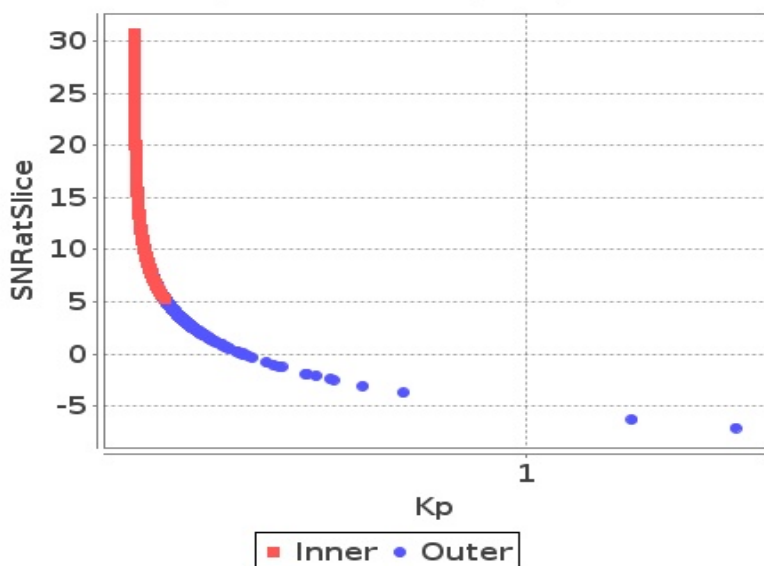
### Sigma0 Vs SNRatSlice (Sea)



# Sigma0 Behaviour (Kp Vs SNR)

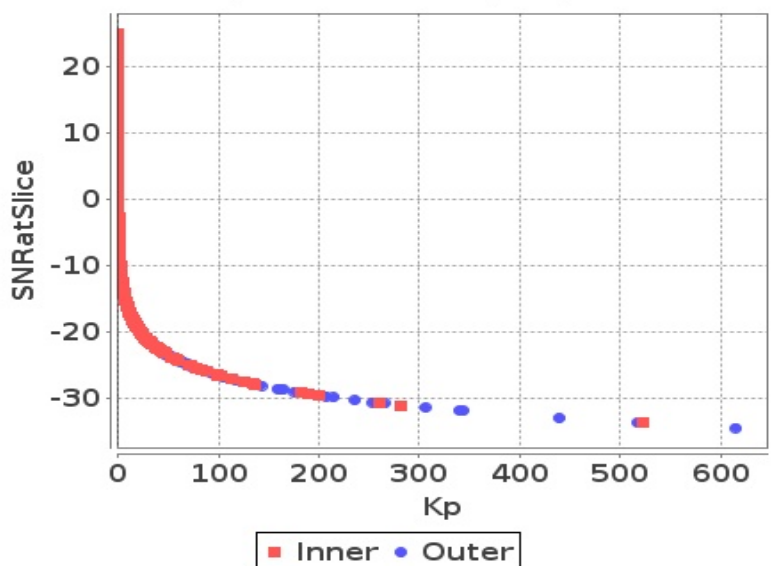
## Slice

### Kp Vs SNRatSlice (Land)



## Slice

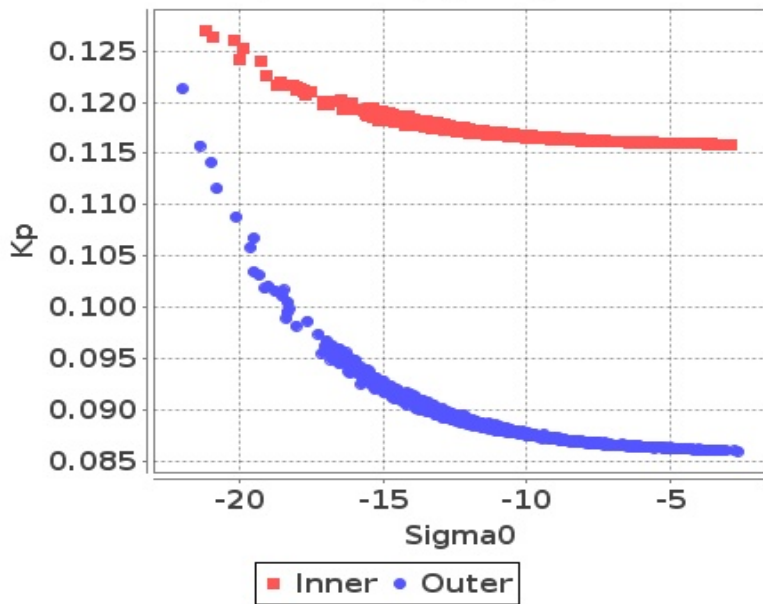
### Kp Vs SNRatSlice (Sea)



# Sigma0 Behaviour(Sigma0 Vs Kp)

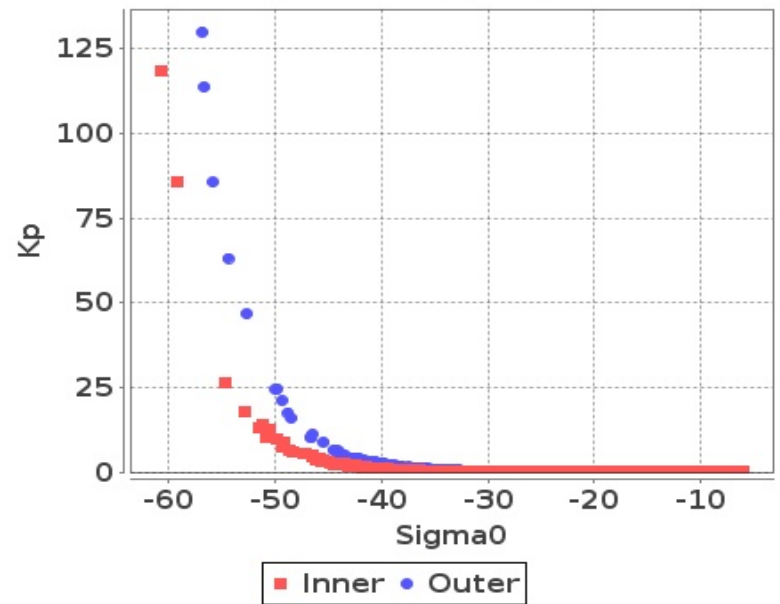
## Footprint-Land

### Sigma0 Vs Kp (Land)



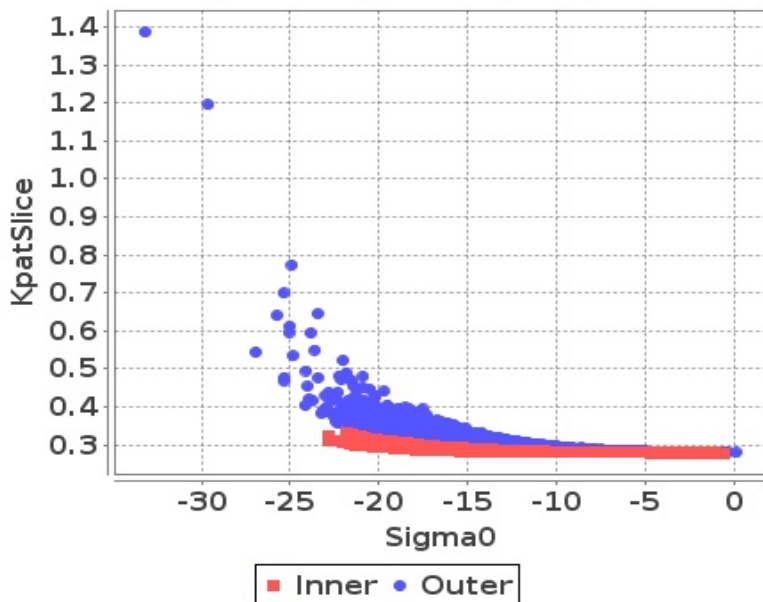
## Footprint-Sea

### Sigma0 Vs Kp (Sea)



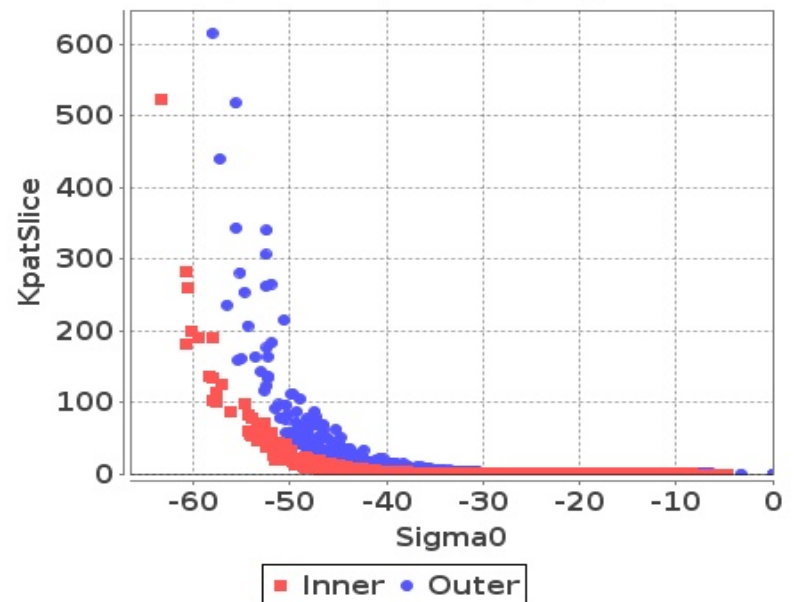
## Slice-Land

### Sigma0 Vs KpatSlice (Land)



## Slice-Sea

### Sigma0 Vs KpatSlice (Sea)

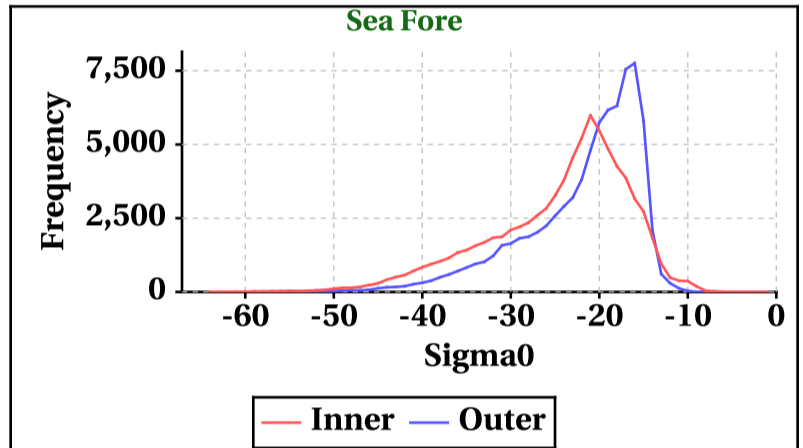
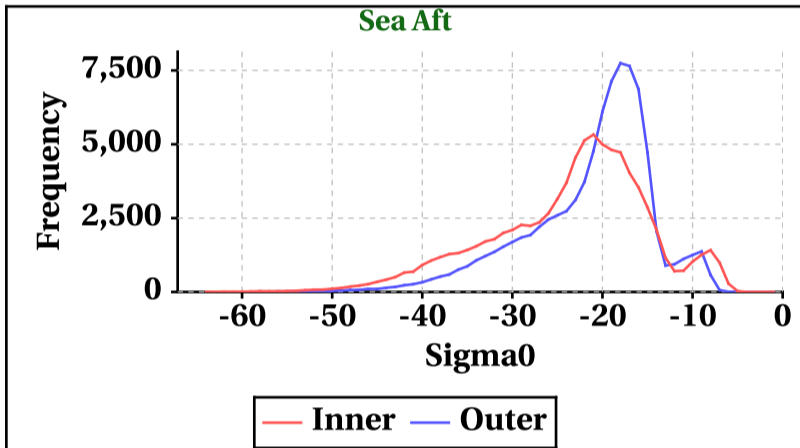
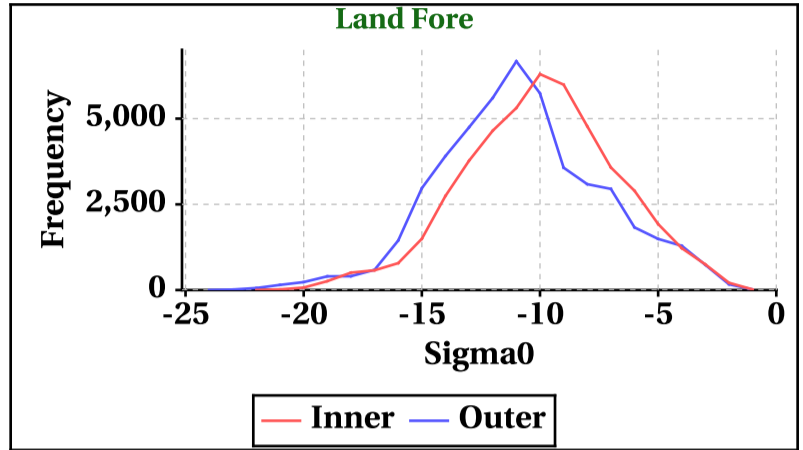
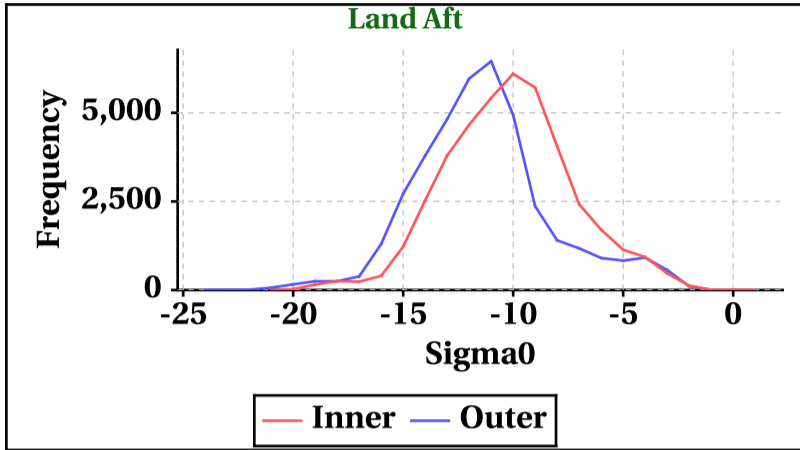


# Dynamic Range (Data Histograms)

## Sigma0(db)

| Inner Beam (HH) |          |           |         |          |
|-----------------|----------|-----------|---------|----------|
|                 | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min             | -21      | -22       | -64     | -64      |
| Max             | 1        | 0         | 0       | 0        |

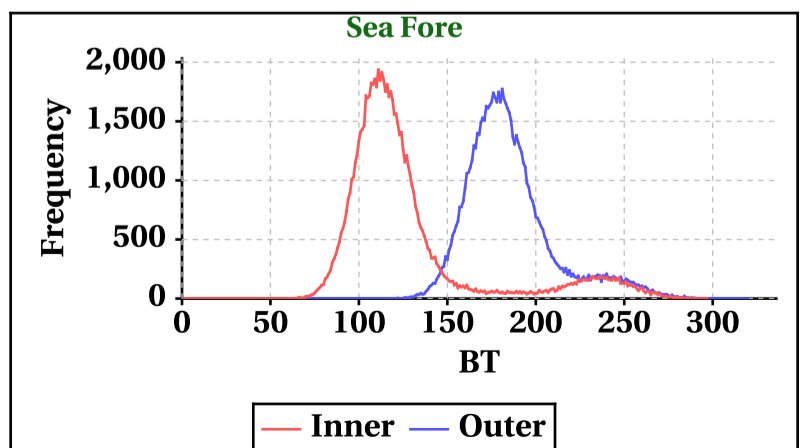
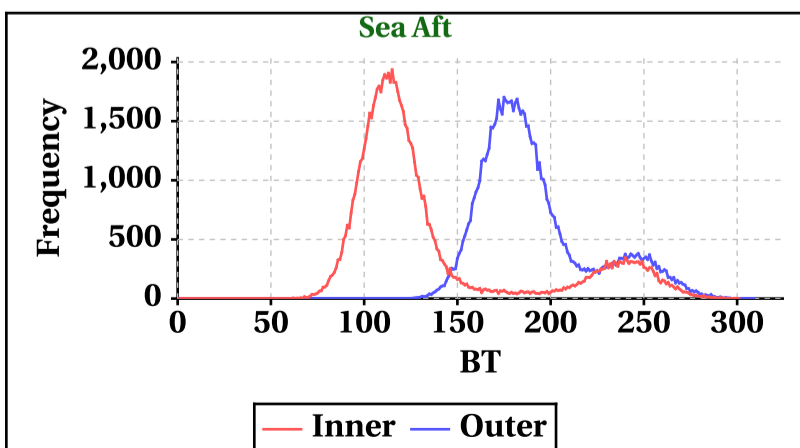
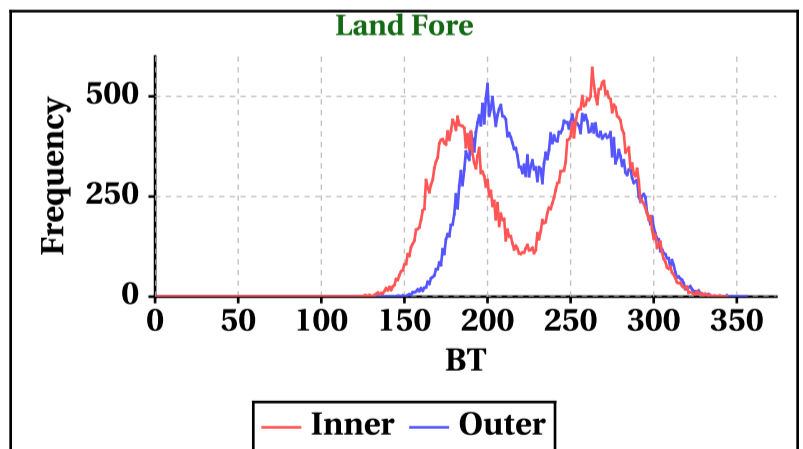
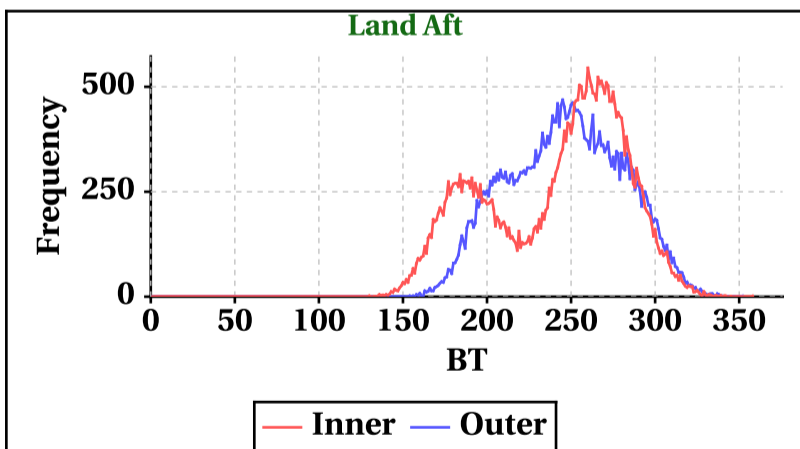
| Outer Beam (VV) |          |           |         |          |
|-----------------|----------|-----------|---------|----------|
|                 | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min             | -24      | -24       | -59     | -60      |
| Max             | 0        | 0         | 0       | 0        |



## Brightness Temperature(K)

| Inner Beam(HH) |          |           |         |          |
|----------------|----------|-----------|---------|----------|
|                | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min            | 0        | 0         | 0       | 0        |
| Max            | 358      | 344       | 301     | 297      |

| Outer Beam(VV) |          |           |         |          |
|----------------|----------|-----------|---------|----------|
|                | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min            | 0        | 0         | 0       | 0        |
| Max            | 352      | 356       | 309     | 320      |

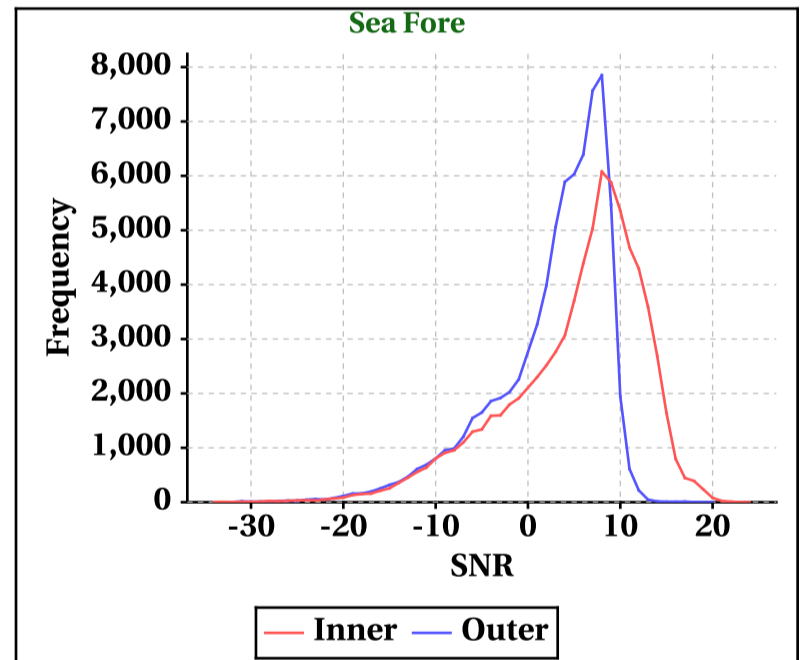
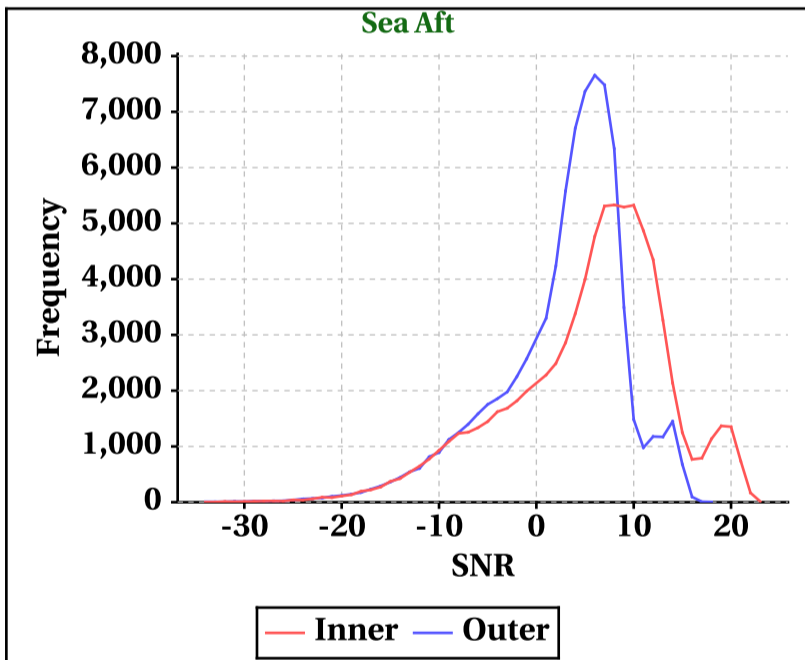
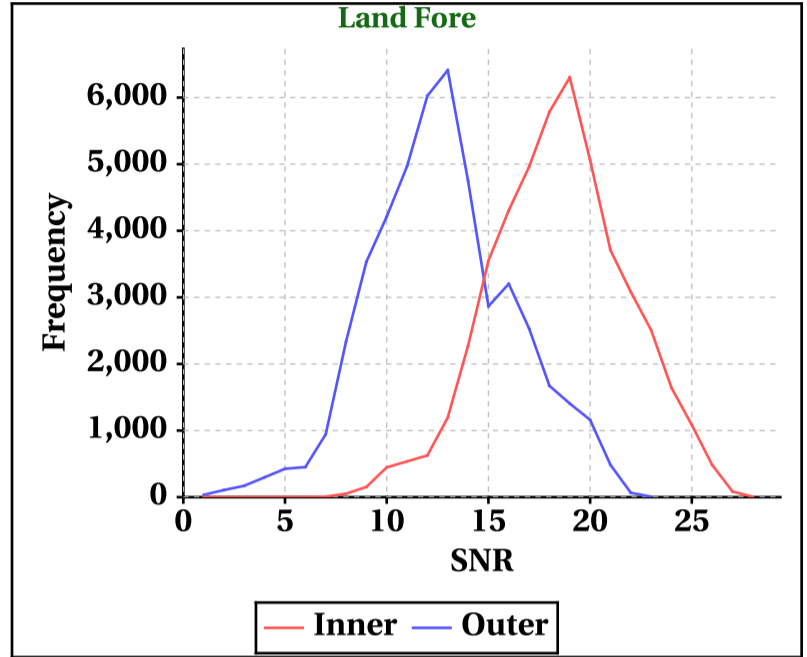
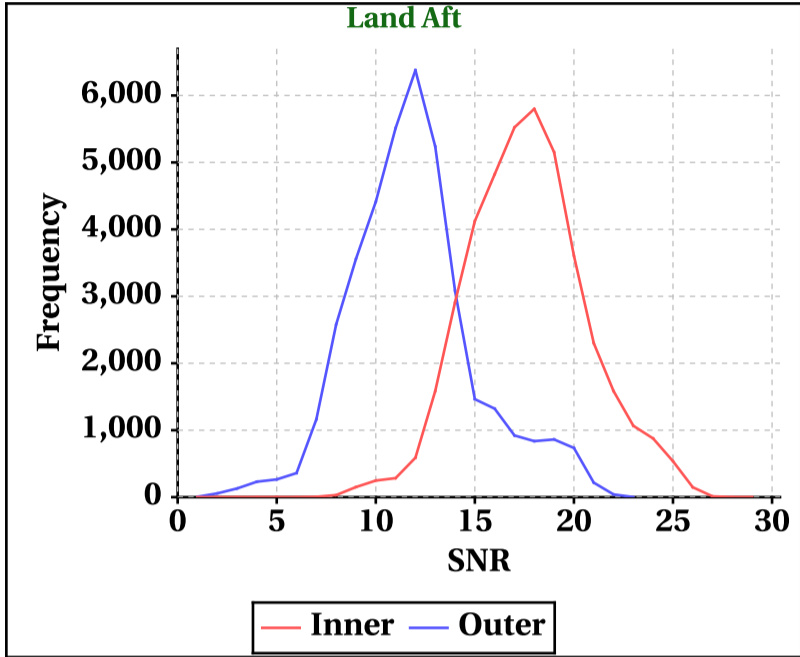


# Dynamic Range (Data Histograms)

## SNR(dBm)

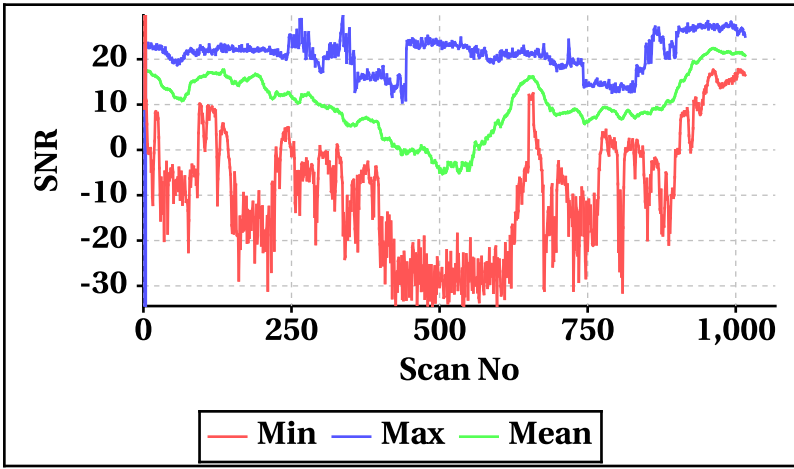
| Inner Beam (HH) |          |           |         |          |
|-----------------|----------|-----------|---------|----------|
|                 | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min             | 0        | 0         | -34     | -34      |
| Max             | 29       | 28        | 23      | 24       |

| Outer Beam (VV) |          |           |         |          |
|-----------------|----------|-----------|---------|----------|
|                 | Land Aft | Land Fore | Sea Aft | Sea Fore |
| Min             | 0        | 0         | -34     | -34      |
| Max             | 23       | 23        | 18      | 20       |

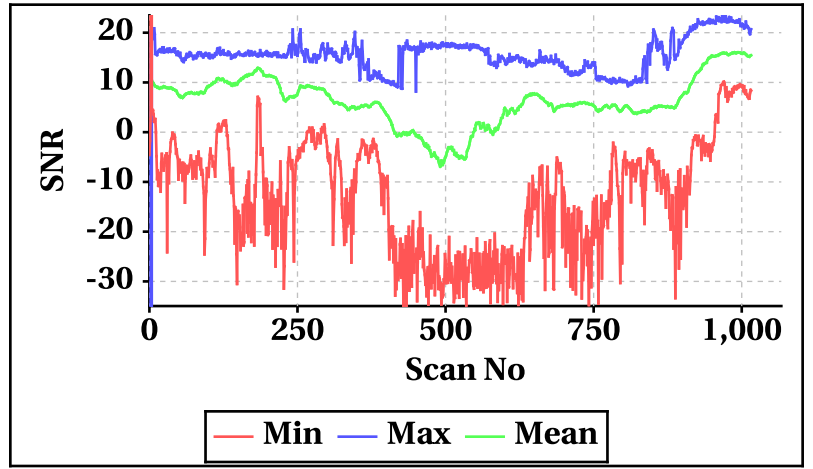


## Orbit-wise behaviour of SNR

Inner Beam (HH)

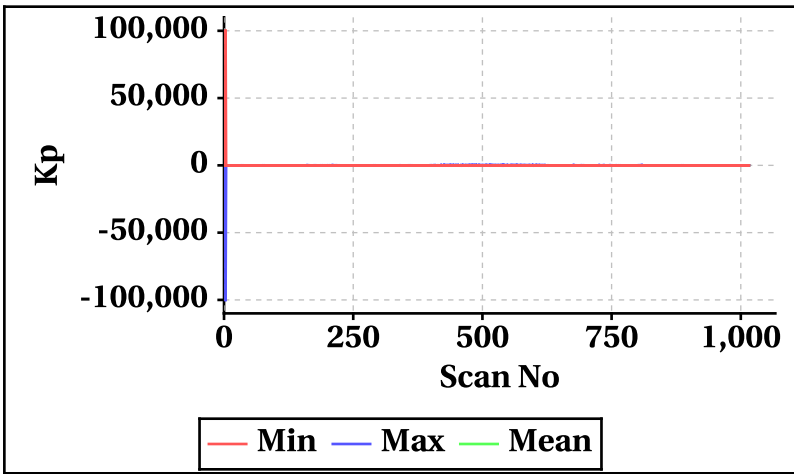


Outer Beam(VV)

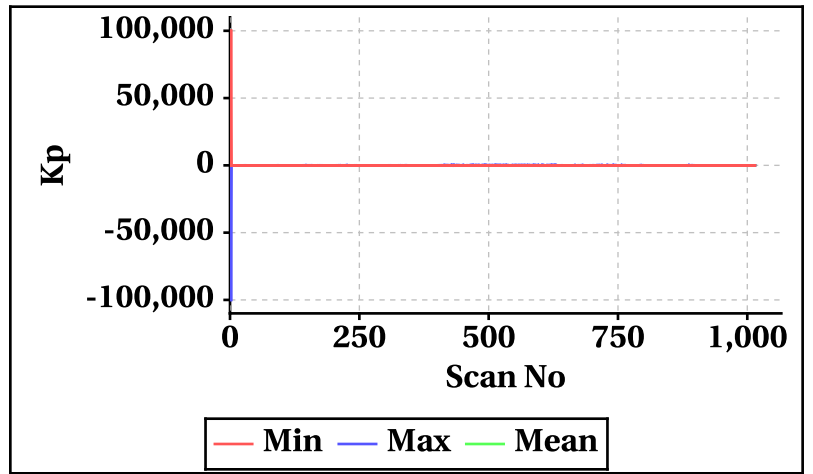


## Orbit-wise behaviour of Kp,Kpa,Kpb,Kpc

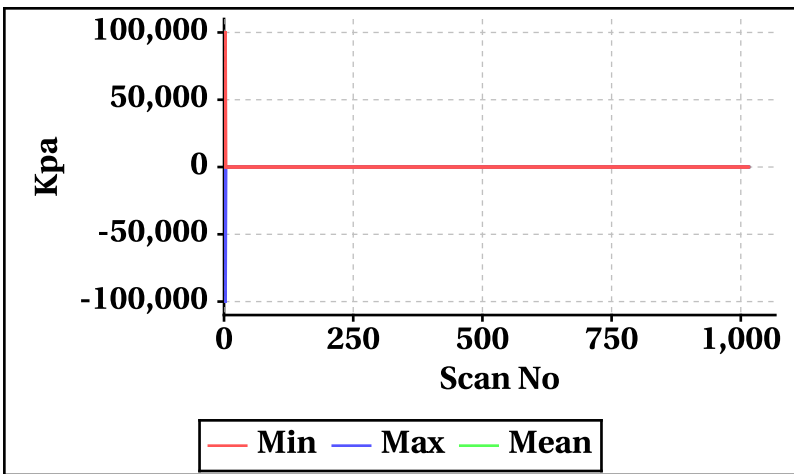
Inner Beam(HH)



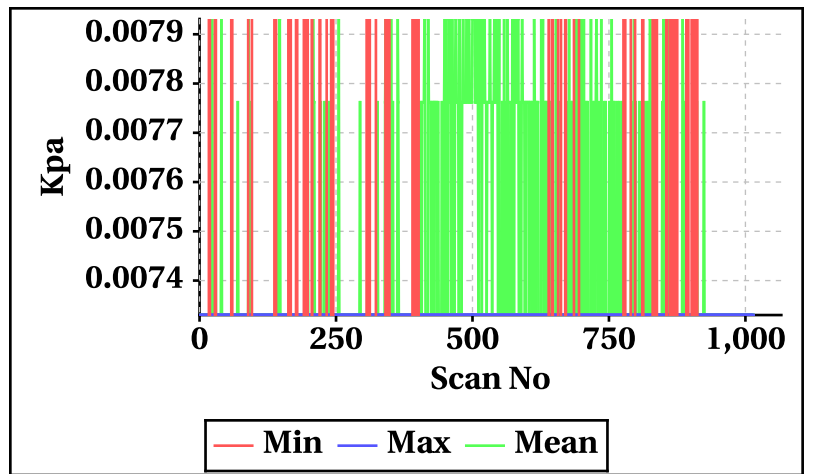
Outer Beam(VV)



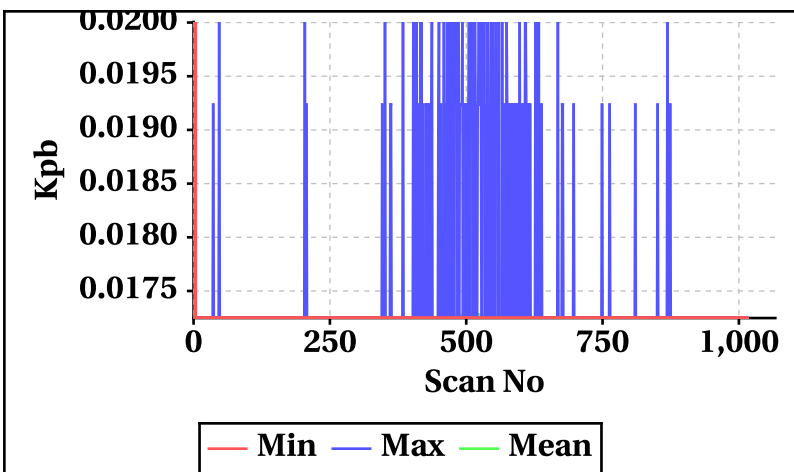
Inner Beam(HH)



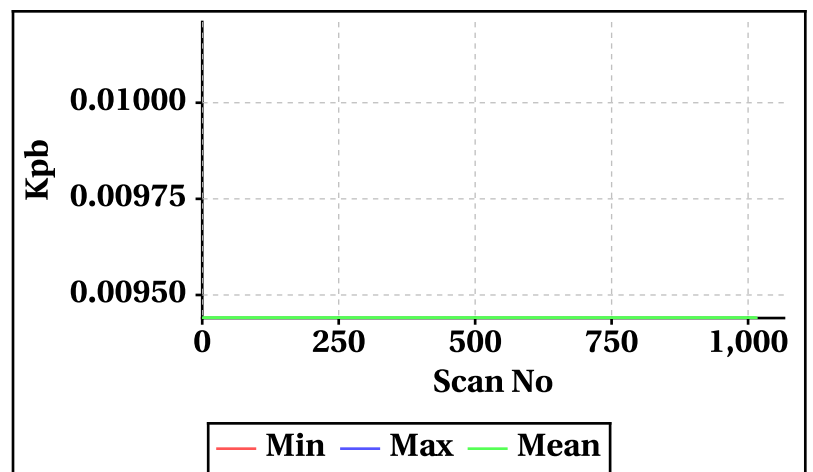
Outer Beam(VV)



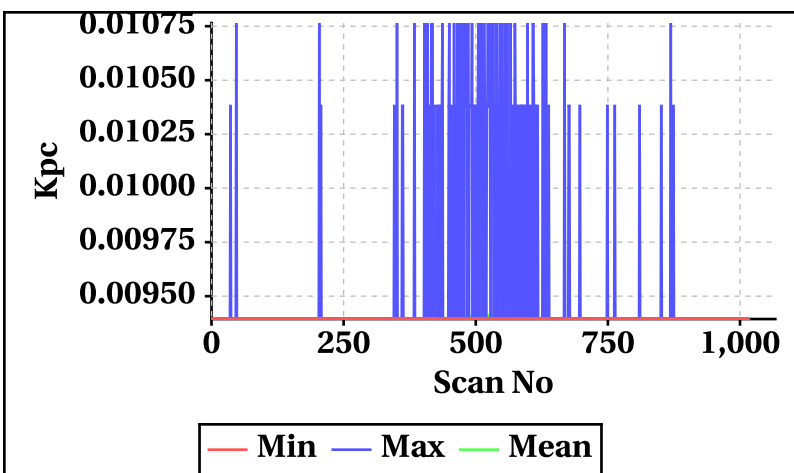
Inner Beam(HH)



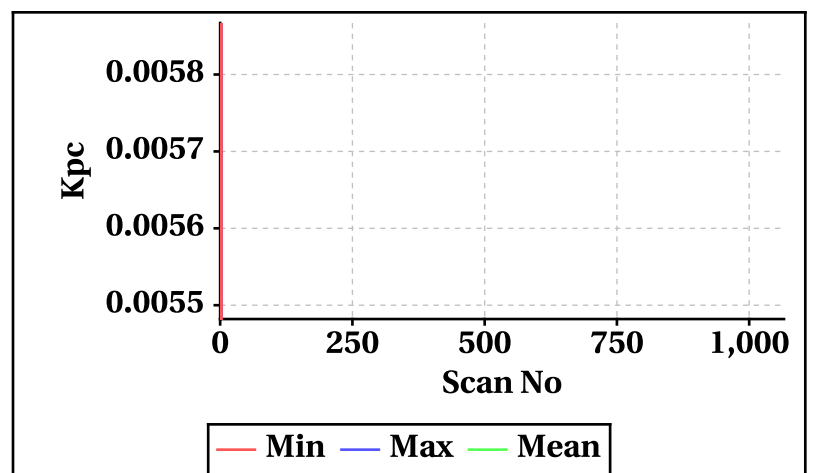
Outer Beam(VV)



Inner Beam(HH)



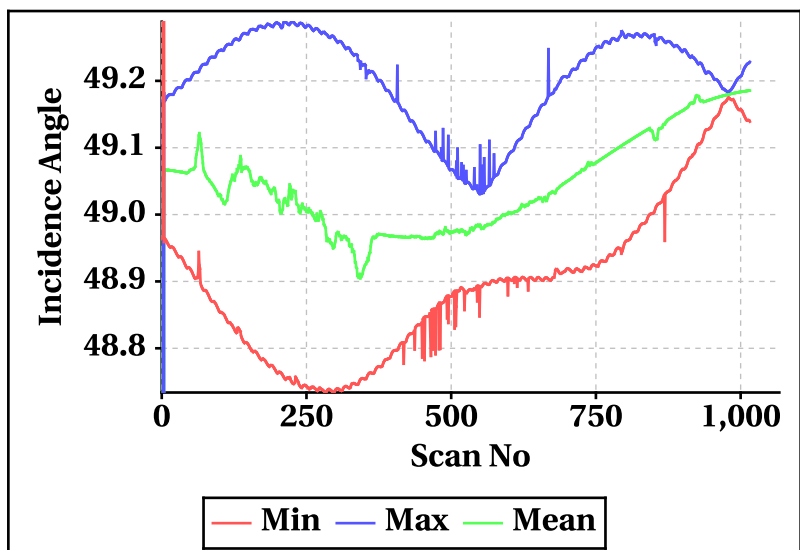
Outer Beam(VV)



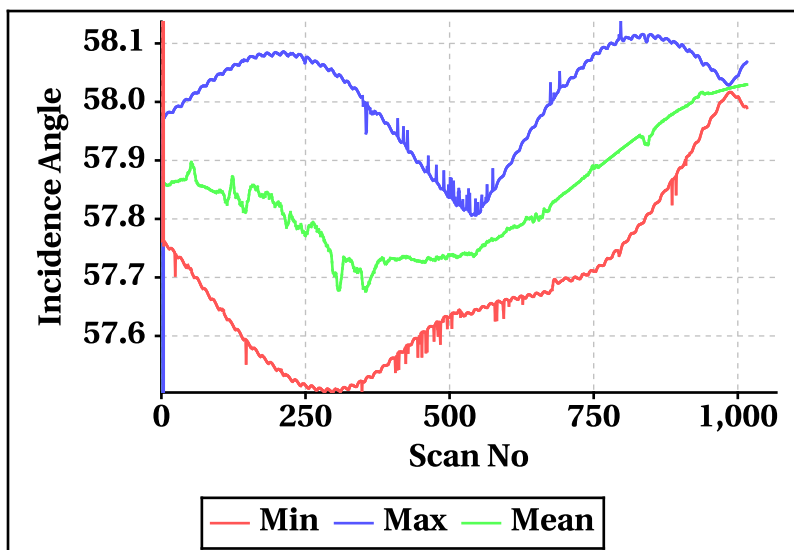


Orbit-wise behaviour of Incidence,Azimuth,Range,X-Factor

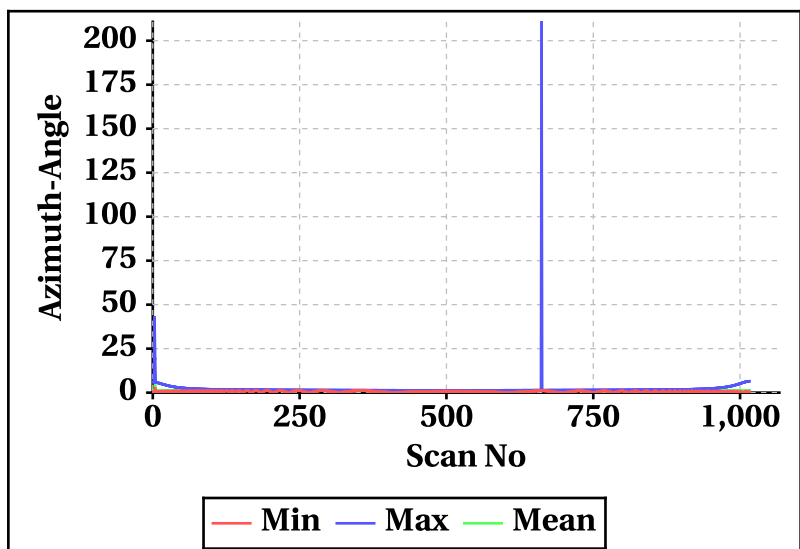
Inner Beam (HH)



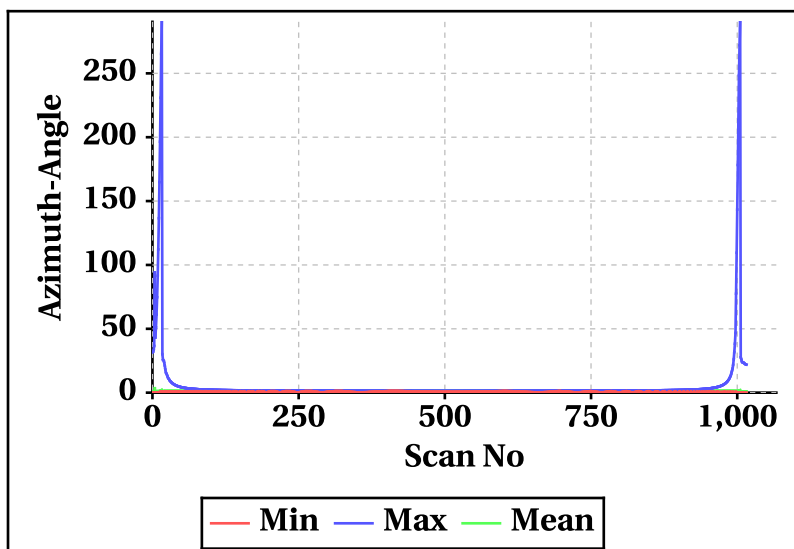
Outer Beam(VV)



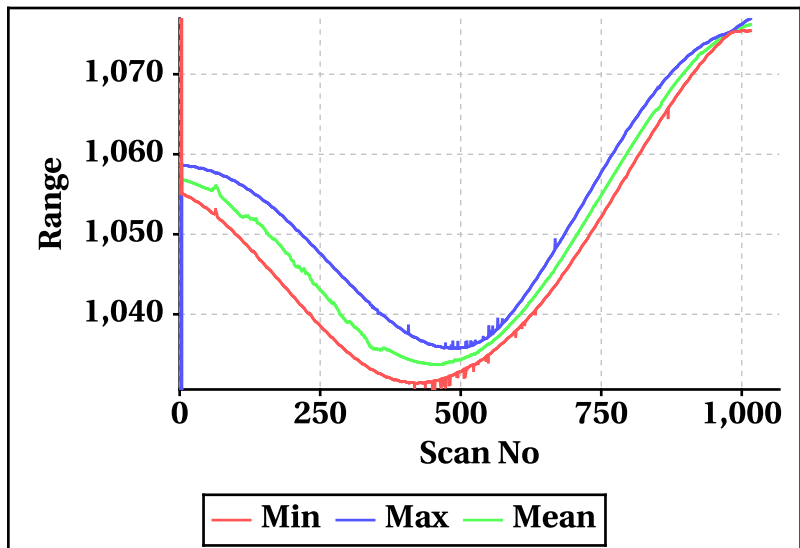
Inner Beam (HH)



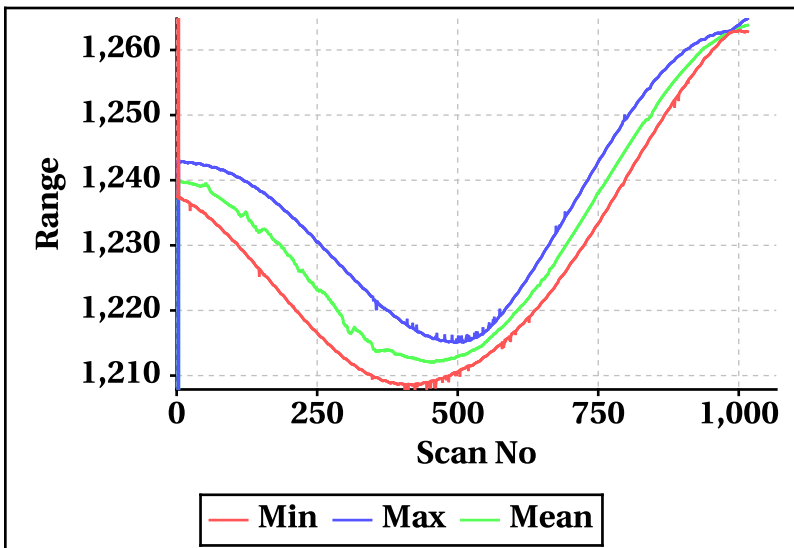
Outer Beam(VV)



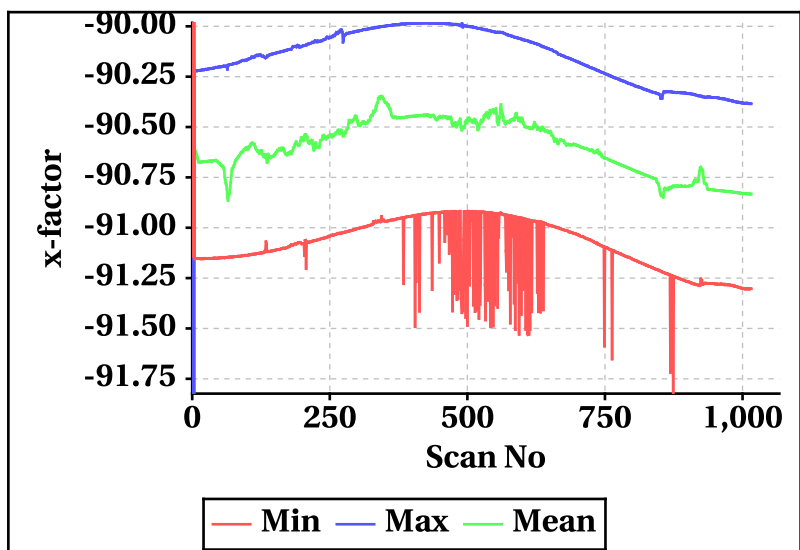
Inner Beam (HH)



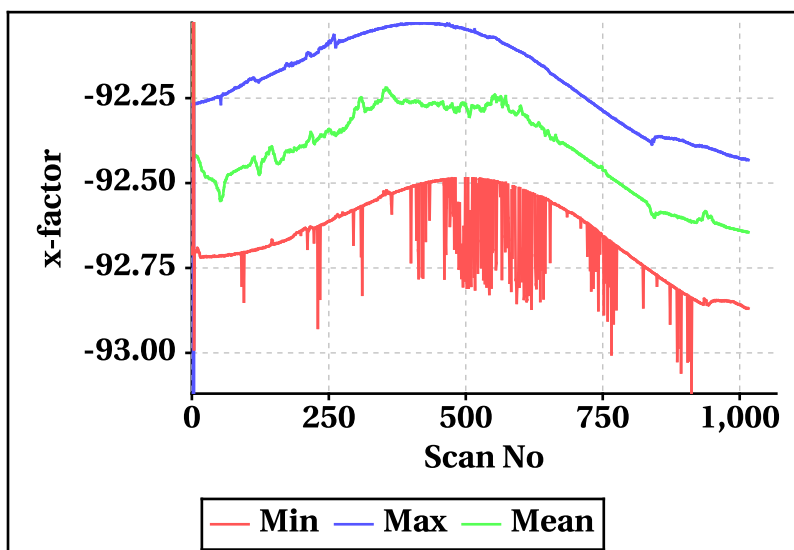
Outer Beam(VV)



Inner Beam (HH)



Outer Beam(VV)

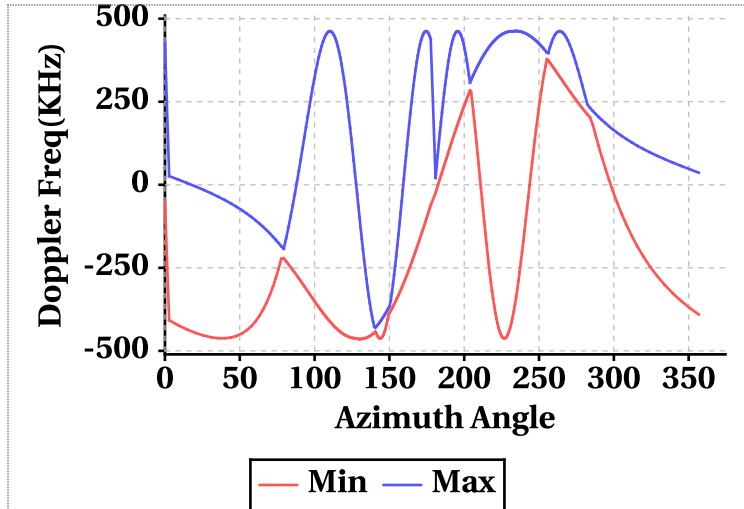


# Doppler Frequency Variation

**Doppler Frequency(KHz) variation statistics Over the half Orbit**

|            | Inner Beam (HH) | Outer Beam (VV) |
|------------|-----------------|-----------------|
| <b>Min</b> | -464.22         | -520.08         |
| <b>Max</b> | 462.76          | 518.76          |

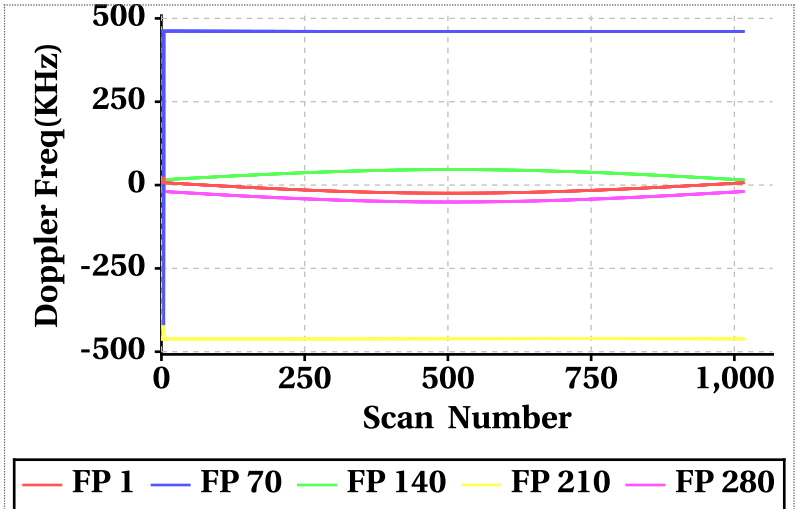
**Footprint wise Doppler frequency variation Inner Beam (HH)**



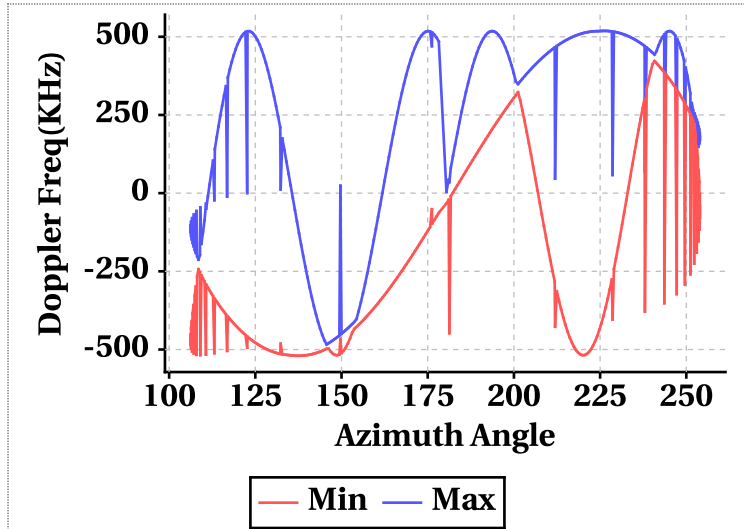
**Doppler Frequency(KHz) variation**

| Doppler_FP  | Inner Beam (HH) |        |         | Outer Beam (VV) |        |         |
|-------------|-----------------|--------|---------|-----------------|--------|---------|
|             | Min             | Max    | Mean    | Min             | Max    | Mean    |
| Doppler_1   | -24.44          | 20.74  | -12.86  | -32.88          | 4.16   | -19.94  |
| Doppler_70  | -416.04         | 462.02 | 459.73  | -474.26         | 517.68 | 514.97  |
| Doppler_140 | -371.10         | 46.62  | 34.81   | -427.10         | 46.58  | 33.29   |
| Doppler_210 | -461.72         | 72.88  | -460.19 | -517.70         | 62.56  | -516.14 |
| Doppler_280 | -51.22          | 426.32 | -38.83  | -51.36          | 470.02 | -37.55  |

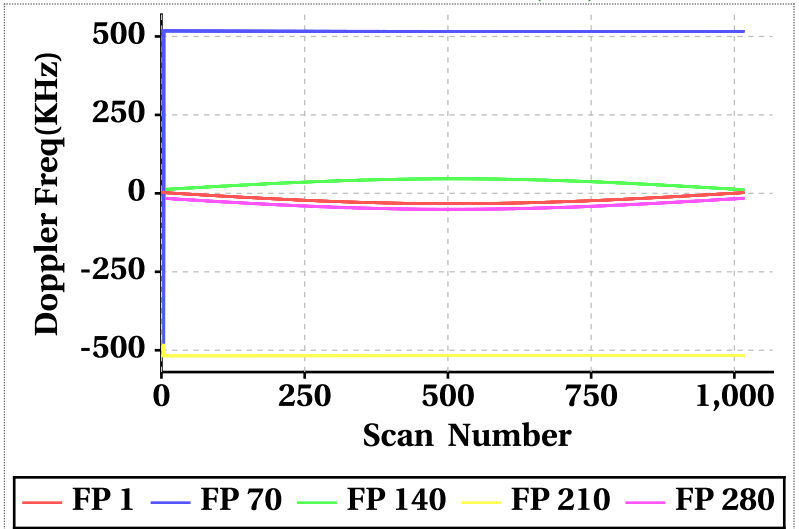
**Doppler frequency variation at footprints: 1, 70, 140, 210 & 280 Inner Beam (HH)**



**Footprint wise Doppler frequency variation Outer Beam (VV)**

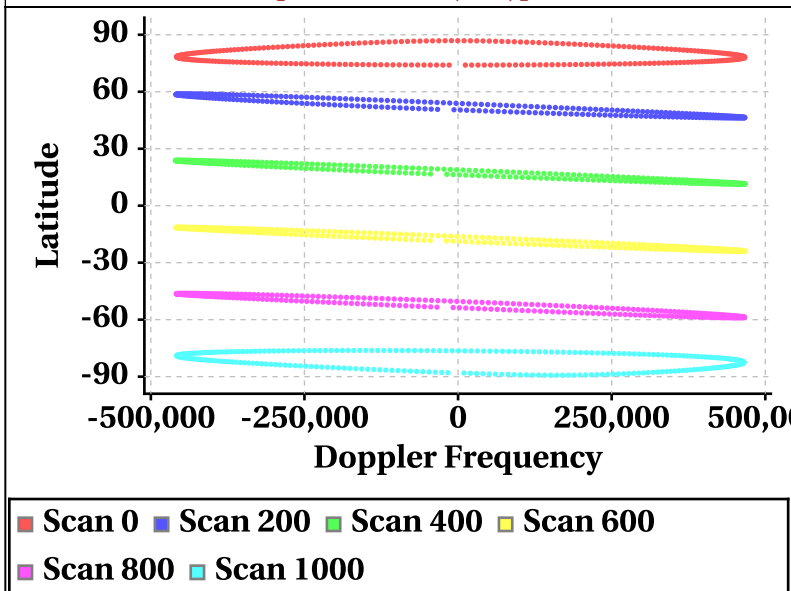


**Doppler frequency variation at footprints: 1, 70, 140, 210 & 280 Outer Beam (VV)**

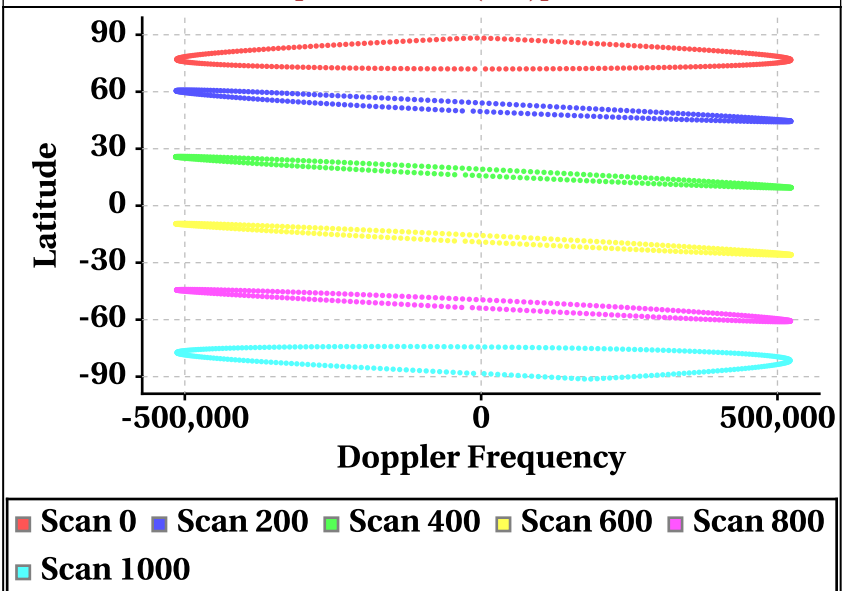


# Latitude Vs Doppler Frequency

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



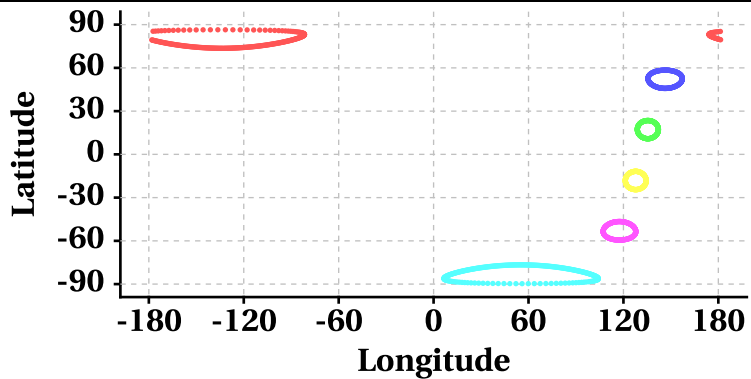
**Doppler Frequency at Scan Interval of 200 [Outer Beam(VV)]**



# Parameter as a function of Latitude

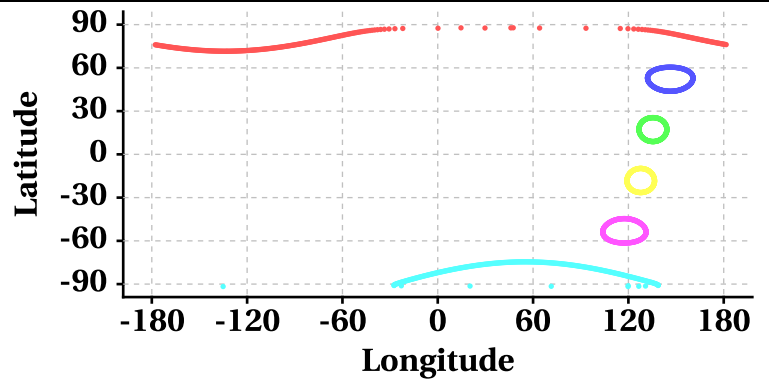
## Latitude Vs Longitude

Scan Trace [Inner Beam(HH)]



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

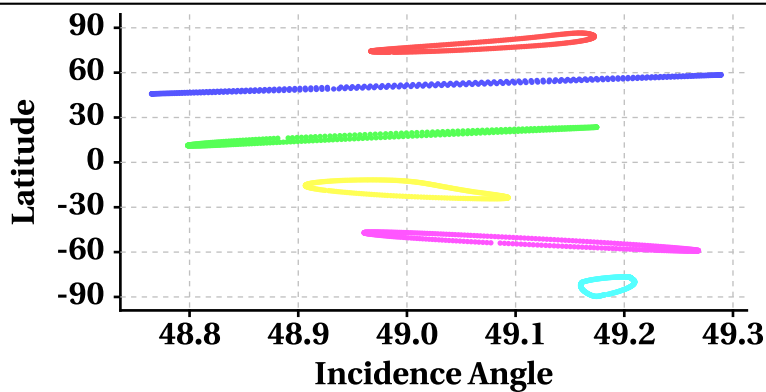
Scan Trace [Outer Beam (VV)]



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

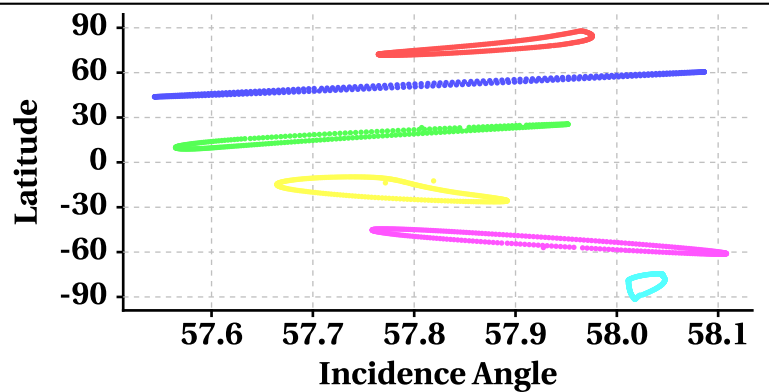
## Latitude Vs Incidence Angle

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



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

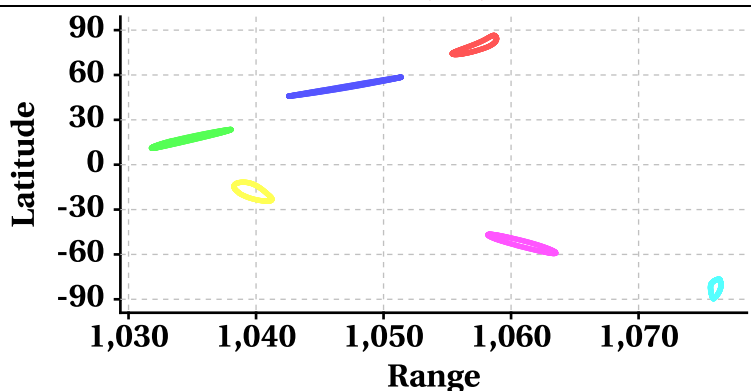
Incidence Angle at Scan Interval of 200 [Outer Beam (VV)]



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

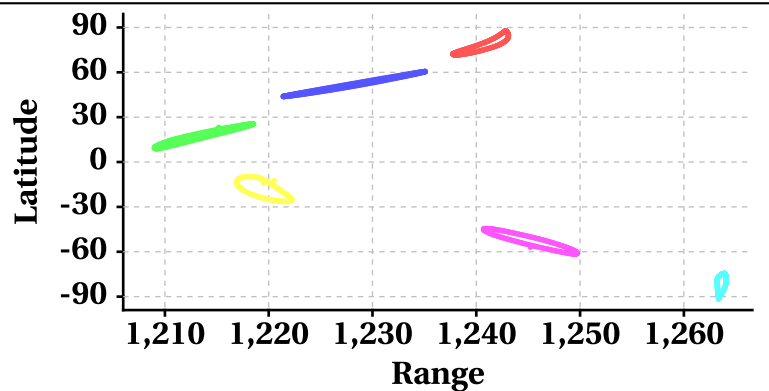
## Latitude Vs Range

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

