**Satellites, instruments**

1. Sentinel 1A, C-Band SAR (stripmap mode only)
2. Sentinel 1B, C-Band SAR (stripmap mode only)
3. ISS, GEDI

**Mission Epoch:** 1/28/2021 15:00:00 UTC Gregorian
**Mission Duration:** 2 days

*Orbital Elements:: UTCGregorian, SMA, TA, RAAN, AOP, ECC, INC*

Sentinel 1A
28 Jan 2021 15:00:00.000 7070.052000472739 135.7009006810358 38.39069816072309 196.5334447649118 0.0006318697105749462 98.1852224430984

Sentinel 1B
28 Jan 2021 15:00:00.000 7070.688121440737 26.55162234490189 38.21545263412436 128.4350156317218 0.0005755569537709292 98.18526501753023

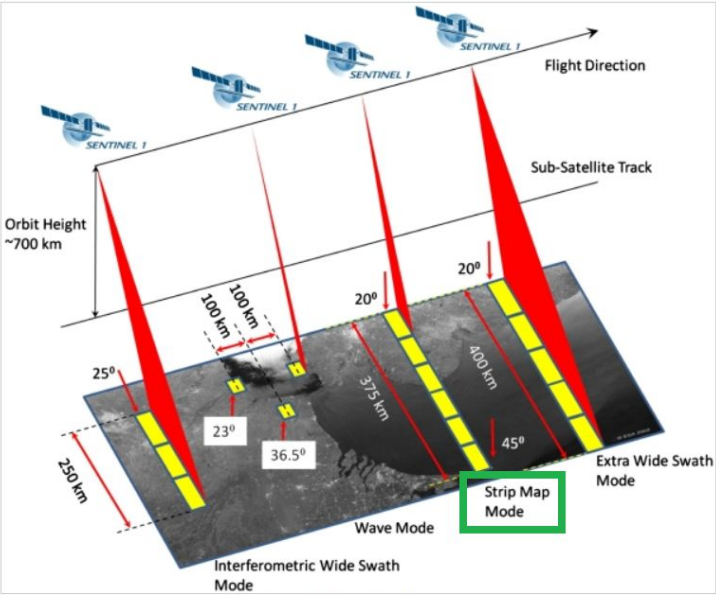
ISS
28 Jan 2021 15:00:00.000 6806.105884479364 21.93742673963972 313.1666332444946 308.8861243613201 0.0003303640879203458 51.67213619188961

Sentinel 1 instrument

https://sentinel.esa.int/web/sentinel/technical-guides/sentinel-1-sar/sar-instrument

https://sentinel.esa.int/documents/247904/349449/S1_SP-1322_1.pdf

https://dragon3.esa.int/web/sentinel/user-guides/sentinel-1-sar/acquisition-modes/stripmap



Sentinel-1 Product Modes

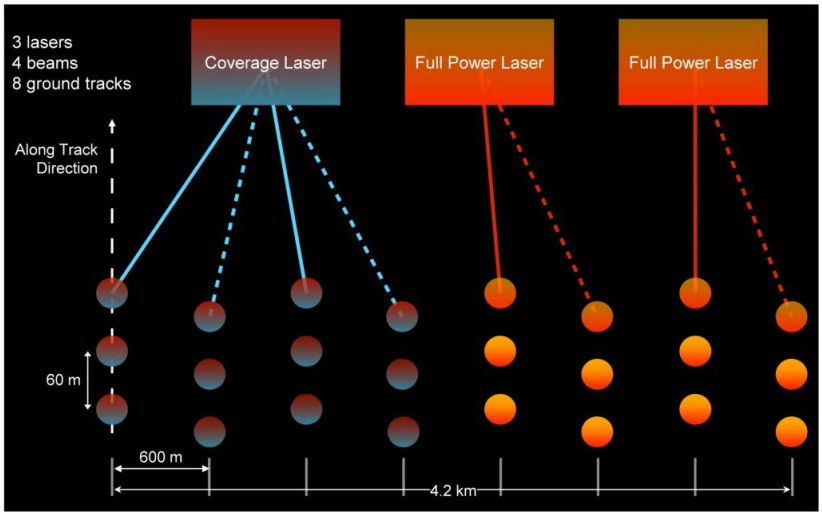
Only Stripmap mode is considered. In this any **one** of the 6 narrow-swath regions can be imaged **at a time.** The 6 narrow swaths correspond to 6 look angles (pointing-options). The extra-wide swath mode trades of image resolution for the wide swath.

| | |
|---|---|
| Center freq | 5.405 GHz |
| Bandwidth | 50 MHz (selected from 0 to 100MHz) |
| Polarization | Dual |
| Antenna size | 12.3m x 0.821m |
| Antenna efficiency | 50% assumed |
| Pulse width | 43us (selected from 5-100us) |
| Tx duty cycle | 8.5% (Stripmap) (not used….) |
| PRF | To be appropriately chosen in the range (1000Hz to 3000Hz). |
| Receiver (System) noise figure | 3.2 dB |
| 2-way Atmos loss | 2 dB assumed |
| Radar losses | 3.5 dB assumed |

| | |
|---|---|
| sceneNoiseTemp | 290K |
| Maneuverability<br>(Look angles [deg]) | *6 Look angles (pointing-options):*<br>20.73, 23.665, 28.585, 33.01, 36.96, 39.27<br><br>(Note taken at min altitude)<br>17.93-23.53 21.00-26.33 26.18-30.99 30.87-35.15<br>35.07-38.85 37.53-41.01 |
| Swath mode | Fixed swath of 80 km (i.e. swath width is fixed irrespective of the look-angle) |
| Peak power | 4368 W |

GEDI

https://gedi.umd.edu/instrument/specifications/




| | |
|---|---|
| FOV | Based on above diagram FOV is modelled (approximately) as rectangular shape with Cross-track = atan(4.2km/408km) = 0.5898deg<br>Along-track FOV = atan(60m/408km) = 8.4milli-deg<br>There shall be 8 spot beams within this FOV where the actual measurements occur. |
| Maneuverability | Can be rotated upto 6 deg either side of ISS<br>Assume that rotation step size is 1 deg, this gives 13 look-angles |

| | |
|---|---|
| | (pointing-options):<br>-6, -5, …...0, 1, 2, …., 6 |

*Notes:*

- The coverage calculation involves finding the intersection of the instrument pointing-axis with the Earth. The FOV of the sensor is **not** utilized.