RADAR GEOMETRY – SCHEMA 1 (flat surface)

- $r_a$ ... azimuth resolution
- $r_r$ ... range resolution
- $L$ ... length of the antenna
- $i$ ... incidence angle
- $C$ ... speed of light
- $\Delta t$ ... pulse width

Azimuth
(direction of the movement of the sensor)

Range
(direction perpendicular to the movement of the sensor)

Ground pixel area:

$$S_{flat} = \frac{r_r}{\sin i} \cdot \frac{L}{2}$$
RADAR GEOMETRY – SCHEMA 2 (slope)

**Ground** $r_r$:

$$|AB| = \frac{r_r}{\sin(i - p)}$$

**Ground pixel area**:

$$S_p = S_{flat} \cdot \frac{\sin i}{\sin(i - p)}$$

**Example**: If Incidence angle is $30^\circ$ and slope is $15^\circ$ then ground pixel area:

$$S_p = S_{flat} \cdot \frac{\sin 30^\circ}{\sin(30^\circ - 15^\circ)}$$

$$S_p = S_{flat} \cdot \frac{1/2}{1/4} = \sim S_{flat} \cdot 2$$

The area of the pixel on sloped terrain will be close to 2x larger than on flat ground.

i_p ........ local incidence angle

$$i_p = i - p$$

p ........ slope

$$r_r ........ range resolution$$
TERRAIN DISTORTIONS – SCHEMA 1

Range

Parallel

\[ \Delta = \frac{h}{\tan i} \]

Flat ground

\( h \) ... height of the target
\( \Delta \) ... displacement

Radar shadow occurs if:
\( i > 90 - p' \)

Layover occurs if:
\( p > i \)

Range