

Ice Velocity from Radar Hyperbola

A point reflector in a radar image has a hyperbolic shape because the receiver records side reflections off of the reflector before the reflector is directly below the system.

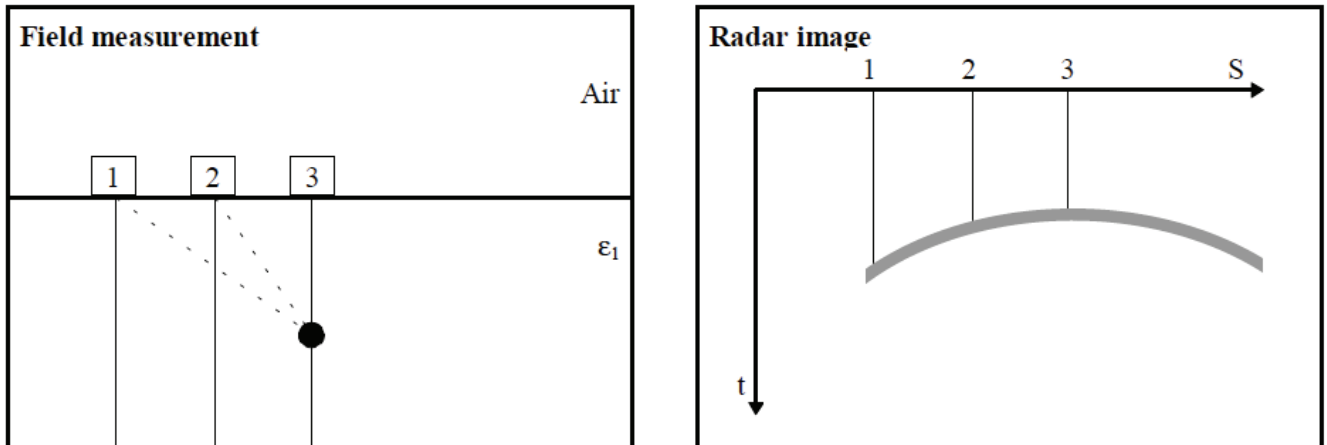


Figure 8 **Generation of hyperbolas in radar images (after ERA 1996).**

We can use data from hyperbola to estimate the average velocity of radar waves in the ice. We expect the hyperbola to follow the following equation:

$$t^2 = \frac{4x^2}{v^2} + \frac{4h^2}{v^2} \quad (1)$$

Where t is the two way travel time from transmitter to receiver, x is the distance along the profile, h is the distance to the reflector, and v is the average velocity of radar through the material.

Below is a complete radar profile from Mt Waddington, BC. I have provided zoomed in images of two hyperbolic reflectors (or what appear to be hyperbolic reflectors). Choose one and use the equation above to determine the distance to the reflector and the average velocity.

Note: I have not done this calculation yet for these data (they are from just a week ago)!

