

The data can also be transmitted to a ground station or recorded on tape for further processing.

Interpretation of SAR Images

Synthetic aperture radar systems illuminate the terrain with a series of microwave pulses. These pulses reflect from the surface objects on the ground and are returned back to the aircraft. The brightness of the objects on the SAR images directly correspond to the amount of microwave energy reflected back to the aircraft sensor. Smooth objects such as water or pavement will appear very dark to black on the radar imagery because most of the microwave radiation is reflected away from the aircraft, much like shining a flashlight beam from an angle onto a mirror. Rough objects, such as cobbled roads, corn fields, or trees, will reflect much of the transmitted radiation back to the SAR sensor receiver on-board the aircraft and, therefore, will appear as brighter targets. It is this surface roughness characteristic of an object that determines how it will appear on SAR imagery.

Many objects appear on SAR data that are below the theoretical resolving capabilities of the system, which is usually three to six meters. This is possible when their edges react as "corner reflectors", thus acting as high reflectors. Often power lines and hydro poles will be observable because of this phenomenon. Figure 1 is a six meter resolution SAR image of a controlled series of four sets of targets placed on a runway and surrounding taxiways. In Area 1, six corner reflectors are visible, having a size of 55 cm, 40 cm, 40 cm, 40 cm, 28 cm and 28 cm. Area 2 has three reflectors, 55 cm, 40 cm and 28 cm in size. Area 3 has five corner reflectors, 55 cm, 70 cm, 90 cm and 90 cm in size. All targets are separated by a distance of 50 m.