Modern SAR systems can operate in wide-area surveillance or high resolution modes. Some systems are dual-sided, imaging swaths on both sides of the aircraft. In addition to the usual strip-map mode, modern digital SAR systems can offer a "spotlight" mode in which the radar antenna is steered to dwell on a particular target as the aircraft passes. This can be used to provide finer resolution or "speckle" reduction to provide a high quality image for interpretation purposes.

While the operational constraints controlling radar image acquisition do not initially appear as restrictive as those for other types of imagery, there are nonetheless a variety of factors which should be considered when planning radar overflights. The sensor might be able to operate in most weather conditions, but it is also necessary for the platform to be able to fly. Fog or severe weather can close an airport, grounding all aircraft. In the case of long range aircraft, they should be based at airports which are not prone to adverse weather conditions. Turbulence over the target site can also be detrimental. The attitude of the platform is usually measured and used for processing the data. Excessive changes in aircraft attitude can degrade image quality.

Radar imagery might often be required when any form of visual navigation will be impossible because of cloud cover. Any aircraft intended as an airborne radar platform must be equipped with the best navigation systems to operate successfully. The aircraft will need to be equipped with a precision altimeter providing a continuous flight record.

Data Processing and Interpretation

Image interpretation, also referred to as image analysis, is the process through which useful information is derived from remotely sensed imagery. Image interpretation involves the detection, identification and measurement of objects recorded in the imagery.