Advances in Spaceborne Active Microwave Sensing

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Abstract

During the 90's, a number of new capabilities and techniques will be used to observe planetary (including earth) surfaces and atmospheres with active or microwave sensors. In 1992, SIR-C will provide the capability of full imaging radar polarimetry at two frequencies L and C-band. In combination with X-SAR, simultaneous imaging at three frequencies will be possible for the first time from space. The SIR-C-XSAR is the predecessor of the EOS SAR, which in addition to the multi-frequency and multi-polarization capability, will be able to provide very wide swath (500 to 600 km) imaging at moderate resolution of few hundred meters. The EOS SAR will also be capable of radar interferometric mapping of the surface topography by using data from repeat orbits.

In the area of altimetry, the next major advance is in the development of scanning altimeters which are capable of providing wide strip topography coverage instead of the line profile required with present systems. Interferometric techniques are also being considered for high resolution ocean topography mapping.

A particular challenge will be the development of a combined imaging/altimetry capability for a Titan radar sensor to be carried on the Saturn Cassini mission. This sensor must have broad flexibility due to our complete ignorance of the properties of Titan's surface. This has to be done in a very restricted weight and power environment.

In the area of scatterometry, considerations are being given to conical scanning scatterometers in contrast to the multiple fan beam scatterometers. This approach allows observation at constant incidence angle across the swath, each point being observed with two azimuth angles. Four azimuth angles are possible with a double beam conical scan.

Finally, active sensors will be used in the 90's to observe and map precipitation from space. Rain radars will allow observation of the rain extent horizontally and vertically and measurement of the rain rate profile.