

Orbital Remote Sensing of the Earth's Surface: A Review

Paul D. Lowman Jr.
Geodynamics Branch
Goddard Space Flight Center
lowman@denali.gsfc.nasa.gov

Abstract

This paper reviews the early years of remote sensing of the earth's surface, as distinguished from its atmosphere, and shows the influence of manned space flight, in particular the Apollo Program.

The first orbital-altitude pictures of the earth were taken from sounding rockets in the 1950s, and eventually led to terrain photography by astronauts of the Mercury, Gemini, and Apollo Programs using hand-held 70mm cameras. There was virtually no appreciation of the scientific value of such photography before the Mercury and Gemini missions. However, the hundreds of high-quality color pictures from these missions triggered a surge of interest among earth scientists. In particular, the Gemini and Apollo earth-orbital photographs stimulated the U.S. Geological Survey to propose an earth resources satellite, which eventually became Landsat with the first launch in 1972. Landsat can thus be considered a by-product of the Apollo Program. Its success led to many subsequent observation satellites, launched by France, the former Soviet Union, India, and China.

The limitations of visual range imagery—daylight availability and cloud cover—led to development of imaging radar satellites, beginning with Seasat in 1978. Since then, orbital radar as typified by ERS-1 and 2, and most recently RADARSAT, has become an invaluable remote sensing tool, both for imaging and for radar interferometry of crustal motions.