

## APPENDIX I—Glossary of Remote Sensing and Remote Data Transmission Terms and Definitions

This glossary contains the terms most used within the papers in this volume. Additional terms and definitions are contained in the *Multilingual Dictionary of Remote Sensing and Photogrammetry*, obtained from the American Society for Photogrammetry and Remote Sensing, Falls Church, VA.

### Terms and Definitions

**absorbed light**—light rays that are neither reflected nor transmitted when directed toward opaque or transparent materials.

**absorption**—the process by which radiant energy is absorbed and converted into other forms of energy.

**absorption band**—a range of wavelengths (or frequencies) in the electromagnetic spectrum within which radiant energy is absorbed by a substance.

**absorption factor**—the ratio of a radiant flux absorbed by a body to that incident upon it. Total absorptance refers to absorptance measured over all wavelengths; spectral absorptance is measured at a specified wavelength.

**accuracy**—the closeness of the results of observations, computations, or estimates to the true values or to values accepted as being true.

**acronym**—a “word” or term made up of the first or other letters of a phrase; for example, radar (from *radio detection and ranging*).

**aerial**—of, pertaining to, or occurring in the air or atmosphere.

**aerial photograph, oblique**—an aerial photograph taken with the camera axis directed between the horizontal and the vertical: (1) *high oblique*—an oblique photograph in which the apparent horizon is shown; (2) *low oblique*—an oblique photograph in which the apparent horizon is not shown.

**aerial photograph, vertical**—an aerial photograph made with the optical axis of the camera approximately perpendicular to the earth’s surface and with the film as nearly horizontal as is practicable.

**aerial reconnaissance**—the securing of information by aerial photography or by visual observation from the air.

**albedo**—the ratio of the amount of electromagnetic radiation reflected by a body to that incident upon it, often expressed as a percentage; for example, the albedo of the earth is 34%. Albedo is also the reflectivity of a body compared with that of a perfectly diffusing surface at the same distance from the sun and normal to the incident radiation. The term may refer to the entire solar spectrum or merely to the visible portion.

**algorithm**—a statement of the steps to be followed in the solution of a problem. An algorithm may be in the form of a word description, an explanatory note, or a labeled diagram or flowchart.

**altitude**—height above a datum point; the datum is usually the mean sea level.

**analog**—a form of data display in which values are shown in graphic form, such as curves. Also a form of computing in which values are represented by directly measurable quantities,

such as voltages or resistances. Analog computing methods contrast with digital methods, in which values are treated numerically.

**antenna**—a device that radiates electromagnetic radiation (EMR) from a transmitter and receives EMR from other antennae or other sources.

**antenna, synthetic aperture (radar)**—the effective antenna produced by storing and comparing the Doppler signals received while the aircraft travels along its flight path. This synthetic antenna (or array) is many times longer than the physical antenna, thus sharpening the effective beam width and improving azimuth resolution.

**apogee**—the farthest point in an elliptical orbit of a satellite from the body about which it is orbiting. The highest point reached by a sounding rocket or other device fired into “space” from a planetary surface.

**Argos**—a satellite-based remote data transmission system that uses polar-orbiting meteorological satellites for the relay of data from data collection platforms.

**attenuation**—in physics, any process in which the flux density (or power, amplitude, intensity, or illuminance) of a “parallel beam” of energy decreases with increasing distance from the energy source.

**automatic data processing system (ADP system)**—an electronic system that includes an electronic data processing system plus auxiliary and connecting communications equipment.

**band ratioing**—spectral band ratioing is a proven technique which allows identification of geologic materials based on the recognition of diagnostic absorption bands.

**black light**—a nontechnical expression for electromagnetic radiation in the ultraviolet portion of the spectrum.

**cathode-ray tube (CRT)**—a vacuum tube that generates a focused beam of electrons which can be deflected by an electric or magnetic field or both. The assembly contains an electron gun arranged to direct a beam on a fluorescent screen. Scanning by the beam can produce light at all points in the scanned raster.

**color-infrared film**—photographic film sensitive to energy in the visible and near-infrared wavelengths—generally from 0.4 to 0.9  $\mu\text{m}$ —usually used with a minus-blue (yellow) filter, which results in an effective film sensitivity of 0.5 to 0.9  $\mu\text{m}$ .

**computer-compatible tape (CCT)**—in Landsat satellites, the magnetic tape on which the digital data from multispectral scanner images are recorded.

**continuous-wave radar (CW radar)**—a general species of radar transmitting continuous waves, either modulated or unmodulated. The simplest form transmits a single frequency and detects only moving targets by the Doppler effect.

**contrast stretching**—the process of increasing the contrast of images by digital or optical processing.

**control, ground**—control obtained by ground surveys, as distinguished from control obtained by photogrammetric methods; it may be used for horizontal or vertical control, or both. Ground (*in situ*) observations aid in interpretation of remote sensor data.

**control point**—any station in a horizontal or vertical control system that is identified on a photograph and used for correlating the data shown on that photograph.

**crown diameter, visible**—the apparent diameter of a tree crown imaged on a vertical aerial photograph.

**data collection platform (DCP)**—an unattended automated radio that collects data from hydro-meteorological sensors and transmits the data to satellite-based remote data transmission systems.

**diapositive**—a positive image on a transparent medium, such as glass or film; a transparency. The term originally was used primarily for a transparent positive on a glass plate used in a

plotting instrument, a projector, or a comparator, but now is frequently used for any positive transparency.

**direct-readout ground station**—a station that receives data that have been relayed through a satellite-based remote data transmission system.

**dish (jargon)**—a parabolic radio or radar antenna, roughly the shape of a soup bowl, hence the use of the word.

**electromagnetic radiation (EMR)**—energy propagated through space or through material media in the form of an advancing interaction between electric and magnetic fields. The term radiation is commonly used for this type of energy, although it actually has a broader meaning. EMR is also called electromagnetic energy.

**electronic data processing**—the use of electronic devices and systems in the processing of data for the purpose of manipulating data and putting them into usable form as an aid to their use and interpretation.

**elevation**—vertical distance from a datum point, usually the mean sea level, to a point or object on the earth's surface—not to be confused with altitude, which refers to points or objects above the earth's surface.

**enhancement, image**—the process of altering the appearance of an image for the purpose of extraction of additional information. It may be accomplished by digital or photographic (optical) methods.

**false color**—the use of one color to represent another; for example, the use of red emulsion to represent infrared light in color-infrared film.

**flight path**—the path made or followed in the air or in space by an aircraft, rocket, or other flying body; the continuous series of positions occupied by a flying body; and, more strictly, the path of the center of gravity of a flying body in reference to the earth or other fixed reference.

**geodesy**—the science that deals mathematically with the size and shape of the earth, with the earth's external gravity field, and with surveys of such precision that the overall size and shape of the earth must be taken into consideration.

**geostationary satellite**—a satellite so placed in orbit above the earth that it rotates with the earth and thus remains fixed over the same area.

**ground check**—the process of collecting or providing information concerning the actual state of the ground, usually at the time of a remote sensing overflight.

**ground control**—accurate data on the horizontal or vertical positions, or both, of identifiable ground points.

**ground data**—supporting data collected on the ground, and information derived therefrom, as an aid to the interpretation of remotely recorded surveys, such as airborne imagery. Generally, this should be performed concurrently with the airborne surveys. Data as to weather, soils, and vegetation types and conditions are typical.

**ground resolution cell**—the area on the terrain that is covered by the instantaneous field of view of a detector. The size of the ground resolution cell is determined by the altitude of the remote sensing system and the instantaneous field of view of the detector.

**ground track**—the vertical projection of the actual flight path of an aerial or space vehicle onto the surface of the earth or other body.

**ground truth (jargon)**—the term coined for data and information obtained on surface or sub-surface features to aid in interpretation of remotely sensed data. *Ground data and ground information are the preferred terms.*

**high-oblique photograph**—an oblique aerial photograph in which the apparent horizon is included within the field of view.

**image enhancement**—the manipulation of image density so that certain features of the image can be more easily seen.

**imagery**—the products of image-forming instruments (analogous to *photography*).

**infrared**—pertaining to energy in the 0.7 to 100- $\mu\text{m}$  wavelength region of the electromagnetic spectrum. For remote sensing, the infrared wavelengths are often subdivided into near infrared (0.7 to 1.2  $\mu\text{m}$ ), middle infrared (1.3 to 3.0  $\mu\text{m}$ ), and far infrared (7.0 to 15.0  $\mu\text{m}$ ). Far infrared is sometimes referred to as thermal or emissive infrared.

**infrared image**—an image acquired within the wavelength from about 0.7 mm to an indefinite upper boundary, sometimes set at 2.6 mm. Photographic infrared is 0.7 mm to about 2.6 mm; thermal infrared is  $>2.6$  mm to 13.5 mm.

**large scale**—refers to aerial photographs with a representative fraction of 1:500 to 1:10 000 and to maps with a representative fraction (scale) greater than 1:100 000.

**lithosphere**—the solid part of the earth or other spatial body, distinguished from the atmosphere and the hydrosphere.

**magnetometer**—an instrument for measuring changes in the earth's magnetic field and used extensively in airborne geophysical surveying.

**medium scale**—refers to aerial photographs with a representative fraction of 1:12 000 to 1:30 000 and to maps with a representative fraction (scale) of 1:100 000 to 1:1 000 000.

**meteorburst (meteorscatter)**—a communications technique that relies on transitory ionized trails in the atmosphere for relaying radio messages. The trails are caused by the destruction of micrometeors as they plunge into the atmosphere.

**Meteosat**—a meteorological satellite in geostationary orbit that supports the relay of data from data collection platforms.

**microwave**—a very short electromagnetic wave; any wave between 1 m and 1 mm in wavelength or between 300 and 0.3 GHz in frequency; the portion of the electromagnetic spectrum in the millimetre and centimetre wavelengths, bounded on the short wavelength sides by the far infrared (at 1 mm) and on the long wavelength side by very-high-frequency radio waves. Passive systems operating at these wavelengths sometimes are called microwave systems. Active systems are called radar, although the literal definition of radar requires a distance-measuring capability not always included in active systems. The exact limits of the microwave region are not defined.

**monochromatic**—pertaining to a single wavelength or, more commonly, to a narrow band of wavelengths.

**mosaic**—an assemblage of overlapping aerial or space photographs or images whose edges have been matched to form a continuous pictorial representation of a portion of the earth's surface.

**near infrared**—the preferred term for the shorter wavelengths in the infrared region extending from about 0.7  $\mu\text{m}$  (visible red) to around 2 or 3  $\mu\text{m}$  (varying with the author). The longer wavelength end grades into the middle infrared. The term really emphasizes the radiation reflected from plant materials, which peaks at around 0.85  $\mu\text{m}$ . It is also called solar infrared, as it is only available for use during the daylight hours.

**noise**—random or regular interfering effects in the data which degrade its information-bearing quality.

**oblique photograph**—an aerial photograph taken with the camera axis intentionally directed between the horizontal and the vertical. A high-oblique photograph is one in which the apparent horizon is included within the field of view, whereas a low-oblique photograph does not include the apparent horizon within the field of view.

**panchromatic**—a term used for films that are sensitive to broadband (that is, the entire visible part of spectrum) electromagnetic radiation and for broadband photographs.

- photogrammetry**—the art or science of obtaining reliable measurements by means of photography.
- pixel**—(derived from “picture element”) a data element having both spatial and spectral aspects. The spatial variable defines the apparent size of the resolution cell (that is, the area on the ground represented by the data values), and the spectral variable defines the intensity of the spectral response for that cell in a particular channel.
- precision**—a quality associated with the refinement of instruments and measurements, indicated by the degree of uniformity or identity of repeated measurements.
- radar**—acronym for *radio detection and ranging*; a method, system, or technique, including equipment components, for using beamed, reflected, and timed electromagnetic radiation to detect, locate, and track objects, to measure altitude, and to acquire a terrain image. In remote sensing of the earth's or another planet's surface, it is used for measuring and, often, for mapping the scattering properties of the surface.
- radar, synthetic aperture (SAR)**—a radar in which a synthetically long apparent or effective aperture is *constructed* by integrating multiple returns from the same ground *cell*, taking advantage of the Doppler effect to produce a *phase history* film or tape that may be optically or digitally processed to reproduce an image.
- remote data transmission**—the automated transmission of data from remote unattended stations. The transmission generally will use telephonic or radio communications technology, and the data often are hydrometeorological.
- remote sensing**—in the broadest sense, the measurement or acquisition of information on some property of an object or phenomenon by a recording device that is not in physical or intimate contact with the object or phenomenon under study; for example, the utilization at a distance (as from an aircraft, spacecraft, or ship) of any device and its attendant display for gathering information pertinent to the environment, such as measurements of force fields, electromagnetic radiation, or acoustic energy. The technique employs such devices as the camera, lasers, radio-frequency receivers, radar systems, sonar, seismographs, gravimeters, magnetometers, and scintillation counters.
- resolution**—the ability of an entire remote sensor system, including lens, antennae, display, exposure, processing, and other factors, to render a sharply defined image. It may be expressed as line pairs per millimetre or metre, or in many other ways.
- satellite**—an attendant body that revolves about another body, the *primary*; especially in the solar system, a secondary body, or moon, that revolves about a planet; a man-made object that revolves about a spacial body.
- scale, gray**—a term used to describe the various tonal gradations on a photographic medium, cathode-ray tube, or other display medium or device.
- side-looking radar**—an all-weather, day-and-night remote sensor that is particularly effective in imaging large areas of terrain. It is an *active* sensor, as it generates its own energy, which is transmitted and received to produce a photograph-like picture of the ground. It is also referred to as *side-looking airborne radar*; abbreviated SLAR.
- small scale**—refers to aerial photographs with a representative fraction smaller than 1:40 000 and to maps with a representative fraction (scale) smaller than 1:1 000 000.
- spectral colors**—the continuous band of pure colors in the visible spectrum is divided for convenience into seven basic spectral colors: violet, indigo, blue, green, yellow, orange, and red.
- spectrometer**—a device to measure the spectral distribution of electromagnetic radiation.
- spectrophotometer**—a photometer that measures the intensity of electromagnetic radiation (EMR) as a function of the frequency (or wavelength) of EMR. It is usually used for the visible portion of the spectrum.

**specular**—in sensitometry, the term is applied to a measurement made by collimated or essentially parallel light rays; it refers to reflection or transmission without scattering or diffusion.

**stereoscope**—a binocular optical instrument for assisting the observer to view two properly oriented photographs or diagrams to obtain the mental impression of a three-dimensional model.

**stereoscopic pair**—two photographs of the same area taken from different camera stations so as to afford stereoscopic vision, frequently called a *stereopair*.

**swath width**—(total field of view) the overall plane angle or linear ground distance covered by a multispectral scanner in the across-track direction.

**synchronous satellite**—an equatorial west-to-east satellite orbiting the earth at an altitude of 34 900 km, at which altitude it makes one revolution in 24 h synchronous with the earth's rotation.

**thermal**—in remote sensing, pertaining to emitted or infrared radiation in the 4.5 to 13.5- $\mu\text{m}$  wavelength range; any sensible heat; of or pertaining to heat, as in thermal capacity, emissivity, or conductivity.

**thermal infrared**—the preferred term for the middle wavelength range of the infrared region, extending roughly from 3  $\mu\text{m}$  at the end of the near infrared region, to about 15 or 20  $\mu\text{m}$ , where the far infrared begins. In practice, the limits represent the envelope of energy emitted by the earth behaving as a gray body with a surface temperature around 290 K (27°C).

**transparency**—(1) the light-transmitting capability of a material; the loss of light in transmission through good optical glass. Approximately 2.4% of visual light is lost for every centimetre of glass traversed. (2) A positive image on glass or film, intended to be viewed by transmitted light, either black and white or in color; also called a diapositive.

**ultrasonic**—of or pertaining to frequencies above those that affect the human ear, that is, more than 20 000 vibrations per second.

**ultraviolet radiation**—electromagnetic radiation of a shorter wavelength than visible radiation but longer than X-rays; roughly, radiation in the wavelength interval between 10 and 4000 Å.

**video tape recording (VTR)**—a magnetic recording of the composite video signal.

**visible radiation**—electromagnetic radiation of the wavelength interval to which the human eye is sensitive, the spectral interval from approximately 0.4 to 0.7  $\mu\text{m}$ .

**wavelength**—(symbol,  $\lambda$ ) velocity divided by frequency. In general, the mean distance between maxima (or minima) of a roughly periodic pattern. Specifically, the least distance between particles moving in the same phase of oscillation in a wave disturbance. Optical and infrared wavelengths are measured in nanometres ( $10^{-9}$  m), micrometres ( $10^{-6}$  m), and angstroms ( $10^{-10}$  m).

**X-ray**—nonnuclear electromagnetic radiation of very short wavelength, lying within the interval of 0.1 to 100 Å (between gamma rays and ultraviolet radiation).

## APPENDIX II—Sources of Remotely Sensed Data\*

### U.S. Department of Agriculture

#### *Agricultural Stabilization and Conservation Service (ASCS)*

ASCS has acquired coverage over about 80% of the United States, excluding Alaska, most commonly at a scale of 1:20 000 on black and white, 9-in. panchromatic film. Coverage usually is on a county-by-county basis on a seven-year cycle, dating back to the 1930s. Since about 1971, 1:40 000-scale photography has been available. Indexes of coverage for specific areas are available for inspection through local county ASCS offices. For more information, contact the following office:

Aerial Photography Field Office, ASCS USDA  
2222 West 2300 South, P.O. Box 30010  
Salt Lake City, UT 84125  
(801) 524-5856 FTS: 588-5856

#### *U.S. Forest Service (USFS)*

USFS has acquired aerial photographs over most of the national forest lands, primarily at scales of 1:20 000 to 1:24 000 on standard black and white, 9-in., panchromatic film that dates back to 1934. Standard coverage through the 1960s was at a scale of 1:15 840. More recently, color and color-infrared photographs at smaller scales ranging up to 1:80 000 are available. Coverage is updated as deemed necessary by USFS. The Forest Service is geographically organized into nine regions with the regional headquarters listed below:

Region 1  
Northern  
Federal Building  
Missoula, MT 59801

Region 2  
Rocky Mountain  
11177 W. 8th Ave., Box 25127  
Lakewood, CO 80225

Region 3  
Southwestern  
517 Gold Ave., SW  
Albuquerque, NM 87102

Region 4  
Intermountain  
324 25th St.  
Ogden, UT 84401

\*This material was prepared by C. Dale Elifrits and A. W. Hatheway of the School of Mines and Metallurgy, University of Missouri—Rolla. The information is modified and updated from *Remote Sensing and Resource Management*, edited by C. J. Johansen and J. L. Sanders and published by the Soil Conservation Society of America, Ankeny, Iowa, in 1982; printed with permission.

Region 5  
California  
630 Sansome St., Room 548  
San Francisco, CA 94111

Region 6  
Pacific Northwest  
319 SW Pine St.  
P.O. Box 3623  
Portland, OR 97208

No Region 7

Region 8  
Southern  
1720 Peachtree Rd.  
Atlanta, GA 30309

Region 9  
Eastern  
633 West Wisconsin Ave.  
Milwaukee, WI 53203

Region 10  
Alaska  
Federal Office Building  
P.O. Box 1628  
Juneau, AK 99502

Inquiries may also be referred to:

Division of Engineering  
U.S. Forest Service, USDA  
Washington, DC 20250

*Soil Conservation Service (SCS)*

SCS has acquired conventional aerial photographs of the United States, generally at a scale of 1:20 000 on a 9-in., black and white, panchromatic film. Most recently, coverage has been acquired at scales ranging from 1:31 680 to 1:85 000. SCS currently is undertaking orthophotographic mapping projects in cooperation with USGS. Surveys are not flown on a prescribed repetitive basis. For more information, contact the SCS:

Soil Conservation Service, USDA  
Cartographic Division  
Federal Center Building  
Hyattsville, MD 20782  
(301) 436-8187

**U.S. Department of Commerce**

*National Oceanic and Atmospheric Administration (NOAA)*

*Environmental Satellite Imagery*—NOAA is acquiring low-resolution imagery of the earth using visible and thermal infrared sensors by a variety of satellites, including SMS-GOES, Tiros, Nimbus, ATS, and ESSA satellites. For more information, contact the following branch:

Satellite Data Services Branch D543  
Environmental Data Service, NOAA  
World Weather Building, Room 606  
Washington, DC 20233  
(301) 763-8111



*National Ocean Survey, Coastal Mapping Division*—The Coastal Mapping Division (formerly the Coast and Geodetic Survey) has acquired coverage over the nation's coastal areas. Multispectral, metric, mapping-type coverage at scales ranging from 1:10 000 to 1:40 000 has been acquired in recent years. This agency also has the responsibility for acquiring aerial photographs over the nation's major airports back to World War II under the Airport Obstruction Chart Survey Program. Coverage is typically in black and white panchromatic film at scales varying from 1:24 000 to 1:60 000. For more information, contact the following agency:

Coastal Mapping Division, NOAA  
Rockville, MD 20852  
(301) 496-8601

## **U.S. Department of Defense**

Estimates of the number of aerial photographs acquired by the Department of Defense (DOD) run between 100 and 200 million frames. The primary agency responsible for archiving this collection is the Defense Intelligence Agency (DIA). The photographs generally are at scales of 1:15 000 to 1:40 000 on 9-in., black and white, panchromatic film. Coverage dates back to the 1930s. Some of the early coverage, such as the Advanced Meteorological Satellite, small-scale coverage of the 1950s, and the Navy/Army-acquired coverage of Alaska, has been transferred to the EROS Data Center archives. The National Cartographic Information Center is currently handling the task of producing plots and indexes of DOD unclassified coverage.

The Defense Mapping Agency (DMA) was established in 1972, with primary responsibilities for mapping and charting within the DOD. Most current activities are being working out in conjunction with USGS.

For more information, contact these agencies:

Defense Mapping Agency  
Topographic Command  
6500 Brooks Lane, NW  
Washington, DC 20315  
Attn: Code 50320

Defense Intelligence Agency  
Attn: DS4A  
Arlington Hall Station  
Washington, DC 20301

## ***U.S. Army Corps of Engineers***

The Corps has extensive involvement in civil projects, such as dams, shoreline and flood protection, and waterway navigation. Aerial photographic coverage dating back to the 1930s generally is with standard 9-in., black and white, panchromatic film. The scales vary considerably with the particular project requirements. More recently, coverage has been acquired using color and color-infrared films. Although the Army Corps of Engineers is officially part of DOD, most of its more recent coverage remains in the hands of the particular project office that collected it. The principal organizations involved with remote sensing data include the Corps Engineer Topographic Laboratories (ETL), Cold Regions Research and Engineering Laboratory (CRREL), Waterways Experiment Station (WES), Coastal Engineering Research Center (CERC), and Institute for Water Resources (IWR).

The Coastal Engineering Research Center at Ft. Belvoir, VA, recently has taken responsibility for indexing much of the imagery collected by the Corps. For more information, contact each corps remote sensing coordinator on the division level.

The division offices are as the following:

Huntsville Division  
P.O. Box 1600 West Station  
Huntsville, AL 35807  
(205) 895-5190

Lower Mississippi Valley Division  
P.O. Box 80  
Vicksburg, MS 39180  
(601) 636-1311 ext. 339 or 611

Missouri River Division  
P.O. Box 103 Downtown Station  
Omaha, NE 68101  
(402) 221-3204

New England Division  
424 Trapelo Road  
Waltham, MD 92154  
(617) 894-2400 ext. 632

North Atlantic Division  
90 Church St.  
New York, NY 10007  
(212) 264-7088

North Central Division  
536 S. Clark Street  
Chicago, IL 60605  
(312) 353-6395

North Pacific Division  
Room 210 Custom House  
Portland, OR 97209  
(503) 221-3757

Ohio River Division  
P.O. Box 1159  
Cincinnati, OH 45201  
(513) 684-3024

Pacific Ocean Division  
Building 230, Ft. Shafter  
Honolulu, HI 96813  
(808) 438-2263

South Atlantic Division  
510 Title Building  
30 Pryor Street NW  
Atlanta, GA 30303  
(404) 526-6704

South Pacific Division  
630 Sansome Street, Room 1216  
San Francisco, CA 94111  
(425) 556-5709

Southwestern Division  
1200 Main Tower  
Dallas, TX 75202  
(214) 749-3166

The field operating agencies are the following:

Engineer Topographic Laboratories  
Ft. Belvoir, VA 22060  
(703) 664-3736

Coastal Engineering Research Center  
Kingman Building  
Ft. Belvoir, VA 22060  
(703) 325-7172

Cold Regions Research and Engineering Laboratory  
P.O. Box 282  
Hanover, NH 02755  
(603) 643-3200

Construction Engineering Research Laboratory  
P.O. Box 4005  
Champaign, IL 61820  
(217) 352-6511

Institute for Water Resources  
Kingman Building  
Ft. Belvoir, VA 22060

Waterways Experiment Station  
P.O. Box 631  
Vicksburg, MS 39180  
(601) 636-3111

#### *Defense Meteorological Satellite Program (DMSP)*

Data acquired by the U.S. Air Force's (USAF) Global Weather Satellite Program is archived at the Space Science and Engineering Center at the University of Wisconsin. These data originate at USAF Global Weather Central, Offut Air Force Base, Omaha, NE. For more information, contact the following center:

DMSP Satellite Data Library  
Space Science and Engineering Center  
University of Wisconsin  
1225 West Dayton St.  
Madison, WI 53706  
(608) 262-5335

#### **U.S. Department of the Interior**

##### *Bureau of Land Management (BLM)*

BLM has acquired photographs in recent years at various scales and film types. For more information contact the following office:

Office of Special Mapping  
Bureau of Land Management  
Denver Federal Center  
Building 50  
Denver, CO 80225  
(303) 234-6036, 6037  
FTS: 234-6036, 6037

##### *U.S. Geological Survey (USGS)*

*EROS Data Center (EDC)*—The EROS Data Center was established in 1971 as part of the Earth Resources Observation Systems (EROS) program of the Department of the Interior

(DOI) and is managed by USGS. It provides primary access to Landsat data, aerial photographs acquired by DOI, and aerial photographs and other remotely sensed data acquired by NASA research aircraft and from Skylab, Apollo, and Gemini spacecraft.

Landsats 1, 2, and 3 have acquired about 480 000 individual multispectral scanner scenes in four separate spectral bands and 52 000 return-beam vidicon scenes. Nearly complete coverage of the world's land areas, except the polar areas, has been collected. Over 56 000 frames of Skylab, Apollo, and Gemini coverage have been archived at EDC. Only selected coverage was taken on these missions.

High-altitude aerial photographs (taken from 60 000 to 65 000 feet altitude) have been acquired by NASA for much of the United States at the request of investigators participating in the NASA Earth Resources Program. The most common scales are 1:60 000 and 1:120 000. Black and white, color, and color-infrared photographs are generally available in a 9-in. film format. Since the inception of this program in 1964, about 1 300 000 frames have been acquired, covering about 80% of the contiguous 48 states. Many areas have been flown more than once. The main sources for these data are the NASA-Ames Research Center in Moffett Field, CA, and the NASA-Johnson Space Center in Houston.

Conventional aerial photography flown by USGS accounts for approximately 2 500 000 frames. The most common scale is 1:24 000, typically on 9-in., black and white, panchromatic film.

A final category includes aerial photographs acquired by various federal agencies at various scales and film types. The following groups have provided about 1 000 000 frames in the EDC archives: U.S. Army Map Service, U.S. Air Force, U.S. Navy, U.S. Army Corps of Engineers, Bureau of Land Management, Bureau of Reclamation, Wallops and Marshall Flight Centers (NASA), Mississippi Test Facility, University of Michigan, and South Dakota State University.

Because the EROS Data Center does not hold the complete collection of aerial photographs acquired by these individual groups, users should contact the originating agency for additional coverage. For more information, contact the following center:

EROS Data Center  
Attn: User Services  
Sioux Falls, SD 57198  
(605) 594-6151  
FTS: 784-7151

*National Cartographic Information Center (NCIC)*—NCIC collects, organizes, and distributes information about cartographic products (aerial and space imagery, maps, charts, geodetic control, and digital cartographic data) held by federal, state, local, and private organizations. The information is generally restricted to data covering the United States and its territories. The information is encoded into a system, such as the Aerial Photography Summary Record System (APSRs), where it is geographically organized and periodically dumped on microfiche available to the public.

At present, more than 200 different organizations are contributing information to the APSRS data base. NCIC will direct users to the appropriate source of cartographic data and, in the case of USGS data, will accept orders for cartographic products. The NCIC headquarters office and the NCIC regional offices are linked together and to the EROS Data Center in a communications network for ordering products, such as USGS aerial imagery and Landsat imagery, available through USGS. In addition to the NCIC national and regional centers, there is one federal and 31 state affiliated offices that handle NCIC's cartographic information for their respective regions.

For information at the national level, contact the following centers:

National Cartographic Information Center  
507 National Center  
Reston, VA 22092  
(703) 860-6045  
FTS: 928-6187  
Contact: John T. Wood

Mid-Continent Mapping Center  
National Cartographic Information Center  
U.S. Geological Survey  
1400 Independence Rd.  
Rolla, MO 65401  
(314) 341-0851  
FTS: 277-0851  
Contact: Dennis L. White

Eastern Mapping Center  
National Cartographic Information Center  
U.S. Geological Survey  
536 National Center  
Reston, VA 22092  
(703) 860-6336  
FTS: 928-6336  
Contact: Walter S. Wagner

National Space Technology Laboratories  
National Cartographic Information Center  
U.S. Geological Survey  
Building 3101  
NSTL Station, MS 39529  
(601) 688-3544  
FTS: 494-3544  
Contact: Henry T. Svehlak

Rocky Mountain Mapping Center  
National Cartographic Information Center  
U.S. Geological Survey  
Stop 504, Box 25046  
Federal Center  
Denver, CO 80225  
(303) 236-5829  
FTS: 776-5829  
Contact: William Graser

Alaska Office  
National Cartographic Information Center  
U.S. Geological Survey  
4230 University Drive  
Anchorage, AK 99508-4664  
(907) 271-4159  
FTS: 8-907-271-4159  
Contact: Cheryl Hallam

Western Mapping Center  
National Cartographic Information Center  
U.S. Geological Survey  
345 Middlefield Rd.  
Menlo Park, CA 94025  
(415) 323-8111  
FTS: 467-2427  
Contact: Richard Zorker

EROS Data Center  
U.S. Geological Survey  
Sioux Falls, SD 57198  
(605) 594-6507  
FTS: 784-7507  
Contact: Karla Sprenger

The following agency is an *NCIC federal affiliate*:

Tennessee Valley Authority  
200 Haney Building  
311 Broad St.  
Chattanooga, TN 37401  
(615) 751-MAPS  
FTS: 858-MAPS  
Contact: Jack Dodd

The following agencies are *NCIC state affiliates*:

*Alabama*

Geological Survey of Alabama  
420 Hackberry Lane  
P.O. Box O, University Station  
University, AL 35486  
(205) 349-2852  
FTS: 349-2852  
Contact: Michael Szabo

*Alaska*

Geophysical Institute  
University of Alaska, Fairbanks  
Fairbanks, AK 99775-0800  
(907) 474-7487  
FTS: 474-7487  
Contact: Katie Martz

*Arizona*

Arizona State Land Department  
Resource Analysis Division  
1624 West Adams, Room 302  
Phoenix, AZ 85007  
(602) 255-4061  
FTS: 765-4061  
Contact: Thomas Loveland

Arizona State Library  
Department of Archives and Records  
Map Services  
1700 West Washington  
Phoenix, AZ 85007  
(602) 255-4046  
FTS: 255-4046  
Contact: Wes Rader

*Arkansas*

Arkansas Geological Commission  
Vardelle Parham Geology Center  
3815 West Roosevelt Rd.  
Little Rock, AR 72204  
(501) 371-1488  
FTS: 740-5011  
Contact: William V. Bush

*California*

Map and Imagery Laboratory Library  
Library, University of California  
Santa Barbara, CA 93106  
(805) 961-2779  
FTS: 961-2779  
Contact: Larry Carver

Map Information Office  
State of California  
1416 9th Street  
P.O. Box 388  
Sacramento, CA 98502  
(916) 445-9259  
FTS: 445-9259  
Contact: Joey Wong

*Connecticut*

Natural Resources Center  
Department of Environmental Protection  
165 Capitol Avenue  
State Office Building, Room 553  
Hartford, CT 06106  
(203) 566-3540  
FTS: 244-2000  
Contact: Sidney Quarrier

Satellite Office  
University of Connecticut  
Map Library, Level 4  
Storrs, CT 06268  
(203) 486-4589  
FTS: 244-2000  
Contact: Pat McGlamery

*Delaware*

Delaware Geological Survey  
Cartographic Information Center  
University of Delaware  
101 Penny Hall  
Newark, DE 19716  
(302) 451-8262  
FTS: 451-8262  
Contact: William Schenck

*Florida*

Florida Resources and Environmental Analysis Center  
361 Bellamy Building  
Florida State University  
Tallahassee, FL 32306-4015  
(904) 644-2882  
FTS: 644-2882  
Contact: James R. Anderson

*Georgia*

Office of Research and Information  
Department of Community Affairs  
40 Marietta Street, NW  
Suite 800  
Atlanta, GA 30303  
(404) 656-2900  
FTS: 656-2900  
Contact: Mason Adams

*Hawaii*

Department of Planning and Economic Development  
Kamamalu Building  
250 South King St.  
Honolulu, HI 96813  
(808) 548-3047  
FTS: 556-0200  
Contact: Craig Tasaka

*Idaho*

Idaho State Historical Library  
325 West State  
Boise, ID 83702  
Mailing address:  
610 N. Julia Davis Dr.  
Boise, ID 83702-7695  
(208) 334-3356  
FTS: 554-1111  
Contact: Larry Jones

*Illinois*

(User Services)  
University of Illinois at Urbana-Champaign  
Map and Geography Library  
1408 West Gregory Dr.  
Urbana, IL 61801  
(217) 333-0827  
FTS: 333-0827  
Contact: David A. Cobb

(Data Acquisition)  
Illinois State Geological Survey  
615 East Peabody Dr.  
Champaign, IL 61820  
(217) 344-1481  
FTS: 344-1481  
Contact: Edward G. Scoggin



*Kentucky*

Director and State Geologist  
Kentucky Geological Survey  
311 Breckinridge Hall  
University of Kentucky  
Lexington, KY 40506  
(606) 257-3196  
FTS: 257-3196  
Contact: Patrick McHaffie

*Louisiana*

Office of Public Works  
Department of Transportation and Development  
P.O. Box 94245, Capitol Station  
Baton Rouge, LA 70804-9245  
Contact: Dot McConnell

*Maryland*

Maryland Geological Survey  
The Rotunda, Suite 440  
711 West 40th St.  
Baltimore, MD 21211  
(301) 338-7212  
FTS: 922-3311  
Contact: Ken Schwarz

*Massachusetts*

University of Massachusetts  
Director/Coordinator  
Cartographic Information Research Services  
102D Hasbrouck Laboratory  
Amherst, MA 01003  
(413) 545-0359  
FTS: 223-2100  
Contact: Dennis Swartwout

*Michigan*

Division of Land Resource Programs  
Michigan Department of Natural Resources  
Steven T. Mason Building, Box 30028  
Lansing, MI 48909  
(517) 373-1170  
FTS: 373-1170  
Contact: Sherman T. Hollander

*Minnesota*

Minnesota State Planning Agency  
Land Management Information Center  
Room LL65, Metro Square Building  
7th & Robert Sts.  
Saint Paul, MN 55101  
(612) 297-2490  
FTS: 297-2490  
Contact: Donald Yaeger

*Mississippi*

Geographic Information Systems Division  
Mississippi Research and Development Center  
3825 Ridgewood Rd.  
Jackson, MS 39211  
(601) 982-6606  
FTS: 982-6606  
Contact: Paul Davis

*Missouri*

Missouri Department of Natural Resources  
Division of Geology and Land Survey  
P.O. Box 250  
Rolla, MO 65401  
(314) 364-1752  
FTS: 758-7212  
Contact: Keith Wedge

*Montana*

Montana Bureau of Mines and Geology  
Montana Tech  
Main Hall, Room 200  
Butte, MT 59701  
(406) 496-4167  
FTS: 585-5011  
Contact: Hal James

*Nebraska*

Director and State Geologist  
Conservation and Survey Division  
University of Nebraska-Lincoln  
901 North 17th St.  
Lincoln, NE 68508  
(402) 472-3471  
FTS: 622-3471  
Contact: Don Rundquist

*Nevada*

Nevada Bureau of Mines and Geology  
University of Nevada, Reno  
Reno, NV 89557-0088  
(702) 784-6691  
FTS: 470-5911  
Contact: Becky Weimer-McMillion

*New Hampshire*

Documents Librarian  
Documents Department  
Dimond Library  
University of New Hampshire  
Durham, NH 03824  
(603) 862-1777  
FTS: 834-7011  
Contact: Frank W. Adamovich

*New Jersey*

Department of Environmental Protection  
Division of Water Resources  
New Jersey Geological Survey  
CN-029  
Trenton, NJ 08625  
(609) 292-2576  
FTS: 292-2576  
Contact: Frank W. Adamovich

*New Mexico*

University of New Mexico  
Technology Applications Center  
2500 Central Ave., S.E.  
Albuquerque, NM 87131  
(505) 277-3622  
FTS: 277-3622  
Contact: Amy Budge

*New York*

Map Information Unit  
New York Department of Transportation  
Albany, NY 12232  
(518) 457-3555  
FTS: 457-3555  
Contact: Paul McElligott

*North Carolina*

Chief, Geological Survey Section  
Division of Land Resources, DNRCD  
P.O. Box 27687  
Raleigh, NC 27611  
(919) 733-2423  
FTS: 733-2423  
Contact: William Flynt

*North Dakota*

North Dakota State Water Commission  
State Office Building  
900 East Boulevard  
Bismark, ND 58505  
(701) 224-2750  
FTS: 783-2750  
Contact: Lloyd Scott

*Ohio*

Ohio Department of Natural Resources  
Division of Soil and Water Conservation  
Remote Sensing Section-NCIC  
Fountain Square, Building E  
Columbus, OH 43224  
(614) 265-6770  
FTS: 265-6770  
Contact: James H. Given, Jr.

*Oregon*

Oregon State Library  
Public Services  
Salem, OR 97310  
(503) 378-4502  
FTS: 530-4502  
Contact: Marge Wright

*Pennsylvania*

Department of Environmental Resources  
Bureau of Topographic and Geological Survey  
P.O. Box 2357  
Harrisburg, PA 17120  
(717) 787-2169  
FTS: 787-2169  
Contact: Don Hoskins

*Rhode Island*

Rhode Island Cartographic Information Center  
Marine Resources Building  
University of Rhode Island  
Narragansett, RI 02882  
(401) 792-6277  
FTS: 838-1000  
Contact: Cyndi Krenicki

*South Carolina*

South Carolina Land Resources Conservation Commission  
2221 Devine St., Suite 222  
Columbia, SC 29205  
(803) 758-2823  
FTS: 785-2823  
Contact: Daniel Fairey

*Tennessee*

Department of Conservation  
Division of Geology  
701 Broadway  
Nashville, TN 37203  
(615) 742-6696  
FTS: 742-6696  
Contact: James L. Moore

*Texas*

Texas Natural Resources Information System  
P.O. Box 13087  
Austin, TX 78711  
(512) 463-8406  
FTS: 463-8406  
Contact: Lou Falconieri

*Utah*

Utah Geological and Mineral Survey  
 606 Black Hawk Way  
 Research Park  
 Salt Lake City, UT 84108-1280  
 (801) 581-6831  
 FTS: 581-6831  
 Contact: Mage Yonetami

*Virginia*

Department of Conservation and Economic Development  
 Division of Mineral Resources  
 Mineral Resources Building  
 Box 3667  
 Charlottesville, VA 22903  
 (804) 293-5121  
 FTS: 937-6011  
 Contact: Avon Hudson

*Washington*

Washington State Library  
 Information Services Division  
 Olympia, WA 98504  
 (206) 753-4027  
 FTS: 753-4027  
 Contact: Ann Bregent

*West Virginia*

West Virginia Geological and Economic Survey  
 West Virginia Cartographic Center  
 Box 879  
 Morgantown, WV 26507  
 (304) 594-2331  
 FTS: 923-1511  
 Contact: Dr. Peter Lessing

*Wisconsin*

State Cartographer's Office  
 144 Science Hall  
 554 North Park St.  
 Madison, WI 53706  
 (608) 262-6850  
 FTS: 262-6850  
 Contact: Christine Reingard

*Wyoming*

State Engineer  
 Barrett Building  
 Cheyenne, WY 82002  
 (307) 777-7354  
 FTS: 328-1110  
 Contact: George L. Christopulos

*National Park Service (NPS)*

NPS has acquired aerial photographs over the national parks at various scales with various film types. For more information, contact NPS at the following address:

National Park Service  
Denver Service Center  
655 Parfet St.  
P.O. Box 25287  
Denver, CO 80225  
(303) 234-5132  
FTS: 234-4500

**U.S. Environmental Protection Agency**

In 1974, EPA established a Remote Sensing Branch at the National Environmental Research Center in Las Vegas, NV. The data acquired are of various types and format. For more information, contact the following centers:

Environmental Monitoring Systems Laboratory  
P.O. Box 15027  
Las Vegas, NV 89114  
  
EPA Interpretation Center  
P.O. Box 1587  
Vint Hill Farms  
Warrenton, VA 22186

Information can also be obtained from the following regional offices:

Region 1  
J. F. Kennedy Federal Building  
Boston, MA 02203

Region 2  
26 Federal Plaza  
New York City, NY 10278

Region 3  
841 Chestnut Building  
Philadelphia, PA 19107

Region 4  
345 Courtland St., NE  
Atlanta, GA 30365

Region 5  
230 Dearborn St.  
Chicago, IL 60604

Region 6  
First International Building  
1201 Elm St.  
Dallas, TX 75270

Region 7  
726 Minnesota St.  
Kansas City, KS 66101

Region 8  
One Denver Place  
999 18th St.  
Denver, CO 80202-2413

Region 9  
215 Fremont St.  
San Francisco, CA 94105

Region 10  
1200 Sixth Ave.  
Seattle, WA 98101

### **General Services Administration**

#### *National Archives and Records Service*

This center is the archive for resource photographs acquired by the ASCS, SCS, USGS, and the Bureau of Reclamation prior to World War II. A catalog entitled "Aerial Photographs in the National Archives" is available upon request. For more information, contact this center at the following address:

National Archives and Records Service  
Cartographic Branch  
General Services Administration  
Washington, DC 20408  
(205) 523-3006

### **National Aeronautics and Space Administration**

#### *Wallops Flight Center*

Wallops Flight Center has an active remote sensing program centered on its Chesapeake Bay Ecological Program. Generally, this is low-to-middle-altitude multispectral photography. For more information, contact the following office:

Chesapeake Bay Ecological Program Office  
NASA-Wallops Flight Center  
Wallops Island, VA 23337  
(804) 824-3421, ext. 260

### **Tennessee Valley Authority**

TVA has acquired conventional aerial photographs of the Tennessee River watershed area, which includes the state of Tennessee and adjoining portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia. Coverage, dating back to 1933, was taken at various scales, typically at 1:24 000. Recently, some special-purpose color and color-infrared coverage has been acquired. For more information, contact the TVA at the following address:

Map Information and Records Unit  
Maps and Surveys Branch  
Tennessee Valley Authority  
101 Haney Building  
Chattanooga, TN 37401  
(615) 755-2122

### **Canadian Sources of Data**

For aerial photographs, contact this library:

National Air Photo Library  
615 Booth St.  
Ottawa, Ontario, Canada K1A 0E9  
(613) 995-4597

Landsat data can be purchased directly from the following service:

Integrated Satellite Information Services (ISIS) Ltd.  
P.O. Box 1630  
Prince Albert, Saskatchewan, Canada S6V 5T2  
(306) 764-3602 or 764-4259

Information on Landsat data availability and ordering assistance (also information regarding airborne remotely sensed data) are provided by the following center:

Canada Centre for Remote Sensing  
Attn: User Assistance  
717 Belfast Rd.  
Ottawa, Ontario, Canada K1A 0Y7  
(613) 995-1210

### **Private Aerial Survey Companies**

If existing coverage is not suitable, it may be necessary to contract for new photography to be flown. For names of aerial survey firms contact the following:

American Society for Photogrammetry and Remote Sensing  
105 North Virginia Ave.  
Falls Church, VA 22046  
(703) 534-6617



## APPENDIX III—Bibliography for Additional Reading

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## APPENDIX IV—Abbreviations and Acronyms Used in Remote Sensing and Remote Data Transmission

The following list of abbreviations and acronyms has been compiled from various sources and is presented as a useful service to the reader:

ADP	Automatic data processing
AIS	Airborne imaging spectrometer
ANSI	American National Standards Institute
APSRs	Aerial Photo Summary Records System
APT	Automatic picture transmission
ARS	Agricultural Research Service
ASCS	Agricultural Stabilization and Conservation Service
ASPRS	American Society for Photogrammetry and Remote Sensing
AVHRR	Advanced very high resolution radiometer
b/w	Black and white
CCRS	Canada Centre for Remote Sensing
CCT	Computer-compatible tape
CIR	Color-infrared film
CNES	Centre National d'Etudes Spatiales
CRPE	Centre de Recherches en Physique de l'Environnement Terrestre et Planétaire
CRREL	Cold Regions Research and Engineering Laboratory
CRT	Cathode-ray tube
CSATA	Centro Studi e Applicazioni in Tecnologie Avanzate
CSR	Centro de Sensores Remotes
CWR	Continuous-wave radar
CZCS	Coastal zone color scanner (6825-m resolution, 1600-km swath, 0.43 to 12.5- $\mu$ m wavelength)
DCP	Data collection platform
DCS	Data collection system
DOMSTAR	Communications relay set
DPS	Digital photogrammetry system
EDC	EROS Data Center
EDP	Electronic data processing
EM	Electromagnetic
EMR	Electromagnetic radiation
EMSL	Environmental Monitoring Systems Laboratory (EPA)
EOSA	Earth Observation Satellite Company (commercial operator of satellite systems in the United States)
EPA	Environmental Protection Agency (USDI)
ERIM	Environmental Research Institute of Michigan
ERL	Environmental Research Laboratory (NOAA)
EROS	Earth Resources Observation Satellite
ERS	ESA Remote Sensing Satellite
ERTS	Earth Resources Technology Satellite (launched 23 July 1972; retired 6 Jan. 1978; renamed Landsat-1)
ESA	European Space Agency
ESMR	Electronically scanning microwave radiometer
FOT	Fourier optical transform
GCP	Ground control point (a geographical feature of known location that is recognizable on images and can be used to determine geometrical corrections)

Geosat	Geologic Satellite Program (also U.S. Navy's satellite altimeter)
GIS	Geographic information system
GOES	Geostationary Operational Environmental Satellites (a series of meteorological satellites in geostationary orbit that support the relay of data from data collection platforms)
GPO	U.S. Government Printing Office
GSA	General Services Administration
GSFC	Goddard Space Flight Center
HCMM	Heat-capacity mapping mission (16 April 1978 to 31 Aug. 1980)
HCMR	Heat-capacity mapping radiometer (visible near infrared and thermal infrared, 26 June 1978 to 10 Oct. 1978)
IAHS	International Association of Hydrological Sciences
ICRSDT	International Committee on Remote Sensing and Data Transmission
ICSU	International Council of Scientific Unions
IEEE	Institute of Electrical and Electronics Engineers
IFOV	Instantaneous field of view
IGRSS	International Geoscience and Remote Sensing Society
IR	Infrared
IRIS	Integrated radar imaging system
IRSS	Indian Remote Sensing Satellite
IRSSP	Interactive remote sensing software package
IS	Image subtraction
ISAR	Intelligent synthetic aperture radar
IUGG	International Union of Geodesy and Geophysics
JPL	Jet Propulsion Laboratory
JTC	Joint transfer correlation
Landsat	<i>see</i> ERTS
L/C	Land cover
MESSR	Multispectral electronic self-scanning radiometer
MIZ	Marginal ice zone
MIZEX	Marginal Ice Zone Experiment
MOMS	Modular optoelectronic multispectral scanner
MOS	Marine Observation Satellite
MSS	Multispectral scanner
NARS	National Archives and Records Service (GSA)
NASA	National Aeronautics and Space Administration
NASDA	National Space Development Agency of Japan
Navstar	Global positioning satellite communication set
NCIC	National Cartographic Information Center (USGS)
NHAP	National High-Altitude Photography Program
Nimbus	Satellite series to meet the needs of atmospheric and earth scientists (first launched 28 Aug. 1964)
NOAA	National Oceanic and Atmospheric Administration (USDOC)
NPS	National Park Service (USDI)
NRL	Naval Research Laboratory
NROSS	Navy Remote Ocean Sensing System
NRSA	National Remote Sensing Agency of India
NSCAT	NASA scatterometer
ODA	Optical diffraction analysis
ONR	Office of Naval Research
RAE	Royal Aircraft Establishment
RBV	Return-beam vidicon
RCS	Radar cross section
RDT	Remote data transmission
RS	Remote sensing
RSAC	Remote Sensing Applications Center of China
SAR	Synthetic aperture radar

SCA	Snow-covered areas
SCS	Soil Conservation Service (USDA)
Seasat	An oceanographic research satellite, the first of a proposed series (launched 26 June 1978; terminated 10 Oct. 1978)
SIR	Shuttle imaging radar (launched 12 Nov. 1981 for 30 h; 23.5-cm wavelength; 40-m resolution; 50-km swath)
SLAR	Side-looking airborne radar
SLS	Stereo line scanner
SMMR	Scanning multifrequency microwave radiometer
SNR	Signal-to-noise ratio
SPOT	Système Probatoire pour l'Observation de la Terre (French)
SRS	Statistical Reporting Service
TDRS	Tracking and data relay systems
TI	Thermal imagery
TIROS	Television and Infrared Observation Satellite
TIRS	Thermal infrared scanner
TM	Thematic mapper
TMS	Thematic mapper simulator
TOPEX	Topographic Experiment
TVA	Tennessee Valley Authority
USACE	United States Army Corps of Engineers (USDOD)
USDA	United States Department of Agriculture
USDC	United States Department of Commerce
USDD	United States Department of Defense
USDI	United States Department of the Interior
USDOC	United States Department of Commerce
USDOD	United States Department of Defense
USDOI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service (USDA)
USGS	United States Geological Survey
UV	Ultraviolet
VFR	Very far radiation
VHRR	Very high resolution radiometer
VLSI	Very large scale integration
VTR	Video tape recording
WES	Waterways Experiment Station (USACE)