

# Military Uses of Civilian Remotely Sensed Data

## 6

**D**ata from civilian satellites systems such as Landsat, but more notably SPOT and the Russian Almaz,<sup>1</sup> have considerable military utility. They can be used to support:

- *Military operations*—For example, the use of Landsat and SPOT data gave the United States and its U.N. allies a marked advantage over Iraq in the Persian Gulf Conflict. The U.S. Defense Mapping Agency used these data to create a variety of maps for the U.S.-led battle against Iraqi forces (figure 6-1). More recently, in March 1993, the United States has used Landsat and SPOT data to create maps of the former Yugoslavia in support of air delivery of food and medical supplies to besieged towns of Eastern Bosnia.
- *Reconnaissance*—The recent use of data from civilian satellites for military reconnaissance demonstrates that post-processing, skilled interpretation, and the use of collateral information can make these data highly informative. For this reason, the civilian satellites' utility in reconnaissance exceeds that which might be expected on the basis of ground resolution.<sup>2</sup> The highly conservative rules of thumb normally used to relate ground resolution to suitability for particular reconnaissance tasks underestimate the utility of moderate resolution multispectral imagery.

**However, reconnaissance missions' requirements for timeliness often exceed the current capabilities of civil-**

<sup>1</sup> In October 1992, Almaz, which had been transmitting data from its synthetic aperture radar, fell back into the atmosphere and burned up.

<sup>2</sup> Ground resolution is a useful but simplistic measure of the capability to identify objects from high altitude.



Figure 6-1—Bomb Damage Assessment of Baghdad During the Persian Gulf Conflict



Although these SPOT images of downtown Baghdad, Iraq, have sufficient ground resolution (10 m) to distinguish intact bridges (left) from damaged ones (right), SPOT's usual timeliness would be inadequate for many bomb damage assessment tasks.

SOURCE: Copyright 1993, CNES. Provided by SPOT Image Corp., Reston, VA.

**ian satellite systems.** Landsat satellites pass over any given place along the equator once every 16 days; SPOT passes over once every 26 days. In addition, both systems may take weeks to process orders and military data users generally require much shorter response times. Because civilian missions generally have less stringent requirements than military ones, civilian satellite systems will continue to fall short in this regard unless they begin to cater expressly to the military market or improve revisit time for other reasons, such as crop monitoring or disaster tracking. As noted in chapter 4, one way to increase timeliness without adding additional satellites is to provide sensors with the capability of pointing to the side. SPOT has the capacity for cross-track imaging, and can reimage targets of interest in 1 to 4 days.

. **Arms Control**—Civilian satellite data have limited, but important utility for supporting arms control agreements. Although some facilities have been imaged by civilian satellites, many other arms-control tasks are beyond the capabilities (particularly resolution) of civilian satellites. Their greatest

weakness in most military applications—lack of timely response—is of less concern in the arms control arena, where events are typically paced by diplomatic, not military, maneuvers.

- **Mapping**—Mapping, including precise measurement of the geoid<sup>3</sup> itself, is a civilian mission with important military applications. These include simulation, training, and the guidance of automated weapons. Existing civilian satellite data are not adequate to create maps with the coverage or precision desired for military use. The military use of data from civilian land remote sensing satellites **would be greatly enhanced by improved resolution, true stereo capabilities, and improved orbital location and attitude of the satellite.** Military map makers and planners would also find use for data acquired with a civilian synthetic aperture radar system, which can sense Earth's surface through layers of clouds.

<sup>3</sup>The **figure** of the solid Earth.

### Box 6-A—The Broadening of Access to Military Information

The commercial availability of militarily useful remotely sensed imagery has sparked the interest of many interested in military affairs. Landsat and SPOT images have appeared in the media, and have been used to support news stories about military action or potentially threatening behavior (plate 10).<sup>1</sup>

Individuals who have used these images to make significant deductions regarding military activity include Johnny Skorve, whose photographic explorations of the Kola Peninsula using SPOT and Landsat images fill two volumes; Bhupendra Jasani, who has used SPOT data of the territory of the former Soviet Union to investigate military questions including INF Treaty compliance (plates 11 & 12), and reporters for several news organizations. These efforts have shown that the resolution provided by SPOT and Landsat, while poor compared to the rule-of-thumb requirements often stated for some military tasks, is more than sufficient to provide useful and even intriguing military information.

Civilians have also explored the military *use* (as distinct from utility) of civilian satellites by studying the records of SPOT Image, S.A. The corporation does not identify its customers, but its catalogue does list pictures already taken by latitude, longitude, and date. Peter Zimmerman makes a convincing case, on this basis, that SPOT has been used for military purposes.

These investigations of military matters share at least one trait in common: they do not require especially timely data. As described in appendix C, it is lack of timeliness, not of resolving power, that most limits the military use of civilian satellites.

See U.S. Congress, Office of Technology Assessment, *Commercial Newgathering from Space*, OTA-ISC-TM-40 (Washington, DC: U.S. Government Printing Office, May 1987).

SOURCE: Office of Technology Assessment, 1993.

Because other nations control some of the most capable civilian remote-imaging satellites, they could deny the United States access to some imagery for political reasons, or operate their systems in ways inimical to U.S. interests. Investment in improving U.S. technical strength in civilian remote-imaging could allay these fears. **However, attempting to stay far ahead of all other countries in every remote sensing technology could be extremely expensive, and would therefore be difficult to sustain in an environment of highly constrained budgets for space activities. From the national security perspective, staying ahead in technologies of most importance to national security interests may be enough.**

Because all countries now generally follow a nondiscriminatory data policy,<sup>4</sup> in which data

are offered to all purchasers at the same price and delivery schedule, foreign belligerents can buy Landsat data to further their wars against each other. These data, coupled with information from the Global Positioning System (GPS), might even be used to prepare for a war (or terrorism) against the United States or its allies. As technical progress continues to improve spatial and spectral resolution, the military utility of successive generations of civilian remote sensing satellites will also improve. Although such uses of satellite data **may pose some risk to the United States or its allies, the economic and political benefits of open availability of data generally outweigh the risks.**

The wide availability of satellite imagery of moderate resolution, and inexpensive computer tools to analyze these images, broadens the

<sup>4</sup>This principle was originated by the United States when it decided to sell Landsat data on this basis. See U.S. Congress, Office of Technology Assessment, *Remote Sensing and the Private Sector*, OTA-ISC-TM-239 (Washington, DC: U.S. Government Printing Office, April 1984) for a discussion of the relationship of the U.S. nondiscriminatory data policy to the "Open Skies" principle.

number and types of institutions and individuals with access to information about secret sites and facilities (box 6-A). Such information contributes to a widening of the terms of the political debate over future military policies in the United States and elsewhere.

Because the military value of remotely sensed data lies in timely delivery, the United States could cut off access to data as soon as the

countries' belligerent status is made clear, as in the Persian Gulf Conflict where both SPOT Image, S. A., a French firm, and EOSAT, Inc., cut off data to Iraq. In that case, the French were part of the allied team opposing Iraq. However, the United States and France (or another country that operates a remote sensing system capable of being used for military purposes) might be on opposing sides of a future dispute.