# Commercial Observation Satellites

## *Dual-Use Technology in an Age of Global Transparency*

John Baker, Kevin O'Connell, and John Robertson

Earth-orbiting satellites and manned spacecraft have been collecting images of the Earth's surface for more than four decades. Nonetheless, a major change is occurring as high-resolution satellite images become available for the first time to a broad range of states and non-state actors. This article examines some of the policy issues that commercial observation satellites raise for U.S. policymakers, who are concerned with both the potential benefits and risks of this dual-use information technology.

**John Baker** is Technical Policy Analyst at RAND.
**Kevin O'Connell** directs the Intelligence Policy Center at RAND.
**John Robertson** is a Masters candidate in the Security Studies Program at Georgetown University.

**Expanding Global Access.** During the Cold War years, the United States and Soviet Union were the only states with access to high-resolution military reconnaissance satellites to help them keep track of worldwide developments. This situation fundamentally changed after the Cold War as the U.S. and Russian governments allowed high-resolution satellite images to become publicly available. These governments took separate steps to declassify older military reconnaissance images, such as the earliest U.S. CORONA satellite images that are now publicly available from government archives. Even more important, both governments authorized commercial enterprises to sell high-resolution satellite images. These steps fundamentally opened the door to satellite imagery data, which is now available to a wide range of users with few government restrictions.

Several U.S. firms have received U.S. government licenses to build and operate their own commercial observation satellites. Despite some initial failures, two U.S. firms are currently operating their own imaging satellites. The IKONOS satellite, owned by Space Imaging, Inc., became the world's first operational commercial observation satellite in mid-1999. Another U.S. firm, DigitalGlobe, Inc., launched its QuickBird commercial observation satellite in 2001. Both satellites collect high-resolution panchromatic (black and white) images at greater than one-meter resolution. At this resolution, imagery interpreters can distinguish between objects as small as cars, trucks, and aircraft. These satellites also collect multispectral (color) images at slightly lower resolutions, which are better suited for distinguishing between vegetation and soil types. Both U.S. firms sell their satellite images to a broad range of domestic and international customers. Their global reach is extended through international partnerships with foreign governments and private firms. Other U.S. firms have plans to acquire their own imaging satellites, although most are making slow progress toward an initial satellite launch.

A growing number of foreign imaging satellites are also expected to become available for commercial use in the next few years, further increasing the overall supply in the international market for high-resolution satellite images and imagery-related information products. For example, SPOT-5, a French civilian satellite, and the EROS-A1 satellite, operated by ImageSat International, an Israeli-led private consortium, are among the first non-U.S. sources of high-resolution satellite images. Along with more satellites from these companies, several other countries (e.g., Canada, China, Germany, India, Italy, Japan, South Korea, and Taiwan) are working to launch new civilian or commercial imaging satellites, with plans to sell or broadly distribute high-resolution images.

Unlike declassified satellite images, which have mainly historical value, the new commercial and civilian observation satellites offer various users detailed and timely information on human activities and natural developments occurring almost anywhere in the world. This new situation means that high-resolution images are not only available to almost all governments, but also to a potentially broad range of non-state actors, including the news media, non-governmental organizations (NGOs), and businesses.

**Dual-Use of Satellite Images.** There is still considerable debate over the potential risks and benefits of this new proliferation of satellite technology. Some observers believe that greater access to high-resolution satellite images is beneficial because it contributes to growing global transparency. This perspective holds that providing all governments, multinational organizations, and non-state actors an additional information source for global monitoring of potentially significant human and natural developments is a positive development. However, others have warned that potential adversaries will exploit this dual-use technology for less benign purposes, such as trying to gain an intelligence or military edge over neighboring states.[2]

The new generation of non-military imaging satellites is well-suited for supporting a wide range of civilian and commercial applications. Civilian uses include natural resources monitoring, disaster assessments, and general public planning. New types of commercial applications include planning for utilities, precision agriculture, and infrastructure assessments.[3] In addition, high-resolution imagery offers novel types of users, such as NGOs, new opportunities for monitoring what is occurring in areas where governments or others might want to avoid public attention. Some current examples of "imagery activism" include revealing and assessing suspected sites of weapons of mass destruction in closed societies (e.g., Iraq, North Korea) or human rights concerns (e.g., images of North Korean labor camps or the urban devastation of Grozny resulting from Russian combat operations in 1999).[4] Based on past experience, satellite images are likely to support future efforts at settling territorial disputes and monitoring compliance with confidence-building measures.[5]

As a dual-use technology, satellite imagery also is quite suitable for supporting military operations. During the First Gulf War, the United States took advantage of lower-resolution Landsat and SPOT civil satellite images to help analyze terrain and plan various military missions, while sharing these overhead images with its coalition partners. The

new commercial and civil observation satellites produce images that are even more relevant to supporting military and intelligence missions because these satellite systems promise more timely delivery of higher resolution imagery data.

Besides the United States and its allies, potential adversaries and regional rivals will be interested in using this new information tool. Aggressive states might exploit their unprecedented access to commercial and civilian satellite images to gain an information edge over regional rivals or to conduct operations against ethnic subgroups in their own countries. Some states might attempt to use such satellite images in monitoring the activities of U.S. military forces. However, translating imagery data into a significant intelligence or military edge requires expertise, technology, and experience that are probably beyond the near-term capabilities of most countries considered threats to the United States and its allies.

Aggressive non-state actors, such as terrorist groups, are likely to be less interested in satellite images than with other information technologies (e.g., cell phones and Internet communications) in performing their activities. Given that terrorist groups can often obtain more detailed and timely information on "soft targets" using ground-level reconnaissance or insider sources, they may not view satellite images as an important information source.

**U.S. Policy Implications.** The information age has heralded an unprecedented flow of raw information, including satellite imagery data, across international borders. The growth of the Internet and affordable computing power has greatly facilitated the global spread of information products and tools, and the ability of the United States to control this flow is limited at best. If the U.S. government chooses to curtail and delay the flow of satellite technology and image products abroad, then foreign customers will simply look elsewhere. This will strengthen foreign industry and give greater encouragement to indigenous satellite programs, including imaging satellite systems.

**Rather than trying** to control the spread of information technologies, the United States is in a better position to help channel information trends.

Realization of the inevitable diffusion of imaging technologies led U.S. policymakers in the mid-1990s to permit several American firms to develop and operate their own high-resolution imaging satellites.[5] The new U.S. Commercial Remote Sensing Policy released last month by the White House builds on this basic approach, although with greater recognition that U.S. federal agencies are a major customer for U.S. firms and with reforms on restrictions on the export of components, turnkey systems, and data. The success of this policy for U.S. leadership in commercial obvservation satellites remains to be seen.

**Conclusions.** Whether desired or not by policymakers, the information age

trends that help foster growing global transparency are unlikely to be reversed. The widespread accessibility of satellite imagery is emblematic of the diffusion of information age technologies, as well as institutional pressures for revealing information. Rather than expending efforts trying to control the spread of information technologies, the United States is in a better position to help channel information trends through technological leadership. In terms of satellite imagery, such policies should encourage global access to the diverse benefits of steadily improving commercial and civilian observation satellites while helping to limit the potential risks of hostile states or non-state actors being able to effectively use such satellite imagery data for their aggressive purposes.

NOTES

1 For background on the Corona imaging satellites and the imagery declassification process, see Robert A. McDonald, ed., *Corona Between the Sun & the Earth: The First NRO Reconnaissance Eye in Space* (Bethesda, MD: The American Society for Photogrammetry and Remote Sensing, 1997); and Dwayne A. Day, John M. Logsdon, and Brian Latell, *Eye in the Sky: The Story of the Corona Spy Satellites* (Washington, DC: Smithsonian Institution Press, 1998).

2 Good arguments for both perspectives are presented in Yahya A. Dehqanzada and Ann M. Florini, *Secrets for Sale: How Commercial Satellite Imagery Will Change the World* (Washington, DC: Carnegie Endowment for International Peace, 2000); and Gerald M. Steinberg, *Dual Use Aspects of Commercial High-Resolution Imaging Satellites* (Ramat Gan, Israel: Bar-Ilan University, The Begin-Sadat Center for Strategic Studies, 1998).

3 Trends in the satellite remote sensing applications are analyzed in Kevin M. O'Connell, et. al., *U.S. Commercial Remote Sensing Satellite Industry: An Analysis of Risks* (Santa Monica, CA: RAND, 2001), 23–64.

4 See the QuickBird image used in John Larkin, "Exposed—Kim's Slave Camps," *Far Eastern Economic Review* (12 December, 2002), 14–18; and the IKONOS image comparisons in "Campaign Poster," *The New York Times, Week in Review* (26 March 2000).

5 For case studies on using satellite imagery for resolving territorial disputes in Central Europe, South America, and the South China Sea, see the various chapters in John C. Baker, Kevin M. O'Connell, and Ray A. Williamson, eds., *Commercial Observation Satellites: At the Leading Edge of Global Transparency* (Santa Monica, CA: RAND and ASPRS, 2001), 295–360.

6 The origins of U.S. policy are assessed in John C. Baker, *Trading Away Security? The Clinton Administration's 1994 Decision on Satellite Imaging Exports* (Washington, DC: Georgetown University, Institute for the Study of Diplomacy Publications, School of Foreign Service, 1997).

# War and Peace in an Age of Transparency

Kristin Lord

Innovations in information technology have changed the conduct of diplomacy. Some opinion leaders theorize that these innovations also will have dramatic effects on war and peace and, more specifically, that the information age will usher in a more peaceful world. The scope of their beliefs ranges from intense optimism to measured hopefulness that greater international trans-

**Kristin Lord** is Assistant Dean and Assistant Professor of Political Science and International Affairs at the Elliot School of International Affairs of The George Washington University.