

## Appendix C

### Synergies Related to Environmental and Other Non-Military issues\*

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Military and commercial intelligence organizations make synergistic use of many sources of information beyond those that they have established themselves. Examples are newspapers, periodicals, books, commercial and scientific journals, and statistics and other records published by governments.

Verification agencies may not have the support of any intelligence agency. They may need to exploit the synergy available from open sources by studies and analyses of their own. But, though generally obtainable, a large mass of public information is costly to assemble and scan, and the analysis requires experienced personnel.

Another opportunity to exploit synergy for arms control verification may exist in the rapidly expanding volume of information being collected for environmental monitoring, resource development and basic scientific research. Satellites and aircraft are being equipped with a growing variety of sensors able to detect features of the earth's surface, the surface of oceans, lakes, and rivers, and the atmosphere.

Many of the electro-optical sensors used for non-military spaceborne and airborne Earth surveillance are able to collect imagery at infrared wavelengths, detecting objects by reflections of sunlight not distinguishable at visual wave lengths. Sensors operating in the infrared range can detect very small temperature differences between objects and their surroundings, by night and by day. In fact, multispectral scanners provide an excellent example of synergy in technical methods: when the information obtained at the different wave lengths is combined, it yields knowledge not evident in

panchromatic images in black and white, even though the latter are likely to have superior resolution.

While the resolution of these images will not match that available to the most advanced military-reconnaissance satellites and aircraft, it may well suffice to indicate the presence of installations or activity not previously noticed by a verifying agency. In fact, with all its resources fully engaged in the Gulf War, the U.S. Department of Defense rented the services of the commercial French SPOT surveillance satellite to produce imagery over the relevant regions of the Middle East. The information was, of course, required for operations, rather than verification, but it proved to yield invaluable information regarding the deployment of military formations.

Before long there will be several commercial observation satellites in orbit equipped with synthetic aperture radar, surveying all of the Earth's surface. Again, their resolution will not match that of the most advanced military-reconnaissance satellites, but it will offer an ability to collect images of any part of the Earth in conditions of cloud cover, at all hours, and without the need for obtaining permission from the observed party.

Both electro-optical and radar sensors can be mounted on aircraft as well as (in fact, often more easily than) on satellites, and can obtain much better resolution because of the smaller distance between sensor and target. Other advantages of airborne surveillance include cost and, in contrast to satellite surveillance, the ability to direct the overflights to the area of greatest interest, and remain there for some hours. But access to the airspace may be denied,

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on 25 June 1992. Much of the background regarding the multiple uses of space surveillance is available in *Surveillance from Space: A Strategic Opportunity for Canada*, by George Lindsey. Working Paper 44, Canadian Institute for International Peace and Security, Ottawa, June 1992.

