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SATELLITE SURVEILLANCE AND CANADIAN CAPABILITIES

by Ronald Buckingham

HISTORY OF REMOTE SENSING AND SURVEILLANCE

In 1959, the US satellite Explorer-6 transmitted the first known photograph of the earth taken from space. A year later, in April 1960, the first of the TIROS weather satellites was launched into space and began feeding meteorological data to the earth. Its circular orbit was at an altitude of 830 kilometres, which is typical for a remote sensing mission. TIROS-1 lasted only 89 days, and the image resolution from its two TV cameras was only one kilometre, but it confirmed that earth observation by satellite had great potential. With succeeding spacecraft, each with better instrumentation, the public soon became familiar with satellite weather reporting.

In the US manned space programme, the Mercury astronauts had taken intriguing pictures with hand-held cameras and subsequently, in June 1965, the first systematic photography of the earth's surface was begun by Gemini astronauts J.A. McDivitt and E.H. White. The usefulness of their initial 39 overlapping area colour photographs prompted a continuing Gemini, and later Apollo and Skylab, remote sensing programme.¹

During that time the US and USSR had also been developing national security satellite surveillance technology ("Surveillance" is the military's equivalent to the scientific community's "remote sensing".) Airborne surveillance had its start in 1859 when aerial photographs were taken from a balloon, near Paris. The new technology was first applied just a few years later, in the US civil war. Photo-reconnaissance became a sophisticated craft in subsequent wars and significantly, for the yet-to-come satellite era, imaging radar and colour infrared photography were developed during World War II.¹ In 1956

the US began U-2 photo-reconnaissance overflights of the USSR and these continued until May 1960 when Francis Gary Powers was shot down by a Soviet missile at 70,000 feet. While this was a headline event, the fact is that over forty other US and allied reconnaissance aircraft had been shot down since the late 1940's.² The cessation of the U-2 flights coincided with the maturation of satellite technology, which was believed to be more useful for three reasons: satellites were then invulnerable to attack, they could cover larger areas, and they were not as provocative as manned aircraft overflights. In March 1955—two years before Sputnik—the US had embarked on a CIA-sponsored programme to develop satellite surveillance technology. The first reentry film package was recovered from the Discoverer 13 satellite on 11 August 1960. As John Kennedy began his presidency the alleged "missile gap" between the US and USSR was proven untrue by surveillance. By 1963, both "area surveillance" photos and "close look" photos were being obtained. The USSR's Kosmos programme began during that same era, and we can speculate that the quality of information was similar to that of the US. American and Soviet technological capabilities in surveillance gave both nations the confidence to enter the Strategic Arms Limitation Treaty (SALT) negotiations in 1969.³

The parallel development of surveillance and remote sensing technology continued. In the US, information on the technology was shared, subject to security classification, between NASA and the Air Force. The USSR does not divide its space efforts into civilian and military agencies.

By 1971 the US was flying 20,000-pound "Big Bird" surveillance satellites in near-polar orbits, typically with apogees (the highest point of the orbit) at 290 kilometres and perigees (the lowest point of the orbit) at 180 kilometres. At these low altitudes such

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