

time between the acquisition of the data and its analysis on the ground is likely to be shorter. For both sectors, earth observation satellites can be divided into six categories based on their function:

- remote sensing of the earth and oceans for scientific and commercial uses
- national security (military) surveillance
- early warning
- meteorology
- navigation, positioning and surveying
- treaty verification surveillance

## VERIFICATION

*“Verification with regard to weapons that are destroyed or limited would be carried out by both national technical means and through on-site inspections. The USSR is ready to reach agreement on any other additional verification measures.”*

—Mikhail Gorbachev  
16 January 1986<sup>4</sup>

Verification has been an underlying—and possibly the most important—issue in negotiating arms limitation, test ban, non-proliferation and other types of treaties. The signing of the Limited Test Ban treaty in 1963 demonstrated that “National Technical Means” (NTM) had been developed to such a degree that both the US and USSR felt confident that they could detect non-compliance with the treaty. The Non-Proliferation Treaty (NPT) was signed in 1968 and by 1985 there were 130 signatories, including Canada and three of the nations possessing nuclear weapons: the US, the USSR, and the UK. The two other nuclear states, China and France, have not signed the treaty. Nor have many “near-nuclear” states such as Israel, India and Pakistan.<sup>9</sup>

At the same time as the signing of the NPT, the US and USSR agreed to begin negotiating a Strategic Arms Limitation Treaty (SALT). In 1972 the Anti-ballistic Missile (ABM) Treaty and the Interim Agreement on Offensive Arms were signed.<sup>2</sup> The successor treaty, SALT II, became effective in June 1979, although the US Congress never ratified it. SALT II formally expired on 31 December 1985, but both countries agreed to continue adhering to its general terms. Under SALT II the US and USSR agreed to ceilings on specific weapons types based on the 1974 Vladivostok understanding between President Carter and Chairman Brezhnev. Strategic nuclear delivery systems such as heavy bombers, intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and air-to-surface missiles were limited by number.<sup>2,3,10</sup>

Technical means of verification include surveillance satellites, aircraft surveillance, listening posts and terrestrial instruments such as seismic sensors and radars. Non-technical means include on-site inspection plus methods such as economic analysis, content analysis of documents and speeches, interviews with travellers and emigrés and clandestine activities. The most reliable approach is to obtain data from multiple sources.

There are four problems associated with technical verification: the physical limitations of the technology, the capability to detect purposely hidden activities, protection if one party tries to confound or destroy the other’s surveillance system, and finally—and perhaps most difficult—the objective interpretation of the data.

A good case can be made for the creation of an impartial surveillance programme, administered and staffed by people from countries other than the two superpowers. There have been several calls for such an organization. For example during the UN Special Session on Disarmament in 1978, France proposed the establishment of an International Satellite Monitoring Agency (ISMA), to operate under UN jurisdiction.<sup>11</sup> Similarly, in 1985, (US) Admiral Stansfield Turner—a former director of the CIA—proposed that the United States’ technical surveillance information be made more widely available. He suggested the creation of an “Open Skies Agency”, taking its name from President Eisenhower’s 1955 proposal.<sup>12</sup> Even without such an agency, we are now aware of the existence and general capabilities of some of the US surveillance satellites, which up until a few years ago were totally classified. A group of six nations—Argentina, Sweden, Mexico, India, Tanzania and Greece—has offered to jointly administer an international monitoring programme.<sup>4</sup> In Canada the Department of External Affairs is sponsoring a study on a potential ground and space verification satellite system named PAXSAT. While not yet completed, the study will probably recommend a Canadian satellite equipped with a high resolution radar and imaging instruments, supported by a sophisticated ground system.<sup>13</sup>

## WHAT AND WHO SHOULD BE OBSERVED?

Because the SALT treaties concerned strategic threats, “targets” such as ICBMs, strategic aircraft, SLBMs and launch facilities were the main subjects for verification. (“Target” is used, without innuendo, to denote the object being observed.) A more comprehensive verification programme would include observation of naval vessels, radar sites, chemical and biological weapons production, stockpiling,