SPECIALIST DESCRIBES U.S. RECON SATS

According to a recognized specialist on space intelligence, U.S. surveillance satellites provide extensive coverage, albeit with critical coverage and atmospheric limitation, of foreign ground and naval targets, as well as foreign electronic activity.

Jeffrey Richelson, who is on the faculty of American University in Washington, made his comments in an unclassified paper on technical collection and arms control presented at a recent International Studies Assn. conference in Washington (MS 3/18). His study discusses five categories of technical intelligence, including photo reconnaissance or imaging, signals intelligence, ocean surveillance, space surveillance and nuclear monitoring. Space, airborne, seaborne and ground-based sensor operations are discussed in each category.

The performance features of such "national technical means" (NTM) of verification, he said, can to some extent be inferred from the carefully drawn limits the U.S. sought to embed in arms control agreements like the ABM Treaty and other SALT 1 and 2 agreements. Verification parameters of interest in the latter include multiple re-entry vehicle (MIRV) loadings on ICBMs and sub-launched ballistic missiles (SLBMs), structural modifications for SALT-accountable bombers and techniques for discriminating post-boost vehicle (PBV) releases of MIRVs from either simulated MIRV releases or penetration-aid releases. They also require very etailed assessment of ground site like missile silos or missile-sub yards.

Richelson says the U.S. operates 4th-generation area surveillance imaging satellites -- the KH-9b"Big Bird" -- and 3rd-generation "close-look" KH-8 satellites, as well as a first-generation real-time digital imaging satellite, the KH-11. KH-9s weigh 30,000 pounds, are 50 ft. long and 10 ft. wide and carry four returnable film capsules. Launched into sun-synchronous polar orbits with apogee/perigee of 155/100 miles, the KH-9 repeats its ground track every 3.5 days. The KH-8, the oldest U.S. imaging satellite, offers the greatest resolution, flying 80-day missions with apogee/perigee of 215/77 miles and returning film in two reentry capsules.

The KH-11, first flown in December 1976, transmits real-time imagery to two "probable" locations -- a Ft. Belvoir, Va., facility (publicly identified by another expert as the Defense Communications Electronics Evaluation and Testing Activity) and the Defense Special Missile and Astronautics Center, Ft. Meade, Md., also the site of the National Security Agency. The satellite relays its data through the Satellite Data System, although reports say it can also use the Tracking and Data Relay Satellite (TDRSS). With a lifetime on the first system a record-breaking 770 days and subsequent flights of 760 and 555 days, the KH-11 is the longest-lived photo/imaging system. It has frequently been used and repositioned to cover crisis areas, says the author.

Richelson says a KH-11 also may have discovered a cannistered Soviet SS-20 ICBM lying next to an encapsulated SS-16 ICBM, from which it is derived. He says this suggests Soviet attempts to calibrate their own overhead imaging satellites, with the intent of creating enough similarity between the two controversial weapons as to deceive U.S. overhead surveillance. The SS-16 has emerged as a probable SALT violation in a recent White House report to Congress.

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Follow-ons to the KH-8, -9 and -11 include the KH-12, a 32,000-pound satellite with resolution equal to current KH-8s that is scheduled for early 1986 launch. Shuttles launching a KH-12 would also retrieve its predecessor for refurbishment on the ground. Plans for a super-KH, the KH-X, were cancelled, he says, due to belated realization of the enormous processing load its sensors would generate. Another successor is an imaging radar satellite, planned for coverage of Soviet and Warsaw Pact targets. It will also use the TDRSS, which has a White Sands, N.M., ground site. Richelson notes such satellites go back to a 1962 Air Force proposal for a "recoverable payload satellite" with a high-resolution radar for ground mapping.

SIGINT satellites in stratagic, tactical, naval roles

Signals intelligence (SIGINT) can also involve space sensors. Richelson includes in this category RADINT (radar intelligence) for sensing both imaging and non-imaging radars; TELINT (telemetry intelligence), particularly important for assessing SALT-related performance parameters; FISINT (foreign instrumentation signals intelligence), including telemetry, beaconing, electronic interrogators, video data links, and tracking, fusing, aiming and command systems; and two other areas listed under a proposed 1980 NSA charter: "nonimaging infrared" (IR), involving remote sensing, and "coherent light signals," apparently a reference to laser comunications, including blue-green laser satellites for communications with submarines .

The U.S. operates two classes of SIGINT satellites, he says. One is in geosynchronous orbit, including the TRW-made Rhyolite. The latter has ground stations at Buckley Field, Colo., and Alice Springs, Australia, and can be targeted against telemetry, C3, radar and telephonic emitters across VHF, UHF and microwave frequencies. Quoting Australian analysts, Richelson says the CIA-operated Rhyolite can also intercept INTELSAT commercial satellite traffic, as well as VHF-UHF walkie-talkie traffic between air controllers and aircraft.

But its primary role is TELINT. Richelson says Soviet missile tests use 50 FM telemetry channels ranging from 150 MHz (VHF) to 3 GHz (S band). Richelson cites news accounts saying one pair of Rhyolites is stationed over the Horn of Africa to catch telemetry from Soviet launches from Tyuratam toward the Kamchatka impact zone, with another pair further east to catch launches from Plesetsk.

Another SIGINT satellite, apparently the geosynchronous Chalet, was reported in 1979 to be undergoing modifications to give it TELINT capabilities, apparently to cover Soviet missile telemetry under the SALT 2 agreements. SIGINT capability may also be a secondary role for the Satellite Data System relay class, whose highly elliptical "Molniya"-type orbit lets it hover over the northern USSR at low altitudes. Yet another SIGINT may be a revised version of the ARGUS, which Richelson says may already have been launched -- apparently a reference to a well publicized Jan. 23 classified shuttle launch (MS

Richelson says the U.S. also operates ferret SIGINTs in lower orbits to map Soviet, Chinese and other radars. Their orbits are distinctively higher than KH-class orbits, but lower than all other U.S. military satellites. The ferrets include a "piggyback" class that are launched with larger satellites, then ejected into individual orbits. The most recent "octagon shaped" piggybacks were launched off KH-9s, he adds.

Navy activities in ocean surveillance are also described in detail by the paper. Richelson says the Navy had no dedicated overhead system for ocean surveillance until 1976, with earlier inputs apparently coming from "national" imaging satellites. Initial studies in 1968 for a Navy-specific system led in

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1970 to a five-volume Ocean Surveillance Requirements Study by the Naval Research Laboratory for the Chief of Naval Operations, in response to the extensive buildup in Soviet naval activity. This "Program 749 study focused on high-resolution phased array radar satellites for all-weather ocean coverage and detection of low-trajectory sea-launched missiles." IR scanners were also suggested for such satellites.

However, the resultant Classic Wizard ocean surveillance system lacks radar capability. Instead, the Classic Wizard's space segment -- White Cloud -- operates passive IR scanners and millimeter wave radiometers, as well as antennas for monitoring Soviet submarine and ship transmissions. White Cloud, comprising a "mother satellite" and three subsatellites, operates in near-circular 700-mile orbits, permitting signal interceptions from targets 2,000-miles away. The cluster apparently uses passive interferometry techniques to determine vessel locations, with overlapping coverage on successive passes. Richelson says five operational satellite clusters have been orbited since 1976. Classic Wizard ground stations include Guam, Diego Garcia and Adak, Alaska, as well as Edzell, Scotland, and Winter Harbor, Maine.

Additional ocean surveillance is provided by two U-2 aircraft, says Richelson, which are modified for long loiters and equipped with a Westinghouse high-resolution radar, IR scanners and ELINT and COMINT ocean surveillance receivers. The U.S. also operates HF direction finding (HF/DF) sensors from ships and land sites. Subsurface acoustic data from a global network of stations is transmitted by FLTSATCOM and DSCS satellites to the Acoustic Research Center, Moffett Field, Calif., where it is integrated with other data and fed into the complex distribution channels of the Navy's ocean surveillance network.

Space nuclear detection, US/Soviet deception practices

Space-based space surveillance may already be partially provided by the KH-11, says Richelson, referring to 1981 press accounts of the KH-11 being used during the first shuttle flight to verify the condition of the tiles on the shuttle's fuselage. Also in this category is an Air Force program as well as DARPA's SIRE (Space Infrared Experiments) program, the latter reportedly already through ground testing. USAF's Space-Based Surveillance System (SBSS) has called for four satellites in low equatorial orbits, with long-wavelength IR sensors on each satellites scanning altitudes from 60 miles to geosynchronous.

Space-based nuclear detection, formerly provided by the recently deactivated VELA class of satellites, is now provided by the Nuclear Detonation (NUDET) Detection System (NDS) aboard Global Positioning Satellites (GPS) and Defense Support Program (DSP) missile launch detection satellites, being a secondary mission on the latter. Richelson also says a classified NUDET system is aboard another class of military satellites.

The paper also mentions U.S. and Soviet practices of modifying or ceasing sensitive terrestrial activities when unfriendly reconnaissance satellites are overhead. The U.S. system, Satellite Reconnaissance Advance Notice (SATRAN), is matched by comparable activities orchestrated by the Soviet General Staff's Chief Directorate of Strategic Deception. The latter, according to a defector citied in the paper, provides updated schedules to army divisions or battalions and naval fleets about the precise ground tracks, flyover times and onboard sensors of U.S. satellites.