Since Discoverer, reconnaissance satellites have advanced enormously. In 1971, the first Big Bird satellite was launched. In its polar orbit, it sent television pictures back to Earth as well as film capsules. Big Bird flies at a perihelion of about 150 km, still higher than some smaller, "close-look" satellites sent up on speciality missions to examine a particular area of the globe.[32]

Of more strategic importance than the Big Bird series of satellites is a highly secret series called the KH-11. The first of these was launched in 1978, and has a higher perihelion (about 250 km), and hence a longer lifetime, than the Big Birds. KH-11's have GEODSS-type electro-optical sensors on board, for the extreme resolution of ground stations. It is believed that KH-11's also probably have sophisticated infrared sensors for "observing" underground missile bases. Big Birds can release data packages to be picked up in nets trailed by aircraft. KH-11's, on the other hand, transmit their data to ground stations such as those at Thule or Guam, or else to higher-orbiting Defense Support Program (DSP) satellites for processing and later transmission.[33]

In addition, there exist Rhyolite VHF ELINT satellites for monitoring communications, and Vela Hotel satellites for monitoring radioactive emissions.

Satellite-to-satellite viewing may already have been employed. When the first space shuttle lost some tiles during its launch, not only were GEODSS sites used to examine its heat shield in detail, but Big Birds and/or KH-11's examined it from orbit as well.[34] It is reasonable to assume, therefore, that observations of other satellites could be made routinely by systems such as the KH-11's.

The idea of using satellites to verify satellite activities is not new. For example, the United States created Satellite Inspection (SAINT) interceptors as early as 1960. The purpose of the SAINT program was twofold: 1) satellite inspection of other satellites by satellites at close range, and 2) actual interception of satellites by satellites. This first practical ASAT system was phased out for various reasons, one of which was the possibility of "enemy" satellites being "booby-trapped" to prevent close inspection. Also, inspection by one side would certainly encourage inspection by the other, and this might not be desirable.

(With regard to "booby-trapped" satellites, consideration might be given to Salyut 6, which apparently possesses ASAT "missile tubes". The one-metre tubes were unusually small for an offensive ASAT system, but were regarded as experimental. However, the subject of "space mines" has been mentioned in ASAT literature, and the possibility that the tubes are mine launchers for *defensive* action must be acknowledged.)[35]

Since existing satellite reconnaissance systems are designed to inspect sensitive areas both on the ground and in space, and because they are in generally low orbits, they are prime targets for ASAT devices. One only has to remember the U-2 incident to realize the precarious situation of reconnaissance missions. With the development of ASAT weapons, a space-based repeat of that incident is possible. In fact, it may have already occurred: it was suspected that a ground-based Soviet laser was responsible for the "blinding" of an American reconnaissance satellite, although later reports "identified" the cause as gas fires in the Persian Gulf.[36]

In the future, since ground-based radar is limited to low-orbiting satellites and GEODSS is limited to night-time, clear-sky viewing, an entirely new system may be required. This system may consist of inter-orbital optical systems, based in space, and ground-based lidars.

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32 Karas, T. *op. cit.*, note 16.

33 *Ibid.*

34 Hoagland, R.C. "Superspy in Orbit", *Science Digest*, V. 89, no. 6, July 1981, p. 32.

35 Oberg, J. "Soviet Developments Point for Space Operations Center", *Astronautics and Aeronautics*, May 1982, pp. 74-77.

36 Main, R. *op. cit.*, note 20.