

THE SATELLITE FETISH

PRELIMINARY NOTES ON SIGNALS INTELLIGENCE

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Submitted to Professor Marko Peljhan
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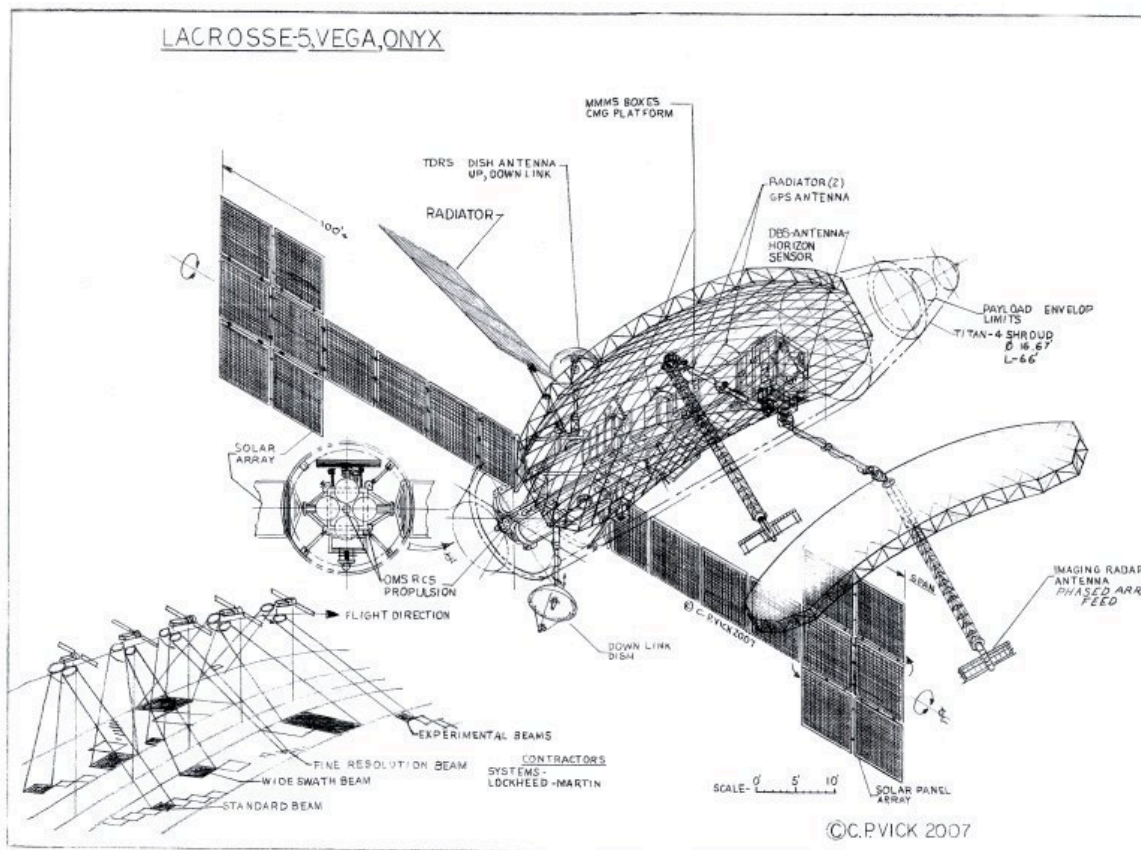


Image from www.globalsecurity.org

Speculated Design of the Synthetic Aperture Radar sensing Lacrosse 5 (AKA VEGA or ONYX). The Lacrosse constellation consists of four Low-Earth Orbit satellites at various inclinations and are used for high frequency radar imaging through clouds and at night. It is suspected that the resolution of the imagery is variable, with maximum estimates at 1-meter pixel resolution.

This pdf briefly describes a few critical components of United States satellite intelligence in preparation for a long term video art project exploring the behavior of these spacecraft constellations, and our fascination with them.

Both this preliminary study and the resultant animated work will rely heavily on the Satellite Toolkit [STK] Software developed by Analytical Graphics in Exton PA to visualize the orbital mechanics of classified payloads. It should be noted that the goal is not to "de-classify" but to "re-classify" data, to introduce a coherent personal thread into the cold and mysterious "Blackworld" of SIGINT.

Many thanks to the numerous "amateur" satellite spotters who help to compose the classified.tle file essential for visualizing the orbits, to Marko Peljhan for his infectious enthusiasm and expertise on everything in orbit, and to Trevor Paglen for his illuminating talk on the subject of satellite spotting.

IMAGINARY INFORMATION

The visualization of "classified" data is so much fun, that even more fascinating than the data itself is our very fascination with it. It is necessary to try psychoanalyze the desire to chase spy satellites in the first place.

Certainly, at the fore of this fascination, is our contemporary quest for complexity. Even beyond the complexity of signal gathering itself, satellite research of this sort entangles various questions and issues. Embedded in the very orbital mechanics of these spacecraft are ill-defined panoptic military terms such as "information superiority" and lop-sided cultural products of "asymmetric globalizations". These abstruse concepts are embodied in SIGINT satellites, where America hones its self-reflexive bastardization of the spirituality of outerspace and the "supreme" quest of Russian Cosmism.

The satellites explored in this paper are central sites of the war of ideas. They both surveil and are surveilled, seeking to uncover conspiracies even as they are themselves subject to conspiracy-like reasoning. What Arjun Appadurai calls the "Social Imaginary" — the complex simulacra of transnational information flow — is herein observed as a battle for the mind. The war on terrorism is not a turf battle, it is the war of ideas, an ideological fight defined in cellphone conversations. Intelligence satellites, like any technology, are negotiated sites. Here the negotiation is between what we know and what we don't know.

What is "precious" here, is that the U.S. military employs the natural order of things, the cosmic gravitational balance inherent in orbital mechanics, as a strategy to monitor the world.

In the first and final instance, these pinpricks of lights in the sky are what replace our lack of information about information war. Therein lies the fetishization of information itself; in their seductive way, spy satellites are the very nearly invisible reality of the clandestine. In the 21st century's information battle, many people have this fetish for the technology which produces intelligence, including myself.

Finally, what follows is also an exercise in intelligence mapping of a different sort – the kind of transdisciplinary nimbleness required for lateral thinking, of the sort that enables technological progress to be made in the first place. Call it science fiction or military fiction or just plain unreality, the very conspiratorial nature of this research is itself, ultimately, what is being explored.

LACROSSE and KEYHOLE

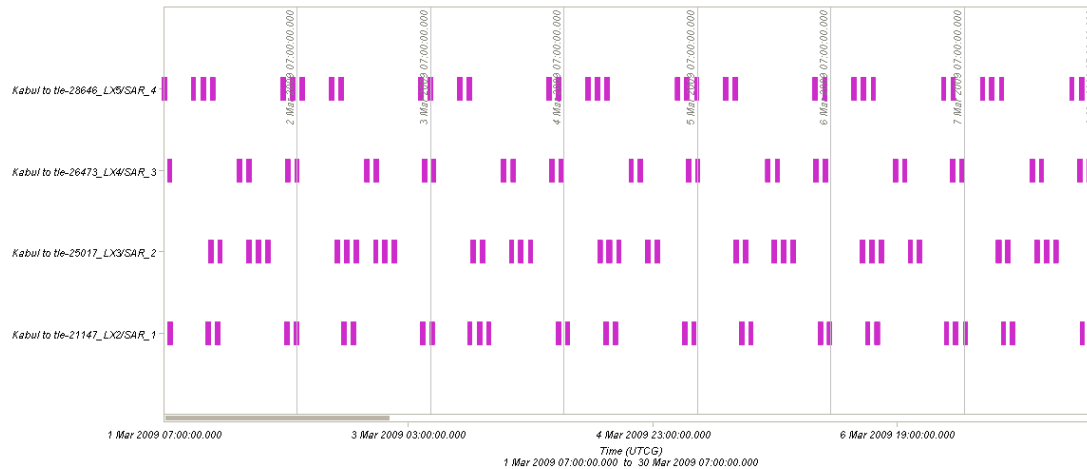
This constellation of 4 satellites (Lacrosse 2 – 5) are the most researched and speculated about. It is presumed that these, in collaboration with the near-polar orbit KEYHOLE satellites, are responsible for the bulk of National Reconnaissance Office [NRO] imaging. Currently in orbit are three launched from Vandenberg (1991, 1997, and 2000) and one from Cape Canaveral (2005), all on a Titan IV bus (the first two on type IV-A and the last two on type IV-B). An earlier satellite (Lacrosse 1, launched in 1988) was de-orbited.

The satellites use Synthetic Aperture Radar imaging which uses a long antenna and multiple measurements of high frequency telemetry to then computationally synthesize an image of up to 1 meter resolution. Each satellite circles the Earth about every 90 minutes, and download times are estimated at 20 minutes.

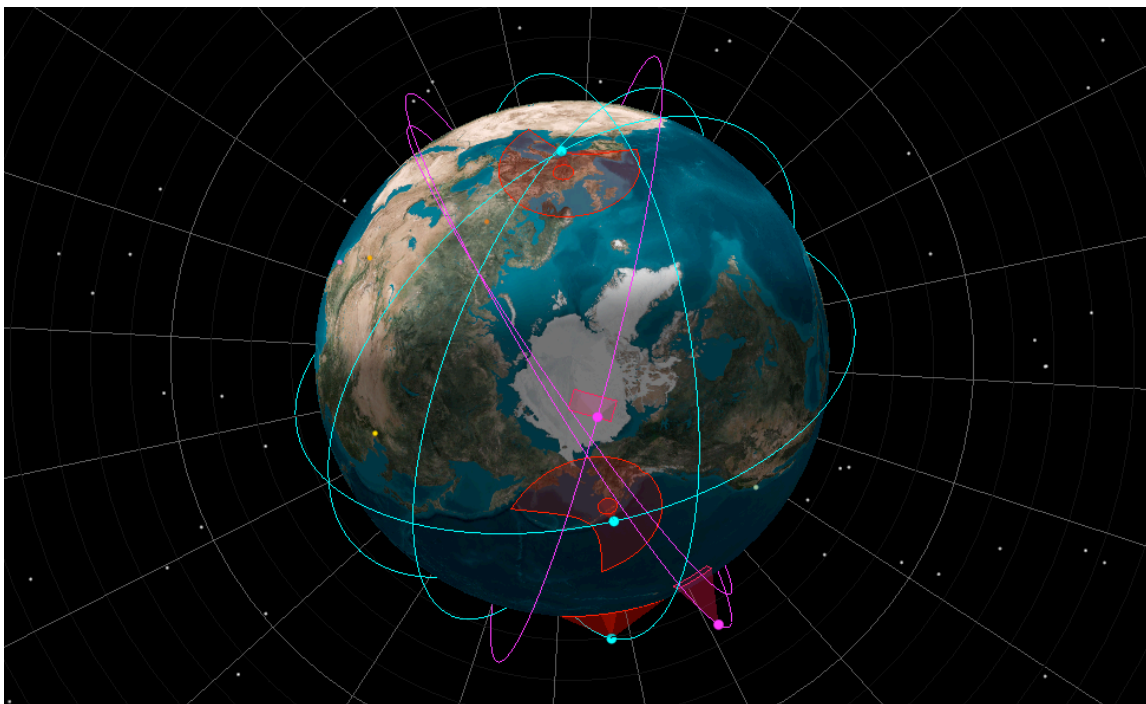
The KEYHOLE satellites a basically photographic space telescopes pointed at the Earth. It is supposed that the newest ones can capture up to 10 cm resolution images. These are placed in near-polar orbit.



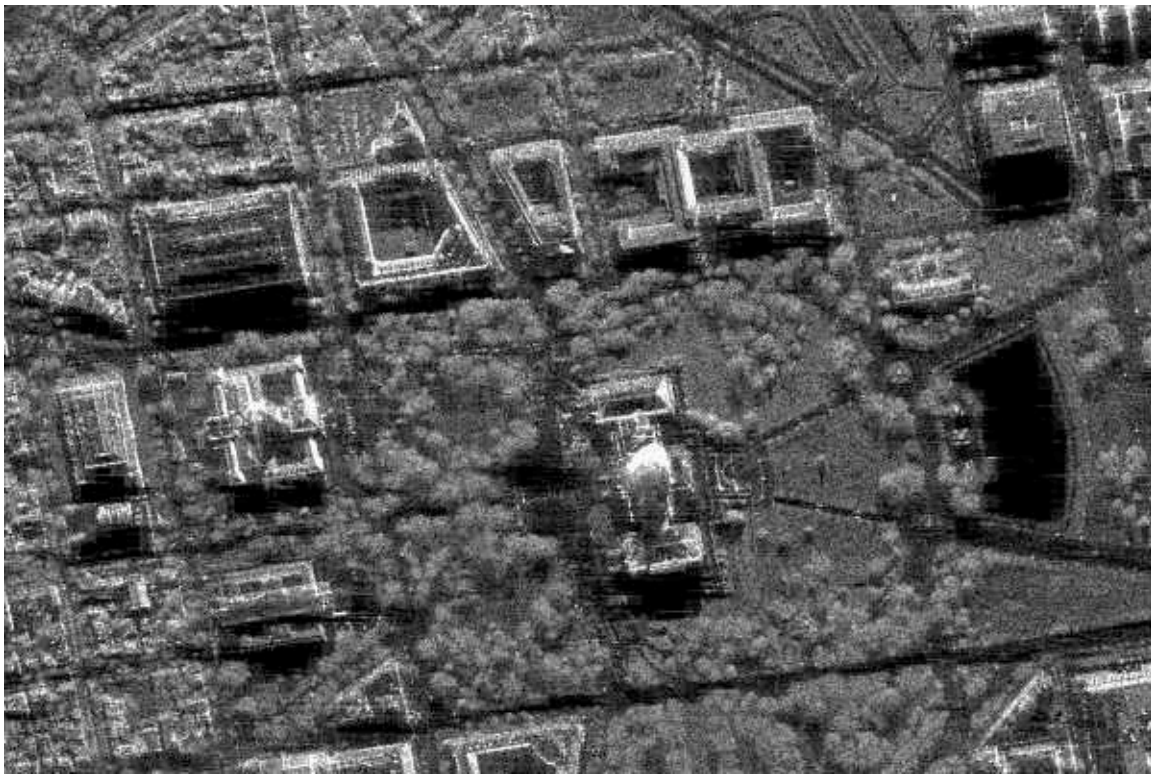
The Lacrosse 4 Mission Patch, shown here in its 68° inclination. Lacrosse 2 and 4 are in 68° inclination, and Lacrosse 3 and 5 in 57° orbits. The RAAN of each are, roughly, 291°, 47°, 142°, 261° in ascending order. We might expect Lacrosse 6 to be launched with an RAAN of around 100°.



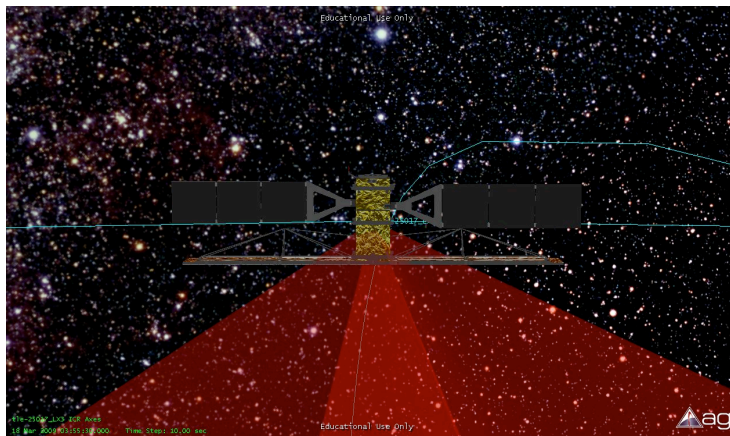
Access Times to Kabul Calculated using an estimated Sensor size to illustrate the technique of shared coverage.



The Lacrosse Constellation (in blue) and part of the Keyhole system in Pink. The Keyhole are presumably the best imaging satellites out there, though others exist – namely Cristal and Misty satellite constellations.

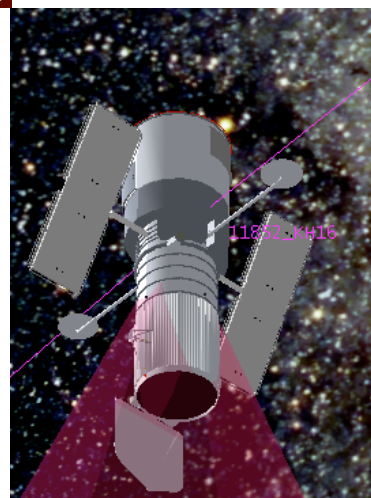


SAR imaging (from <http://cobweb.ecn.purdue.edu/~ace/sar/sar.html>)

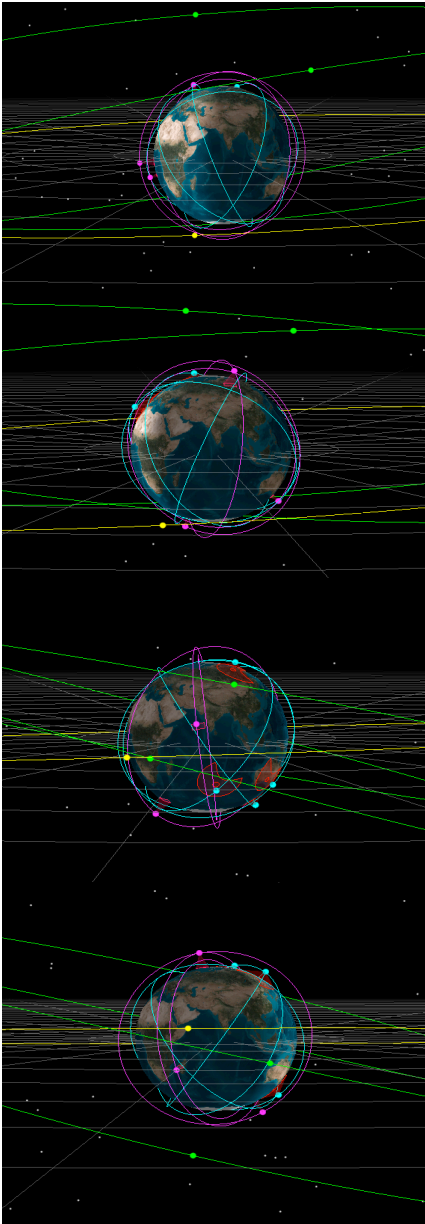


LEFT: 3D Model of an SAR type imaging satellite.

RIGHT: 3D model of a Photographic Satellite



MAGNUM 1 and 2, ORION, and several UNKNOWNNS



Using STK software, I was able to observe the intervisibility patterns of Geosynchronous SIGINT satellites hovering above the Middle East. Magnum 1 and 2 (GREEN), along with Orion (YELLOW), are "known" satellites that are almost Geostationary, but are slightly inclined to allow for latitudinal shifting (presumably to allow for data collection from directly above Pakistan, Afghanistan, India, etc.).

It is presumed that these satellites contain giant communications dishes to intercept phone chatter. It is interesting to observe how the orbits are designed so that Orion "crests" as Magnum 1 and 2 "fall", like a family of dolphins, in order to maximize coverage directly above the target region. Observing this pattern, there are several other "Unknowns" that follow similar behavior in the similar orbits: 90006, 90012, 90031, for instance.

This research is preliminary, but has been my own attempt to become fascinated with the invisible information *about* information collection, specifically satellites that seek to collect audio and visual information within the framework of an ideological struggle. Next step: Animations and Sound effects!



Titan-IV launch site (SLC4E), now decommissioned, at Vandenberg Air Force Base in Lompoc, California. Below, A 3D model of the same site, complete with Titan-IV rocket, from AGI's website.

