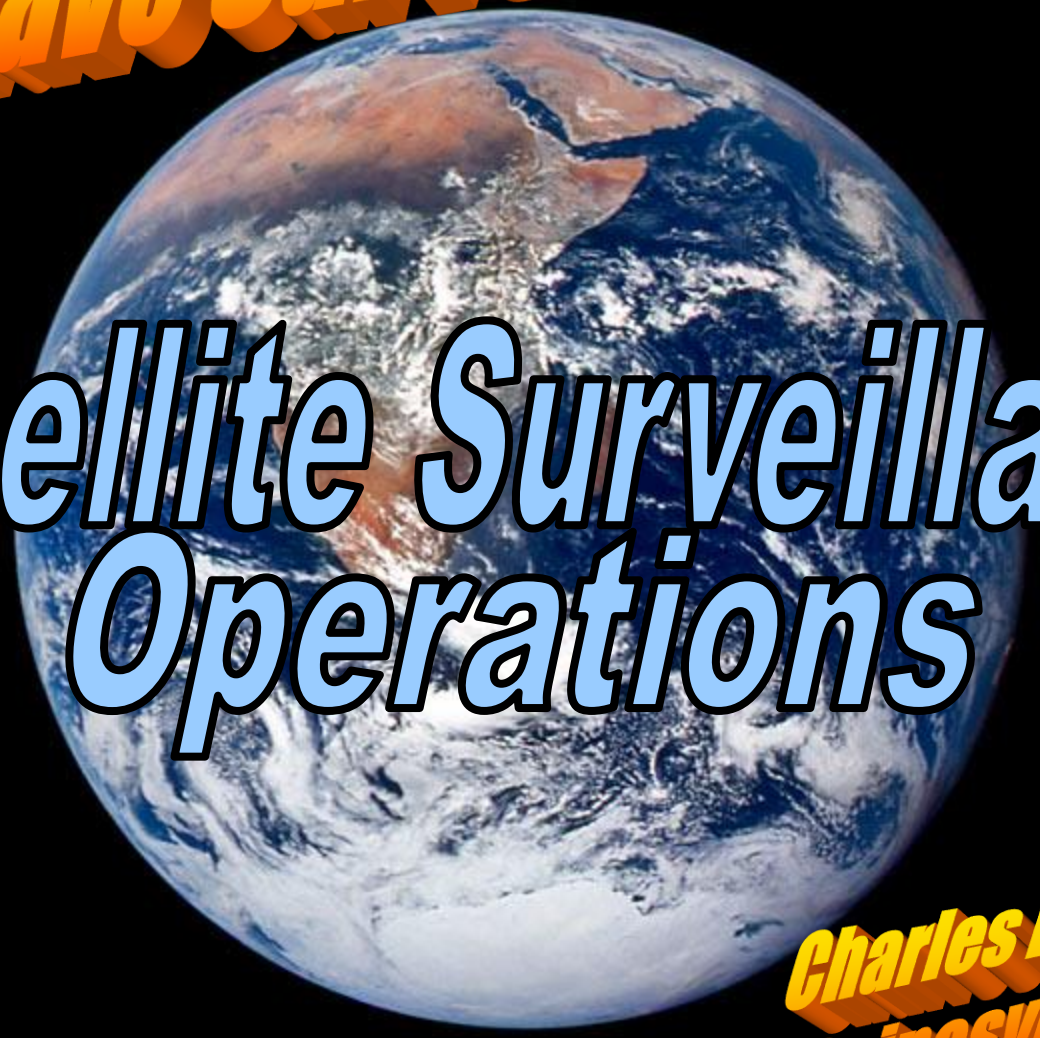
Microwave Surveillance



Satellite Surveillance Operations

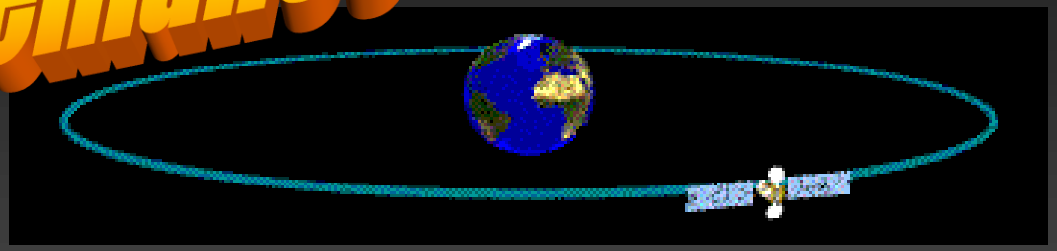
Charles F. Harding III
Gainesville, Florida,

Microwave Surveillance

Why Should People Be Concerned?

Microwave Surveillance From Government and Commercial Satellites

Microwave Surveillance



Early Surveillance from Satellites

KH-9 photographic satellites were the first satellites to provide a view of activity behind the Iron Curtain.

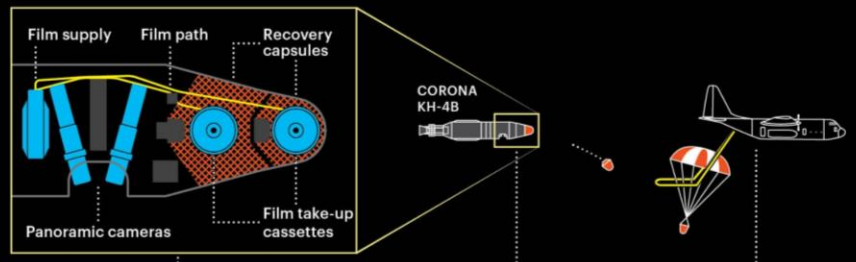
After making their overhead passes and taking rolls of pictures, the film recovery capsule would be jettisoned and dropped for surface recovery.

All-Seeing Eyes

How satellites are used to spy on us all

CORONA PROGRAM, c. 1959–1972

First series of U.S. spy satellites are launched into orbit. Following 12 unsuccessful attempts, the satellites eventually capture a total of 2.1 million feet of film in 39,000 canisters, and acquire images of previously unknown Soviet airfields and missile sites.



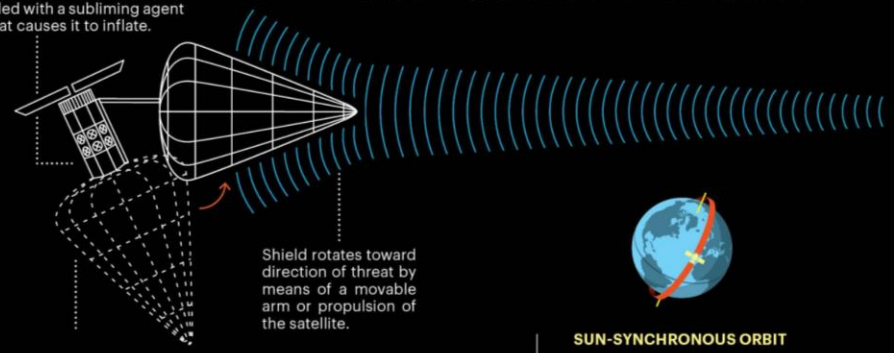
Exposed film is gathered in one of two watertight, vacuum-sealed recovery capsules.

After each capsule detaches, it decelerates by means of retro-rockets during its descent into earth's atmosphere.

Recovery plane locates the capsule by means of a radio signal and snags it using a nylon-rope loop.

MISTY PROGRAM, 1990–?

Weeks after U.S. launches new stealth satellite, military officials declare it had malfunctioned and would burn up on re-entry. However, civilian observers are able to track it sporadically throughout the years. Its whereabouts are currently unknown.

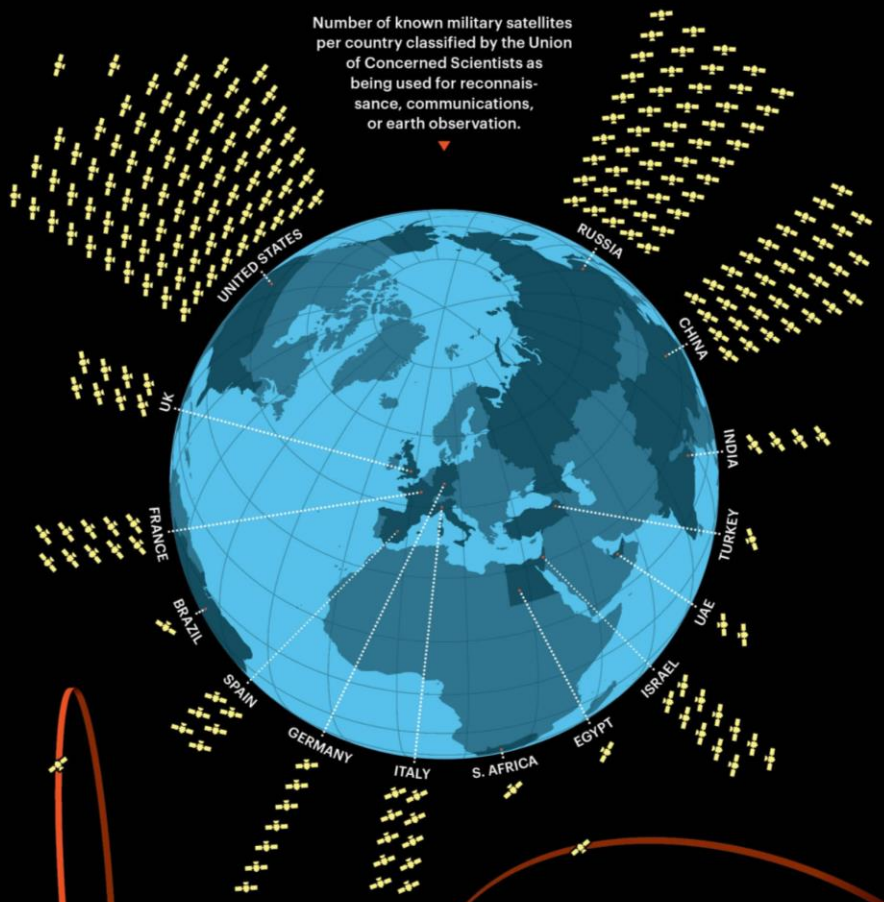


FOUR COMMON TYPES OF ORBIT

SUN-SYNCHRONOUS ORBIT

Satellite orbits nearly over poles, shifting its orbit about 1° eastward per day (keeping it in line with sun), and allowing it to pass by same spot at same time daily. Ideal for observation because of consistent sunlight over one spot.

Number of known military satellites per country classified by the Union of Concerned Scientists as being used for reconnaissance, communications, or earth observation.



MOLNIYA ORBIT

Satellite elliptically orbits at inclination of 63.4°. Used for observation and communications because satellite spends 11 of 12 hours over Northern Hemisphere.

POLAR ORBIT

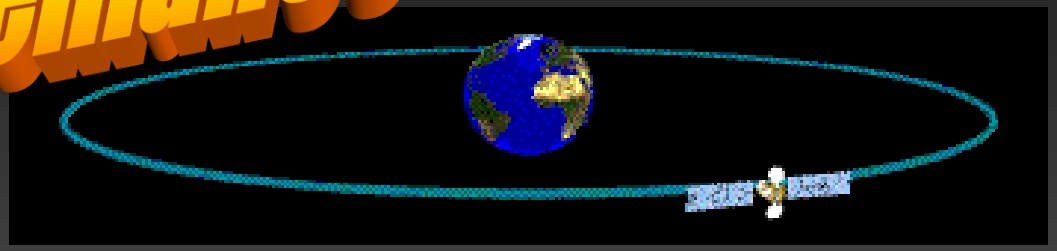
Satellite orbits over poles as earth rotates beneath it. Used for earth observation because satellite can cover entire surface of planet in one day.

GEOSTATIONARY ORBIT

Satellite orbits at distance of 22,236 miles above equator, allowing it to rotate at same speed as earth. Used for communications purposes because satellite remains over same spot.

Graphic by Haisam Hussein

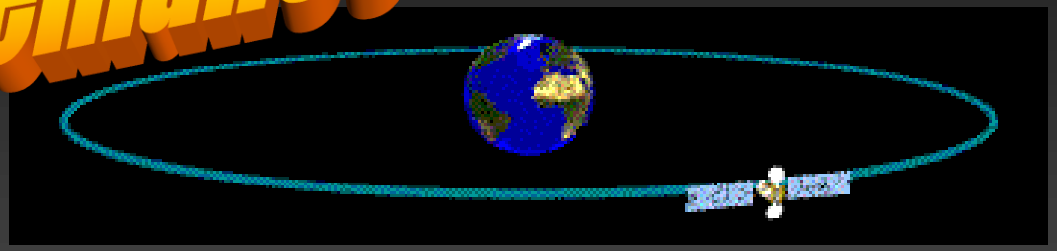
Microwave Surveillance



Surveillance from Satellites

Microwave Surveillance from space has been conducted by governmental agencies and corporate entities using government and commercial communications satellites against unsuspecting citizens since the 1970's.

Microwave Surveillance



Surveillance from Satellites

Total Number of Satellites- 1,738

LEO Satellites- 1,071

MEO- 97

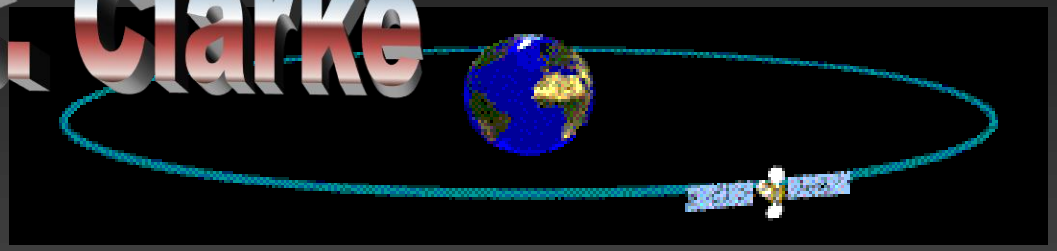
Elliptical- 39

GEO- 531

United States Satellites- 803

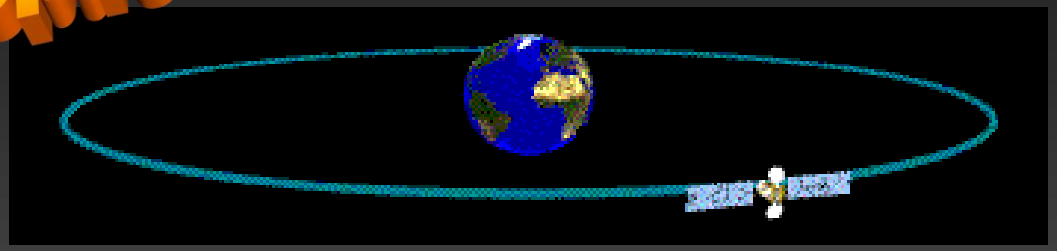
(includes launches through 8/31/17)

Arthur C. Clarke



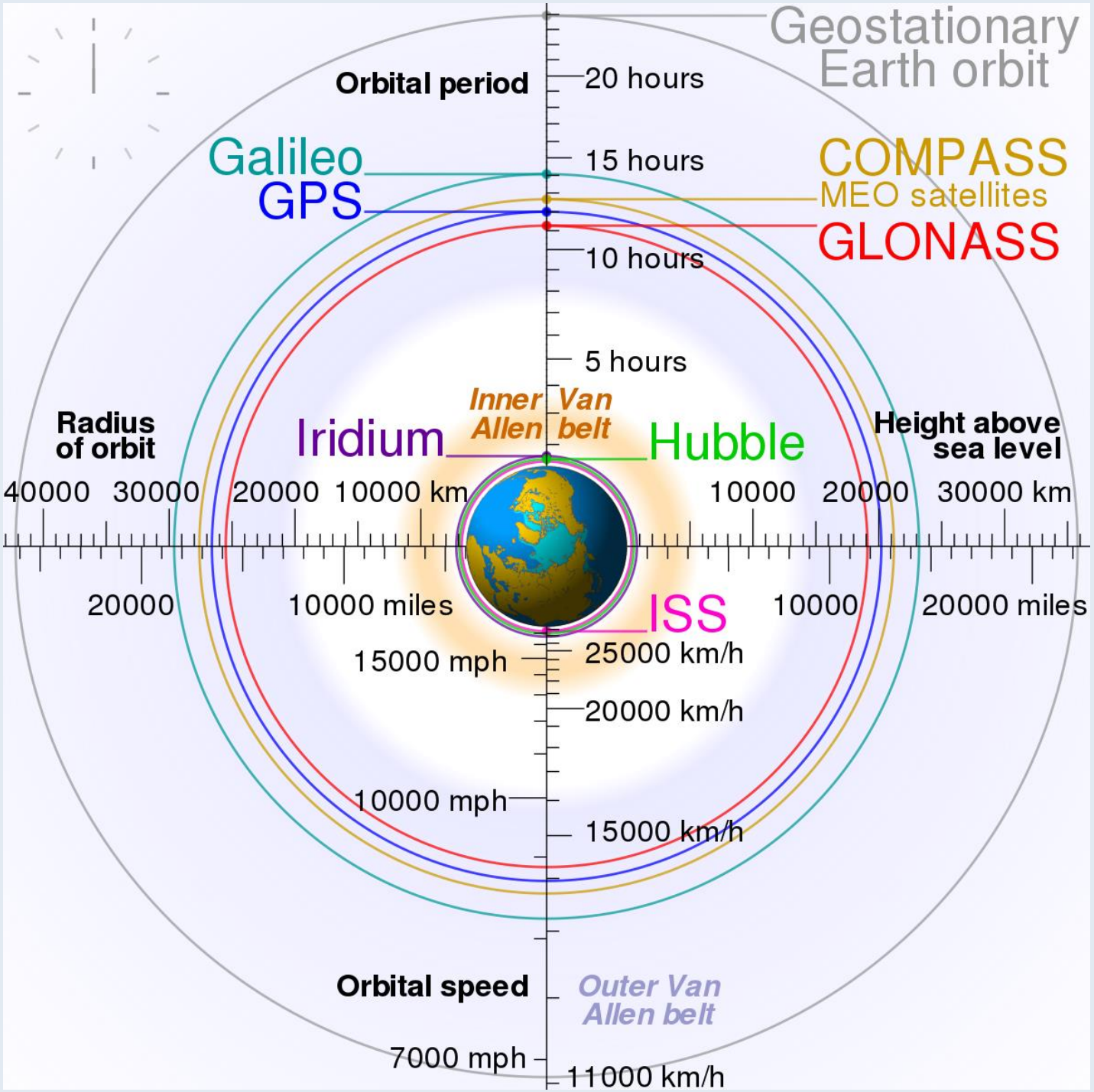
- *In October of 1945, Arthur C. Clarke reasoned that if a satellite were positioned high enough above the Earth's equator, its orbit could be matched by the rotation of the Earth. In recognition of his pioneering vision, this band of outer space "real estate" is called the Clarke Orbit.*

Surveillance from Space

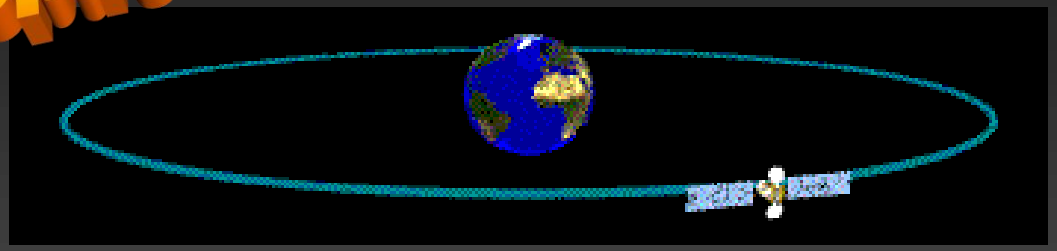


Footprints from Space

- *A Geosynchronous Satellite is much like a broadcasting tower 22,300 miles high, an automatic relay station that can transmit into a coverage area, "the Footprint," which encompasses up to 42.4 percent of the Earth's surface.*

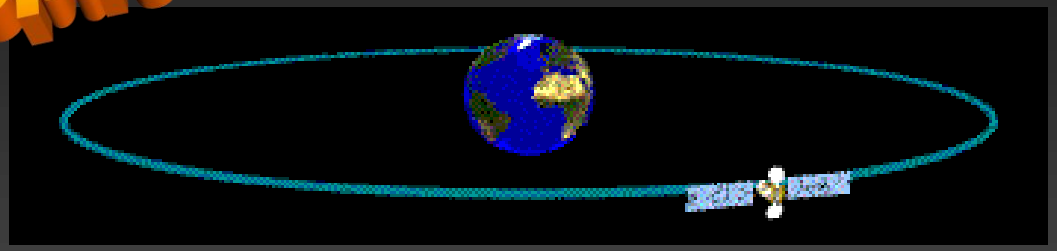

Geostationary Earth orbit
Orbital period
20 hours
15 hours
10 hours
5 hours
Galileo
GPS
COMPASS
MEO satellites
GLONASS
Inner Van Allen belt
Iridium
Hubble
Radius of orbit
Height above sea level
40000 30000 20000 10000 km
10000 20000 30000 km
20000 10000 miles
10000 20000 miles
ISS
15000 mph
25000 km/h
20000 km/h
10000 mph
15000 km/h
Orbital speed
Outer Van Allen belt
7000 mph
11000 km/h

Surveillance from Space



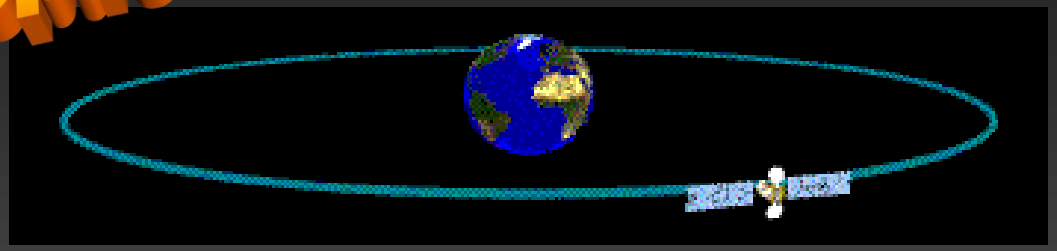
- *Low Earth Orbit (LEO)- (altitude of 2,000 km (1,243 mi)) is the region of space around Earth above sea level and below the*
- ***Medium Earth orbit (MEO)**- sometimes called **Intermediate Circular Orbit (ICO)** which in turn is below the*
- *Geostationary Orbit- (altitude of 35,786 km (22,236 mi))*

Surveillance from Space



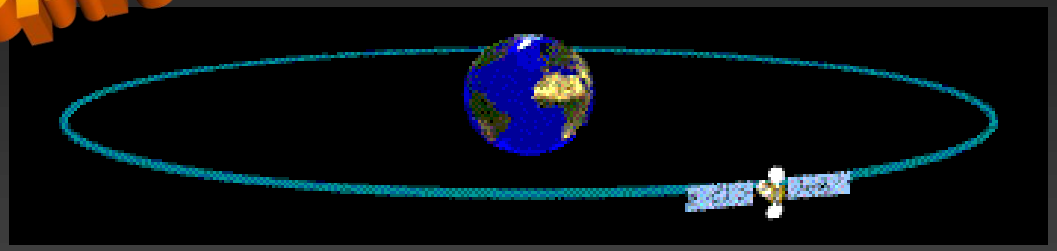
- *Low Earth Orbit (LEO) (altitude of 2,000 km (1,243 mi) and with an orbital period of between about 84 and 127 minutes*
- ***Except for The Apollo Moon Flights, human spaceflights have taken place in LEO or below.***
- ***The International Space Station conducts operations in LEO.***

Surveillance from Space



- ***Medium Earth orbit (MEO)***- *The most common use for satellites in this region is for navigation, communication, and geodetic/space environment science.*
- *The most common altitude is approximately 20,200 kilometers (12,552 mi) which yields an orbital period of 12 hours, as used, for example, by the Global Positioning System (GPS).*

Surveillance from Space



- *KH-11 KENNEN is a type of reconnaissance satellite first launched by the American National Reconnaissance Office in December 1976.*
- *Manufactured by Lockheed in Sunnyvale, California, the KH-11 was the first American spy satellite to use electro-optical digital imaging, and create a real-time optical observation capability.*
- *KH-11 (USA-224) launched January, 2011 orbits elliptically between 290 km × 985 km*

Surveillance from Space

Synthetic Aperture Radar

- *Through recent improvements of the techniques, radar imaging is getting more accurate. Imaging radar has been used to map the Earth, other planets, asteroids, other celestial objects and to categorize targets for military systems.*
- *Applications include: land use monitoring, wind shear warning; environmental monitoring; weather radar- storm monitoring, medical microwave tomography; through wall radar imaging; 3-D measurements, agricultural monitoring, etc.*

Surveillance from Space

Synthetic Aperture Radar

The April 9, 1994 Space Shuttle Endeavour, flight STS-59, carried the Space Radar Laboratory's complementary radars – the Spaceborne Imaging Radar-C/X-band Synthetic Aperture Radar (SIR-C/X-SAR) in the payload – which first demonstrated their capability to obtain vast amounts of data that could be used to advance many disciplines, including ecological, oceanographic, geologic and agricultural investigations.

Surveillance from Space

SIR-C/X-SAR in the payload bay of space shuttle Endeavour on STS-59, April 9, 1994.

Surveillance from Space

"One of the things this discovery helps us examine is the origin of what's called the Great Bend of the Nile," said Dr. Bob Stern, a SIR-C science team member at UTD.

Surveillance from Space

"The discovery of the river channel shows us that probably between 10,000 and 1 million years ago, the Nile was forced to abandon its bed and take up a new course to the south."

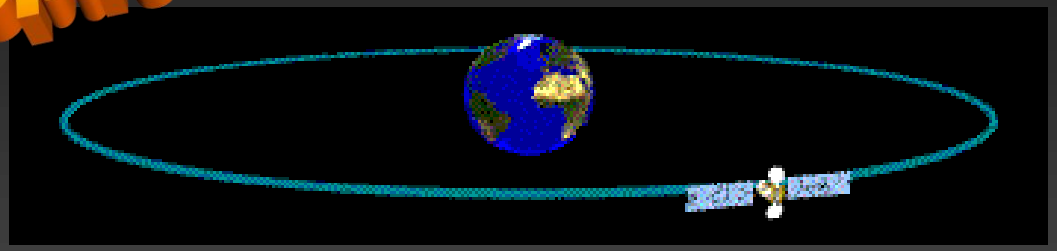
Surveillance from Space

Scientists in China are using space radar images to locate and study two generations of the Great Wall of China that have been eroded and buried in places by centuries of blowing sand.

Surveillance from Space

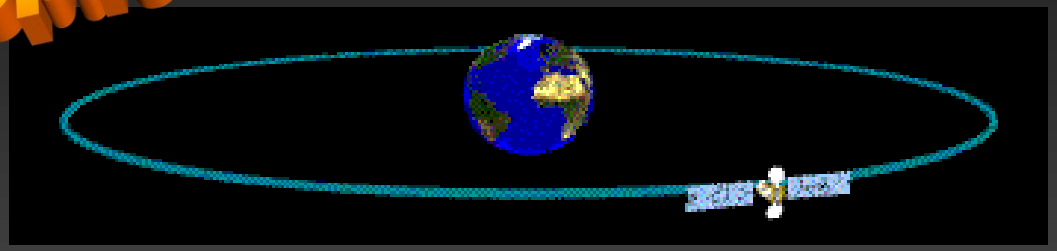
"In the images we can recognize two different dynasties that built the Great Wall. One was built in the Ming Dynasty and is about 600 years old. The other was built during the Sui Dynasty and is more than 1,000 years old."

Surveillance from Space



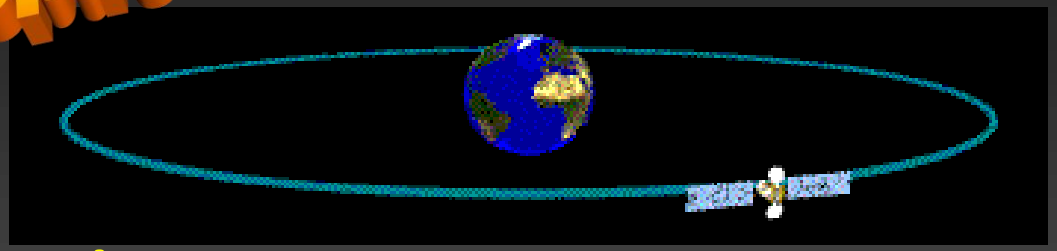
- *KH-12 Lacrosse Imaging Radar Satellite uses an application of radar to create two-dimensional images, typically of landscapes.*
- *Imaging Radar provides its light to illuminate an area on the ground and take a picture at radio wavelengths. It uses an antenna and digital computer storage to record its images.*
- *In a radar image, one can see only the energy that was reflected back towards the radar antenna.*

Surveillance from Space



- *In operation, the KH-12 Lacrosse Imaging Radar satellite moves along a flight path of the area illuminated by the radar, or footprint, building the image as it does so.*
- *Each pixel in the radar image represents the radar backscatter for that area on the ground.*
- *Imaging radar has advantages. It can operate in the presence of obstacles that obscure the target, and can penetrate ground (sand), water, or walls.*

Surveillance from Space using



C-Band Frequencies

- The frequency range known as the "C" Band covers the range of (4.0 to 8.0 gigahertz- GHz).
- Nearly all C-band satellites throughout the Americas use the band of frequencies from 5.925 to 6.425 GHz for their uplinks and from 3.7 to 4.2 GHz for their downlinks.
- This is the frequency range of observed Microwave Surveillance Operations.

Surveillance from Space

SIGINT- Signals Intelligence

- ***From Secretary of Defense, William S. Cohen's book <u>One-Eyed Kings</u>.***
- ***NSA was charged with intercepting and interpreting signals intelligence which ranged from radio and electronic signals emitted during Soviet and Chinese missile tests to conversations taking place in the Soviet President's dacha, limousine, or bathroom.***

(p. 44)

Surveillance from Space

SIGINT- Signals Intelligence

- ***Few words in the world were secure from NSA's giant ears. A laser beam directed against a distant building could peel a conversation from inside as easily as a blade could strip away wallpaper.***

- ***Satellites deep in space could listen to radio conversations as if they were on an old-fashioned party line.***

(p. 44)

Surveillance from Space

SIGINT- Signals Intelligence

- ***The ability to listen to conversations and decode radio signals could provide the United States with virtually unlimited advantages in carrying out preemptive air strikes or sabotage.***
- ***The NSA's worldwide array of equipment could also disrupt an opponent's command and control systems through jamming and electronic pulsing.***

(p. 44)

Surveillance from Space

SIGINT- Signals Intelligence

- ***"GLOWWWORM?" Falcone asked, shaking his head.***
- ***"Yes sir. It's a remarkable breakthrough we've achieved in electromagnetic technology. We've got the ability to track our agents anywhere—underground, under water, anywhere."***

(PP. 46-47)

Surveillance from Space

SIGINT- Signals Intelligence

"The equivalent of tagging pigeons."

Falcone observed.

Think of tracking a person based on their dental work such as "gold bridges," which are much denser than the rest of the human body and the surroundings.

(PP. 46-47)

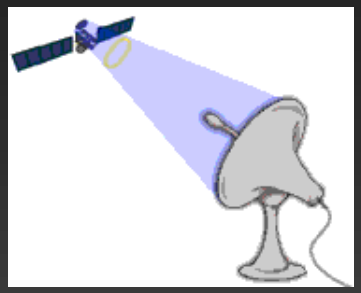
Surveillance from Space

SIGINT- Signals Intelligence

- ***Building from the definition for "Radar"- Radio for Direction And Ranging- the radio signal "uplink" to a satellite transponder and the returning "downlink" function as a radar picking up the much denser gold bridges.***

Gloworm Indeed!

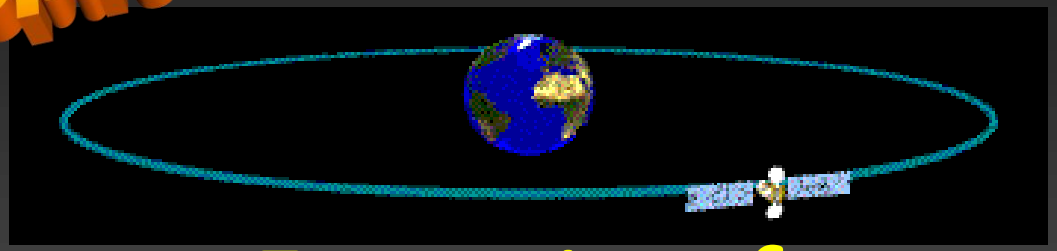
Surveillance from Space using

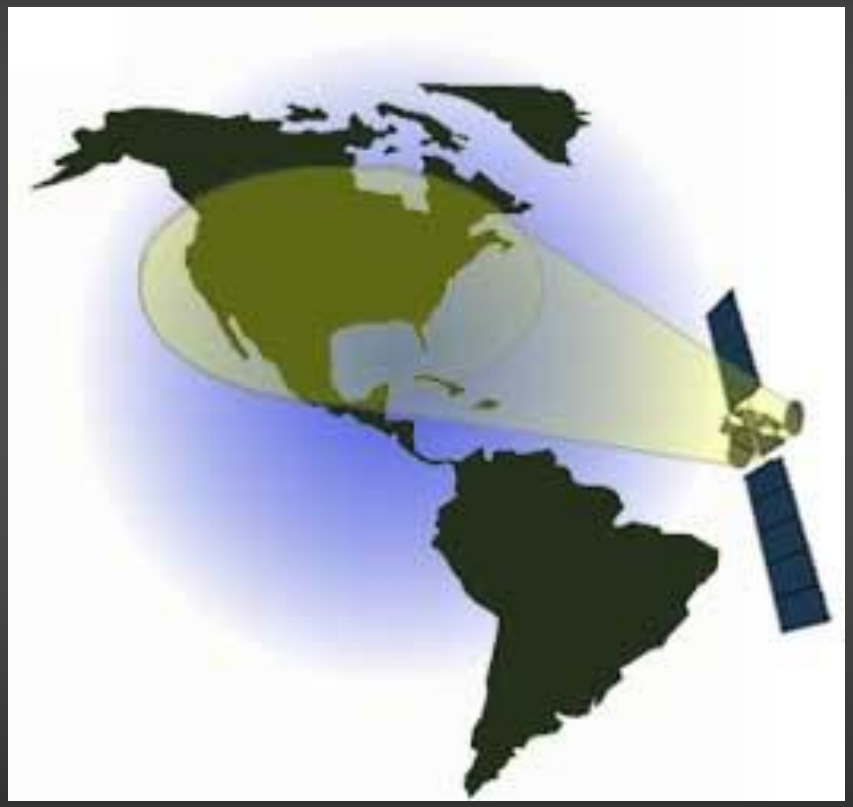


Communication Satellites

- ***Each satellite is both a Receiver and a Transmitter (a Transceiver). First, the ground station, also called the uplink, sends a signal to the satellite. The satellite automatically changes the signal's frequency and retransmits it back to stations on the ground. This second path is called the downlink.***

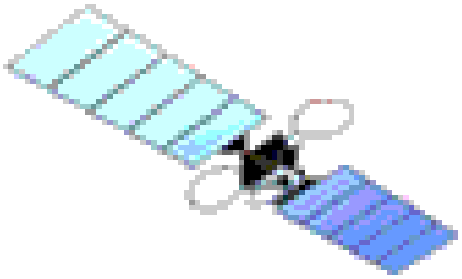
Surveillance from Space

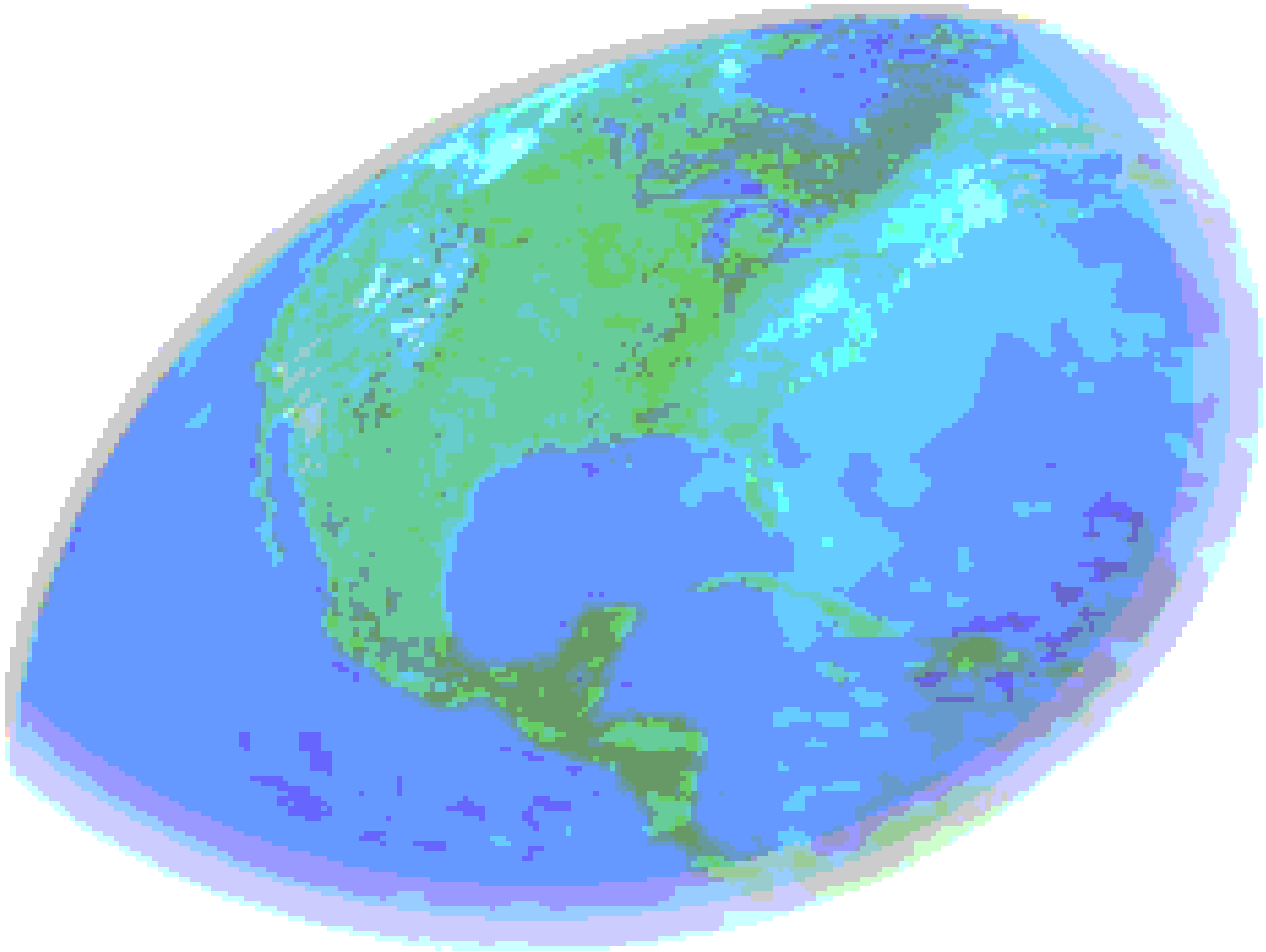




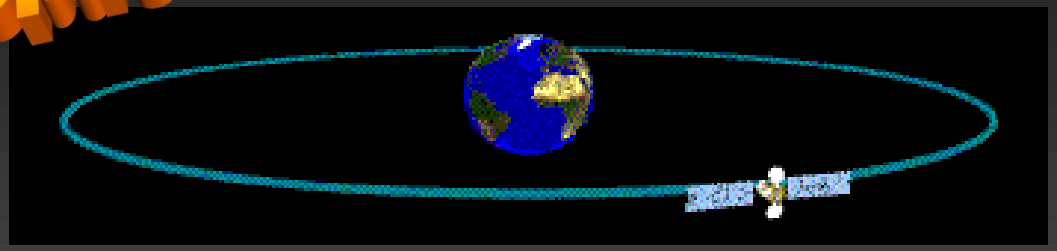
Footprints from Space

- ***The satellite's transmission area covers a certain part of the Earth's surface, called a Footprint.***





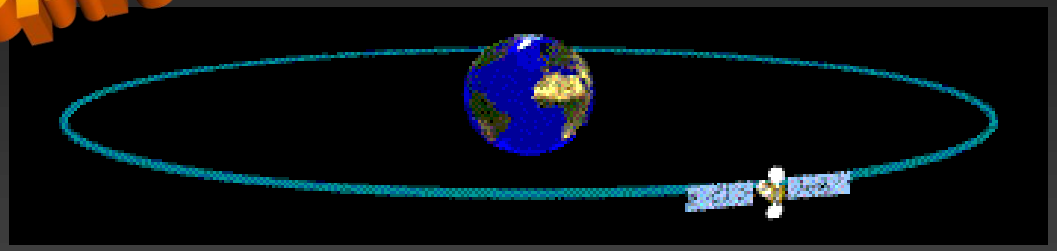
Surveillance from Space



From Footprints to Surveillance

- ***An agency with access to a satellite's operating codes can "commandeer" the services of one of the satellite's transponders and conduct surveillance of a targeted individual and intercept all conversations and sounds within the surroundings of this individual.***

Surveillance from Space

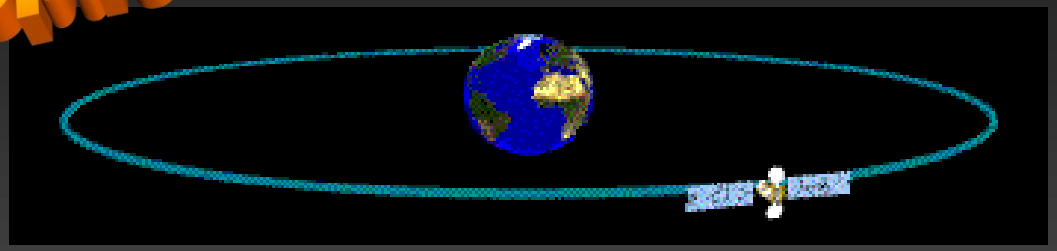


C-Band Surveillance

- ***C-Band Microwave Signal Frequencies from 5.925 to 6.425 GHz for their uplinks and from 3.7 to 4.2 GHz for their downlinks penetrate through clouds, sand, and walls.***

- ***Raising the Amplitude (Strength of Signal) causes C-Band Microwave Pain on the target.***

Surveillance from Space



C-Band Surveillance

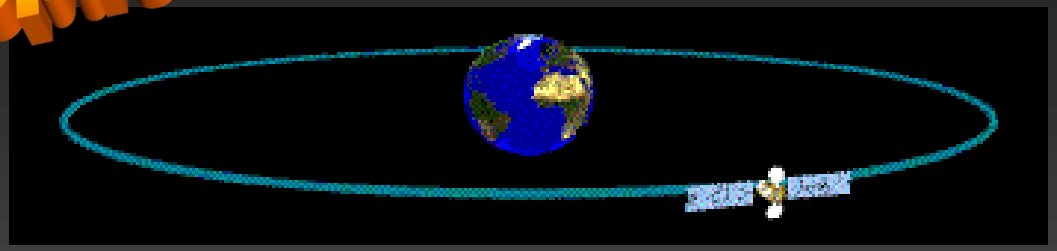
- ***Two-way Electronic Brain-Link** is done by remotely monitoring neural audio-visual information while:*
- ***(1) Transmitting sound to the auditory cortex***

  (a) Bypassing the ears and . . .
- ***(2) Transmitting faint images to the visual cortex***

  (a) Bypassing the optic nerves and eyes

  (b) The images appear as floating 2-D screens in the brain.

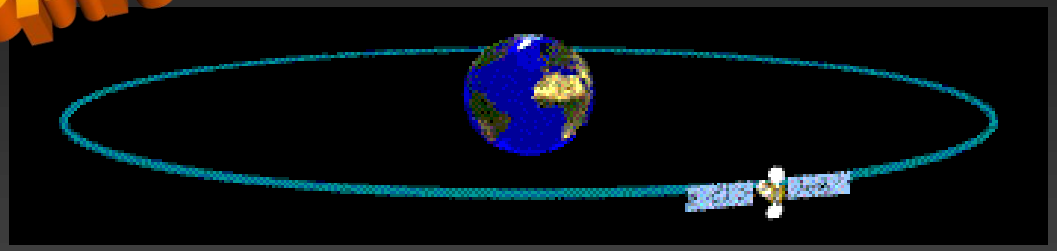
Surveillance from Space



C-Band Surveillance

- ***Two-Way Electronic Brain Link** has become the ultimate communications system for CIA and NSA personnel.*
- ***Remote Neural Monitoring (RNM)** which remotely monitors bioelectric information in the human brain, has become the ultimate surveillance system. It is used by a limited number of agents in the U.S. Intelligence Community.*

Surveillance from Space



C-Band Surveillance

- ***Remote Neural Monitoring (RNM)** requires decoding the **fundamental frequency** of each specific brain area, varying from **3 Hz to 50 Hz**. That frequency is then modulated in order to impose information in that specific brain area.*
- ***The original wave is also called the **1st harmonic**, the following harmonics are known as **higher harmonics**. As all harmonics are periodic at the **fundamental frequency**.***

Examples of Remote Neural Monitoring (RNM):

- Brain Area affected by Bioelectric Resonance Frequency Information Induced Through Modulation

(1) Brain Area- Visual Cortex

25 HZ

Images in the brain, bypassing the eyes

(2) Brain Area- Auditory Cortex

15 HZ

Sound which bypasses the ears

Examples of Remote Neural Monitoring (RNM):

(3) Brain Area- Motor Control Cortex

10 HZ

Motor Impulse Co-ordination

(4) Brain Area- Somatosensory Cortex

09 HZ

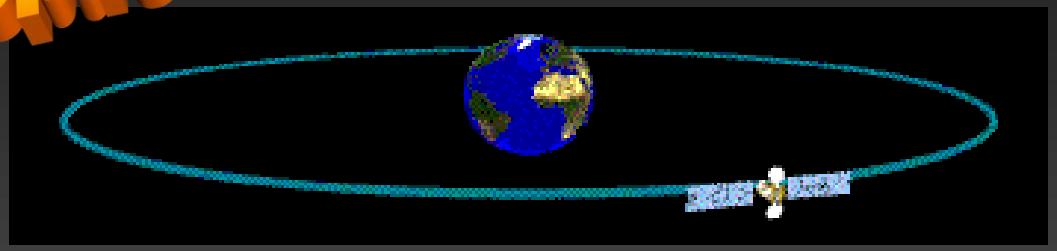
Phantom Touch Sense

(5) Brain Area- Thought Center

20 HZ

Imposed Subconscious Thoughts

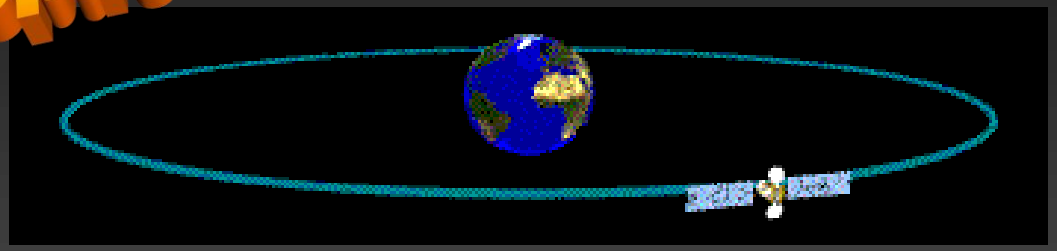
Surveillance from Space



C-Band Surveillance

- ***Remote Neural Monitoring (RNM) and Harmonics- if the fundamental frequency is 50 Hz the frequencies of the first three higher harmonics are 100 Hz (2nd harmonic), 150 Hz (3rd harmonic), 200 Hz (4th harmonic) and any addition of waves with these frequencies is periodic at 50 Hz.***
- ***The sum of harmonics is also periodic at that frequency.***

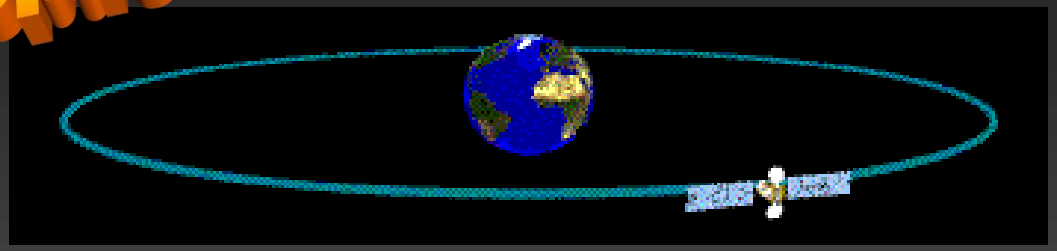
Surveillance from Space



C-Band Surveillance

- ***C-Band Microwave Signals** in the Gigahertz range are a billion times larger than the **fundamental frequency of 50 Hz** but are still **periodic** to that **fundamental frequency** which **'sticks like glue'** to the Gigahertz transmission signal.*
- *Only **NSA Signals Intelligence** modulates signals in this frequency band.*

Surveillance from Space

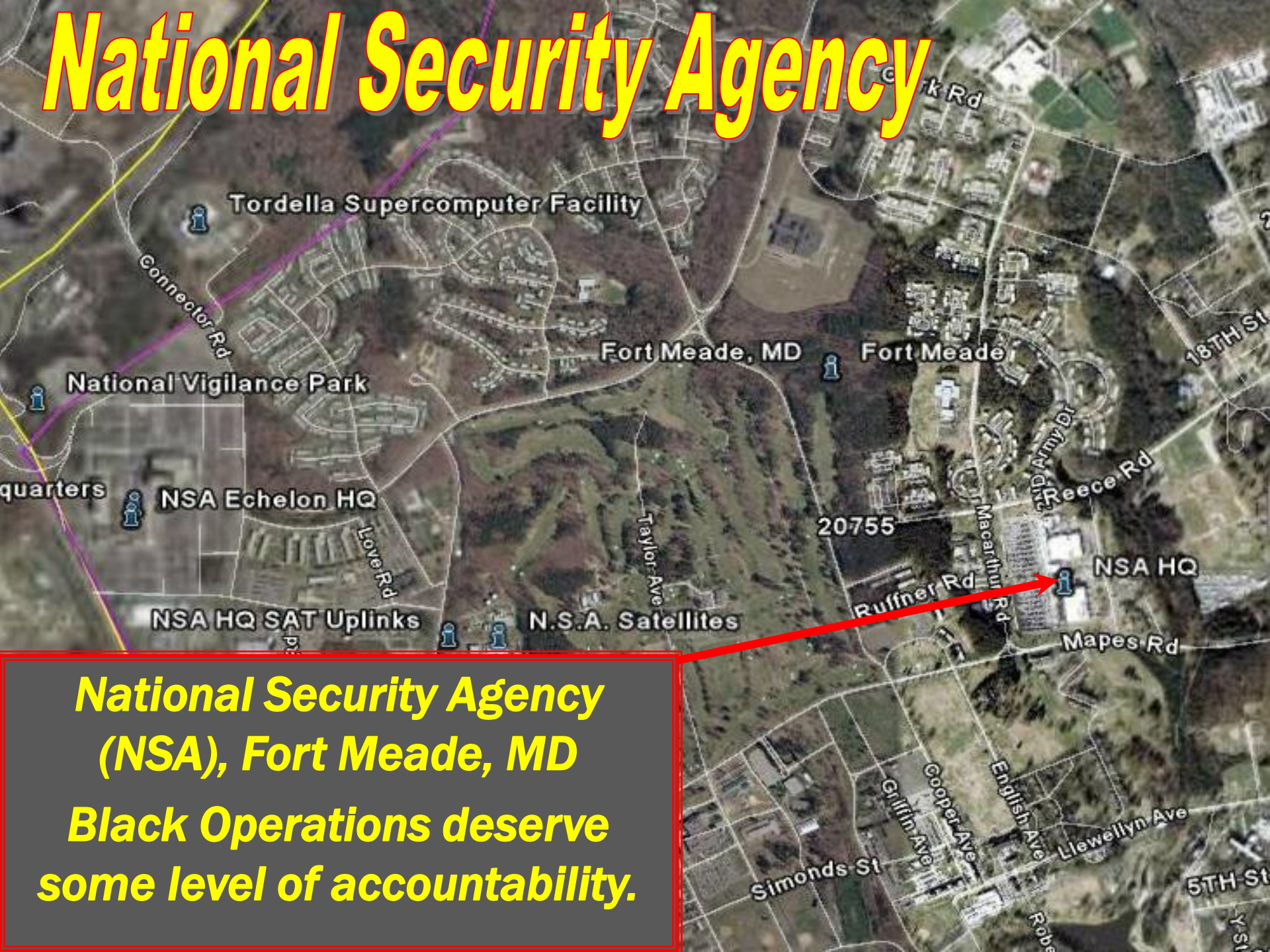


C-Band Surveillance

- ***C-Band Microwave Signal Frequencies from 5.925 to 6.425 GHz for their uplinks and from 3.7 to 4.2 GHz for their downlinks bounced off a satellite in space targeted on dental work, allows the tracking of movements, conversations, thoughts, and dreams, and the conducting of:***

Terrorism Without Fear of Prosecution

National Security Agency



National Security Agency (NSA), Fort Meade, MD

Black Operations deserve some level of accountability.

National Security Agency

National Security Agency (NSA), Fort Meade, MD

The National Security Agency (NSA) uses this technology!

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