

TELE-VISION: SATELLITE IMAGES AND SECURITY

IN OCTOBER 2007 SATELLITE PHOTOGRAPHS PURPORTING TO SHOW THE DESTRUCTION OF A SYRIAN NUCLEAR REACTOR WERE RELEASED TO THE MEDIA. DAVID CAMPBELL SAYS THIS IS ONLY THE LATEST INSTANCE OF THESE IMAGES PLAYING A ROLE IN GLOBAL POLITICS.

In the early hours of 6 September 2007 local residents on the Syrian-Turkish border reportedly heard five jet fighters overhead. The following day a Syrian government official told the Reuters news agency Israeli aircraft had bombed an empty area in the country's eastern desert before being engaged by air defences, but Israel refused to comment officially on the incident, imposing a news blackout on the story.

So began weeks of international speculation about what had taken place. US newspaper accounts questioned whether the still unconfirmed flight of Israeli warplanes over Syria had been an exercise in intimidation, intelligence gathering, or the targeting of conventional weapons caches bound for Hezbollah in Lebanon. However, within two weeks the media had settled on the claim that the target of Israel's strike was a nuclear facility on the Euphrates River, some 90 miles from the border with Iraq. According to these accounts, Israel had supplied the US with dramatic evidence of this nuclear site,

principally in the form of photographs and satellite imagery.

Syria countered these claims by taking journalists on a tour of the alleged site in early October 2007. Showing the visitors an agricultural research centre, government officials denied any attack had taken place, despite the fact, one week earlier, the Syrian president told the BBC an abandoned military site had been targeted, something the Israeli military censor subsequently confirmed. So what did take place in Syria's eastern desert in early September 2007? The public release of satellite images by a private American group in late October 2007 started to make the picture clearer.

The Institute for Science and International Security (ISIS) – headed by former weapons inspector David Albright, and dedicated to 'employing science in the pursuit of peace' – obtained commercial satellite imagery from the American-based satellite operator DigitalGlobe (Fig. 1). ISIS argued that the images, taken six weeks apart, revealed a nuclear reactor under

construction and then a bomb damaged site being concealed by earth movement.

The international media lapped up these images, and stories based on them ran globally. And yet, for all their surface veracity, these satellite images recalled earlier concerns about the amount of trust that should be placed in such annotated pictures. This was because when then US Secretary of State Colin Powell went before the UN Security Council in February 2003 to offer evidence of weapons of mass destruction to back the planned invasion of Iraq, the bedrock of his argument was a series of satellite images said to show the weapons programmes the Iraqi's were allegedly hiding (Fig. 2). Powell called his slideshow 'an accumulation of facts' from solid intelligence, and David Albright told CNN at the time he found Powell's presentation 'compelling' evidence of the Iraqi failure to comply with the UN's demands for disarmament.

Despite such certitude, the US occupation of Iraq failed to disclose any evidence of Iraqi weapons of mass destruction (WMD).



Fig. 1

Syrian Arab Republic

A composite picture of handout photographs released by DigitalGlobe showing satellite imagery of a suspected nuclear facility (L) collected on 05 August 2007 and after being completely destroyed by an Israeli airstrike in September 2007 (R), east of the Euphrates river in Syria, collected on 24 October 2007.

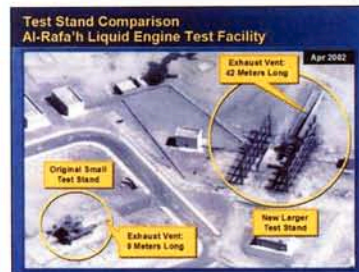
Image by © Digital Globe/ Handout/epa/Corbis



slide 25 In May 2002, our satellites photographed the unusual activity in this picture. Here we see cargo vehicles are again at this transshipment point, and we can see that they are accompanied by a decontamination vehicle associated with biological or chemical weapons activity.



slide 26 This photograph of the site taken two months later in July shows not only the previous site, which is the figure in the middle at the top with the bulldozer sign near it, it shows that this previous site, as well as all of the other sites around the site, have been fully bulldozed and graded.



slide 35 Iraq has built an engine test stand that is larger than anything it has ever had. Notice the dramatic difference in size between the test stand on the left, the old one, and the new one on the right. Note the large exhaust vent. This is where the flame from the engine comes out.

Fig. 2

Three slides and captions from Secretary of State Colin Powell's address to the U.N. Security Council on the issue of Iraq and disarmament, 5 February 2003. slides 25, 26, 35 / White House website.



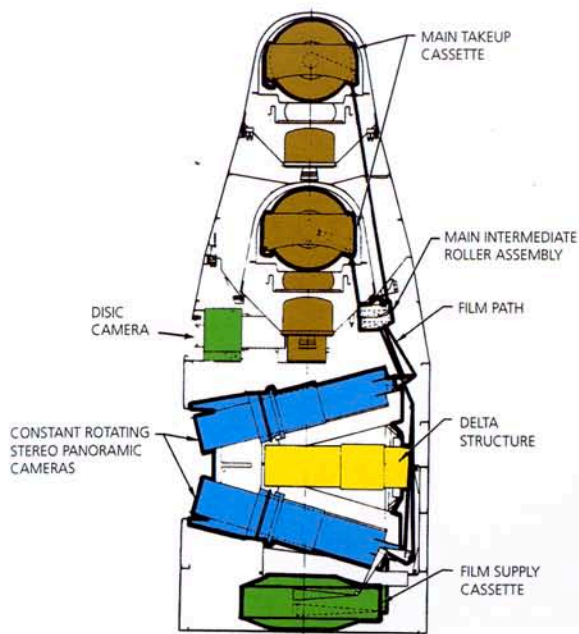
Fig. 3

Aerial Reconnaissance Imagery of Auschwitz.

The mission of 26 June 1944 to the I. G. Farben chemical plant also showing the Auschwitz-Birkenau complex. Analysed by former CIA photo interpreters Dino Brugioni and Robert Poirer retrospectively in 1979.

After the war the official Iraq Survey Group concluded that all Iraq's WMD were effectively destroyed in the Gulf War of 1991, and the country's nuclear ambitions had ended in the same year. If Syria had embarked on a nuclear program close to the Iraqi border then America's preoccupation with Saddam Hussein's non-existent WMD programs was even more misplaced. And that is what another commercial satellite photo seemed to show. The day after the ISIS report deployed the DigitalGlobe images, the US company GeoEye released a 16 September 2003 image that showed the Syrian site in much the same state as the August 2007 photograph. The Syrian reactor story was thus becoming a battle of images.

How have satellite images become powerful resources for claims about international security? Why are satellite images regarded as compelling evidence? Part of the answer is historical, for since flight has been possible, military authorities have developed technologies for remote sensing so that data about distant or obscure things can be captured by contemporary imaging technology. Cameras were attached to tethered balloons as early as 1858 in order to produce aerial views. World War I was the first conflict in which aircraft-borne cameras enabled widespread photoreconnaissance, and this technology progressed as both photography and flight became more sophisticated. In World War II the Allied Central Interpretation Unit in Buckinghamshire was the headquarters for the Royal Air Force's photographic intelligence. Handling 25,000 negatives and 60,000 prints of these images per day, the unit was staffed with personnel using primitive stereoscopes to find evidence of enemy military placements in order to coordinate future attacks. Analysts could only see what they were tasked to find, however. This meant, for example, that although Auschwitz had been photographed more than thirty times by allied aircraft before Soviet forces liberated it in January 1945, nobody had connected the images to the Final Solution until the former CIA photo



interpreters Dino Brugioni and Robert Poier retrospectively analysed the intelligence files in 1979 (Fig. 3).

The Cold War was the context for an expansion of photoreconnaissance. The difficulties for intelligence posed by a closed Soviet Union meant that Western agencies sought more advanced means to spy on their opponent's military forces. At a 1955 summit, President Eisenhower proposed that the US and the USSR enter into an 'open skies' agreement that would permit military overflights of each other's territory in order to provide photographic reassurance that neither was planning to attack the other. The Soviets refused and the Americans developed advanced aircraft like the U2 that enabled long-range and high-altitude photoreconnaissance. From a height of 70,000 feet its cameras could record images with resolutions as low as 2.5 feet. The U2 famously documented the Cuban Missile Crisis in 1962 – photographs showed Soviet vessels carrying nuclear missiles to Cuba and the construction of launch pads on the island –

providing the Kennedy administration with visual evidence to mobilise its allies and force Khrushchev to back down. Through moments like this, photoreconnaissance – which continues using unmanned aerial vehicles like the 'Global Hawk' – established a record as a revelatory force that could overcome political obstacles to transparency and knowledge.

Photoreconnaissance is but one possible remote sensing technology among many others. It depends on what Jeffrey Richelson calls 'limited black and white visible-light photography' that cannot record things if they take place at night, in the shadow of solid objects, or under the protection of cloud cover. However, panchromatic technologies cover only one small aspect of the electromagnetic spectrum from which images can be produced. The history of remote sensing in the period since World War II has been a history of new technologies designed to increase the resolution of images, the speed of their delivery, and the variety of sensors through which they are recorded. The quest has been for what Lisa

Parks terms 'tele-vision' – the best means of seeing what cannot be seen because of either distance or the limitations of the eye. As a result, satellite reconnaissance using earth-orbiting platforms fitted with infrared sensors and imaging radars as well as visible light cameras greatly increase what can be recorded, regardless of conditions. Russia, France, China and the US are the major nations that have developed these capabilities, but the American program has been by far the largest and best known.

Satellite reconnaissance began in the Eisenhower administration as a way to unilaterally achieve open skies, and this capacity remained an official secret until 1978. Beginning with the CORONA programme in 1960, satellites carried Keyhole (KH-1) film cameras with a resolution of between 25-40 feet. They ejected canisters that had to be collected from the air by special aircraft before the film could be processed and interpreted (Fig. 4). This meant that although satellite observation could proceed without

Fig. 4
Left: Major components of the CORONA satellite camera system.

Right: A U.S. Air Force plane recovers a CORONA Capsule returned from Space. The aircraft was specially modified for the mid-air retrieval of space capsules re-entering the atmosphere from orbit by snagging their parachutes. (U.S. Air Force photo)

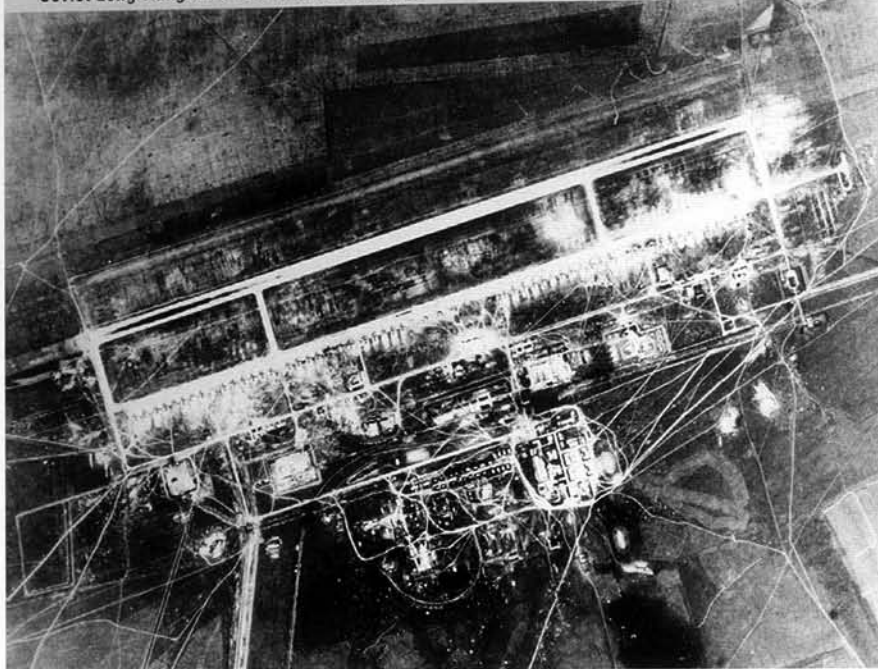


Fig 5.

A KH-4A image of Dolon airfield, which was a major Soviet long-range aviation facility located in what is now the Republic of Kazakhstan. The image shows two regiments of Tupolev (Tu-16) Bear bombers. The main runway is 13,200 feet long. The KH-4A camera system was first introduced in August 1963. Resolution ranged from 9 to 25 feet.

any constraints from another country, the detail of the images and the time it took to get them was some way behind what photoreconnaissance aircraft could achieve. By the end of the CORONA programme in 1972, however, resolutions of 5-6 feet were being achieved, and by the time the more advanced Keyhole optical systems were operational, digital signals transmitted by relay satellites ground stations were producing photographs as low as six inch resolution in near real-time (see Fig. 6, from the National Security Archive). Given that a satellite image, taken at an altitude of hundreds and sometimes thousands of miles, is equivalent to a conventional photograph taken from an aircraft flying at only 3,000 feet, this precision is a considerable technical achievement.

The technological developments that have increased both the accuracy and speed of images have given satellite reconnaissance an aura of unsurpassed objectivity. With their ability to thwart environmental and political obstacles, the notion that space-

based cameras can capture images anywhere, anytime, thereby revealing what others do not want disclosed, extends the cultural understanding of mechanically generated objectivity (literally) to new heights. With advanced optical systems, orbiting anywhere up to 22,000 miles above the earth, satellite reconnaissance embodies Denis Cosgrove's idea of the god-like 'Apollonian eye' surveying all below from a remote vantage point. This omniscient perspective establishes the earth as a domain over which the technological masters can exercise global control. Given that the best satellite resources are controlled by either the US government or American-based corporations, the power to see globally is unequally spread. As the recent Syrian reactor story shows, the international media readily consume satellite images – something that additionally bolsters the images claim to objectivity – but pays little heed to the fact they are distributing a necessarily partial perspective.

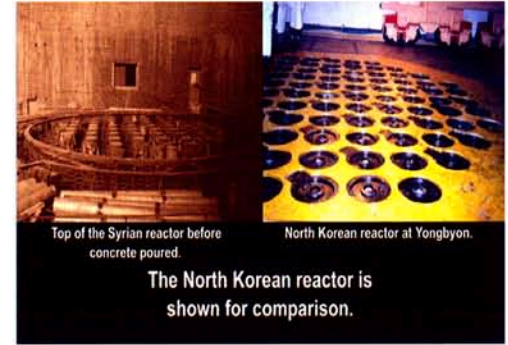
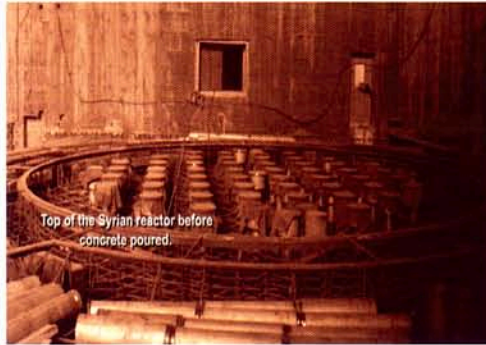
Although the sophisticated technology,

orbital position and media appetite for satellite images contribute to the heightened aura of objectivity surrounding these pictures, they are anything but self-evident. When Colin Powell introduced satellite photos of Iraq as part of his Security Council presentation, he made a revealing observation. 'The photos that I am about to show you,' Powell observed, 'are sometimes hard for the average person to interpret, hard for me. The painstaking work of photo analysis takes experts with years and years of experience, pouring for hours and hours over light tables. But as I show you these images, I will try to capture and explain what they mean, what they indicate to our imagery specialists.' Given the rise of digital technologies, Powell's description of photo analysis as taking place at a light table is somewhat anachronistic, but the importance of analysis in the production of satellite imagery cannot be underestimated.

Satellite images do not arrive fully formed as photographs. The raw data has to be computer processed before it can be viewed



Fig. 6
A degraded KH-11 photograph of the Zhawar Kili Base Camp, Afghanistan, which housed training facilities for Osama Bin Laden. The photograph was used by the Secretary of Defense to brief reporters on the 1998 cruise missile attack on the facility. This was the first official release of contemporary classified satellite imagery by the US government.



in a meaningful form. One outcome is an ‘orthophoto’ whereby distortion from camera perspective is removed, another are stereo pictures to create three-dimensional scenes. This is done in outfits such as the CIA’s ‘National Photographic Interpretation Center’ where more than 1,200 staff work on images through ‘photogrammetry’ (using pictures to extract the three-dimensional coordinates of what is photographed) and ‘photo interpretation’ (which draws on previous cases to establish the nature of the objects photographed). Because satellite images do not speak for themselves, the end result is that they appear in public festooned with arrows, captions and claims designed to anchor what is otherwise – increasing resolutions notwithstanding – a blurry and imprecise picture. Moreover, even though satellite images can be produced in real-time, their tense is one of latency: satellites are constantly scanning the earth’s surface but their data is most often archived rather than analysed. As Lisa Parks’ writes in *Cultures in Orbit*, ‘satellite image

data only becomes a document of the “real” and an index of the “historical” if there is reason to suspect it has relevance to current affairs.’ Much like CCTV footage, then, satellite data is dormant and only becomes an image after the fact, when it is rendered, analysed and circulated in response to an event.

These issues of analysis and timing are clear in the case of the Syrian reactor story. Not only did the satellite imagery require captioning, subsequent efforts by the US intelligence community to secure the meaning of the story drew upon other photographic forms to anchor the images. In April 2008 two CIA officers briefed the media in support of the argument that North Korea was working on the Syrian reactor. The transcript has been published on globalsecurity.org, and the associated video presentation has been posted on global news sites. While the satellite images are prominent, they are linked to dozens of hand-held, ground level photographs of the reactor under construction

(Fig. 7). Dating from 2002, and obtained by Israeli intelligence, these snapshots helped generate a ‘photography-based computer model’ of the site. Central to this analysis are repeated comparisons with satellite images of North Korea’s nuclear facilities at Yongbyon (themselves published on the BBC News site alongside the Syrian story). Here then we have all the components that generate the conventional but strong understanding of satellite images as objective – their technical complexity, association with other forms of photography, rendering into a computer model, links to prior historical cases, textual annotation and propagation by media outlets around the world. Israel has still not officially acknowledged its raid on the Syrian site, but with these images freely circulating such an acknowledgement would be redundant.

A notable feature of the Syrian reactor story has been the role played by commercially produced satellite images. While programs like LANDSAT have provided broad but coarse multispectral imagery of the earth’s

Fig. 7
Ground level photographs from 2002 of the Syrian reactor under construction obtained by Israeli intelligence, a ‘photography-based computer model’ of the site and a comparison with North Korea’s nuclear facilities at Yongbyon. globalsecurity.org



surface since 1972, high-resolution satellite imagery remained a prerogative of the state until commercial operators emerged in the late 1990s. The first image from a US-owned commercial satellite was released in October 1999, and since then companies like DigitalGlobe and GeoEye have expanded their technical capacities.

These operators can provide satellite imagery for a variety of purposes, and various non-government organisations have purchased them to highlight issues of humanitarian concern. For example, the American Association for the Advancement of Science's 'Geospatial Technologies and Human Rights' program enabled Amnesty International to get imagery that exposed the government-organised campaign of house demolitions in Zimbabwe (Fig. 8). The director of Amnesty's Africa programme described the images as 'irrefutable evidence' of injustice, demonstrating that non-state actors are equally attracted to the aura of objectivity such images continue to carry.

While commercial operators have challenged state control, US based firms are subject to 'shutter control.' The government is permitted to terminate the right to take images that could be detrimental to national security, although this is yet to be directly exercised. Instead, licensing restrictions limit the circulation of satellite imagery. Pictures with 1 metre resolution or less cannot be freely sold while images of Israel with 2 metre resolution or less are prohibited by Congress. There is also 'censorship by contract' whereby the government limits the public flow of satellite images by purchasing all the output from commercial operators for a specified time. During the 2001 US attack on Afghanistan the Pentagon spent \$2 million per month to gain exclusive rights over Space Imaging's pictures of that country. This policy was modified during the US invasion of Iraq because the Bush Administration made commercial operators the US government's principal supplier of satellite imagery, something that netted Space Imaging a \$120 million contract,

and left the secret National Reconnaissance Office's space assets free for specific missions.

Satellite imagery is an information resource that helps construct our global geopolitical landscape. Once the tool of a few dominant states, it is now playing a wider role, even though its meaning cannot be predetermined. Google Earth (which gives the appearance of real-time but uses DigitalGlobe images between one and three years old) can either mobilise activists alleging genocide in Darfur, or it can be used by Hamas to target their rocket attacks from the Gaza Strip. In this context, we need to follow Chad Harris's assessment that aerial and satellite images should be understood and interpreted as artefacts of our broader visual culture. We need to read them critically like any photograph, exploring their production, interpretation and circulation in terms of the political work these supposedly objective regimes of vision support.

Fig. 8

Photographs released by Amnesty International to show a Zimbabwe government-organised campaign of house demolitions in June 2005. The images were supplied by Digital Globe and analysed by the American Association for the Advancement of Science.