Google Earth

Satellite Images and the Appropriation of the Divine Perspective

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In the last few years cartography has received considerable interest. Notably with the introduction of Geographical Information Systems (GIS) cartography has merged with social media platforms and communication structures. Geobrowsing has emerged as a new name for this conflation. Apart from being an innovative trait of communication in social networks, geobrowsing applies a variety of traditional media forms, particularly with regard to the transformation of the imagery of the earth, which figures as central in geobrowsing. Traditional cartography, specific forms of film and photography and the satellite image can be counted as important predecessors of the geobrowsing applications.

The view of the earth from heavenly heights, the omniscient view of the earth, was a dream of cartographers and artists, who re-formulated their wish in a religious discourse and subscribed it to God, nonetheless trying to construct it. The view of the earth from space has since been amply documented, beginning following humanity's first successful attempts at space travel. The photograph taken from Apollo 17 in December 1972 using a Hasselblad camera constitutes one of the first ever visual documents of planet Earth and proved to be a highly effective advertisement for the Swedish manufacturer. Since these images were produced, this – once spectacular – view has become a more or less commonplace element of everyday culture.

Fig. 1: The Earth from Apollo 17

One consequence of the centuries-long idealization of this view of Earth is the potential for it to become overcharged with religious meanings, something that is also evident in secular contexts such as discourses about the ›blue planet‹.[1] Its image has since become an iconic symbol warning us of the perils of climate change.

Although both the Apollo photograph and digital satellite imagery were produced for supposed documentary reasons, these images nonetheless carry within them fixed visual conventions and meanings which, as Denis Cosgrove puts it, »have drawn upon and reconstituted a repertoire of sacred and secular, colonial and imperial meanings, and […] these representations have played an especially significant role in the self-representation of the post-war United States and its geo-cultural mission«.[2] The aim in the following is, first, to explore the technical and visual traditions in which cartographic and satellite images have been produced and to show, second, the extent to which the concept and media practice of geobrowsing rely on traditionally conceived imagery and structures of visuality.

In terms of the history of technology, satellite images came about as a result of military interests. With the start of the Cold War and the first attempts at space travel, efforts were also undertaken to study the earth

1 | Cf. Skinner 1999.

2 | Cosgrove 1994, 270.

from space, following on from the military tradition of using either moored balloons or airplanes to produce photographs of landscapes from a higher vantage point. Naturally, military interests and military financial clout played a prominent role here, confirmed in the following comments made by U.S. President Lyndon B. Johnson, who had approved the cessation of regular flights by spy planes in view of the satellite technology being developed in the Soviet Union in the mid-1960s:

> I don't want to be quoted on this, but we've spent thirty-five or forty billion dollars on the space program. And if nothing else had come out of it except the knowledge we've gained from space photography, it would be worth ten times what the whole program cost. Because tonight we know how many missiles the enemy has and, it turned out, our guesses were way off. We were doing things we didn›t need to do. We were building things we didn't need to build. We were harboring fears we didn't need to harbor.[3]

Interestingly, ideas about how to transport data corresponded to communication media technologies available at the time. The satellites worked partly with photographic stills or moving pictures, and the resulting films were physically transported down to Earth in capsules. More modern technology worked similarly to television. A television camera was used, and its images were stored on magnetic tape until the satellite had passed by a receiving station and the images could be passed on as electric signals. This kind of technology was used in satellite transmissions until the end of the 1970s. At that point photography was replaced by a new technology, which recorded and stored light using a sensitive electro-optical technique – just as in the video camera which was to be developed later.[4] Here, too, the analogy between media technology and satellite imaging begins to become apparent.

After the end of the Cold War satellite surveillance gradually began to be used for civilian purposes. The first professionals to recognize the value of panoramic photography were meteorologists.[5] Drawing on photographic techniques and combining these with elements from electronics, optics, and information, remote sensing was developed in

3 | Thaller 1999, 12.

4 | Cf. Dyring 1992, 29.

5 | Cf. Ibid., 34f.

which data on emitted radiation are recorded and transformed into images.[6] From a media theory perspective, this represents a radical change. No longer are we dealing with technical records of the Earth's surface but with digital imaging, which was able to transform data into visual structures. The history of observing Earth from satellites offers clear documentation of military interests in media technologies. Military technologies were apparently able to engage in observation of the earth away from the gaze of a public whose mass media were based on the same technological structures.

However, there is a long-standing tradition of collaboration between media and the military. In War and Cinema, French media philosopher Paul Virilio uses media theory to highlight the parallels between war and cinema, working with a tightly woven technological analogy between the apparatus of war and the film camera:

> It was in 1861, whilst travelling on a paddle-steamer and watching its wheel, that the future Colonel Gatling hit upon the idea of a cylindrical, crank-driven machine-gun. In 1874 the Frenchman Jules Janssen took inspiration from the multi-chambered Colt (patented in 1832) to invent an astronomical revolving unit that could take a series of photographs. On the basis of this idea, Etienne-Jules Marey then perfected his chrono-photographic rifle, which allowed its user to aim at and photograph an object moving through space.[7]

In the course of his subsequent comments on this issue, Virilio emphasizes the efforts made by the military to acquire filmic and photographic aerial shots: still or film cameras were tied to hot air balloons or airships to obtain aerial photographs of strategically important swaths of land. Virilio continues:

> Soon the army was rigging together the most varied combinations: camera-kites, camera-pigeons and camera-balloons predated the intensive use of chronophotography and cinematography on board small reconnaissance aircraft (several million prints were made during the First World War). By 1967 the US Air Force had the whole of South-East Asia covered.[8]

6 | Cf. Ibid., 35.

7 | Virilio 1989, 11.

8 | Ibid.

This theory should not be dismissed out of hand, and indeed it does form part of the proceedings offered here. Nonetheless, Paul Virilio's argument fails to address some important aspects of the origins of visual traditions and of the discursive attributions of media apparatuses. In addition to technical inscriptions of images, there are formative visual traditions and habitualizations of images which serve a wider function. Instead of exploring the formative power of these inscriptions, however, Virilio implicitly takes them as given and is thus able, drawing on historical visual traditions, to formulate his theory of the dominance of technological inscription. In this way, his ideas confirm the persuasive power of images, which has emerged in the course of a long historical process. They are images which, on account of their technical and visual traditions, establish an objective spatial perception.

My assumption – drawing on Cosgrove's comments – is that there are image-related conventions and structures of communication which transform meanings and enable them to function in adjacent discourses beyond the technologies. Accordingly images become modal points for a multitude of different discourses.

Since there are real disadvantages to focusing methodologically on the technical aspects of photographic and filmic imaging, in the following I shall offer a concept of looking that relates both cultural and visual traditions and technical dispositions to one another. This way of proceeding draws on Arjun Appadurai's ideas about strategies of signification that work in different manners, which he calls ›scapes‹. According to Appadurai, a specific way of looking necessarily emerges from the combination of these different discursive spaces.[9]

Interestingly, implicit assumptions regarding photography and its capacity to offer a supposedly objective reflection of the world have remained a part of discourses about digital images. According to Lorraine Daston and Peter Galison this attribution of ›truthful representation‹ to photography arose in the context of the suppression of subjectivity in scientific discourses of the 19th century, at the same time as the shift occurred from drawing to photography. While illustration was still allowed to carry the marks of subjectivity, photography was accorded the role of being both symbol and image of the new objectivity – suggested not least by its mechanical equipment.

9 | Cf. Appadurai 1996.

Apparently, those engaged in military research and civilian use see the need to maintain the scientific claim (to objectivity) of their own images by seeking to perpetuate traditional photographic attributions that have already long become obsolete: in contrast to technological progress, the representations of landscapes as well as the satellite images of the earth follow fixed visual traditions for which clear evidence can be found. Thus the images serve not only as up-to-date documents; they also reveal political and cultural interests which reach much further.

One of the first landscape overviews arose long before any technical means of media recording existed. In the year 1570 Abraham Ortelius's representation of the earth, Teatrum Orbis Terrarum, displays astonishing similarities to contemporary representations.[10] Common to both these images is the way the viewer's gaze is guided from a seemingly divine standpoint down to the landscape below: viewers are equipped with an omniscient eye, giving them total control over the image and what it depicts. A particular gaze is established which later becomes important in military contexts to guarantee an alleged objective perception of landscapes.

Provost's painting Sacred Allegory (1510) clearly links gaze, property and ideological legitimation. Next to the risen Christ stands his mother Mary, elevated to Queen of the World; both appear to float among the clouds while between them, held out by a disembodied hand, is a globe which is exposed to the all-dominating and controlling gaze of God. This scene, a clear representation of imagined power relations, is dominated by the eye of God, which takes up the central viewing position like the sun in a solar system. Here, the eye of God is the ideal point of escape from which to gaze upon the earth. Even though this is not represented explicitly in early modern representations of maps or landscapes, the imaginary gaze of God – that is, the gaze from above – is etched onto the map as an ideal typical position.

This representation also reveals much about the way the landscape is viewed – in a controlled and controlling way. The imaginary eye of God – or some other superior authority gazing down from the heights onto the landscape – is another highly stable tradition of the European visual imagery. Representations that portrayed the seeing and possessing or appropriating eye of God from the outside were especially popular. This

10 | Cf. Cosgrove 1994, 271.

gaze of God is also imitated by the early maps of the Renaissance, which are based on an imagined view from the air.

There is a mutual correspondence here between the views of the controlling eye and the viewing constellations of the eye itself. An external view brings about objectivity and authority, according to Peter Galison and Lorraine Daston this role was taken over by photography in the 19th century[11] and it similarly defined the way in which landscape is represented. Thus we have a tradition of imagery running parallel to the maps and pictures of landscapes, which documents the positioning of the gaze in the form of a media disposition.[12]

According to Cosgrove, landscape representation arose as a mode of seeing the external world in the 15th and 16th centuries and was closely associated with the visual endeavors of the Renaissance and its concept of humanism and space.[13] As Cosgrove shows, representations produced in different disciplines and areas of society, such as in painting and in landscape gardening, adhere to the same demands of the linear perspective as were also used in cartography and land surveying.[14]

Spatial processing, modified according to the discipline concerned, was taught in a special manual.[15] This fact explains the varied usage of conceptions of space in different scientific disciplines. In this sense we can say that cartography and taking possession of the landscape occurred in parallel with one another, while the application of geometry often either made the acquisition of actual space easier or prepared the way for it.

> Implicit in the landscape idea is a visual ideology which was extended from painting to our relationship with the real world whose frame and compass Elizabethans so admired and which Georgian English gentlemen would only approach through the language of landscape painting.[16]

Cartographers were happy to subordinate themselves to this purpose, an understanding that emerged in a comment made by John Dee, the

11 | Cf. Daston/Galison 1992.

12 | Cf. Cosgrove 1994, 272-273.

13 | Cf. Cosgrove 1985, 46.

14 | Cf. Ibid.

15 | Cf. Ibid.

16 | Ibid, 55.

famous Elizabethan mathematician and magician, who underlined the special impact of landscape drawing and its use for military achievements.[17] Bruno Latour even goes so far as to describe the central perspective as a new kind of communication medium in early modernism, whose function was to link different pieces of information together. If we take Latour's ideas seriously, we understand that the central perspective is more than an aesthetic decision: it links the various scientific disciplines and social domains with one another, thereby facilitating the interchangeability of visual representations. Images could now be used within and exchanged between different contexts, such as economic or aesthetic ones, without a hint of disruption.[18]

Against this background it is easy to discern that the visual zoom function provided in *Google Earth* is based on the visual and epistemic history of the images of the earth in cartography and satellite photography. With the introduction of *Google Maps* and *Google Earth*, both released in 2005[19], cartographic images of the world have experienced a surge on social media platforms. And although a variety of Geographic Information Systems (GIS) had been in use before, *Google Maps* and *Google Earth* brought about a new quality and a broader popularization within GIS systems, which can be described as their popular proliferation, as Michael Jones, Chief Executive Officer of *Google Earth*, stated in 2007:

> What's happening now [...] is that instead of just GIS experts talking to each other, or experts making maps for regular people, regular people are talking to each other, and they are making maps for each other. And that's very important [...] the story of the where is very important.[20]

Contrary to classical GIS, *Google Maps* and *Google Earth* combine social communication with cartographic systems and thus shift cartographic competence away from the experts. Furthermore, contemporary cartographic systems can be installed on the personal computer to achieve a division between content and presentation. Data can be stored on a

17 | Cf. Ibid, 58.

18 | Cf. Latour 1990.

19 | Cf. Crampton 2010, 27.

20 | Ibid, 25.

server and the client computer merely requires a browser to enter cartographic systems. Data and modules are loaded onto the client server on demand.[21] This has made the general use of cartographic systems even easier.

In the following, I would like to discriminate between Geographical Information Systems and the Geoweb applications, which combine Web 2.0 characteristics with cartographic information. Geoweb programs such as *Google Maps* and *Google Earth* are open, hybrid systems. Even if not particularly intended, the hybrid form of *Google Maps* was introduced through a hacking event later referred to as mashup, which built the operational basis for Google's cartographic programs. Consecutively, *Google Maps* went online in February 2006, and within hours the program was reverse-engineered, so that rather than Google's intended contents, the programmer's content appeared on the screen. *Google Maps* had been hacked by people who intended to use Google's well-designed maps to display and share their own data. This had been achieved by either exploiting open-source mapping applications or by combining one site's function with another.

The confluence of these factors resulted in a new configuration of digital cartography, the so-called geo web and its myriad locative media platforms, which facilitated different modes of production and consumption of geo-coded data as well as the appropriation of location platforms through social media platforms.

The aforementioned process can be understood by considering the contextual politics of code and appearance. The term for the new media practice is ›mash-up‹, which also offers a central application of *Google Earth*. The appropriation of existing contents is feasible because of the markup language (XML) and Application Programming Interfaces (APIs). XML, a further modification of HTML, allows for the standardization of program parts, thus supporting the swapping of contents even better than HTML. Open source APIs define the connection of parts of the software. They can be thought of as ›public interfaces‹. Many online applications such as *Google* and *Yahoo* accept this form of programming and profit from it. These online web-based applications have brought about an understanding of places as ›experienced space‹, since space can be appropriated and personalized through geo-webbing.

21 | Cf. Abend 2013, 150.

As has been demonstrated, *Google* applications are extremely complex hybrid products, which engage a variety of media practices and visual strategies. In the following I want to focus on the representational aspects of this software to point to the different pragmatic and theoretical aspects of these visual representations of the earth.

As previously argued, rational cartography traces a direct lineage to the early Renaissance and, specifically, Mercator's scientific world map from 1569. *Google Earth* particularly picks up on this perspective in the label of its program and – as one of various meanings – claims the iconic tradition of the ›objective‹, godlike eye. Pragmatically it merges the seemingly omniscient eye with the software's application. Within the software the eye signifies the function and the button with which the virtual planet can be moved around, it controls the zooming into the deeper layers of planetary space.

In the wake of deconstructive philosophy, cartographers turned against the notion of the objective map and began to trace cartographic epistemologies. Brian Hartley in particular applied Michel Foucault's idea of the discourse and Jacques Derrida's concept of deconstruction to the map, reconsidering the traditional rules of cartography as an object to be deconstructed.[22] Hartley's writings, which date from the late 1980s, were thus introduced long before Internet mapping technologies became prevalent.

The Geographic Information Systems (GIS) that proceeded to develop were not influenced by deconstructive critiques of the mapping experience, but instead transported epistemological certainties into digital cartographies. To the contrary, the introduction of GIS brought about critical opposition because of its alleged positivism and its repudiation of critical, discursive, or deconstructive thought. The ensuing discussions between supporters and opponents resulted in a major dispute which lasted a decade. The reference to the negative role of GIS in the first Gulf War was a strong affirmation of its supporters. Theoretical strife began to calm in 2001, with supporters and opponents increasingly leaving the debate behind to produce more socially responsible GIS. Critical GIS today means (1) to contribute to a theory of GIS which is neither technical

22 | Cf. Hartley 1989.

nor instrumental, (2) to show how disciplinary effects operate, and (3) to lay open the epistemological assumptions of GIS.[23]

As soon as the geoweb was introduced in 2005, several conflicting positions have been developed within material and digital cartography. Questions arose immediately after introduction about what geoweb would do to GIS and what the differences between geoweb and GIS were.

The main difference resides in the use of everyday paper maps and the proliferation of amateur maps within geowebbing, especially since *Google* and *Yahoo* are media companies and not cartography suppliers. McMaps is a common term for this kind of popular mapping.[24] Digital technologies have reconfigured mapping into a new experience closely connected to neighboring media practices and technologies. Geowebbing is based on:

- databanks and archives,
- interfaces for data handling and calculations,
- a dashboard for user communication,
- different outputs tailored to a wide variety of users, i.e. Web 2.0 applications or printing, and
- a palimpsestic surface of the geoweb.[25]

Additionally there are inherent factors which provide huge advantages for the geoweb and which rely on the activities of the community. These include:

- ›Crowdsourced‹ data as for example in Wikipedia,
- open source tools and services, and
- participation and syndication (the web as platform).

Against this background we can clearly conceive of the difference in intention and technology between GIS Systems and *Google Earth*, the last one definitely catering for more interests than ›pure‹ cartography. Through the inherent GPS device *Google Earth* also turns into ›locative media', thus relocating global content within situated knowledge.

23 | Cf. Crampton 2010, 98-100.

24 | Cf. Crampton 2010, 130.

25 | Cf. November/Camacho-Hübner/Latour 2010.

From a media theoretical point of view, *Google Earth* applies a range of traditional media technologies that are revamped in a digital surrounding. The difference in media technologies also effects new modes of reception: against the ›navigational‹ use of the traditional map, which allows for a semiotic reading of the map as sign system, the geoweb map combines ›navigational‹ with ›mimetic‹ use: sometimes the user can determine which one to apply, other times the program regulates the modes of reception. This practice underscores Latour's conviction that our specific understanding of images functions contextually. Geoweb applications provide a heterogeneity of polysemic visual structures; and by combining old and new media technologies, they offer new forms and combinations of media practices.

There are a variety of visual and conceptual backgrounds to these developments, notably the moved cartographies in war and propaganda films figure as one of the forerunners of geobrowsing.[26] This technology has been traced through the Panoramio database within *Google Earth*, which provides the system with individual photographs to accompany the traversing of cartographic spaces.

Other important technologies adapted from film are the camera zoom and the virtual camera. When a user opens *Google Earth*, he or she first zooms into the blue planet earth. From here the zoom carries the user into the desired place and a switch to Google Street View once again offers us real filmic images, but here the camera overcomes the limitations of the real camera and turns virtual – a new medially fabricated room is brought about through camera movement called ›zoomscape‹.[27] The virtual camera redefines the cartographic space and, contrary to the classical camera, enables the viewer to move through space since the viewer actively controls it. Thus the mixture of film and active camera resembles the organization of video games, which also shift between ›filmic‹ and ›interactive‹ parts.

As has been mentioned above, photography has been rekindled in *Google Earth*. By letting the user switch to *Google Maps*, it offers the choice between the satellite and the cartographic image. Additionally, individual photographs can be superimposed on the cartographic image. Follow-

26 | Cf. Kreimeier 2005, 89-95.

27 | Cf. Abend 2013, 127.

ing Latour, a mimetic use is added to the navigational use.[28] Practically speaking, these uses cannot be split up, for they merge into each other.

Additionally, *Google Earth* offers a layering of various information which turn the program's surface into a palimpsest. These layered structures prevent the sole navigational traditional use of maps while opening up a variety of modes of reception that are not controlled by the map. The image thus can be charged with a surplus of information – mimetic, cartographic, semiotic – that, through overcharging, turns the image into random visual noise.

Also of importance within the use of *Google Earth* applications are the visual and pragmatic references to video games. The little figure in Street View is called ›Peckman‹, a pun on the name of a character from Pacman, one of the first video games. Peckman navigates through virtual space while providing users with a ›human‹, ›natural‹ or ›central perspective‹ of geowebbing. In terms of mediality, Peckman offers a filmic and, in some ways, documentary approach to the streets.

As previously mentioned, *Google Earth* works with Open Software Protocols and APIs. Thus although not visible on the surface, categories of software connection and digital alliances become important for critical consideration. Referring to the data-mining aspects of *Google Earth*, Carlos Barreneche traces the way images transfer from representation to computational processes.

> Like similar geoweb applications, Google Earth datamines the images of Flickr and other image databanks, in order to populate the street imagery: overlaying physical locations with Flickr's geotagged media layers. This form of visibility is enabled through network protocols and it is critically labeled as ›scopic regimes‹ (Paul Clapan). The transfer of images is controlled by the APIs, which define the categories of exchange. This brings about a hidden agenda of choosing images of places creating social attention as well as exploring places by user generated tags. APIs produce asymmetries of power as they establish descriptions of operations that are allowed and assigned a priority or blocked.[29]

This mechanism can be watched in the collection of images, which usually cater to a tourist or commercial gaze on the respective place. The

28 | Cf. November/Camacho-Hübner/Latour 2010, 582.

29 | Barreneche 2012.

asymmetrical nature of geo-coded information is represented visually by a few centers getting all the attention of a place. We find patterns of uneven representation, with dead zones in.[30]

Facing the massive impact of geowebbing and the organization of hegemonial knowledge through software, Carlos Barreneche hints at the difference in organizational structures: Flickr measures attention along the lines of social relations as they are expressed into the object. Research should go into the underlying structures of these object relations and, in Bernhard Stiegler's words, the ›grammatisation of affect‹. This means that the affective relationship towards the software is organized by standardized software structures.[31]

Following these aspects of software structure, we have to understand that *Google Earth* and other digital cartography services do not follow a critical, discourse-oriented, or deconstructive attitude towards cartography that Hartley formulated in 1989. Although on the surface we can observe a move towards cartographic community structures, the discursive regulations have moved into software and application structures and from there serve has a hidden disciplinary structure.

As we have seen, *Google Maps* and *Google Earth* offer a variety of functions and semiotic and semantic systems. Contrary to the distant planet seen in the Apollo photograph, the planetary image in *Google Earth* serves as a centralizing force: it is the starting point and the target of all searches. Earth itself has lost its metaphoric and symbolic powers to become the browser itself. As opposed to the traditional cartographic intent and the hegemonic perspective on our planet, *Google Earth* disjoins the experience of a planet earth into fractured smithereens of planetary knowledge.

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30 | Cf. Barreneche.

31 | Cf. Stiegler 2012.

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