THE MODIFICATION OF MAN-MADE CLOUDS : THE INDUSTRIAL CLOUD

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Submitted: <leave for Editor to date>

Abstract
The following **article** discusses anthropological clouds and in particular industrial clouds, which are exemplary for modalities of art science collaboration. It was written for the Leonardo *Water is in the Air* workshop **[1] and is part of the** forthcoming book "Man Made Clouds" **[2].**
The text is a theoretical response to our artwork *Fleur de Lys* [3]

Keywords: air pollution, emissions, man-made clouds.

Study of clouds

The cloud is an extraordinary subject matter to contemplate the liaison between art and science. The famous exchange between Johann Wolfgang von Goethe and Luke Howard on this subject demonstrates the ability of the cloud to float freely from one discipline to the other. The art-science dialogue followed the publication of Howard's "*Essay on the modification of clouds*" [4] whereby Goethe used Howard's classification system to write a poem in his honour[5]. The question posed in this article is whether illustrating scientific findings in the form of poetry can be considered as a symbiosis of art and science? On the one hand, both Goethe and Howard were truly multidisciplinary 19th century beings, which allowed them to act as artist and scientist in one person. In this capacity they were able to imprint their morphological observations through language onto science, constructing ideas that are still valid today [6]. This kind of contribution to science is difficult to imagine for an artist today. In the days of Howard and Goethe, a brainstorm of science and poetry could still shape knowledge in the mist of the romantic era. Stéphane Audeguy, in his novel "La Théorie des Nuages" [7] depicts the exchange between theses two important figures in a way that is true to the ideals of their times. Goethe and Howard have an apparitional encounter in a nebulous mountain landscape, without actually grasping the real presence of each other.

Since that time, today's clouds have forfeited much of their heavenly, transcendental existence. Media and marketing have made their beauty banal whilst science has disclosed their secrets. They have been painted, photographed, categorised, seeded, artificially manufactured and digitised from satellites above. Moreover, the modern sky has new cloud formations to offer, new typologies, such as aeroplane contrails, that didn't exist when Howard was making his observations.

Today's clouds are man-made. As Peter Sloterdijk has argued, the 20th century has been witness to a terrorised air space where people have been deprived of their naturally given, egalitarian right: to breathe freely wherever we are. Sloterdijk locates the starting point of this "atmospheric terrorism" in the year 1915, during world war I, when Germany used chemical gas as a weapon. From this point onward, aerial warfare is no longer directed against individuals but aims to make the environment as a whole unliveable [8]. The anthroposphere becomes an open air laboratory.

A consultation on the web sites of today's institutes for atmospheric science affirms this. The untouched white natural cumulus is no longer a major subject of research. On the contrary, contemporary publications in atmospheric research are dealing with the analysis of our own emissions clouds. We live in a man-made atmosphere and it is this atmosphere which we study. "Modernisation is becoming reflexive, it is becoming its own theme", as Ulrich Beck notes. An updated version of Luke Howard's classification should not be titled "Nimbusclature" but "An essay on the modification of Man-made Clouds".

Modification of industrial clouds

The most familiar category within the study of man-made clouds is the industrial chimney cloud. Appearing larger in scale than all other air borne emissions, the appropriation of the atmosphere is visualised by the massive architectures of thermodynamic production. The "coal forest" [9] underneath the earth, which grew over millions of years, is injected into the atmosphere via the chimneys of our industrial ovens which rest on the thin crust of the earth. Even Hollywood has adapted this theme, encapsulated in the film poster of Al Gore's *An Inconvenient Truth*. The poster shows an industrial chimney releasing a hurricane into the atmosphere, linking the extreme weather events caused by climate change to unchecked industrial production.

Since the beginnings of the steam powered industrial revolution, the production of energy has been the underlying force behind our industrial lifestyle and consequently the representation of the factory and its cloud have been a highly political subject matter. During the Russian revolution, the factory is the spiritual centre, a beacon for the new ideology where the emission is a banner to carry the revolutionary message. Similarly, but from a different political perspective, an election campaign poster for the British Conservative party in 1931 shows chimneys against a cloudless sky and reads "Smokeless chimneys – and

Fig.1. *Fleur de Lys* at the exhibition *Convivialité, écologie et vie pratique* at Domaine de Chamarande, Dimensions: 1m80 x70 x 60 cm. Materials: water-filled aquarium, aluminium, PET model, plumbing, computer, projector, speakers. Image © Laurence Godart.

anxious mothers!". The presence of the emission cloud is essential to the well being in two contrasting social-economic systems but neither poster makes reference to the inevitable chemical composition of the factory cloud [10]. On the contrary: "Smoky chimneys are the breath of Soviet Russia" [11] reads one poster. Much later, in one of the most enduring images of the Atelier Populaire during the May 1968 Paris uprisings, the graphic cloud-image coming from a factory chimney takes the form of a clenched fist: a declaration of resistance bearing the slogan "La Lutte Continue" (The Struggle Continues). This industrial emission is far from the pictorial plumes of the impressionists or the spiritual overtones of the "cathedral of work." Here, the factory is the centre of a conflict, a class struggle in which workers aim to free themselves— by literally letting off steam through political action and revolt. By the 1980s, the image of the industrial smoke stack was invariably used by the mass media as a symbol for pollution, more particularly acid rain, caused by sulphur and nitrogen emissions. In more recent years, the factory cloud has been used to draw attention to its chemical composition, notably CO2, and the economic system that allows such a hazardous environment to be created "Our Climate is not your business" [12].

Invisible clouds and risk

It appears that the imaginative power of the factory cloud is growing alongside the inconceivability of its chemical, atomic composition. Whilst potentially hazardous particles are becoming smaller and smaller, more and more man-made clouds are becoming invisible. The complex filtering technologies that are added to thermodynamic devices only accelerate this phenomena: automobile exhaust, for instance has become much more invisible with the widespread introduction of the catalyst convertor. Fine suspended particle dust can only be perceived through scientific measurement and is relayed to us via a news bulletin as a PM10 index. If the great London Smog from 1952 could still be perceived by our bare eyes, the 2003 ozone episode in France, which was in part a result of a heat wave across Western Europe, could only be experienced through the sensors of air quality readings [13]. Both toxic cloud events had devastating health implications. Hence, both scientific measurement and *interpretation* are of political concern. Risks, such as Man-made clouds or air pollution can thus "be changed, magnified dramatized or minimized within knowledge, and to that extent they are particularly *open to social definition and construction*." [14]

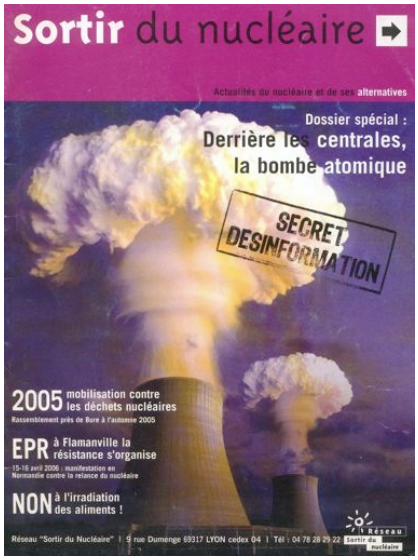

Fig.2. Sortir du nucléaire, numéro 26, février 2005

As little as we know about the chemical content of the cloud coming out of the chimney, we also do not understand the mode of operation of the factory itself. "We know the factory as a place in which obscurely things are born, which come into our world. In this space not everybody is allowed to go. It is not transparent, but rather closed off and submissive to the rules of access. Therefore the factory distinguishes itself profoundly from a theatre. In difference to the latter it is averse and not lit up to be looked at." [15]. In post-industrial Europe, the image of local red brick factory is obsolete, but retains a nostalgic imaginary power. It's presence has been superseded by the all mighty power plant, "la centrale thermique". Located far outside the city, the production of energy has been emancipated from the necessity to manufacture of goods, it's raison d'être is now to ensure their comfortable consumption. The power plant obeys a machine language that lacks any architectural self explanation for the onlooker to decipher the functioning of the high-tech processes inside.

Hubert Damisch evokes the often stated fact that the cloud is a place in which our imagination can unfold freely. It has "the powers of a material in which any kind of figure may appear and then vanish". If this holds true, then since the 20th century we are making the readings of the clouds explicit, in the words of Peter Sloterdijk "making the air conditions explicit". From now on we are quasi forced to take a position in regards to the binomial factory/cloud. We need to give form to the industrial cloud, draw a contour around it and fix it into an image in time, which has a meaning.

Amongst the subcategories of industrial clouds is the enormous vapour clouds emitted by atomic power plants. Operating behind the thick concrete walls in high security zones on an atomic level, far away from the city centres, they are often visually perceivable through the bright, white fluffy clouds coming from their giant cooling towers. However, the allegedly clean white vapour emissions contrast with the potential danger of an invisible nuclear cloud. The ensemble becomes place for furious dystopian visions, matching the sublime powers of nature in the romantic era.

Fig.3. Untitled, faxed for the exhibition FAX at The Drawing Room, New York City, 2009. Image ©HeHe

Art Science collaboration in the era of man-made clouds

Returning to the "collaboration" between Goethe and Howard in the beginning of this article, the modalities in regards to an art and science collaboration nowadays need to be rephrased. In the romantic era, natural phenomenon could be studied with the bare eye. However, the nuclear clouds of our risk-friendly epoch are produced by complex technological scientific economic endeavour and can only be perceived

through scientific measurement. In short, the nuclear radiation clouds, have to be "believed, they cannot be experienced as such." [16]

In this light the meeting point between art and science is situated between the emotional tension evoked by the imaginative power of the nuclear radiation cloud and the technical feasibility to transpose such a feeling into art. In art-science collaboration, it is not the formal, joint, inventive, scientific discovery that occupies the foreground, but the strength, novelty and realised depth of the experience of an otherwise not perceptible emotion, offered within the technological resources of science.

Description of the artwork

Fleur de Lys is a miniature underwater simulation of a nuclear meltdown. It consists of an atomic power plant with cooling tower, which dominates a post industrial landscape, immersed in a water-filled aquarium. Borrowing techniques of vortex creation from the discipline of fluid mechanics, which entails controlled manipulations of liquid, a slowly spreading mushroom cloud is released from the industrial chimney. Every twenty minutes a pre-programmed sound and lighting score accompanies the miniature catastrophe and the simulated explosion enters the realm of the theatrical and cinematic perception. The work was realised in collaboration with Jean-Marc Chomaz, Director of LadHyx laboratory at the Ecole Polytechnique, Paris.

References and Notes

1. Atelier Rencontres Interdisciplinaires Leonardo/Olats, IMéRA, Marseille 25 & 26 Juin 2012

2. Helen Evans and Heiko Hansen, *Man Made Clouds* (Orléans : Editions Hyx, forthcoming 2013).

3. *Fleur de Lys*, HeHe, Made with the support of the Edith Russ Haus for Media Art, Oldenburg, Germany, 2009 – 2011

4. Howard published his classification in 1803, Goethe was made aware of it in 1815. See: Karl-Heinz Bernhardt, "Goethes Beziehungen zu Luke Howard und sein Wirken auf dem Gebiet der Meteorologie", *Proceedings of the International Commission on History of Meteorology* 1.1, 2004.

5. Goethe wrote the poem *In Honour of Howard,* illustrating the different clouds: Stratus, Cumulus, Cirrus, Nimbus.

6. Bernhardt [4] argues Goethe contributed to the classification, for example by adding the "Stratocumulus" .

7. *S*téphane Audeguy, *La Théorie des Nuages* (Paris : Editions Gallimard, 2005, pp. 28.

8. Peter Sloterdijk, *Sphären III, Schäume*, Suhrkamp, 2004, pp. 168).

9. Rolf Peter Sieferle, *Der unterirdische Wald. Energiekrise und Industrielle Revolution*, 1982.

10. This should not mean, that no environmental consciousness existed. It always did. See: the coal smoke abatement society in England.

11. History of the Soviet Union, http://en.wikipedia.org/

12. *Our climate is not your business,* protest poster for 2009 United Nations Climate Change Conference

13. www.airparif.asso.fr/_pdf/dossier_ozone.pdf

14. Ulrich Beck, *Risk Society* (Surbkamp Verlag, 1986, pp. 23).

15. Pierre Damien Huyghe in *L'Usine dans l'espace francilien* (Paris : Publications de la Sorbonne, 2000).

16. Beck [14] pp. 28.