

# Landscapes {Soundscapes: Dronestrikes on Saturn

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## Abstract

Dronestrikes on Saturn is the collaboration in between raxil4 and his Nameless Is Legion, an audio work that uses reverb laden drones with pedals, sine generators and a four track with loop tapes of some fine recordings or sonifications of the Saturn radio waves recorded near the poles of the planet via the Cassini spacecraft. It is a media ecology audio work offering an ethical composition and an aesthetical piece for preservation of the space, the urban space or the outer space, where these waves have been captured. In this case, preservation laws could develop a strong policy to facilitate the research for audio work in the conservation of sound as (eco)system.

**Keywords:** audio work, drones, generators, sonifications, waves, media ecology, soundscapes, sound ecosystem, landscape, sonic landscape

## 1. Introduction: Spatial Aesthetics, Situationism & Cybernetics.

A Soundscape is a tool to map the city, a counter mapping ideology opposed to surveillance. Following **Situationism** and **Psychogeography**, sound art in public space defence the connections between the place, the identity and the memory, refusing the commodification of non-places and the unifying non-symbolic landscape proposed by capitalist architecture. Since surveillance has turn into merchandise, artists and medialabs transform the public space into a more sociable place within the implication of alternatives strategies for communication which use geophysical instruments such sensors or lasers.

Brandon LaBelle in *Background Noise: Perspectives on Sound Art* describes a soundscape as a potential tool to transform reality [1]. As he says, revolutionary statements make a claim onto history to charge a given time and place with radical energy: to galvanize the masses, to overturn social behaviour, to disrupt and ultimately transform reality. Such statements act as momentary bursts of outrage and political conscientiousness, giving definition to the here and now as a time in need of rupture. Exploring revolutionary desire as a temporal moment, Brandon LaBelle examines various historical texts and statements calling for social transformation. From **Situationism** to Black Caribbean rights, random melodies are lyrical homages to revolutions. Comments and suggestions about art production, time of spectacle, and organization of labour are used to declaim about the revolutionary moment as a recurring intensity throughout history. But, in a deeper projection, LaBelle also refers to **soundscapes**. A part to understand the powerful meaning of sound in history, in *Acoustic Territories: Sound Culture and Everyday Life* he explores the features of the **auditory paradigm**, its relation within the surrounding environment and the condition of architectural spaces [2]. There is a genealogy or list of sites and topographies, such as underground spaces, the street or the home, to investigate how sound lends to experiences of place. This is further explored by considering place according to particular **sonic behaviours**. Understandings echo, vibration, feedback, rhythm, silence, noise and transmission, all are used to investigate and unfold particular auditory histories and cultural narratives, and to detail the **sonic geographies** of everyday life. In that sense, Brandon LaBelle, is one of the main exponents on the **Spatial Aesthetics**, a philosophic movement, influenced by **cartography**, **mapping**, **Psychogeography**, non-objectual tendencies in contemporary art, geopolitics and materialism. Spatial Aesthetics connect art with technology and ecology. **Geopolitics**, **Psychogeography** and **Situationism**, as well as **soundscapes**, and other metaphysical and artistic movements considering the effects of **public space**, territory or space in general, are studied and ana-

lysed under its features. **Spatial Aesthetics** has an intention to define and introduce a methodology to study theory of systems and universal laws.

Another point to consider is **Psychogeography**, the science or study of the effects of the landscape on the emotions of its passers-by. In this sense, there should be a **sound-psycho-geographic-practice** to pay attention to the establishment of security practices in public space consisting on the display of CCTV. Electronic technologies provide videosurveillance devices such as cameras or microphones for public space. CCTV, wireless video and other surveillance system are imposed to reduce the crime. There is one example to be analysed and it is the recorded video material of an incident occurred in Woolwich, London, U.K. It is an historical case about progress, technology and civil rights. The attack in Woolwich is described as a terrorist attack, where the British Army soldier: Drummer (Private) Lee Rigby of the Royal Regiment of Fusiliers was killed by two men near the Royal Artillery Barracks. The existing CCTV recorded material was analysed by the police but not released in the media. The Independent Police Complaints Commission released a statement about the incident based in the recorded CCTV footage. But, the images taken from passers and residents using mobile devices and telephone cameras were distributed through media channels like YouTube and newspapers as Daily Mirror. The most important about the case, refers to the audio captured and recorded from i-phones and microphones from mobile telephones. This is an historical novelty about **public space sound recording**, new journalism and surveillance. Regarding the Data Protection Law 1998 it is not permitted to record sound in public space. Electronic communications are subjected to privacy legislation. Phone calls, emails, text messages, web browsing sessions, GPS data, although being able to capture and record sound, they are finally not permitted, its uses are against the law and against privacy and human rights.

Following, **Situationism** is a counter-culture tendency in art and public space. It is defined as a furious reaction to the establishment of a mainstream culture. Their reaction implied an option that encourages struggle, populism, and favoured a position for ecology in public space. The artists and writers who participated in the **International Situationist** were Guy Debord, Libero Andreotti, Herbert Marcuse, among others. **Situationism** is the European alter-ego of the **Beatnik** generation, formed by Bob Dylan, Burroughs or Brion Gysin, in America. Both movements have been influenced by oriental philosophy and open processes to understand art, science and society. The Beatniks trusted that *“Things does not happen in logical sequence. Any writer who hopes to approximate what actually occurs in the mind and body of his characters cannot confine himself to such arbitrary structure as logical sequence. Joyce was accused of being unintelligible and he was presenting only one level of*

*cerebral events: conscious sub vocal speech. I think it is possible to create multilevel events and characters that a reader could comprehend with his entire organic being*". This paragraph offers an idea about what exactly was the definition of a **landscape of sound** in mind for the **Beatnik** artists. Gysin in the Dream Machine achieved to measure the ontological and **metaphysical dimension of sound** through lighting the sense of vision towards the inside of the brain. The effects of the movement in the neurons produced by the sparks of lights created an **inner soundscape**. The **Beatniks** understood why sound is an open process and a non-linear system. Supporting that, **Beatniks** referred about how different levels of speech in the mind of oneself, could resemble the idea of different range of frequencies found in a sound spectrum. This is also a statement exposed by James Joyce in *Finnegan's Wake*, and it is about the multi-layered labels of language in the brain. Finally, it also has to be said how the **Situationism**, and among them, Guy Debord declared themselves against "*La Societe du Spectacle*" criticizing the media production, the cultural industries, and the pop rock celebrities mass culture. From the counter culture scene, **Beatniks** and **Situationists** were also defenders of punk D.I.Y. do it yourself ideology as anti-corporative movement. [3]

Another supporting idea about **landscapes** and **soundscapes** is about **inner landscapes, mindscapes** or experiences with Dream Machines. Here is to say why the composition of audio works is a complete construction offering meaning and answer to the space that surrounds us. This idea is defended in **Cybernetic** theories developed by Norbert Wiener. The author offers an analytical response to understand the Sound as a non-linear system. Through an approximation to **noise** as an effect in the computational process, sound is determined as a chaotic and non-determinate responsive process. Moreover, Norbert Wiener cites the Copernican system and the Ptolemaic system as philosophical examples to study the geocentric system of the Universe. Those ancient traditions are based in trigonometric analysis. But in **complex system** (such as electronics, computation or physics), **random and indeterminacy** are main features to non-linear processes, making systems become more complex and sometimes subjective. **Noise** is understood as a random system. This effect creates an approximate definition of creative processes in the Universe. In Norbert Wiener, all these considerations regarding complex system, leads to determine a new direction for **Cybernetics** and scientific rationalism. And this is the development of new models of techno-science based in electronics and biology. This new model of science is dedicated to the study of life as a complex, dynamic and random system, and moreover to **sound as an (eco)system**. Experiments with brain waves give us more information about biological process and brain functions. Sounds coming into the brain give us a physical response to the surrounding environment. So, sound is studied through biologic processes based in Hei-

senberg, who developed the theory of atomic indeterminacy, based in molecular textures, homeostatic processes (changes in matter and temperature) and micro unities of measures. In addition, **Cybernetics** as a confluence between biology and electronics, in most part of the cases uses sound, **noise** and audio works to study complex systems altogether with gas and other substances. It makes to change the idea about the definition of system, a concept that belongs to mathematics, but becomes obsolete here because of new processes to study more analytically the meaning of an eco-system, rather than a system. It means, organized or not, a system that is alive. Indeed, the theory of the **Cybernetics** supports the idea of cyber-biology, techno-science and cyber-feminism. This New Science considers sound as an **eco-system** of spectral frequencies. Stochastic processes imply not only a re-consideration of the biological condition of the **sound spectrum**, but also a new designation and definition for the idea of the ecosystem of sound. To study sound as a phenomena under the point of view of mathematics and logic, means to accept the definition of a system, but considering the 90's idea of a lively systems under the point of view of the biology, sound as ecosystem introduces a change in natural history and cybernetics. **Cybernetics** studies of frequencies and spectrums and various ranges of oscillations are using homoeostatic processes to consider the reaction of gas and air in the spectrum of sound. These processes connect automatically with the idea of the **soundscape** as a landscape of materials where micro-materials define the **metaphysic of sound**. In that order, the experimental use of sound in Cybernetics and neuroscience connect art, science and technology and resolve this idea of **noise** as a fundamental part on **Cybernetics** theories, because cybernetic noise considers and connects with disciplines as communication engineering, cardiology, mathematics and neuroscience, a part of sound and vision .The major idea here is to defend too, the processes of **inner soundscapes** as a response of an **outer landscape**.

Another supporting idea about how the system of sound becomes an **ecosystem of sound** (**soundscape** or **landscape** too) is represented in *Music of Changes* by John Cage. In John Cage, **indeterminacy** is the main feature to create music, and it brings light to the idea about the **nonlinear systems of music**. **Uncertainty, fractal, indeterminacy, chaos** are main features for music influenced by oriental system of thought. John Cage opened the possibility to indeterminacy, a prophetic style in art and music that develop the cutting edge of the scene in vanguard culture. It takes some references from cut up projects. In its study of language as a multi-layered element of brain, John Cage describes the use of different registers of voices those who allow personality and human being to develop memory and to communicate. These registers are studied for artists belonging to **Beatnik** generation such William Burroughs and Brion Gysin. In their poetics and aesthetics, the Beatnik generation,

**Fluxus** movement and **Conceptual Art**, follow orientalism and Zen attitude, producing audio works resembling **inner landscapes**, states of **soul**, transcendent and immanent **inner visions**, explaining **spacing out** phenomena. Nowadays, artists have a better scientific approach to resolve the problem of the senses, using methodologies based in atomic physics and neuroscience, solving interconnection between sound and vision [4]. Finally, it has to be said that a contribution to these **soundscapes**, is the one that Marshall McLuhan offered. His version about the optical cortical nerve, denominated quiasma, is a cross in between 2 nerves that produces the exchange between **sound and vision** and explains the phenomena of **spacing out** as an inner **soundscape**.

## 2. Three Examples of Sonic Landscapes: Locus Sonus, Psycho-geophysics Summit and OrbitandoSatelites.

Here it is mentioned different supporting examples to illustrate the idea of soundscape as a solution for ecological systems in public space. First, there is the practice with microphones and field recording for live streaming. One of the most advanced systems of this type is **Locus Sonus**, a pure data tool for microphones and soundscapes that collaboratively creates a network of connected profiles worldwide established. **Locus Sonus** is a live open microphone network online. **Locus Sonus** artists work collaboratively curating sound art exhibitions and producing different events and conferences involved in sound resources. The project **Locus Sonus** is a global open microphone network based in Southern and Central France. **Locus Sonus** is engaged at all levels, from hosting a network to develop streamings hardware and promoting research. One of the last actions has represented more than 10 sound artists from London (raxil4, hNIL, Luke Jordan, Grant Smith, Graham Dunning, Robbie Judkins) in an exhibition about **wavefield recording**, amplifications, microphones improvisation, distortions, radars and telegraphs sounds, signal intrusions and electromagnetic interferences, soundscapes, warscapes and seascapes, using filters, feedbacks, echoes and experimental d.i.y. devices. Grant Smith presented for the occasion a live **audio stream** under the Antarctic ice made available by the AlfredWegener Institute's PALAOA marine research project. This was distributed in the exhibition space through two severed communications tubes found on site. Moreover, Grant Smith organizes **SoundCamp**, a daybreak listening event in London, broadcasted in a 24 hour worldwide transmission, relayed by streamers on the **Locus Sonus** network and elsewhere. Reveil/SoundCamp engages with the study of place, nature, and merges philosophical enquiries about art, ecology, politics and the use of technology. Reveil/SoundCamp project aspires to be a fully global collaboration. In London, it is connected with the Centre for Sound Arts Practice (CRiSAP) at LCC/UAL, and in Belfast

with the Sound Arts Research Centre (SARC). Reveil is catalyzed and coordinated by Sound-Camp. Reveil is interested in **Wild soundscapes**, the implications of listening attentively and especially listening live to **fragile soundscapes**. There is an intersection with the concerns of **bioacoustics** on land and under water, as these involve monitoring, habitat conservation/reconstruction, and **environmental activism**. To **soundmap** demonstrate that the experience to listen to a sound locally gains a new dimension different than placed elsewhere, the auditorium, for instance. Reveil is an evolution of **field recording**. Bernie Krause has said that most of the locations where he has captured sound since 1968 are now severely degraded if not actually 'without voice'. All these different ways to produce audioworks or artworks, offer a new possibility to understand and interpret reality.

Second, the **Psychogeophysics Summit** is used to explain **landscape** and **soundscape**. It develops experiments in interaction with sound as a **local spectral ecosystem**. Reading the memory of the landscape, artists give a counterculture radical position of established policies of art, industries and resources. Following to the definition of **Psychogeography**, **Psychogeophysics Summit** introduces to the study of geographical environment, the consideration of emotions, behaviour and mental states of the citizens and passers-by. Including geophysics and studies of **local spectral ecology**, the term **Psychogeophysics** was first used explicitly during a research group conducted as part of the Transmediale.10 festival, Berlin in February 2010, entitled Topology of a Future City. **Psychogeophysics** names a new direction in which many artists and researchers have explored recent history of sound. The first **Psychogeophysics Summit** took place in early August 2010 in London, assembling an international group of artists, researchers and theorists to promote this novel discipline with a series of public oriented experimental workshops and seminars investigating various psychophysical fictions in East London. **Psychogeophysics** borrows techniques from EVP/ITC (Electronic Voice Phenomena and Instrumental Transcommunication), classical **psycho-geography**, thoughtography, amateur radio astronomy, archaeological geophysics, TEMPEST analysis and environmental steganography. These techniques include: excitation, intervention and performance, domains and frequencies (earth or skin resistance or impedance measurement), low and highfrequency electromagnetic radiation detection, all frequencies of sound signal detection. Apparatus and technologies that are used correspond to VHS, tape recorder, television, magnetometers and spectrometers, and sometimes electroencephalographs. Supporting **Spatial Aesthetics** philosophy, **Psychogeophysics** also contributes aesthetically and technically to **re-mapping**, to **archaeological geophysics** of urban locations, to data forensics and hidden emissions, and to **geomagnetic phenomena**. Among the **Psychogeophysics** activities and projects such day collective exploration of spectral phenomena,

investigations of non-causality and detection of anomalies within processes of measurement and observation are underlined. So, **Psychogeophysics** authors follow to describe a non-scientific knowledge based on research and experience. Its constant influence of **landscape**, memory and **drift**, among electromagnetic techniques and factors such indeterminacy, uncertainty, refer to our hearing as a response and transposition of the sensible/metaphor and metaphysics [5].

Finally, it has to be considered the **aero-spatial practices** as part of the **landscape of sounds**. **OrbitandoSatelites** was a workshop conducted by sound artists, engineers, hackers and musicians; the workshop used geophysics methodologies and typologies for a quantitative observation of the **earth**, the **sun** and **lava flows** altogether with its correspondent physical properties. **OrbitandoSatelites** was part of Plataforma0 and took part in LABoral Gijón. It showed some of the results of a process of investigation begun by Plataforma Cero in May 2011 with the meeting of a group of artists, investigators and amateurs dedicated to listening, watching, thinking and imagining satellites. The aim was to approach and improve the observation and listening to satellites and its technology, the **outer space** features and their poetics, and finally to analyse data captured from satellites and transcript into sound and images. Among the participants, Alejandro Duque, Joanna Griffin, David Pello, Reni Hofmüller, Luca Carrubba Husk, Lord Epsilon, Xiu Cueva, Bruno Vianna, Cinthia Mendonça, Laura Plana, Pedro Soler, Gonzalo Garcia, Pablo Gallo, Victor Mazón, Raquel MP19, Una\_Fremen, Ana Arbolea, Nuria Rodríguez, Cristina Ferrández, Lorena Lozano, Josian Llorente, Aritz-Zabaleta. The Manual OrbitandoSatelites [OS] presents text by text and one by one all of the authors. It is said that since 1990s, the arrival and growth of the Internet facilitated the exchange of information among Natural Radio hobbyists and eventually made real time solar and **geomagnetic information** available to everyone. During the workshop, the participants developed and learned from different tools, software and hardware to manage and listen to the satellites that are already orbiting the earth:

1. **Gpredict**, a real time satellite tracking program for GNOME, based on the tracking engine of John Magliacane's excellent satellite tracker Predict and written by Alexandru Csete, also known as OZ9AEC, a physicist from the University of Aarhus, working in the European space industry, holder of a CEPT Cat.1 amateur radio certificate since 1991 [6].
2. **PureData**, written by Miller Puckette and the PD community, used by Husk, connected via OSC to Gpredict in the audio track to the exhibition called Dreaming Satellites.



3. **GNU radio**, developed toolkit that provides the signal processing runtime and processing blocks to implement software radios using readilyavailable, low-cost external RF hardware [7].
4. **SatTrack3D**, written by Makoto Kamada, Japan [8].
5. **FunCUBEDongle**, connects the antenna reception to GNU radio via USB by AMSAT-UK as part of the FUNcube satellite project [9].
6. **OpenROTOR**, built by David Pello in Plataforma Cero, 2011, an Ionic Satellite Fountain model based in one built by Bruno Vianna in Plataforma Cero, 2011 [10].
7. **OSC module for Gpredict**, written by David Pello with contributions from Alejandro Duque and Bruno Vianna as part of the Orbitando Satelites project 2011 @Plataforma Cero, LABORAL, it was first envisioned as a useful bridge to allow experimental uses of data in sound installations during interactivos10 @medialab-prado 2010 and the module enables Gpredict to send values out to other programs allowing the control of motors and other hardware or software via OpenSound Control. All this techniques and different range of tools, allow artists to capture sounds, intercept communications and provide more information about the **outer space**. All was an exercise inside the imperceptible realm of the waves of **radio electric frequencies** to spot and listen to both geosynchronous and low elevation orbiters. To locate and observe, like the ornithologist, guided by **sound and spectral analysis** technologies of the Victorian age, and given as a result **soundscape** captured with a VLF (Very Low Frequency) receiver to allow the listening of satellites.

### 3. Dronestrikes on Saturn

Dronestrikes on Saturn is the audio work resulting from the collaboration in between raxil4 and hNIL (his Nameless Is Legion). An audio work that uses reverb laden drones with pedals, sine generators and a four track with loop tapes of some fine recordings or **sonifications** of the **Saturn radio waves** recorded near the poles of the planet via the **Cassini spacecraft**. It is a **media ecology** audio work offering an ethical composition and an aesthetical piece for preservation of the space, the urban space or the outer space, where these waves have

been captured. In this case, preservation laws could develop a strong policy to facilitate the research for audio work in the conservation of sound as **(eco)system**. Here, the **Cassini Orbiter Instrument** survey and sniff, analyse and scrutinize. And of course, they take stunning images in various visible spectra. The 12 science instruments on board the Cassini spacecraft are seemingly capable of doing it all. Each instrument is designed to carry out sophisticated scientific **studies of Saturn**, from collecting data in multiple regions of the **electromagnetic spectrum**, to studying **dust particles**, to characterizing **Saturn's plasma and magnetosphere environment** [11]. The instruments gather data for 27 diverse science investigations, providing scientists with an enormous amount of information on the most beautiful planet in our **Solar System**. Inbetween them **Optical Remote Sensing**, mounted on the remote sensing pallet, these instruments study **Saturn** and its rings and moons in the electromagnetic spectrum. Composite Infrared Spectrometer (CIRS), Imaging Science Subsystem (ISS), Ultraviolet Imaging Spectrograph (UVIS), Visible and Infrared Mapping Spectrometer (VIMS). A part, **fields, particles and waves** are studied and analysed through particular instruments to detect the **dust, plasma and magnetic fields** around **Saturn**. While most don't produce actual "pictures," the information they collect is critical to scientists' understanding of this rich environment. These are the Cassini Plasma Spectrometer (CAPS), Cosmic Dust Analyzer (CDA), Ion and Neutral Mass Spectrometer (INMS), Magnetometer (MAG), Magnetospheric Imaging Instrument (MIMI), Radio and Plasma Wave Science (RPWS), Microwave Remote Sensing. So, using **radio waves**, these instruments **map atmospheres**, determine the mass of moons, collect data on ring particle size, and unveil the surface of Titan, with Radar and Radio Science (RSS). In this sense, electronic artist **raxil4**, Andrew Page, has created an immeasurable beautiful series of audio work based in **Saturn**, and other planets. The series so far have featured a range of **soundscapes** manipulations. He creates sounds from **field recording** and electronics, sometimes using the radio emissions from planets like **Jupiter**. His sounds also feature de-tuned radios, televisions, computers, turntables, CDs and MP3 players, tape recorders, electronic games, vintage equipment and handmade electronic devices and sculptural instruments [12]. Some examples here: Solo, a white dwarf star GD358 track [13], a live mix of Saturn, the Sun and GD358 [14], and a new live version on 3 four tracks featuring 3 new tapes, a second recording of Saturn, the Diamond Star and Alpha Centauri, as well as the original Saturn tape, The Sun and GD358 [15].

It has to be said, that within the last 3 examples, involving **Dronestrikes on Saturn, Orbitando Satellites** and **Psychogeophysics Summit**, all these are using **spectrometer** (spectrophotometer, spectrograph or spectroscope) to measure the unit of light on the electromagnetic spectrum [16]. And also **magnometers**, among others devices, but these both are

the common ones and the more important. It is primordial to use and understand these devices and tools in the creation of audio work to define nature of soundscape. A part of sound techniques to capture landscapes, there are many others to capture, like the UAVSAR, the Uninhabited Aerial Vehicle with Synthetic Aperture Radar, used in image science, equipped with radars to get images through interferogram techniques. All of these tools and hardware capture images in polimetric phases detecting changes on earth with time to show interferometric images. It has to be added, radio waves detectors, wavelength in airplanes with autopilot for geo-scientific exploration and remote sensing apparatus [17]. This versatile NASA equipment of imaging radar system is showcasing its broad scientific prowess for studying our home planet. More information about tools is available at NASA [18].



Figure 1. Raxil4 – his Namelessness Is Legion.

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