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Mapping Hertzian Space: A Noospheric Atlas of the United States

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ABSTRACT This work in progress aims to map the hertzian space created by the United States' mass media broadcast stations. This space is not definable in traditional terms of surveyed boundaries of state and local territories, but rather by electrical fields and consumer markets in the air around us. Geospatial data provided by the FCC is rendered as translucent shapes whose color is determined by the type of service (AM/FM/TV). The resulting image depicts a landscape formed by our collective communications. The project is planned as a series of print atlases as well as a web-based, interactive map database. The artist will discuss the importance of mapping as a tool to re-imagine the structures we create for ourselves. In addition, aspects of how the hertzian space created through wireless media compares and contrasts with physical space will be discussed along with its use as an artistic playground for social commentary, activism and creative enterprises.

FIGURE 1: *A detailed color field taken from the Noospheric Atlas of the United States*

PROJECT OVERVIEW

We define ourselves, in part, through a nested set of boundaries: our bodies, our homes, our neighborhoods, our cities, our counties, our states, our countries, our continents. These are primarily geophysical and political boundaries that we identify with in space. In addition to these "hard" boundaries, there are more diffuse ones that are created by the ways in which we organize ourselves technologically. Technological boundaries link us into a network of social interactions via communication. The sum of these communication networks is framed as a manifestation of Tilehard de Chardin's theoretical *Noosphere*, or envelope of thought around the world, by R. Muray Schafer in the context of his notion of "Radical Radio."[1]

As an artist working in the genre of transmission arts, I had a great interest in visualizing the vague terrain of the Noosphere primarily for aesthetic purposes. Exploring the Federal Communications Commission's datasets with GIS mapping tools provided a visual rendering of the AM, FM and TV mass-media service areas for the United States. Technically speaking, a radio antenna radiates traveling waves that create a field that is strongest at its point of transmission and attenuates as it travels from its source. Such attenuation may also be due to geographic features. The FCC calculates a boundary that represents a particular field strength in space. This varying field strength is somewhat analogous to the loudness of a sound at a particular distance. These boundaries are referred to as "protected" because two stations with the same frequency are guaranteed no interference with one another based on the strength of a signal within a boundary. The station's protected boundary is a measured line and is an approximation of the actual distance a broadcast may propagate. The protected boundary ensures that the owner of the station has influence over that particular frequency, the geographic locale it occupies and the people that lie within. In actuality, it is possible that particular station could be heard at a greater distance, but the FCC does not guarantee lack of interference from other stations on the same frequency or adjacent ones outside of this boundary.

Collectively, the resulting maps have become part of an artistic work-in-progress entitled *The Noospheric Atlas of the United States*. The project is aimed at envisioning the United States, not in terms of its hard, surveyed boundaries, but rather in terms of the diffuse boundaries of listenerships, advertising markets and communication network architectures. These diffuse boundaries are geographic features of an invisible, but perceivable hertzian space accessible only through electronic media. Formally,

the rendered maps are detailed color fields of varying hues, densities and transparencies. Colors are assigned based on the type of service the boundary represents:

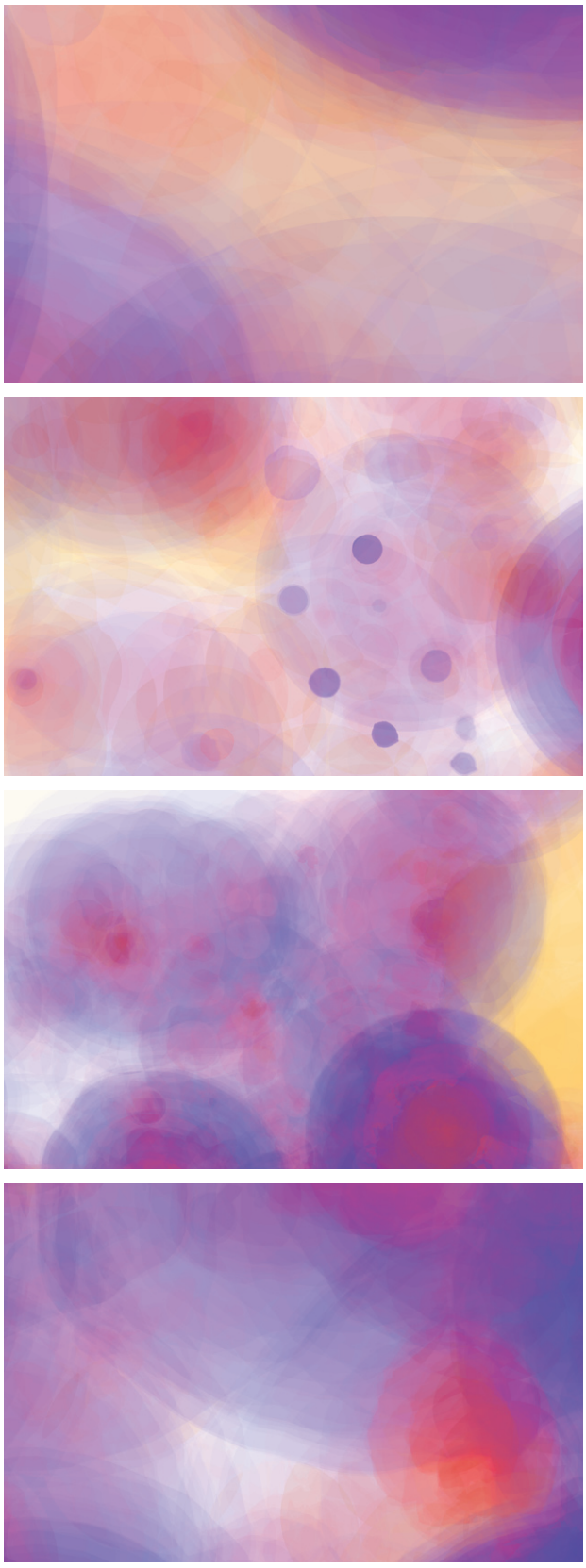
YELLOW = AM RADIO:
535–1705 kilohertz

BLUE = TELEVISION:
54–72, 76–88, 174–216,
470–608, 614–698 megahertz

RED = FM RADIO:
88–108 megahertz

The transparencies are assigned to reveal underlying complexity. Purposely, there is no indication of scale either explicitly or given by recognizable geographic features on the rendered maps (FIGURES 1–5, image on previous page and sequence on this page). This lack of both scale and geographical references abstracts the visual components so that the relationships between them are foregrounded rather than the relationships between the visual elements and the actual space they inhabit. This abstract space can then become a playground for re-imagining the structures we create for ourselves.

Through my own explorations of this hertzian landscape, I found that visual complexity doesn't become aesthetically provocative until the scale of the map is sufficiently large to encompass a wide geographic area. Looking just at FM service areas, it is clear to see that on a 100 km scale (FIGURE 6, page following) there is much more visual diversity than at the 10 km scale (FIGURE 7, page following).



FIGURES 2–5:
A comparative sequence of detailed color fields taken from the Noospheric Atlas of the United States. The varying hues, densities, and transparencies are based on the color and frequency assignments listed above.

Tetsuo Kogawa, philosopher, media critic and activist, explains this phenomenon:

> *Conventional radio and television is generally eager for as large a service area as possible: from nation-wide to global networks. According to these models, communication is considered as a way of conveying information as a material entity from one place to another. Mass media has functioned (and still does) as strong catalyst of industrialization, characterized by the transportation of solid material, integrated homogeneous grouping and an industrious work ethic. However, as Humberto Maturana and Francisco Varela have argued, such a notion of communication is forced and distorted. Human communication is not based on tube conveyance but on structural coupling.* [2]

The visual homogeneity present on a map indicates a one-to-many relationship between broadcaster and receiver—a particular architecture defining the type and direction of the flow of information. This contrasts with a many-to-many network architecture where consumers are also producers. Architecture patterns our physical behavior, directions, and experiences. If we consider radio as McLuhan does, as an architect of "lebensraum," [3] the spatial aspects of transmission similarly represent a built environment whose structure influences our thoughts, feelings, and beliefs. Homogeneity in broadcast media leads to homogeneity in the informational landscape with its content being produced by a relatively small number of people. Those who are not producers are left only to be consumers. Considering that mass media has such a large geographical profile, "...it generates a new concept-the mass audience. For commercial purposes, the 'community' within the radio profile becomes a mass market." [4]

But what if individuals are broadcasting and producing, as well as consuming? On the 10 m scale (FIGURE 8), we can envision another broadcast model: micropower broadcasting. This model of broadcasting promotes transmission within the legal bounds set forth by the FCC for unlicensed broadcast. For about 10 USD, one could build a FM transmitter that covers up to a radius of approximately 60 m. If individuals start producing content relevant to their communities (news, announcements, music, art, activism, etc.) and put that content on the air, the diversity in local media is enriched. The relative ease and low cost of a FM transmitter lowers the barrier to the democratizing of media space and encourages those within it to participate rather than just passively consume. If we add detail to the

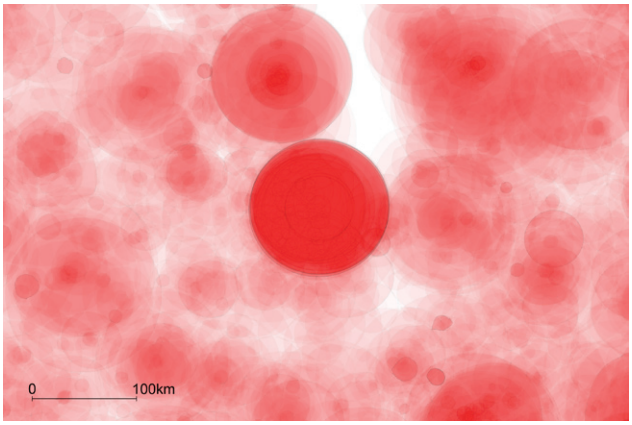


FIGURE 6: *Hertzian space at the 100km scale*

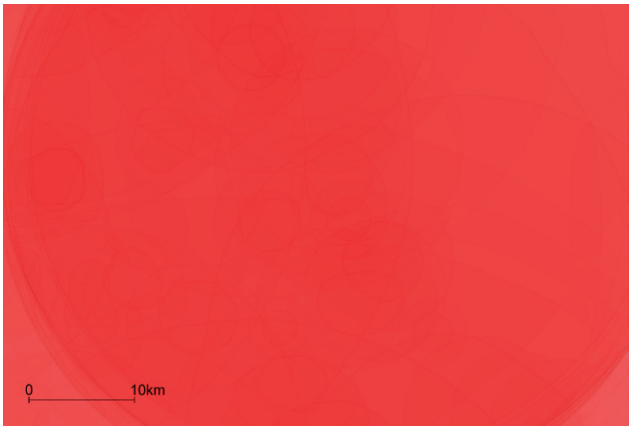


FIGURE 7: *Hertzian space at the 10km scale*

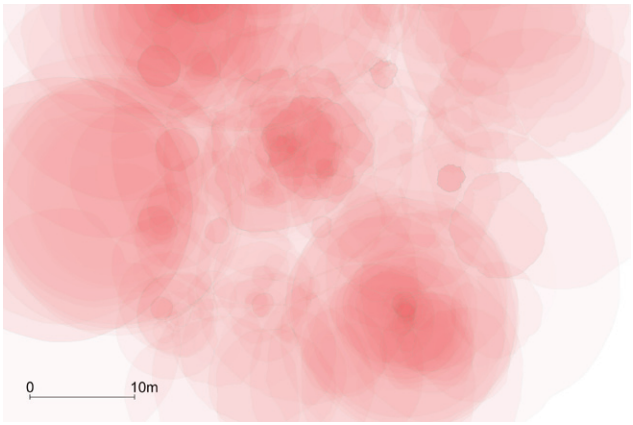


FIGURE 8: *Hertzian space at the 10m scale*

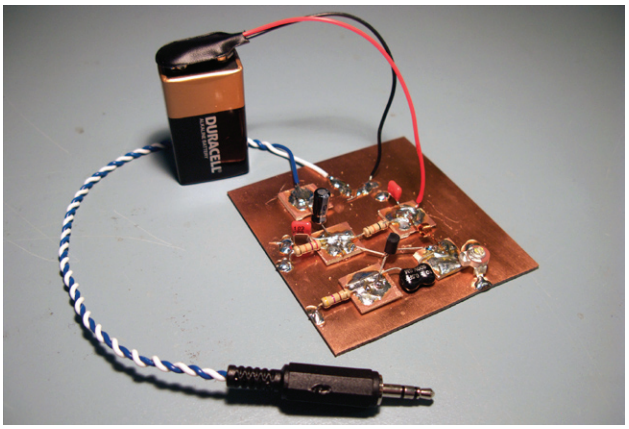


FIGURE 9: *An author-created version of Tetsua Kogawa's Microprocessor Transmitter*

map, the heterogeneity of the Noosphere increases. Kogawa refers to this new media architecture as polymorphous space and has researched and published instructions on his website for building such a transmitter.[5] This design is simple and inexpensive. (FIGURE 9) In terms of fidelity and range, it cannot compete with commercial models, but that is not the point. The point is to create a low-cost but effective means of empowering individuals with the ability to extend their boundaries into the local sphere of influence, becoming a part of a communications network that serves the more important local community.

Thus far, the project has been instructive in envisioning a space where its citizens create local diversity in media by using the same technology that large institutions with similarly large spheres of influence use to broadcast but on a smaller geographic scale. This is not a limitation of the micropower broadcast medium, but rather a strength. We all can contribute to the Noosphere to enrich its diversity of content and its geographic complexity by engaging this model of broadcast.

BIOGRAPHY

Brett Ian Balogh is an artist in Chicago who draws on his education in the sciences and fine arts, incorporating both traditional and contemporary technologies into his work. He has performed and exhibited at various venues in Chicago, New York, Philadelphia, and elsewhere.

NOTES

1 R. Murray Schafer, "Radical Radio," *Sound By Artists*, edited by Dan Lander and Micah Lexier (Art Metropole and Walter Phillips Gallery, 1990), 207–216. (Orig. pub., 1987).

2 Tetsuo Kogawa, "Toward Polymorphous Radio," http://anarchy.translocal.jp/non-japanese/radiorethink.html

3 Marshall McLuhan, "Radio: The Tribal Drum". *AV Communication Review* 12, 1964), 133–145.

4 Barry Truax, *Acoustic Communication* (Westport: Ablex Press, 2001), 112.

5 Tetsuo Kogawa, "How to Build the Simplest FM Transmitter," http://anarchy.translocal.jp/radio/micro/howtosimplestTX.html