working title:

SPECTER[AL]S OF NATURE

SEEING BEYOND THE VISIBLE

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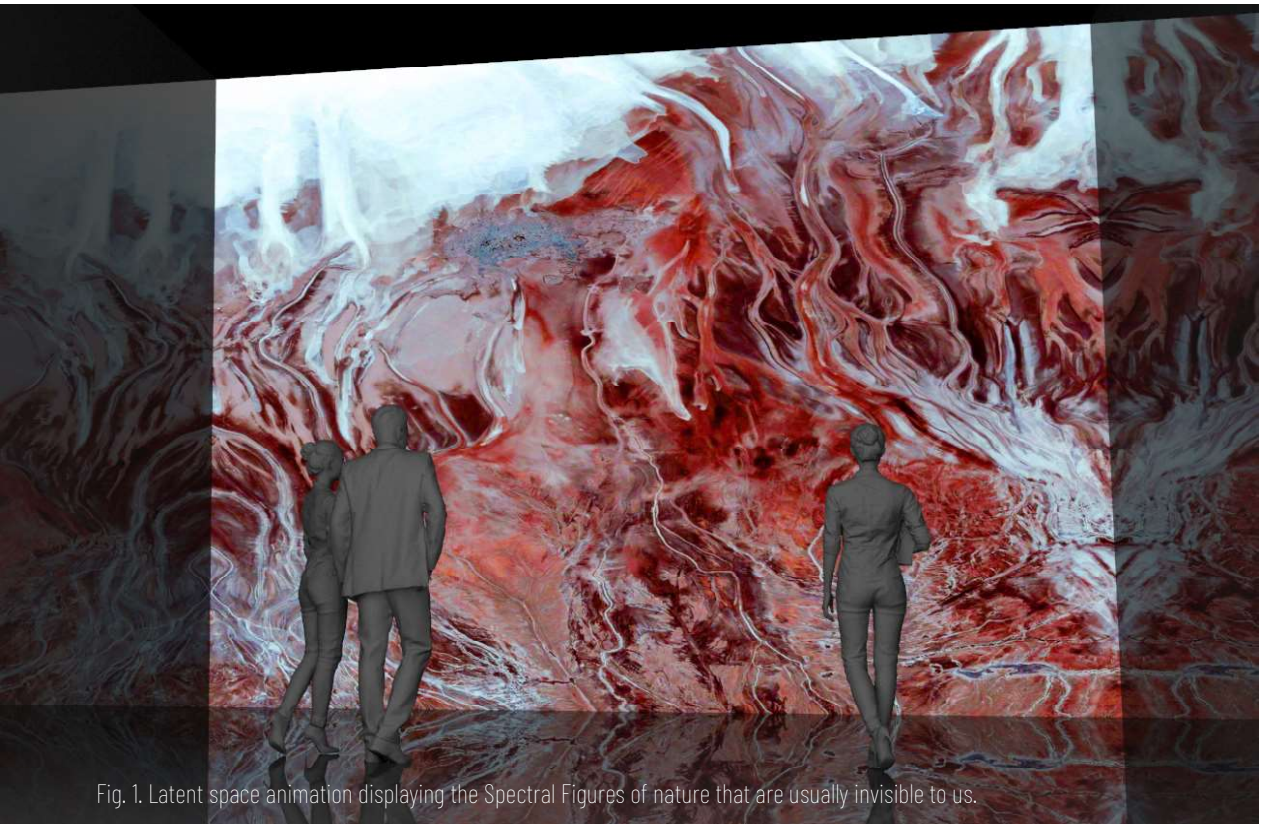

Fig. 1. Latent space animation displaying the Spectral Figures of nature that are usually invisible to us.

Specter[al]s of Nature is a project focused on the use of earth observation research results to pursue an exploration of the natural environment on a planetary scale beyond the limits of our senses. Notably, the project considers remote sensing technology as a speculative medium, one that not only shows us direct correlations between the causes and effects of urbanization on our natural resources, but that can be reinterpreted and synthesized using neural networks to imagine the built environment in complete synergy with the natural.

RELATION TO NATUREARCHY

The world population is expected to continue to rise as the 21st century progresses, and cities will mirror this growth. **The way we manage urbanisation will have long-term ramifications for our planet.** The urgency is even more apparent given that global **anthropomass** exceeded all living **biomass** in 2020.[1] Traditional urbanisation concepts, anchored in modernity,[2] struggle to meet contemporary challenges, which feature complex systems of connectedness that existing theories cannot fully grasp.[3] The challenge is to create an urbanisation system and a way of living together that is closely connected to the **resource landscapes that produce the city and the waste landscapes the city produces**,[4] more closely connected to how ecosystems work, and recognizes the need to co-create an environment where multiple forms of existence have equal agency. Therefore, the project places the (back)ground of urbanization in the foreground.

Today, urbanisation has caused profound interventions that affect deep temporal and spatial planetary scales while clinging to inaptly shallow views of their implications. This limited time-and-space literacy keeps us alienated, not only from nature but also from the long-term and expansive consequences of our actions. How can we start thinking and acting according to more extensive timescales that encompass the ecological and geological resources from which the city draws? How can we project hundreds, perhaps thousands, of years into the future **to build our habitations by, for and with nature**? The proposed **project is a call to expand the human temporal and spatial sensibilities** essential to developing frameworks, habitations, cities and governance strategies capable of supporting a deep time and planetary scale.

SCIENTIFIC BACKGROUND

Scientific earth observation datasets conducted continuously and with great precision over a long period allow us to peer into the large-scale changes in the natural environment caused by urbanisation, which is the starting point of this collaboration. Alan Belward's work[5] provides **unique access to the temporal changes of nature**, providing insights into its morphological processes and the symbiotic relationship urban interventions. Such details not only emerge from the long-term data recording but from technology that covers the entire **electromagnetic spectrum** and far exceeds the comparatively small colour spectrum that the human eye is capable of capturing. It enables what I have called an *odd interspecies way of seeing*, as it provides us with vision normally only available to species such as insects, reptiles or other mammals. Thus, we obtain completely different levels of information about the natural environment and its processes through a non-anthropocentric lens, which is compounded[6] by human vision into a composed image.[7]

Through AI the **project will speculatively expand on these two aspects**: different modes of temporal and spatial scale and multi-spectral imaging to create landscapes as **yet unseen** by the human eye. Landscapes are latent, but since they interact as a **sympoietic system over planetary distances and time spans,** they remain an invisible world, inaccessible to our senses, our brains or our eyes.

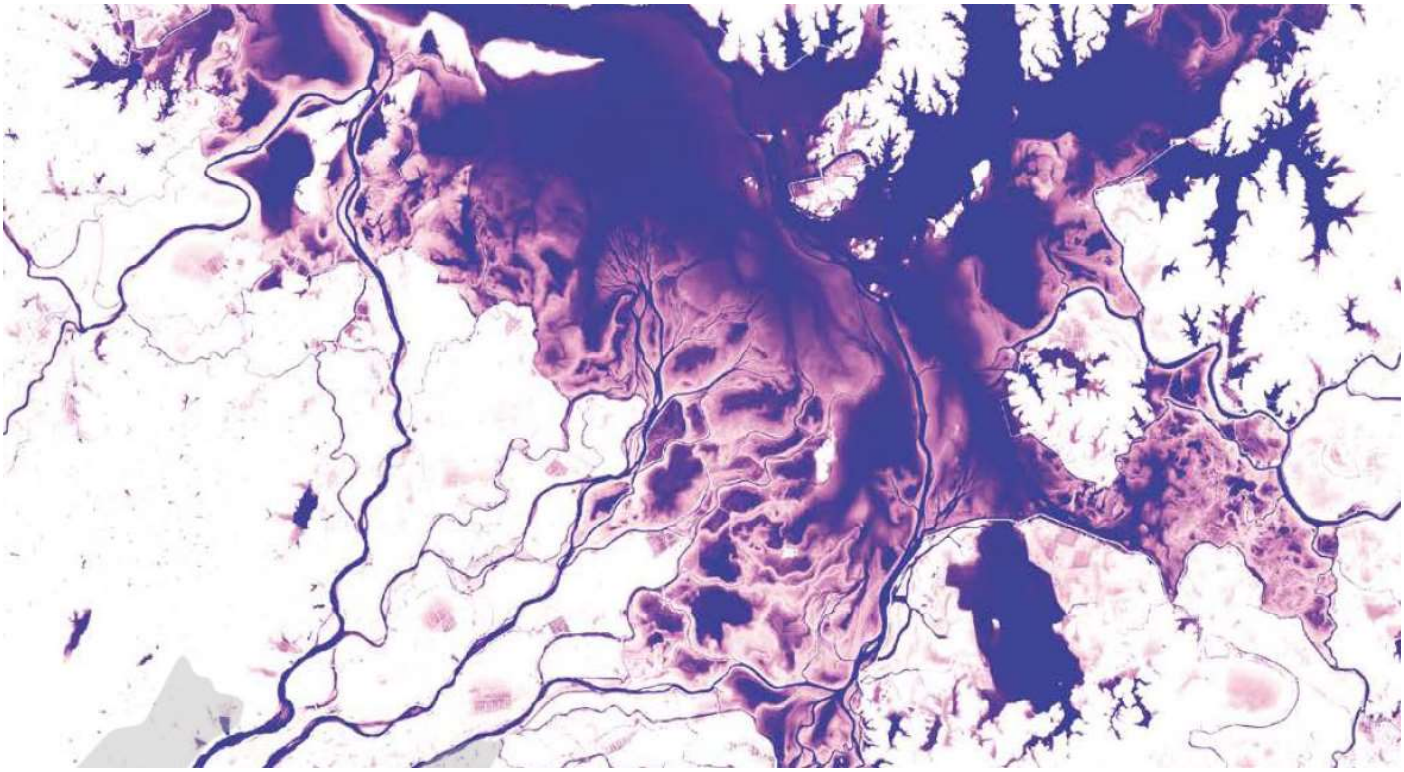

Fig. 2 Image from the *Atlas of Global Surface Water Dynamics* showing the intra- and inter-annual variability [p.96-7].

DESCRIPTION of different pieces

The **main piece is an installation** where viewers are **immersed** in a hypnotic change of the terrestrial surface: their **perception of time is altered** in relation to the temporal complexity of the ground. **The project intends to create an experience that embeds the audience in planetary cycles and natural rhythms that usually remain invisible as they exceed human perception.** Visitors experience the processes taking place in a temporally accelerated way. Using machine learning algorithms trained on false colour satellite imagery, the project explores machine-based visual speculation on the sympoietic of the locale und global landscapes which conditions the city and is conditioned by them.

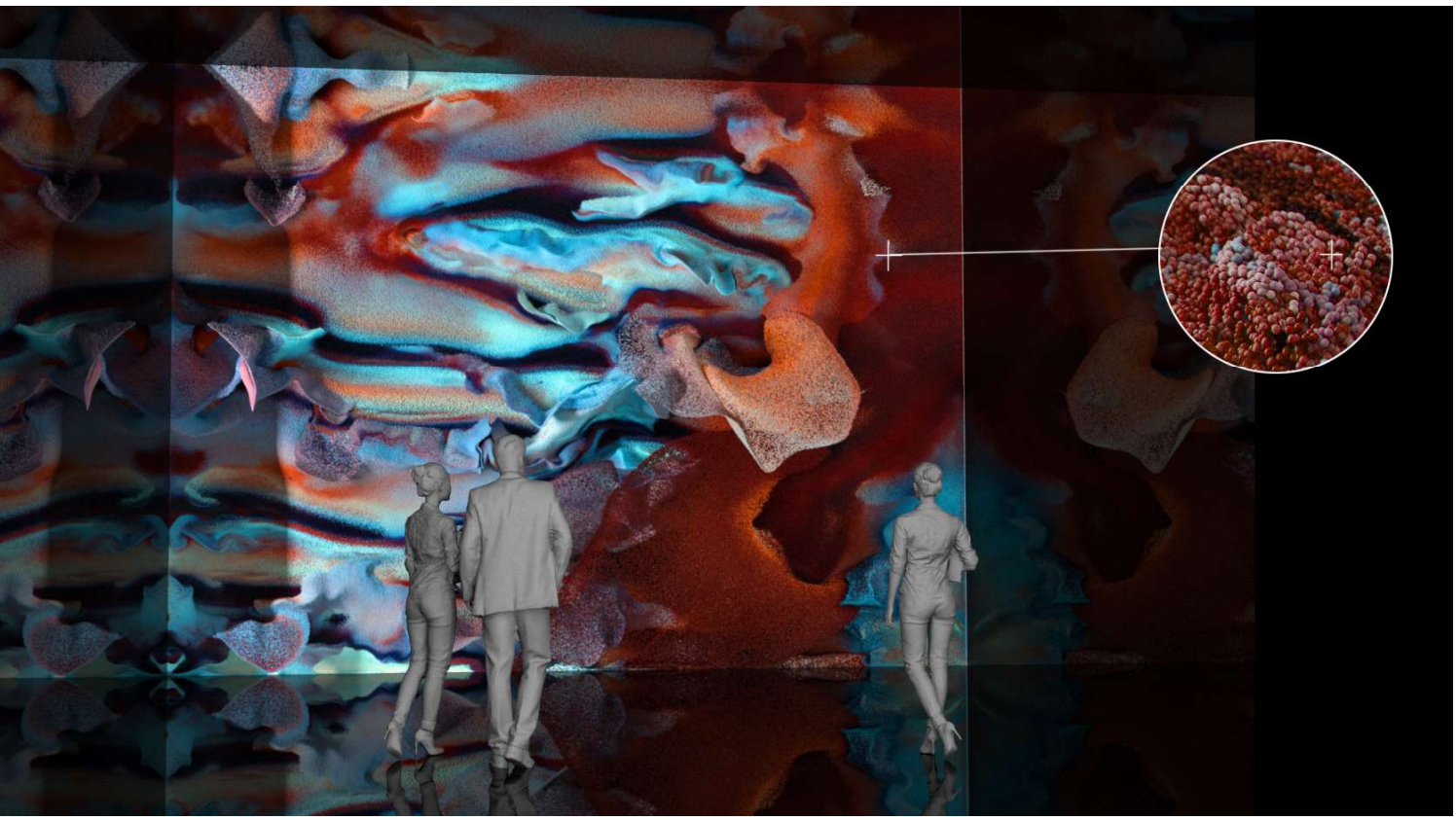

Fig. 3 Another way to depict the results from latent space [see Fig. 1] is by combining them with fluid dynamic algorithms, which ¬enhances the immersive experience by adding depth. Thereby each pixel is translated into a voxel and transforms into a geometrical entity (see left). Each pixel in an image will have multiple values, which means that in the process of reverse engineering the spectral signature of pixel (voxel) that represents a natural subject, only probabilities can be assigned. The artwork will make use of this uncertainty and explores the superimposition and mutations of natural subjects.

As a **second piece,** I would like to propose the translation of the **spectral figures** from the digital into the physical domain. These are actually **time figures** – an odd interweaving pace-layering model[8] –, because it is the 4th dimension that creates the 3rd. This means, it is not the actual volume of the natural subjects that is depicted here, but their **flickering presence**. This series reveal the complex intra-action of a profoundly intelligent system and the secret life of its subjects as it **depicts its continous change over long time spans**.

I consider the finely detailed 3D printed structures – each one representing a different natural subject – both **specimens** to be studied and researched and **relics** that reinforce the dynamic and fragile composition of the ground and may be lost forever. To do so, a sort of reverse engineering[9] will be applied, allowing for the reconstruction of different natural subjects (traced and catalogued by their specific pigmentation) and their temporal and spatial evolution.

Fig. 4 Time figures we cannot see, transforming the digital into physical. Series of specimens/relics, each representing one natural subject, such as water, soil in its different conditions and vegetation ranging from different trees to grass and plants (left). Alternative: multi-colour 3D print showing all features in one model differentiated by colour (right).

As an alternative second piece, I discussed with Giorgio the possibility of translating the temporal process onto a specific city (e.g. Milan or a different European city) and thereby **oscillating between a planetary and a local scale**. This process would envision how a city might look like if we had **co-created it with nature**: some parts might not have evolved yet, others already might have degraded, and additional structures might remain half built. The **science-fictionesque cityscapes catapult the viewer 200 years into the future**, immersing us in a different form of habitations and reminding the viewer, in retrospect, what the centuries-long application of the **New European Bauhaus vision has accomplished**.

Due to vacation schedules, we have not yet explored this idea further.

TECHNICAL FRAMEWORK

To convey a sense of belonging to the natural world, I would suggest a large-scale projection. Therefore, a high-quality video projector (preferably an HD projector) with an HDMI port to be connected to a computer will be needed. LED screens would enhance the immersive and memorable experience compared to conventional projections. To create a space, which allows visitors to feel surrounded and a part of the artwork displayed on the screens, mirror walls and floor can be set up. However, it depends on the exhibition space and available budget. In short, this piece can be displayed in a wide range.

The 3D prints would need some sort of base/pedestal.

BUDGET

IMMERSIVE INSTALLATION	Renting of LED wall 4,32m x 2,40m – 3.75mm LEDCON SL-3.75SI *cost estimation based on a conventional supplier without discounts; surely smaller LED walls can be used, just keep in mind that smaller screens reducing the viewing distance and thereby require a higher resolution. For comparison: 3,36m x 1,92m – LEDitgo sB2HB 2,5mm, would be just € 720,— cheaper in sum for the same amount of days).*	€ 5.300,—
	The most inexpensive version to display the animation is a projector which I assume is available at the JRC including the corresponding equipment like a laptop with HDMI port...	*€ 200,—*
PHYSICAL OBJECT [1 out of 3 options]	3D-prints (time figures) with biocompatible polyamide 5 pieces, approx. size 150x150x150mm à € 120 – 150 *assuming that 3D printers are not available in house and need to be produced in a lab*	~ € 750,—
	3D multi-color print (alternative), 1 piece approx. size 150x150x150mm *The costs depend on many variables therefore it is difficult to get any estimation without the specific project and 3D model. However I try to provide some very rough estimation.*	€ 2.500,—
	Big scale 3D prints (alternative urban structures) 3 prints each of an approx. size 1000x1000x250mm *The prints could be produced at our university in Innsbruck, we do large-scale prints with robots, we are currently researching and testing various bio-based materials. Biodegradable materials are in a highly experimental stage – I would be curious if the here proposed reverse engineering and the mutations and hybrids that may arise could led to new recipes and material compositions...* *Biodegradable materials and bio-based polymers are about 10€/kg; However, the material price per kilo is not very meaningful because the materials have different specific weights and strengths.*	€ 8.100,—
SUPPLEMENTARY	Technical support	€ 2.200,—
	Incidentals (like glass cover, pedestal ...)	€ 950,—
	costs vary greatly depending on the version and display variation	**€ 4.000,— – 16.500,—**

1 Emily Elhacham et al., 'Global Human-Made Mass Exceeds All Living Biomass', Nature 588, no. 7838 (2020): 442–44. doi:10.1038/s41586-020-3010-5.

2 In this context, I would also like to refer to Alan Belward's article, which discusses the consequences of the modern idea of urbanisation and the exploitation of nature that goes with it are illustrated. See Alan Belward, 'Running Out of Land', The Biologist 61, no. 3 (2014): 28–32.

3 The city no longer exists as a single site but is rather a distributed object in space and time – a planetary-scale mega structure. 'Historically, the availability and types of resources in surrounding hinterlands limited the size and scope of a city. Water, fuel for energy, and building materials restricted a city's growth. ... Today, trade, commerce, and migration have decoupled cities from their immediate surroundings. Cities rely on both the local and global environments'. See Karen C. Seto and Meredith Reba, City Unseen: New Visions of an Urban Planet (Yale University Press, 2018), 1–2. https://doi.org/10.2307/j.ctv5cg9zg.

4 While the city is always limited to the 2% (sometime 3%) of the planet's surface, we lose sight of the fact that cities rely upon 70% of the terrestrial surface.

5 I refer specifically to the Atlas of Global Surface Water Dynamics. A. Belward and J. Pekel (eds.), Atlas of Global Surface Water Dynamics, European Commission (Joint Research Centre Publications Office, 2020). https://data.europa.eu/doi/10.2760/20986.

6 Donna Haraway, When Species Meet, (University of Minnesota Press, 2008), 252. See also Karen Barad, who explains the compound eye in reference to the brittlestar: a creature without a brain that is simply 'a visualizing apparatus ... a metamorphosing optical system'. Karen Barad, 'Invertebrate Visions: Diffractions of the Brittlestar', in The Multispecies Salon, edited by Eben Kirksey (Duke University Press, 2014), 221–41.

7 At this point, I would like to refer to the paradigmatic difference between photography and image. I think this distinction is crucial: satellite images are oft misunderstood in the context of photography, but they are fundamentally different, technically and conceptually. Images are a form of photon detection. Energy emitted from an environment is detected and converted into electrical charges called signals. Images, unlike photographs, are inherently dynamic and continuously relate the present to all possible futures and pasts simultaneously. In contrast, mechanical-chemical photography as a form of heliography involves a fixed imprint on an equally stable surface and is associated with a linear conception of time. On this topic, John May's book provides a great overview. See John May, Signal. Image. Architecture (Columbia Books on Architecture and The City, 2019).

8 This concept was introduced by Stewart Brand and brought to my attention by Elahe Rajabiani.

9 I discussed with Alan various ways to draw knowledge from the speculative landscapes about their possible hybrid compositions.