



An interview with Nigel Helyer, Jill Scott and Marille Hahne about *Sonus Maris* during the first exhibition of the work at the University of New South Wales (UNSW) in February 2023.

Sonus Maris is an exhibition navigating the intersections between art and science emerging from an ongoing collaboration between artist Dr. Nigel Helyer and water engineers and scientists at the UNSW Water Research Laboratory (WRL). Working in close partnership with WRL postdoctoral researcher Dr. Valentino Heimhuber, Helyer employs audio-visual media to reinterpret data charting the unique dynamics of intermittently closed and open lakes and lagoons (ICOLLs).

ICOLLs are the most prominent type of estuaries found on the NSW coastline and are unique in that they alternate between open and closed oceanic entrance conditions, driven by the dynamic interplay between oceanic and land-based forces. Through data archaeology and a novel algorithm, Heimhuber extracts valuable information from a four-decade archive of public satellite imagery, drawing attention to long-term morphological and Eco-hydrological variations in these crucial sites. Helyer interprets this detail-rich source material to compose a series of musical scores that translate the changeability of ICOLLs as a multi-sensory experience. Helyer's experimental music reveals the complex patterns that underlie natural phenomena and invites audiences to rethink knowledge systems.

The *Sonus Maris* series:

Sonus Maris, a multi-screen audio-visual presentation, at The International Conference on Coastal Engineering at the International Conference Centre, Sydney, December 2022.

Sonus Maris, exhibitions; at the UNSW Library Exhibition Space, Sydney, February-May 2023; TTT2023, Valletta, Malta, September 2023; Siggraph Asia, Sydney, December 2023; and the Jervis Bay Maritime Museum, Huskisson, NSW July 4 – October 13, 2024.

Sonus Maris concerts—in collaboration with the New Music Collective at the Museum for Applied Arts and Sciences (now Powerhouse Ultimo) and The Creative Performance Lab UNSW in April 2023.

Nigel, in your well designed and appealing exhibition *Sonus Maris* you explore the scientific data about the changing coast in four locations in NSW. There are two main works in the exhibition, *Sonus Maris* and *Sonus Maris; Strange Attractor* both video-projections of sonified and visualised satellite earth imaging.

Can you explain the twist in the title of the second video?

Sonus Maris, literally the Voice of the Sea, is a unique way to regard the extremely complex interactions in a set of globally rare coastal environments called ICOLLS (Intermittently Closed and Open Lakes and Lagoons) that cluster along the southeastern seaboard of the Australian Continent. These, generally shallow, lakes and wetlands respond to both terrestrial and oceanic forces, such as tides and storms, but also to atmospheric pressure and terrestrial rainfall, causing them to switch states between, waterbodies that debouch into the ocean and closed lake systems. Australia has the worlds highest proportion of ICOLLS (at 23%) followed by Mexico and South Africa.

The title of the second video work, *Sonus Maris; Strange Attractor* relates to mapping of water channels, that when overlapped in a time sequence create iterations of very similar, but never identical routes - basically the definition a strange attractor.

How did this work relate to your own history of ongoing art and science collaborations?

At a personal level spending time focussing on environment where the land and sea interface made a direct connection with my past, growing up close to the salt marshes and tidal harbours in Sussex (UK). Maritime environments have always featured in my creative practice, either metaphorically, as cultural histories and narratives but also as the direct interpretation of scientific data drawn from environmental or biological systems.

What was the process of working with the postdoctoral researcher Dr. Tino Heimhuber at the UNSW Water Research Laboratory WRL?

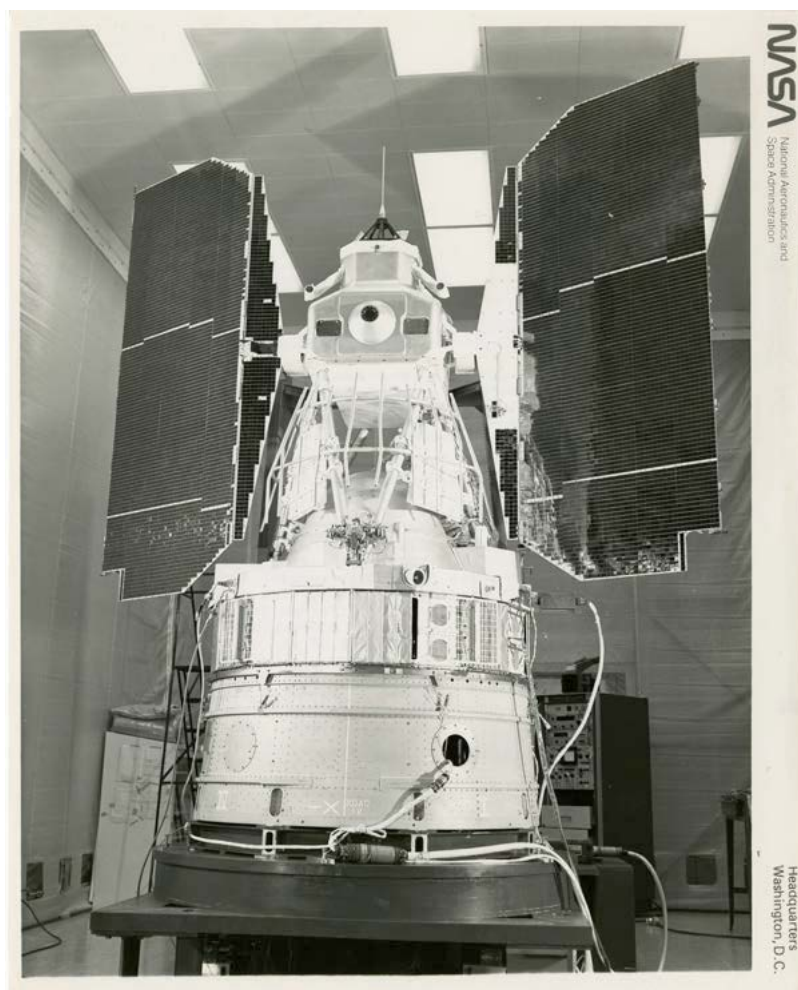
As I once heard Steve Katz of the Critical Art Ensemble say when asked— What is the best way to initiate an Art and Science project? He responded— Simple, go make friends with a scientist. Whilst coming from quite different disciplines Valentino and I also share many things in common, a keen interest in natural systems, especially the concept of conjuring forth the invisible structural patterns that underlie environmental processes. We are both European in upbringing and so also have a slightly different perspective on the Australian environment (which is sometimes an advantage, at other times not!). Valentino's Inlet-Tracker software provided me with literally thousands of data points and thousands of still images, that I was able to reformulate. Firstly, as a simple musical score for each of the four ICOLL sites, and then match each composition to animated compilations of the satellite images. The most difficult part of the creative process was trying to be true to the

information contained in the data—basically keeping artistic licence at bay—in a type of co-creation, that let the data speak (or sing).

What was the most inspiring part of this collaboration, for you as an artist?

The thing that got me hooked was very simple, although it took some time for me to realise what exactly was drawing me into the material. In a nut-shell I became fascinated by the realisation that what the, often blurry, satellite images and corresponding data sets were showing were distant spatial and temporal events. In effect a form of data-archeology, but in most instances of environmental processes that no-one at the time would have paid any attention to, much less recorded or studied. These legacy images were hiding in plain sight, a trove of complex environmental knowledge stretching back decades.

The changing coastline is driven by both offshore and land-based forces as well as human manipulation of river mouths. Your focus was on the constantly changing incoming and outgoing tidal range and how these movements are continuously changing the shoreline. This movement is hard for the public to imagine over time.



How did access to four decades of satellite data help you turn these long-term observations into a kind of language called sonification, that can more easily be experienced by the public?

I am a subscriber to the KISS theory (keep it simple, stupid) and I also adhere to the idea that by working with only a few simple variables, incredibly complex outcomes can be generated. In this work my raw materials were impressively long CSV spreadsheets and files of thousands of satellite images, as well as some of my colleague, Valentino's direct graphical parsing of the data. Over four decades the quality of the images slowly improve, but in general they are slightly blurred and full of glitches—a testament of sorts to the experimental nature of both the original NASA kit but also to the ambitions of the *Sonus Maris* project.

Can you talk about your choice of piano scales for this sonification?

Ironically for an artist who specialises in 'the nature and culture of sound' I am not musically trained, and in fact I have consciously avoided acquiring traditional musical skills which forces me to always seek alternative sonic pathways. So of course, my approach to sonifying complex numerical data is to simplify the process as much as possible, whilst still retaining an indexical relationship to the source. For *Sonus Maris* I quantified the data's numerical range into thirty steps (quanta if you like) and specified the scale of C major (the white keys of the piano) as this avoided sharp and flat notes. Finally, the entire project was transcribed onto the Grand Staff by hand in pencil, one note per data value then played and recorded on a grand piano—this provided the musical basis for the audio/visual works and the more recent collaboration with the New Musical Collective (UNSW) and the creation of a thirty-minute concert piece for the eight-person ensemble.

When we listened to these sonifications, we experienced a dense complexity of many individual but overlapping increments. Were you surprised to hear your sonification results even though they strictly followed the translation laws you had given to your own composition?

The reactions of my scientific collaborators when they first hear the sonification of their data always amuses me, for some reason there is a general expectation of dissonance and incoherence. Ironically, most data sourced from environmental or biological sources contain cyclic patterns, with variables that are directly related to one another (for example, in oceanic data, as depth increases so does pressure, simultaneously, light levels and temperature diminish, etc). With *Sonus Maris* the data covers a period of about fifty years and in many cases displays quite distinct and regular iterations. When translated musically this produces some beautiful melodic sequences, punctuated by sudden dramatic changes, such as those caused by the opening of an ICOLL to the ocean. This represents a tipping-point between a closed lake with zero water flow, to a torrential outflow to the ocean—a process that flips from one state to another without a gradual transition. When placed in a creative context, such an abrupt transition is a form of edit point, a cut, a narrative twist, a counterpoint.

What were your listening aims in relation to the layout of the visual information (maps, satellite photographs and short drone films) from these locations in the exhibition?

The combination of sonifications with data visualisations overlaid upon the actual legacy satellite images (which were the original source of the data) form a compound way of seeing—a type of multi-modal gestalt that bridges both art and science. It is an attempt to communicate the complexities of these wetland environments and their sensitivity to oceanic and terrestrial rainfall events. The coastal system of lakes concentrated along the eastern seaboard of the Australian Continent are biologically highly productive and have long been sites of human habitation, favoured by First Nations people. They are also the canary in the mine, highly sensitive to the increasing effects of global warming driving unpredictable rainfall and ocean storms.

How did you deal with the balance between scientific information and your own artistic interpretation for *Sonar Maris*?

From a very practical point of view, I try and approach the collaborative relationship, and indeed the notion of working with scientific 'objective' data as a form of co-creation. It is important for all parties to listen and understand the range of ambitions and expectations. When creating a musicalised form from data I generally regard the data stream as a collaborator and try and adhere to the data form exactly without any 'nips and tucks' to make it more melodic for example.

Conceptually, we are neurologically predisposed to seek patterns in our surroundings; in fact, pattern recognition is our core cognitive ability, vital to our evolution and survival as a species—as it affords the capacity of prediction.

In life, as in art, we delight in the symmetries, growth patterns, and morphologies of the natural world as we recognise our own formation through them. However, there is a constant flux between the regularity, or predictability of a pattern and a counter-current of instability or turbulence that might threaten to render it indecipherable.

This is embraced in creative practice as we always require a twist to a narrative, a dissonant metaphor in a joke, or an unpredictable note to conclude a melodic series. This is the sweet spot, where our expectations of regularity in a pattern are disrupted, but not too much, just enough to throw the brain into mild confusion.

It is the fissure, the reveal, and the punchline that reflects on the narrative arc and plays with our assumptions. To walk this tightrope between order and chaos is one of the central techniques of art. By contrast, the task of science is to distil clarity from chaos, to disambiguate the signal from the noise.

Can you explain why the (original) exhibition is divided into three rooms, each one with its focus on the specific geographies from the NSW shore locations?

The layout of the original *Sonus Maris* exhibition was itself a collaboration between the artist, the scientists and the UNSW curator of collections. One room housed the original *Sonus Maris* audio/visual work that had been presented as a multi-screen at the International Conference of Coastal Engineering at the end of 2022. This work referenced the satellite technology

that gathered the original image data and encapsulated the scientific and artistic methodologies, by which the work was created. Each of the four geographic sites were presented with a slightly different component of these techniques, all being underscored by a soundscape itself created from the scientific data.

The second exhibition room delivered contextual geographic, historical and cultural material related to each of the four sites, illustrated with contemporary drone photography, original Landsat and Sentinel satellite images, both contrasted with historical maps and nautical charts.

The final exhibition space displayed a second audio / visual projection *Sonus Maris; Strange Attractor*, again based upon the four sites but designed as a more acoustically and visually immersive experience—with the central focus placed upon animated sequences which overlay hundred of water channel traces. These start as simple linear tracks and gradually accumulate into extraordinarily complex and extraordinarily beautiful matrices that clearly illustrate the strange attractor theory.



What is the response so far, from the public to hear translated scientific data into set of musical audio scores?

The simple answer to audience reaction, be it from professional scientists and engineers, or from younger student audiences, is that they were equally surprised and delighted by the complexity of the natural cycles (and hence sonic structures) that underlay the interactions of these coastal lakes and lagoons with both oceanic and terrestrial forces. The other aspect that captivated audience interest is the technical ability to extract accurate water flow information from the vast collections of earth imaging satellites, dating back some fifty years. Ultimately these data might be correlated with metrological and tidal data to give precise trajectories to the effects of Global Climate warming—ICOLLs are the canary in the mine!

There is a growing interest from Art researchers into phenomena that is increasingly caused by climate change compared to nature's traditional shifting patterns.

How does this work connect to the aims of some other artists who are also working with climate change?

How can working with the scientific data be an inspiring starting point to increase our own understanding for the fragility of our ecosystems?

Environmental concern has become a central political and artistic issue in the contemporary world. Environmental and climate change science now perform crucial roles in analysing, and forecasting the increasingly precarious state of the global environment as it teeters towards a cascade of irreversible tipping points.

Siân Ede, in his book *Art and Science* (2005), has proposed that. 'the fragile environment' might well become 'the most crucial matter for the future concerns of both artists and scientists.'

However, in the broader public and political realm, the realisation that art and science can form powerful and symbiotic relationships with benefits that extend into all aspects of social, economic, and cultural life has been a long time coming.

'L'art c'est la science faite chair.'

'Art is science embodied,' these words by the French poet Jean Cocteau written in 1918, neatly encapsulate a perspective that imagines art and science as two expressions, as two voices of the same spirit of enquiry, but perhaps delivered in a different register. Cocteau's short phrase employs the French word 'chair,' in English quite literally 'flesh,' emphasising that art brings science into the visceral world as a palpable experience, and by so doing, it can become something that we can relate to directly—a narrative behind the data! It is this embodiment of curiosity, knowledge, and sheer wonder that the melding of art and science is all about.

The oceans are front and centre of the climate emergency. *Sonus Maris* hopes to elucidate this in a way to draw people into dialogue with the issues rather than polarise the debate.

How will this work inform your future projects about the Anthropocene?

Firstly, this project has convinced me that powerful artworks that engage a wide range of audiences can be created from almost any environmental or biological system, even those relatively overlooked subjects like the coastal lakes and lagoons that feature in *Sonus Maris* (and which of course turn out to be of great ecological significance). Secondly, as the collaboration developed the work organically blossomed into several modes. The initial commission was for a multi-screen audio/visual presentation at the International Conference of Coastal Engineering (Sydney International Conference Centre, December 2022). En route to this production I was invited to create an

exhibition that extended the original scope. This ran from February to May 2023 in the central library exhibition space UNSW. Finally, discussion got underway for a music concert that developed my four original scores, which I had generated from satellite image data analysis, crafting them into a thirty-minute piece for the New Music Collective with debut concerts held at the Museum of Applied Arts and Sciences and at the Creative Performance Lab (UNSW) in April 2023. In effect the project, focussed on an environmental subject has embraced the attention of audiences that range from international scientists, academics and their tutees and the devotees of contemporary music—and this provides me with food for thought!



Biographies.

Jill Scott is Emeritus Professor for Art and Science Research at the Institute of Cultural Studies in the Arts, Zürich University of the Arts, and founder of the Artists-in-Labs Program.

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Marille Hahne is Emeritus Professor in Filmmaking at the University of the Arts (ZHDK) in Zürich, Switzerland and Documentary Filmmaker.

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Dr Nigel Helyer; is an internationally prominent sculptor and sound artist, whose interdisciplinary practice combines art and science to embrace our social, cultural and physical environments. He brings these concerns together in creative projects that prompt the community to engage with their cultural histories, identity and sense of place; inviting us to examine the abstract conditions of our world and our complex relationships to it. Nigel is an honorary professor at Macquarie University.

<https://www.sonicobjects.com>