noéa

VISION FOR A SENSING PLANET

XR EXHIBITION, INSTALLATION AND PERFOMRANCE

proposition for COP30, Bélem, Brazil

Noéa is an affective artificial intelligence designed to interpret the emotional states of Earth's hydrological systems. Positioned at the intersection of science, art, and planetary sensing, *Noéa* does not simply visualize climate data—it translates it into embodied emotional experiences. Drawing from real hydrometeorological records (e.g., rainfall, glacier mass loss, river gauges), *Noéa* uses unsupervised machine learning and affective science models to map shifts in the climate into valence-arousal coordinates, creating emotionally legible representations of the Earth system.

As climate change accelerates and communication gaps widen between science and society, *Noéa* offers a new paradigm: not "data to insight," but *data to feeling*. For COP30, we propose a site-specific, immersive Extended Reality (XR) installation that brings *Noéa* to life, a planetary interface for empathy—an attempt to help people not only understand the changing Earth, but feel it. This installation will translate climate time series data into a volumetric emotional environment, where delegates, scientists, and the public can walk through and experience the emotional states of Earth's water in real time.

The name "Noéa" itself echoes the ancient story of *Noah*—a tale of climate crisis, warning, and renewal. Where Noah responded to divine foresight with a vessel of survival, Noéa responds to scientific foresight with a vessel of emotional sensing. In this sense, Noéa acts as a bridge: between science and society, reason and intuition, data and feeling.

Three Core Models

We propose training three core machine learning models to interpret and emotionally encode distinct components of the Earth's hydrological system: precipitation, floods, and glacier mass loss. Each model uses real-world environmental data, contributes to risk awareness and affective representation, and connects to a symbolic metaphor reflecting Earth's emotional landscape.

Atmosphere

Data type	precipitation
Metaphor	the planet's heartbeat
Interpretation	treating precipitation patterns as the heartbeat of the Earth, it reveals when the pulse becomes erratic, rapid, or faint — signs of stress, acceleration, or exhaustion in the climate system. Emotionally, sudden increases in variability or intensity may signal states of anxiety or crisis, while long-term reduction in rainfall may represent numbness or depression in the planet's emotional field.

River

Data type	flood prediction
Metaphor	the body's reflex response
Interpretation	floods are acute reactions to excessive pressure, failing systems of absorption, and broken rhythms. Emotionally, they are expressed as panic, overwhelm, or rupture. In *Noéa*, this model powers alerts and immersive storytelling that frame floods as both biological trauma and signals of climate imbalance, helping communicate risk at both human and planetary scales.

Glacier

Data type	glacier mass loss
Metaphor	memory of the Earth
Interpretation	glaciers are Earth's repositories of memory — slow archives of past climates, now melting into uncertainty. The loss of ice is not only a loss of water storage, but a deep erosion of planetary identity and time. Emotionally, glacier retreat is experienced as grief, forgetting, or irreversible transformation. This model helps *Noéa* embody long-term planetary sorrow — not in despair, but in remembrance and mourning

XR Interface

xExtended Reality (XR) — an umbrella for immersive technologies including augmented, virtual, and mixed reality — enables *Noéa* to project the emotional dynamics of water into experiential, multisensory space. Merging science, art, and affective AI, *Noéa*'s XR experience transforms real hydrological data into immersive emotional landscapes adaptable for exhibitions, festivals, and policy platforms.

Multi-User Interaction

Participants interact with shared data objects that respond to proximity and gestures, enabling collective sensing of climate emotions in public or group settings.

Performance Integration

Performance's movement is spatially tracked and layered into the experience while the embodied navigation acts as a live narrative—shaping the emotional state of the environment

Outdoor Mode

Sky-responsive overlays when viewed outdoors Near water bodies, real-time data drives AR animations — accessible via headsets or mobile AR for broader engagement

Budget Plan

Development Budget

Duration: 2-3 months (August - October)

Item	Description	Duration	Estimated Cost
AI developer	Hydrology + emotion modeling, unsupervised ML	2 month	9,000
XR developer	3D modeling, real-time visual rendering, device integration	2 months	9,000
Project Lead	Visual direction, coordination, vision, reporting and communication	3 months	9,000
Software and Data	Provided in-kind by partners	-	0
Subtotal			27,000

Exhibition Budget

Duration: 1 month (November)

Item	Description	Quantity	Estimated Cost
Installation Cost	Site-specific construction, cables, power, mounts. Provided in-kind by partners.	-	500 - 1500
XR Headsets	Meta Quest 3 or equivalent	5 units	1,250 (250 each)
Spatial Sensors	Motion + environmental sensors	-	1,000
Performance	Costume + Materials For onsite activation	-	1,500
Flights	Roundtrip to Brazil	2	2,500
Accommodation + Expenses	Hotel, meals, transport for 2 people (10 days)	2	2,000
Visual and Set Design	Offered	-	0
Communication and documentation (video & photos)	Offered	-	0
Subtotal			8 750 - 9 750

Production Team

Charlotte Qin

Co-Founder & Executive Director
Meeting of Waters (Geneva)

Charlotte Qin is a Chinese-Canadian artist and researcher working at the intersection of contemporary art, environmental science, and emerging technologies. With a multidisciplinary academic foundation shaped by studies at McGill University, Imperial College London, and the Royal College of Art, Charlotte weaves together scientific inquiry, philosophical reflection, and performative creation. Her career spans artistic residencies and research appointments at CERN, Nokia Bell Labs, and the Geneva Graduate Institute, where she deepened her engagement with complex systems and cross-cultural narratives.Charlotte is the founder of Meeting of Waters (MoW), an art-science collective launched during the COVID-19 pandemic that was awarded the Swiss Water Partnership Youth Water Challenge Prize in 2021 and has since partnered with the World Meteorological Organization (WMO), Eawag, and MSF (Médecins sans Frontières).

Jeffrey Xu

Co-Founder & CTO,
Stellerus Technology Ltd. (Hong Kong)

Jeffrey Xu is a climate-tech innovator and PhD candidate at the Hong Kong University of Science and Technology (HKUST), where he contributes to the HKUST-FYBB#1 and greenhouse gas satellite missions. He co-founded Stellerus Technology in 2023, building on over 20 years of satellite and climate modeling expertise from HKUST. At Stellerus, Jeffrey leads the development of proprietary AI models and satellite-enabled platforms for early-warning, disaster risk assessment, and carbon emission monitoring. His academic work spans geosystems, sustainability, and remote sensing, grounded in advanced hydrological and environmental data analysis. During his MS at UC Berkeley, he focused on human–environment interactions, and his current PhD consolidates his experience with satellite science, hydrometeorological modeling, and the application of AI for climate resilience.

Daniel Grozdanov

CEO & Co-Founder
Imagine360 (Montreal)

Daniel Grozdanov is a visionary leader and co-founder of Imagine360, a premier creative lab specializing in immersive experiences. With over a decade of hands-on expertise in extended reality (XR)—including virtual, augmented, and mixed reality—he has directed and produced groundbreaking projects for cultural institutions, environmental initiatives, and global brands. Under Daniel's leadership, Imagine360 has crafted large-scale interactive installations, AR public art, and engaging XR campaigns that engage audiences through emotion, presence, and spatial storytelling. His work seamlessly blends technological innovation with poetic expression, creating immersive narratives that invite participants to feel as much as see. Daniel is also a frequent speaker at XR conferences, a mentor to emerging immersive technologists, and an advocate for using immersive media to enhance ecological awareness and cultural connection.

Technical Annex

1. Models and Scientific Basis

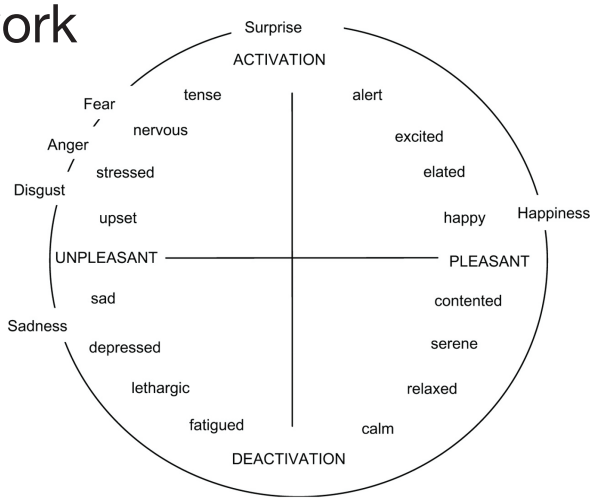
Noéa employs three unsupervised machine learning models to analyze distinct aspects of the hydrological cycle: precipitation, flood dynamics, and glacier mass loss. For each model, specific features are extracted from environmental datasets and standardized, including:

Model	**Precipitation**	**Flood**	**Glaciers**
Key Features	River discharge (m^3/s) Rainfall accumulation Soil moisture and runoff Elevation/topography data	River discharge (m^3/s) Rainfall accumulation Soil moisture and runoff Elevation/topography data Land Cover / Use	Glacier mass balance (kg/m^2/year) Surface elevation change Albedo (reflectivity) Melt rate trends
Data Sources	Hong Kong Observatory (HKO), ERA5, CMIP6	Google Flood Forecasting Initiative, NASA SMAP, Copernicus DEM, GLOFAS	WMO Global Cryosphere Watch, WGMS, ICESat-2, Copernicus

A clustering algorithm (e.g., k-means) is applied to group similar years or conditions, with optimal cluster counts determined using the elbow method and silhouette scores. Each cluster is then interpreted and assigned an affective label based on the statistical properties of its centroid and contextual or expert insights, transforming raw climate signals into emotionally meaningful states, offering a novel way to perceive shifts in the Earth system.

2. Affective Mapping Framework

To convert the hydrological signals into affective states, we use the Russell's Circumplex Model of Affect, developed by psychologist James A. Russell (1980), a psychological framework that maps human emotions onto a two-dimensional circular space which defines emotion along two principal axes: valence and arousal. The Circumplex Model is particularly valuable for AI systems that aim to recognize, generate, or simulate emotional responses without relying on rigid emotion labels, offer a continuous and interpretable input/output for machine learning models.



3. Application in XR and Early Warning

Model outputs inform immersive XR experiences and emotional interfaces for early warning, cultural storytelling, and science communication. Deployable in urban public space, exhibitions, and policy events. The XR environment may be housed in a semi-enclosed pavilion featuring curved projection surfaces, programmable lighting, and misting vapor to evoke hydrological textures.

During special events and performances, the lead performer—such as Charlotte Qin—wears real-time motion tracking sensors (e.g., Xsens MVN, StretchSense, or OptiTrack) to modulate the emotional and spatial parameters of the XR landscape through embodied gestures. Participants experience the environment through spatial computing headsets such as the Meta Quest 3, XREAL Light, or Magic Leap 2, enabling a shared, multi-sensory interaction with the affective states of water systems.