PROJECT: AdvancEd Techniques for Holistic Environmental Remediation

SCIENTIFIC DIRECTOR: Anastasios Doulamis

DURATION (MONTHS): 42 months

DEPARTMENT: Department of Topography

FINANCIER: Horizon Europe

DESCRIPTION: Environmental pollution is critical urban challenge, disproportionately affecting vulnerable populations, contributing to the upsurge of NC Diseases. Despite existing policies under the EU ZP Action Plan, management of urban pollution remains fragmented, with gaps in multi-modal assessment, source attribution & short-to-long term mitigation strategies. AETHER spearheads a novel, integrated sociotechnical framework that couples sophisticated pollution sensing with exposure-response modeling & active engagement for rethinking how cities monitor, predict & mitigate pollution-related health risks. AETHER develops multi-scale pollution assessment integrating CAMS-based climatic modeling, statistical-AI downscaling & MOS-enhanced pollutant dispersion modeling to deliver fine-resolution air quality predictions. It advances pollution monitoring with IoT-enabled sensing networks, UAV-based hyperspectral soil assessments, and robotic submersibles for water pollution detection, while providing noise pollution modelling through real-time traffic data recalibration techniques.

AETHER integrates health impact assessment & exposure-response modeling in urban planning through geo-referenced epidemiological data & Bayesian-adjusted ERFs assuring that impacts of air, water, soil & noise pollution to public health are assessed across the domains. Active engagement will be enabled through the Zero-Pollution Living Labs, participatory sensing campaigns, and behavioral nudging applications toward more sustainable urban behaviors. The AETHER PULSE (Integrated Platform for Urban Level-ZP strategies) serves as an XAI-driven decision-support system, equipping policymakers with real-time pollution dashboards, dynamic abatement strategies & predictive scenario modeling to optimize ZP interventions. AETHER will be demonstrated in three FrontRunner Cities-Athens, Linz, Utrecht-while Glasgow & Łódź will act as Follower Cities, ensuring scalability & transferability across diverse urban contexts