

The perception of dust particles in sentinel territories
Kick-off meeting for the International Research Network PerRisPou
Collège de France, Salle Françoise Héritier,
52 rue Cardinal Lemoine, 75005 Paris
30 september-1 October 2026

Climate change is leading to increased desertification, more erratic storm patterns, and dust storms in places with a lot of heat and lack of moisture. The International Research Network PerRisPou (La perception sociale des risques sanitaires liés aux poussières aériennes) aims at comparing the perception of dust particles in three territories that have been particularly exposed to dust storms : Tucson (Arizona), Dakar (Senegal) and Delhi (India). These territories can be called sentinels because they display early warning signs of multiple consequences of climate change. Their populations have mobilized to perceive dust particles through different technologies that are complementary to models of aggregation of dust storms built by earth sciences. This network compares these different technologies to understand how they contribute to mitigate the effects of climate change and industrial pollution. The questions raised in this program will be: what does it mean for humans to live with dust? How does dust transform the perception of air quality in sentinel territories? How does measuring dust lead actors to engage with the causes of air pollution?

30 September

9h30 : Welcome

Frédéric Keck (CNRS, Paris)

10h : Aero-ecologies in India

Vasundhara Bhojvaid (Shiv Nadar University Delhi)

Aero-ecologies and their metamorphosis into planetary forces make people, places, and ideas and are remade by them. This presentation will detail three aero-ecologies to explain the changing focus of my work on atmospheres in India. This is divided along three phases, household air pollution and black carbon mitigation, cities as voluminous enclosures and, toxic flows understood as material vectors that produce distributed environmental violence. First starting in 2012 as part of a USAID project on cooking behaviour in rural parts of Uttarakhand

and Uttar Pradesh, I question how household air pollution emerged as an important site to mitigate black carbon emissions. Second the WHO database on ambient air quality was first released in May 2014, which pronounced Delhi as the most polluted city in the world. Since 2014 the city is increasingly identified as a prison of polluted air in popular imagination, resident's perceptions and policy. I ask if air is transboundary how do prisons of polluted air subsist. And third, I engage with farmers that practice stubble burning. Farmers in the states of Haryana, Punjab and Uttar Pradesh (adjoining Delhi) have come under the scanner for agricultural burning of paddy during harvest seasons. The smoldering stubble in agricultural fields produce toxic emissions that drift to Delhi to impregnate and make its infamous noxious sky. Understanding uneven toxic flows as material vectors I seek to make apparent how farmers vulnerabilities mediate their exposure to environmental violence and expose the structural limitations that determine their inability to adapt or resist it.

11h-11h15 : break

11h15 : Emission Inventories from Below. Day-to-Day Experiences of Dust and Gas Emissions in New Delhi

Mathieu Quet (French Institute for Research and Development, Paris)

Delhi's air pollution crisis is often narrated through statistics and city-wide policies. Against this background, we document what pollution means for residents living in the city's informal settlements. The notion of "emission inventory from below" allows us to describe and capture the ways in which residents a) account for pollution sources, b) identify causes and responsibilities, c) set up coping and cleaning mechanisms that compensate and overturn municipal services.

12h15-14h : lunch break

14h : Precipitations: Dust Storm Trajectories and Meteorological Phases

Jerry Zee (Princeton University)

This paper explores dust storms through a notion of precipitation: either the meteorological phenomenon of a material falling out of the sky, or the event through which diffuse materials suddenly shift phase into another form. In thinking about the movement of dust storms across geographies and phases of matter, I offer three images of dust through precipitation: the attempt

to keep desertifying landscapes from become a downwind weather problem; the physical precipitation of atmospheric particulates into mineral solids - by machines, in fallout, and through breathing; and how transnational dust events both precipitate and undo territorial senses of international relations.

15h : Attitudes on Climate Change and Air Pollution in the Russian Far East (1990s - 2010s)

Benjamin Beuerle (Centre Marc Bloch, Berlin)

This presentation examines attitudes toward climate change and air pollution, as well as how these attitudes evolved between the 1990s and the 2010s in the Russian Far East. To what extent were the general public and scientists, in particular, concerned about these phenomena? What causes of these phenomena and what connections between them were identified? How did these attitudes evolve over time—and to what extent were they specific to the Russian context? To answer these questions, the presentation draws on articles from regional newspapers as well as on interviews conducted during research trips in 2017 and 2019. Finally, the presentation will also address the connection to the overarching workshop theme, as well as the possibilities and limitations of the analysis within the current challenging research context in Russia.

16h-16h15 : break

16h15 : Modeling and Prediction of Dust Storms in the Southwestern United States: Challenges and Emerging Opportunities

Avelino Arellano (University of Arizona, Tucson)

Dust storms are a recurring and intensifying hazard across the southwestern United States, with the Tucson and greater Arizona region among the most dust-active areas in North America, facing growing consequences for public health, transportation, and energy infrastructure under a changing climate. This talk examines key gaps in dust storm prediction spanning sub-kilometer emission processes to synoptic-scale dynamics, and discusses emerging opportunities from high-resolution simulation, next-generation modeling frameworks, and AI/ML approaches. Better prediction tools, combined with community-based monitoring efforts, can inform public awareness and engagement with dust as a growing public health and environmental challenge.

17h15 : Devices and materialities of air quality perceptions in Arizona

Louise Biville (CNRS, Tucson) (online)

Throughout the state of Arizona air quality is impacted by different industries and sources. Communities across this state are using various low-cost sensors and producing data to assess the air they breathe. Different sensing methods are thus reshaping and creating discourses about what it means to live in dusty atmospheres. Through extensive fieldwork in Arizona using methods of participatory observations, ethnographic drawings and interviews, I study how the perceptions of air quality is made and re-made through discourses and data representations. First, I will discuss the use of low-cost sensors in regard to opposition to mines at different stages of their lives. Then, I will examine how the way low-cost sensors operate makes dusty landscapes hardly mappable through these monitoring frameworks and the impact it has on perceptions of such air. Finally, I will argue that the perceptions of air quality in Arizona are entangled with the regulatory framework of air pollution management.

18h : Nilch'i : Diné wind spirit and air pollution

Andrew Curley (University of Arizona, Tucson) (online)

Since industrial coal mining entered the four corners area of the Navajo Nation, residents have complained about the smog and pollution from two major coal fired power plants, the Four Corners Generating Station and the San Juan Generating Station. Whereas environmental laws such as the Clean Air Act and the environmental justice mandate are designed to mitigate harm to communities around power plants, Diné community members in these areas felt that the air was made bad by the tribe's participation or support of these power plants - despite the jobs and revenues coal provided. Reviewing published critiques from Diné environmental justice organizations and public community testimony about coal fired power plants in and around the Navajo Nation, this article highlights the colonial ambiguity of atmospheric jurisdictions in Indian Country. It argues tribal sovereignty as a land-based project fails to keep air clean and communities healthy. The allowable pollution through industrial energy production - often around tribal communities - demonstrates a form of waste-airing (like wastelanding) on the lives and bodies of Indigenous peoples. Finally, I conclude with a consideration of Nilch'I, or how Diné have defined sky and wind as sacred and fundamental to cosmic ordering, order disrupted by coal pollution.

1st October

10h : Dust exposure in Senegal

Aloys Bory (University of Lille) and Marie Madeleine Atome Bassene (University of Lille)

West Africa is heavily impacted by Saharan dust outbreaks. Monitoring airborne dust concentrations and dust deposition is therefore essential for assessing their impacts on air quality, human health, climate, and ecosystems. It is also useful to better understand past dust deposits recorded in marine sediments, which provide major clues about climate change in the Saharan region over geological timescales. PM₁₀ records obtained at three different locations—a remote rural site in southern Senegal (Casamance), an urban area in the regional capital city of Ziguinchor, and the coastal Bel Air district of Dakar—will be presented. These records enable us to document the temporal variability of dust dynamics along the West African margin, in particular its marked seasonal patterns, as well as its spatial variability. Using an original source-to-sink reverse approach based on back-trajectory analysis, these records also help us identify dust emission source areas, which is key to better constraining the characteristics of dust outbreaks. Moreover, comparison of these records offers new insights on how Saharan dust contributes to air quality degradation in rural and urban areas. These results establish a basis for assessing the relationship between Saharan dust exposure and related health issues in Senegal.

11h : Dusting off participatory air quality monitoring and building citizen–scientist alliances: The case of the Peuftan laboratory in Senegal

Mélina Macouin (CNRS, Toulouse), Mayoro Gueye (CNRS, Dakar) and Yann-Philippe Tastevin (CNRS, Dakar)

Evaluating air pollution in West Africa requires going beyond PM mass. Saharan dust dominates, often obscuring the anthropogenic fraction that matters most for exposure and action. In Senegal, we designed, implemented, and used frugal tree-bark sensors as boundary objects, bringing citizens, artists, and scientists together around shared scientific records of pollution and perceptions of it. This approach revealed lead- and zinc-rich airborne particles far from industrial sources, corroborating residents' testimonies. Beyond monitoring, this collaboration is helping build a citizen–scientist observatory in which scientific and local

knowledges and practices, nature-based approaches and participation generate new ways of perceiving, understanding and acting on environmental pollution.

12h-14h : lunch break

14h : From Particles to the Particular: Making Dust Perceptible in Senegal

Charline Kopf (University of Oslo)

This paper examines how dust - cement dust, coal ash, and Saharan sand - is rendered visible and made subject to intervention in Senegal through three distinct practices of knowledge production. Based on fieldwork in Dakar and Bargny (2024–2026), I trace the different actors who track dust, mapping a bodily and geographical cartography of its industrial and atmospheric life. First, I follow meteorological knowledge produced by forecasters at Senegal's national meteorological and civil aviation agency (ANACIM) and scientists at Dakar's university UCAD, tracing its mixture with industrial and urban pollutants as it settles over Senegal, and its onward movement across the Atlantic, where it plays a role in shaping hurricane formation in the Caribbean. Second, I turn to citizen-based knowledge production in Bargny where residents mobilize against industrially produced dust through protests and build evidentiary archives such as one resident's daily photographic record of different dusts by colour and industrial source. Third, I extend this into a collaborative register through a participatory cartography workshop conducted with Bargny residents as part of the Observatoire Ecocitoyen, in which mapping polluted sites became a method for articulating exposure but also attachments to particular sites and local histories endangered by industrial expansion and its toxicity. By tracing dust's genealogies and verticality, this paper asks how granular *particles* become *particular*: how dust is experienced in individual lives and is converted into evidence of harm through collective practices that run alongside, against, and in collaboration with more institutional science.

15h : Evaluating the impact of different agropastoral practices on wind erosion in western Sahel

Caroline Pierre (CNRS, Paris)

In the Sahel, nutrient-poor sandy soils are vulnerable to wind-driven erosion and can be further degraded if left unprotected. As more than 60 % of the Sahelian population depends on rainfed

agriculture, land degradation is a primary concern. In the last 60 years, climatic and socio-economic factors have thoroughly modified the Sahelian cropping systems. Understanding the interaction between land uses, agropastoral practices and wind erosion is crucial.

We estimated the effect of the main types of land uses and management that occurred in the Senegalese groundnut basin in the last decades on potential wind erosion of soil at the field scale. *In-situ* measurements of meteorological data, vegetation and horizontal fluxes of aeolian sediments were monitored on the land uses of a typical Sahelian landscape (groundnut plot, four fallows, four millet plots), each with contrasting and representative land managements, creating an unprecedented dataset in this region. We developed a modeling approach combining vegetation models with a horizontal flux model, calibrated on the gathered data. This modeling approach was able to reproduce existing measurements and is intended eventually to upscale fluxes of aeolian sediment at the landscape to regional scales.

15h45-16h : break

16h-17h: Brainstorming session on the next steps of the IRN