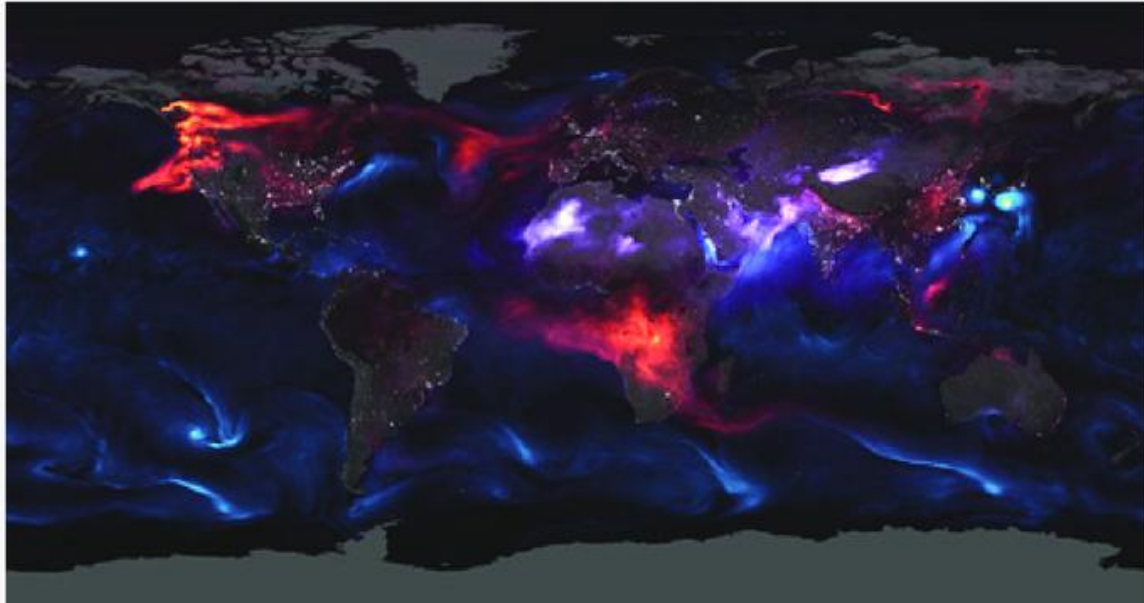


Early Earth's Atmospheres, Oceans and Planetary Habitability-EON

23-24 April 2026, University of Oslo, Blindern Campus



Model shows black carbon particles in red from combustion processes, like smoke from the fires in the United States and Canada, spreading across large stretches of North America and Africa. Sea salt aerosols are in blue, swirling above threatening typhoons near South Korea and Japan, and the hurricane looming near Hawaii. Dust shown in purple hues is blowing over African and Asian deserts. Credit: NASA Earth Observatory, GEOS FP, Joshua Stevens. Credit: NASA Earth Observatory, GEOS FP, Joshua Stevens.

Description

Understanding the physical and chemical evolution of the early Earth's atmosphere is fundamental to tracing the emergence and early evolution of life. A key constraint is the presence of liquid water in equilibrium with the early atmosphere – a condition that links atmospheric composition, surface temperature, and ocean chemistry. Processes such as volcanism, hydrothermal activity, and the sources and sinks of major atmospheric gases (CO_2 , CH_4 , N_2) shaped early planetary environments, yet their interactions remain poorly understood. Aerosols may provide a unifying link. In the modern Earth system, aerosols influence atmospheric chemistry, cloud microphysics, radiative transfer, nutrient transport, and ocean-atmosphere coupling. Their role on early Earth, however, has received comparatively little attention. On the early Earth, aerosols likely acted as dynamic intermediaries between volcanic emissions, ocean chemistry, ice formation, and atmospheric processes – with direct implications for climate regulation and habitability.

The discussions will address the following main topics:

- What was the role of aerosols, volcanoes, oceans, and hydrothermal systems for the origin of early life?
- How do planetary habitability, atmospheric and climate processes couple together?
- How do aerosols control a planet's surface temperature, cloud formation, and precipitation?
- What were the Early Earth's hydrological and sedimentary processes in a CO_2 -dominated atmosphere?

Workshop details:

- **Dates:** 23–24 april 2026
- **Location:** Helga Engs hus, Auditorium 1, University of Oslo
- **Participation:** In-person attendance is encouraged. Remote participation via Zoom will be available **only for participants who are not in Oslo.**

We warmly invite you to join us for this stimulating event. Please, find below information regarding registration and the preliminary program.

ZOOM: <https://uio.zoom.us/j/69880853059?pwd=9V8SBiTbtIAA9aJtBOegxtU7pTUeVF.1>

The link for registration is <https://nettskjema.no/a/600883>

Workshop coordinators: Jaganmoy Jodder, Robert David and Alexander Minakov, Department of Geosciences, University of Oslo

Organisers: The PHAB-Centre and the Department of Geosciences, University of Oslo

23rd April 2026, Thursday

10:00 am Opening

10:15 am Introduction to EON by **Joseph Henry Lacasce** (Head of Geosciences, UiO, Norway)

10:30-11:00 am **Trond H Tosvik**, UiO, Norway: Atmospheric CO₂ and global mean surface temperatures in deep time: Reverse Engineering

11:00-11:30 am **Kirstin Krüger**, UiO, Norway: Modelling present-day volcanic aerosol climate responses

11:30-12:00 pm **Breakout sessions/Discussion**

12:00-1:00 pm **Lunch**

1:00-1:30 pm **Tómas Zoega**, UiO, Norway: Effusive volcanic eruptions and their impacts on Arctic climate

1:30-2:00 pm **Desiree Lisette Roerdink**, UiB, Norway: Early sulfur cycling, atmospheric interactions of volcanic sulfur and sulfate aerosols

2:00-2:30 pm **Breakout sessions/Discussion**

2:30-3:00 pm **Eivind Olavson Straume**, UiO, Norway: Early Earth Ocean Circulation: Implications for Climate and Habitability

3:00-3:30 pm **Steffen Leth Jorgensen**, UiB, Norway: The Oceanic crust - an early habitat for life?

3:30-4:00 pm **Breakout sessions/Discussion**

6 pm EON dinner

24th of April 2026, Friday

10:00 -10:30 am **Joshua Krissansen-Totton**, University of Washington, USA: The role of the geologic carbon cycle in maintaining planetary habitability

10:30-11:00 am **Trude Storelvmo**, UiO, Norway: Climate feedback caused by land-atmosphere interactions and their impacts on clouds

11:00-11:30 **Breakout sessions/Discussion**

12:00-1:00 pm **Lunch**

1:00-1:30 pm **Eva E. Stüeken**, University of St. Andrews, UK: Exploring lightning as a source of bioavailable nitrogen on the early Earth

1:30-2:00 pm **Sara Blichner**, University of Stockholm, Sweden: Modelling feedback with biogenic volatile organic compounds in the Earth System

2:30-3:00 pm **Johanna Marin Carbonne**, University of Lausanne, Switzerland: Reconstructing Early Earth Climate Conditions from Stable Isotope Records of ancient sediments

3:00-3:30 pm **Breakout sessions/Discussion**

3:30-4:00 pm **Fabian Klenner**, UC Riverside, California: Enceladus and what we can learn from aerosols and ice grains

Closing remarks (Jaganmoy, Robert and Alexander)