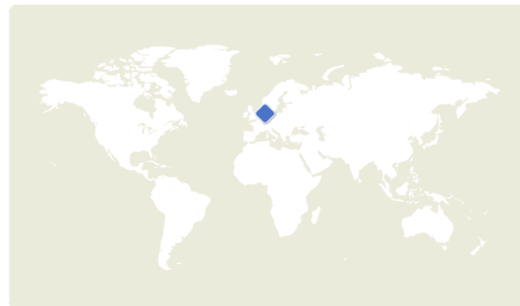


AIRBORNE MEASUREMENTS FROM THE NORD STREAM GAS LEAKS



Airborne measurements using HELiPOD reveal high methane emission rates persisted over the Nord Stream pipeline leak sites weeks after leaking had ceased.



DONOR:
European Commission



**BENEFITTING COUNTRIES
OR REGIONS:**
European countries



SECTOR:
Oil & Gas



Subsector, if applicable:
—

STATUS: Published

TIMELINE: Measurements obtained in October 2022. Published in January 2025.



**IMEO SCIENCE
OBJECTIVE:**

→ **Advance reconciliation and data
integration approaches for multi-scale
emissions data.**



KEY FINDINGS

While most of the methane that leaked from the pipelines escaped directly into the atmosphere between 26 September and 1 October 2022, a fraction dissolved in the Baltic Sea. The atmospheric measurements of methane acquired using HELiPOD revealed that, on 5 October 2022, sea-surface outgassing rates ranged from 19 to 48 metric tons per hour. These emission rates are of similar magnitude to those of the Upper Silesian Coal Basin, which is the largest anthropogenic source of methane in Europe. Satellites are not equipped to detect the diffuse (non-point source) methane emissions measured by HELiPOD, pointing to the importance of diversifying measurement tools and approaches to obtain more accurate emission data. The study findings broadly align with oceanic methane transport and dissolution models over the Baltic region and are proving crucial to verify the simulated emission rates presented as part of IMEO's synthesis work on the Nord Stream pipeline leaks (Harris et al., 2025).



RATIONALE

The 2022 Nord Stream underwater pipeline explosions are thought to have caused one of the largest anthropogenic methane emission events ever recorded. A team led by IMEO conducted the first and only aerial measurement of the event to provide rapid direct assessment of its impact. The goal of the study was to quantify the short-lived methane emissions that occurred immediately after, and directly near, the Nord Stream leak sites.



RELATED PUBLICATIONS

- [Reum et al., 2025, Airborne observations reveal the fate of the methane from the Nord Stream pipelines.](#)



SIGNIFICANCE FOR DECISIONMAKERS

The study demonstrates the benefit of fast-response airborne missions to detect and quantify methane emissions from dynamic and short-lived emission events, especially when these emissions cannot be detected using other measurement tools such as satellites.



STUDY APPROACH/ACTIVITIES

On 5 October, and on 16 and 17 November 2022, the German Aerospace Center (DLR) took measurements over the Nord Stream leak sites using a helicopter equipped with the sonde HELIPOD. The airborne observations were modelled to derive emission rates near all leak sites and subsequently compared to oceanic models.



Photo Attribution: Lutz Bretschneider, Technische Universität Braunschweig



CATALYZING ACTION

Initiation of the study by IMEO resulted in the only in situ measurements over the Nord Stream leak sites.

OTHER SUPPORTERS/STAKEHOLDERS

Principal Investigator: **German Aerospace Center (DLR), Germany**

Revision History: **February 2025**



Photo Attribution: Klaus-Dirk Gotschaldt, Deutsches Zentrum für Luft- und Raumfahrt (DLR)

The UN Environment Programme's International Methane Emissions Observatory (IMEO) exists to provide open, reliable, and actionable data to the individuals with the agency to reduce methane emissions. IMEO does this by integrating and reconciling data across sources, including its global methane science studies. IMEO supports measurement and research studies around the world to close the knowledge gap on methane emissions and provide policy-relevant insights to decisionmakers.