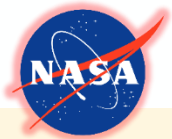


# ARTIC METHANE AND PERMAFROST CHALLENGE (AMPAC) - 2025+

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European Space Agency



## Outcomes since 2020:

- 10 papers on Arctic change published, 5 in Nature
- International media coverage of papers and collaborations with 4 EU nations
- Collaboration with the Mars Rover team at JPL for Astrobiology paper
- 2 Summer Schools hosted by AMPAC
- NPP Post-doc at JPL completing first AI-mapping of Arctic region
- EGU and AGU sessions
- Collaboration with ABoVE and CoMET airborne campaigns

## Work 2024:

- Summer School in Svalbard 2024 collaborating with SIOS
- EGU Union Session
- European Polar Science Week 2024
- 9 additional papers to be submitted by end of 2024 including:
  - Permafrost AI model (GeoCryoAI)
  - Alternative climate data sets
  - Bottom Up-Top Down carbon resolution
  - Permafrost knowledge gaps

# On-going ESA Activities to support AMPAC



## Directly related to AMPAC

- **CCI Permafrost:** Developing long term data records of permafrost-relevant land products
- **SMART-CH<sub>4</sub>:** Advancing SWIR and TIR CH<sub>4</sub> satellite observations to assess sources and sinks on regional and global scale, with significant focus on Arctic. ESA flagship activity on methane exploitation, in collaboration with the European Commission.
- **MEDUSA:** Develop and demonstrate a pre-operational system to harmonise and integrate global information on anthropogenic GHGs
- **Forthcoming study on Wetland and Lake Dynamics in the Arctic, in association with linked call with European Commission DG-RTD.**



## Upcoming ESA Copernicus missions

- Sentinel-5: Copernicus atmospheric monitoring for daily global coverage for climate, including methane;
- CHIME: Copernicus Hyperspectral Imaging Mission for the Environment;
- CIMR: Copernicus Imaging Microwave Radiometer;
- CO2M: Copernicus Anthropogenic Carbon Dioxide Monitoring;
- CRISTAL: Copernicus Polar Ice and Snow Topography Altimeter;
- LSTM: Copernicus Land Surface Temperature Monitoring;
- ROSE-L: Copernicus L-Band Synthetic Aperture Radar.

**Although not directly targeting AMPAC, these satellites may help unlock some of the mysteries.**



AMPAC priorities for 2025+

- 1. How can upcoming satellite missions be used to better characterise methane emissions from the Arctic?**
- 2. What are the key knowledge gaps or areas of uncertainty that need to be addressed in future research to better understand the dynamics of methane release from permafrost?**
- 3. How can we ensure the sustainability and continuity of efforts to monitor and mitigate methane emissions from Arctic permafrost?**
- 4. How might the lessons learned from the ESA-NASA Arctic Methane Permafrost Challenge be applied to other regions facing similar challenges related to climate change and permafrost thaw?**