

# Biogenic volatile organic compounds emissions from the coastal waters of Gulf of Finland, Baltic Sea and their role in aerosol formation

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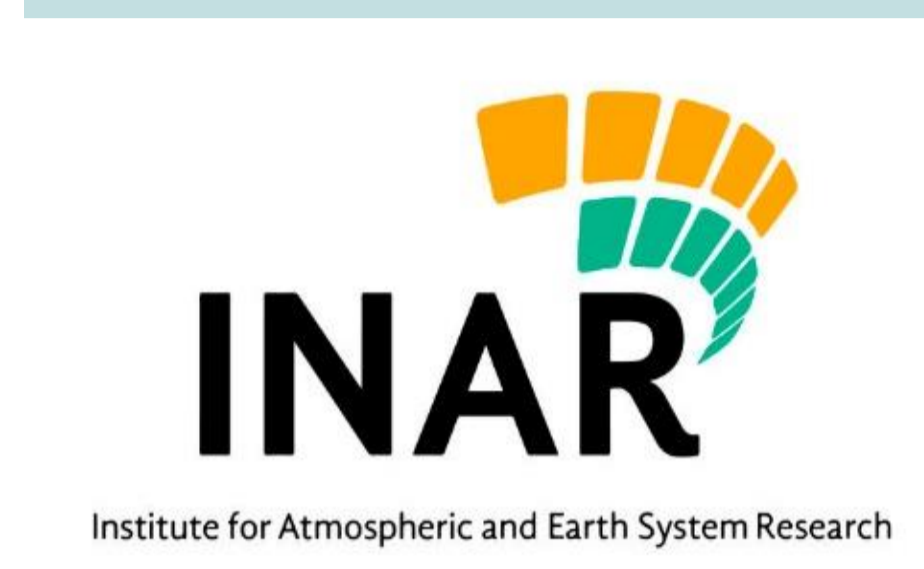
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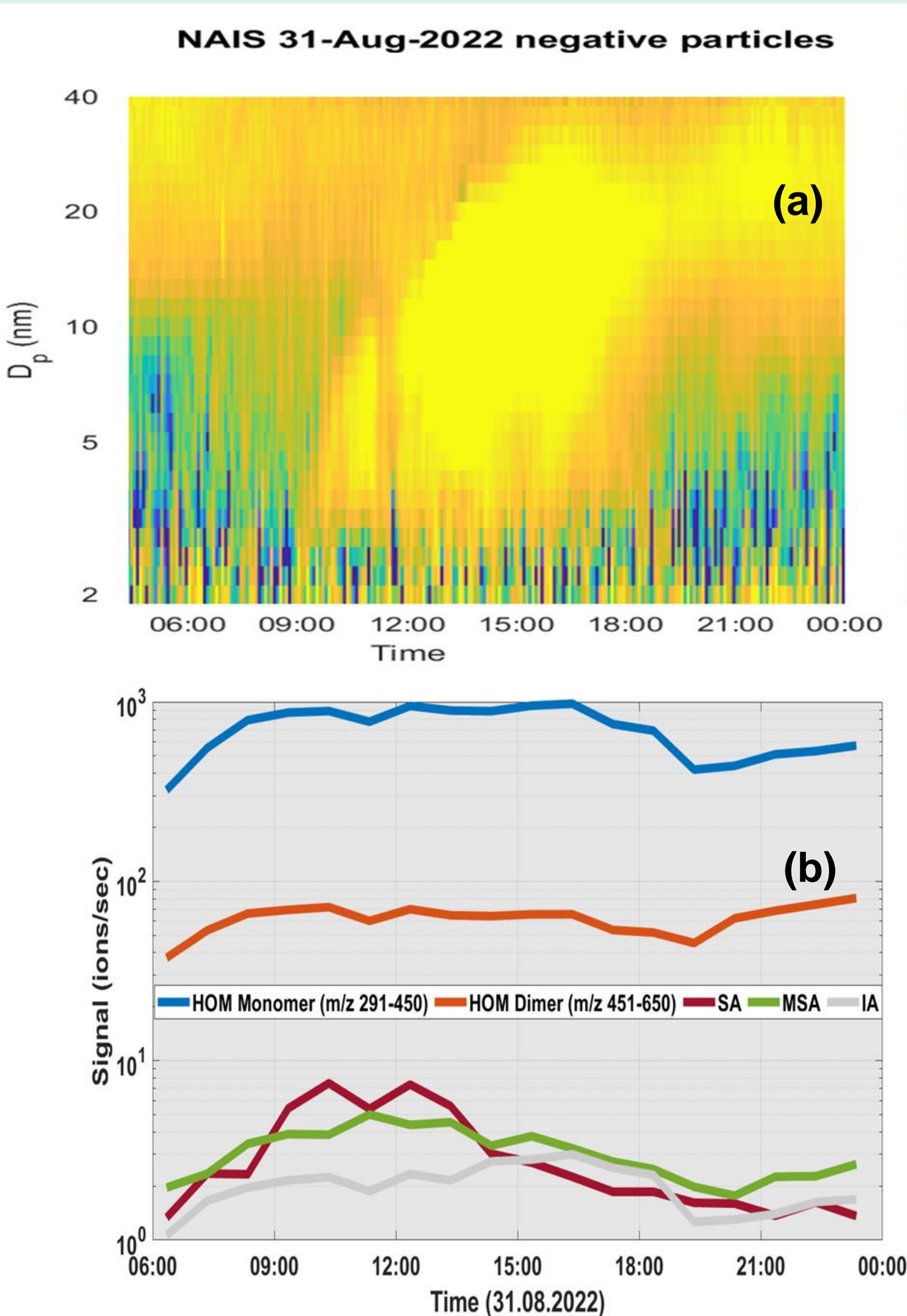
Project: <https://www.coastclim.org/>



## INTRODUCTION

The *coastal environments are hot spot ecological area* having the potential of not only being an important greenhouse gas sink/source but also a climatically relevant ecosystem to study the emissions of biogenic volatile organic compounds (BVOCs), other trace gases that can play an important role in marine aerosol formation.

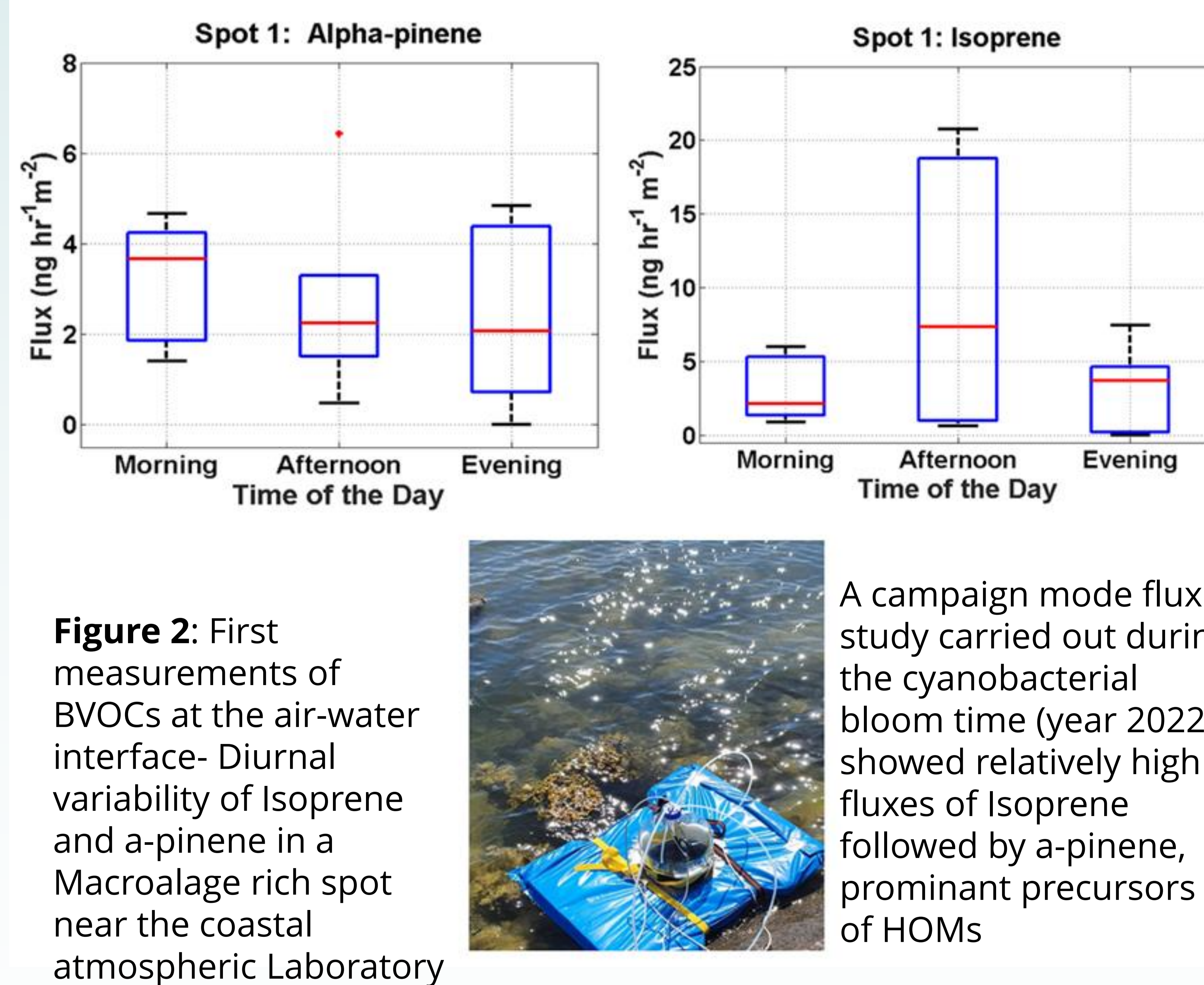
## RESULTS



**Figure 1:** (a) Regional event at the coast (b) Diurnal variability of the trace gases (SA: sulphuric acid, IA: Iodic acid, MSA: Methane sulphonic acid, HOMs: Highly oxygenated molecules) during the event (c) 5 day back trajectory analysis done by HYSPLIT

## SITE

The atmospheric observatory established at Tvärminne Zoological Station in 2022, is located on the Hanko peninsula, marking the northern boundary between the Baltic Sea and the Gulf of Finland. It provides a *prime example of the Baltic Sea ecosystem* and a valuable reference for comparing coastal ecosystems processes across Europe.



**Figure 2:** First measurements of BVOCs at the air-water interface- Diurnal variability of Isoprene and a-pinene in a Macroalgae rich spot near the coastal atmospheric Laboratory

## METHODOLOGY

Instrument s	Specifications	Variables
Aerosol instruments	DMPS, NAIS, APS, PSM	Particles : 1nm-1000nm; 0.5-20 microns; Ions: 0.8-40nm
Mass spectrometers	MION-Api-ToF (Multischeme chemical-ionization-atmospheric pressure interface-Time of Flight mass spectrometer); Vocus-PTR-ToF (Proton Transfer Reaction-Mass Spectrometer)	Trace gases-inorganic+organic; volatile organic compounds
Trace gas analyzers	O <sub>3</sub> , NO <sub>x</sub> , SO <sub>2</sub> and CO (Teledyne and Thermo)	O <sub>3</sub> , NO <sub>x</sub> , SO <sub>2</sub> and CO concentrations
Water chemistry	LICOR sensors, seabird salinograph	CO <sub>2</sub> , CH <sub>4</sub> conc. temperature, salinity, oxygen, Chl <sub>a</sub>
Eddy covariance mast	METEK uSonic-3 sensors, LICOR sensors	Fiction velocity, Fluxes: Heat, momentum, H <sub>2</sub> O, CO <sub>2</sub> , CH <sub>4</sub>
Flux chamber measurements	Floating glass chambers, Tenax tubes and pump system	Biogenic VOCs

## CONCLUSIONS

Campaign based studies combined with long term data of BVOCs, other condensable vapors and aerosol size distribution would provide a comprehensive understanding of the state of Baltic Sea, its BVOC emissions and its impacts on the aerosol formation

## ACKNOWLEDEMENTS

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The emissions of several other BVOCs have also been measured from various other spots around the coast in this study. Previous studies have indicated these BVOCs act as precursors to HOMs that can be contributing to growth of aerosols