



# Biogenic Aerosol, oceanic Primary production and Nucleation Events in the Arctic - BioAPNEA

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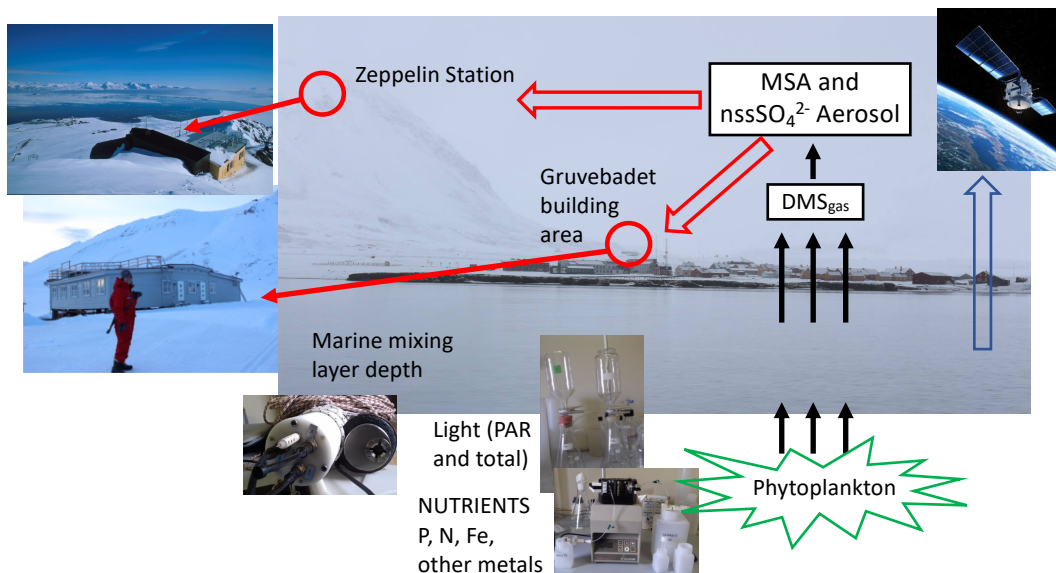
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## INTRODUCTION

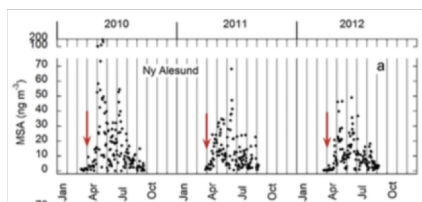
BioAPNEA project aims at improving the knowledge of the ocean-atmosphere interconnection by the investigation of the link between measured primary production, sea ice melting, gaseous DMS and aerosol MSA atmospheric concentration and occurrence of New Particle Formation (NPF) events. The understanding of this link will be useful for interpreting long-term DMS and MSA trend and their connection with global change and Arctic amplification.

In this project we combine in situ marine seawater sampling and measurements in Kongsfiorden with atmospheric measurements and sampling at Ny-Ålesund (Gruvebadet and Zeppelin).



## WHEN?

All the field activities will be carried out in May when the maximum concentration of DMS and MSA occurs, on the basis of previous results



Temporal evolution of MSA in PM10 throughout three years.

MSA presents a seasonal pattern with increasing concentration in March/April, reaching maxima in May and return to background concentration in September. The increase in MSA in spring and summer depends on the DMS source, the photochemical processes and gas to particle conversion producing MSA (in the aerosol) from gaseous DMS, and transport in the atmosphere.

[Becagli et al., 2016. Atmos. Env. 136, 1-15. <http://dx.doi.org/10.1016/j.atmosenv.2016.04.002>]

## CONTRIBUTION TO SIOS

These results will be of particular relevance in the framework of the SIOS observing system as it takes advantage of long-term observatory data obtained within SIOS to interpret change in the Arctic environment. Moreover, it will allow to design new strategy to fill actual knowledge gaps and to propose future prioritisation in optimising the observing system.

## EXPECTED OUTCOME

- Acquisition of time series of phytoplankton biomass in the Kongsfiorden.
  - Adaptation and improvement of polar net primary production (NPP) models, considering the measured photosynthetic active radiation (PAR), in situ and remote sensing data.
  - Study of the relationship between the photosynthetic performance of phytoplankton surface assemblages and the production of DMS.
  - Study of the spring-summer evolution of MSA and  $nssSO_4^{2-}$  concentration analysed at least at daily resolution in parallel with their biogenic precursor: DMS.
  - Evaluate the link between sea ice evolution (area and melting) and biological parameters (Chl-a and PP).
  - Study of the correlation between Chl-a, PP and concentration of atmospheric species (DMS and MSA) considering wind direction and intensity, pathway and elevation of air masses from the source areas to the sampling site.
  - Analysis of the correlation between sea ice parameters and biogenic species in the atmosphere.
- New information to better understand the link relating NPF events with biogenic aerosol formation and sea ice parameters (melting and ice marginal zone extent).